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# Different Profiles of Psychological And Sociodemographic Characteristics of Mixed Martial Arts athletes

## Diferentes Perfiles de Características Psicológicas y Sociodemográficas de Deportistas de Artes Marciales Mixtas

## Diferentes Perfis Características Psicológicas e Sociodemográficas de Atletas de Mixed Martial Arts

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**ABSTRACT**

**Objective:** This study represents an analysis of the association of resilience, stress, coping strategies, and sociodemographic data from Mixed Martial Arts (MMA) athletes. **Methodology:** Fifty Brazilian male MMA high performance athletes aged 25 ± 4.8 years participated in the study. The data were collected using a Sociodemographic questionnaire, the Connor-Davidson Resilience Scale, the Athletic Inventory of Coping Strategies, and the Athlete's Stress and Recovery Questionnaire (RESTQ-76). Analysis was conducted through cluster analysis. **Results:** Three distinct groups were found: Athletes from Clusters I and II proved resilient with strategies of Coping with adversity, Concentration and Coachability, showing higher scores at the following recovery scales of: success, social relaxation, general well-being, being in shape, and self-efficacy. The sociodemographic characteristics of cluster I athletes consisted of being older and having dependents, while Cluster III athletes had the lowest level of resilience, used freedom from worry strategy, and had stronger emotional stress as well as lack of energy, in addition to being younger and having no dependents. **Conclusion:** Considering the athletes' characteristics, we may conclude that the level of resilience and age combined with the responsibility of having dependents can influence the use of coping strategies as well as stress in MMA athletes.

**Keywords:** Resilience Psychological, Stress Psychological, Athletes.

**RESUMEN**

**Objetivo**: Este estudio representa un análisis de la asociación de resiliencia, estrés, estrategias de afrontamiento y datos sociodemográficos de atletas de Artes Marciales Mixtas (MMA). **Metodología**: Cincuenta atletas brasileños de alto rendimiento de Artes Marciales Mixtas, con edades entre 25 ± 4,8 años, participaron del estudio. Los datos se recopilaron mediante un cuestionario sociodemográfico, la escala de resiliencia de Connor-Davidson, el inventario deportivo de estrategias de afrontamiento y el cuestionario de estrés y recuperación del atleta (RESTQ-76). El estudio se realizó a través del análisis de conglomerados. **Resultados**: Tres grupos distintos fueron encontrados: los atletas de los grupos I y II demostraron ser resilientes con las estrategias de afrontamiento de la adversidad, concentración y entrenabilidad, mostrando puntajes más altos en las siguientes escalas de recuperación de: éxito, relajación social, bienestar general, estar en forma y autoeficacia. Las características sociodemográficas del grupo I consistieron en ser de mayor edad y tener dependientes, mientras que los del grupo II tienen el nivel más bajo de resiliencia, usaron la estrategia de ausencia de preocupaciones y mayor estrés emocional y falta de energía, además de ser más jóvenes y no tener dependientes. **Conclusión**: Teniendo en cuenta las características de los atletas, podemos concluir que el nivel de resiliencia y la edad combinados con la responsabilidad de tener dependientes pueden influir en el uso de estrategias de afrontamiento y el estrés en los atletas de MMA.

**Palabras clave**: resiliencia psicológica, estrés psicológico, deportistas.

**RESUMO**

**Objetivo:** Este estudo representa uma análise da associação entre resiliência, estresse, estratégias de enfrentamento e dados sociodemográficos de atletas de Mixed Martial Arts (MMA). **Metodologia:** Participaram do estudo 50 atletas brasileiros de Artes Marciais Mistas de alto rendimento, com idade entre 25 ± 4,8 anos. Os dados foram coletados por meio de um questionário sociodemográfico, Escala de Resiliência Connor-Davidson, Inventário Atlético de Estratégias de Enfrentamento e Questionário de Estresse e Recuperação do Atleta (RESTQ-76). A análise foi realizada por meio de análise de cluster. **Resultados:** três grupos distintos foram encontrados: Atletas dos Clusters I e II mostraram-se resilientes com estratégias de Enfrentamento da adversidade, Concentração e Coachability, apresentando pontuações mais altas nas seguintes escalas de recuperação de: sucesso, relaxamento social, bem-estar geral, estar em forma e auto-eficácia. As características sociodemográficas dos atletas do cluster I consistiram em ser mais velhos e ter dependentes, enquanto os atletas do cluster III apresentaram o menor nível de resiliência, usaram a estratégia de ausência de preocupações e apresentaram maior estresse emocional e falta de energia, além de serem mais jovens e não ter dependentes. **Conclusão:** Considerando as características dos atletas, podemos concluir que o nível de resiliência e a idade combinados com a responsabilidade de ter dependentes podem influenciar o uso de estratégias de enfrentamento, bem como o estresse em atletas de MMA.

**Palavras-chave:** Resiliência Psicológica, Estresse Psicológico, Atleta.

## Introduction

Athletes experience pressure originated from many aspects, such as high physical, tactical and psychological demands (Simim et al., 2010; Stefanello, 2009), occurrence of injuries (Carson & Polman, 2010), anxiety, sports demands (Nicholls et al., 2012), and high training loads (Moreira et al., 2010) representing aspects capable to influence directly the athlete's performance as well as athletic success (De Rose Júnior, 2002), beside to conditions outside the sports environment, like family and health issues. Mainly, athletes feel incapable to deal with these adverse situations whether these events come from the sporting area or from their personal lives (Wagstaff et al., 2017; Weinberg, 2008).

Other factors as the importance attributed to the event or competition, doubt regarding the results, unknown or stronger opponent, event location, lack of confidence, high levels of anxiety and low self-esteem, are stress-generating which may affect athletes' performance. In addition, higher levels of stress can also cause diseases (Brink et al., 2012) and interfere in the recovery of athletes after intense training (Coutts & Reaburn, 2008) and participation in competitions (Noce et al., 2011).

In that regard, it is necessary for athletes deal stressful and adverse situations in order to adapt to the demands of the sport (Calmeiro et al., 2010), which is based on the coping strategies defined by Lazarus and Folkman (1984) as a set of cognitive and behavioral efforts that individuals use to deal with specific demands which appear in stressful situations.

The capacity to cope with stressful and adverse situations has been described as a differential of successful athletes and plays an important role in the performance and satisfaction (Jowett & Spray, 2013; Lazarus, 2000). The implementation of these strategies before a stressful event can be considered as a protection factor through the process of a certain situation faced (e.g. competitive event, injuries and losing a fight).

Fletcher and Sarkar (2012) investigated former Olympic athletes to better understand how resilience develops, and found that successful athletes had protective (resilient) resources during adversities encountered and presented positive personality, motivation, confidence, focus and perceived social support throughout periods of stress. The authors further postulated that protective resources are under the influence of challenges assessments and metacognitions to provide cover against potential negative effects of stress. These processes promote facilitating responses that precede sports performance (Galli & Vealey, 2008).

Fletcher and Sarkar (2013) indicate that a resilient nature may influence how athletes evaluate certain events and deal with stress in response to the emotions and the selection of coping strategies. In other words, resilient athletes assess the situation before the responses (Fletcher & Sarkar, 2012). Besides, more experienced and resilient athletes are better prepared to overcome the challenges and stress of sporting environments, increasing the chances of having a successful career in sport (Bicalho, Melo & Noce, 2020).

Therefore, resilience can be defined as the role of mental behavior at promoting personal qualities as a protective factor against the negative effects of experienced stressors (Fletcher & Sarkar, 2012). Or a psychological reintegration process based in the ability of the subjects to learn new skills, enhancing abilities to cope with further stressful events in life (Richardson et al. 1990). The combination of psychological factors and skills that can be developed – goal setting, optimism, self-talk, among others – to helps individuals to be more flexible when facing stressful or adverse events (Wagstaff et al., 2017).

In combat sports, stressful or adverse events occur throughout the fight, and the way the athlete deals with these events is essential to decide the results. Thus, athletes are constantly withdrawn from their comfort zone and forced to deal with a variety of unpleasant feelings during competitions / fights. Being resilient implies a quick recovery from such adverse situations, which, during a fight, can be an unexpected blow, loss or injury. The duration of the process of reintegrating from an adversity can range from a few minutes to a few years, depending on the severity of the problem, for a athlete to develop new skills. For example, during a fight the athlete receives an unexpected jab and falls. Get up, concentrate and return to the fight more focused and win. On the other hand, during a volleyball game an athlete misses a serve, becomes unbalanced and is no longer able to play well and is injured. After recovery, the athlete may still not feel confident enough to perform well during games. Therefore, in facing these situations, athletes improve their response to similar events in the future and will re-establish themselves more quickly (Richardson et al., 1990).

Although several studies have investigated resilience in the sporting environment, the relation of athletes' sociodemographic factors and psychological aspects – especially combat sports athletes – is yet to be investigated. Several factors about resilience and its relationship with sport are still being investigated. So, knowing the different profiles can lead to a better understanding of which characteristics the most resilient athletes have, namely psychological and sociodemographic characteristics. Therefore, this

study aims at analyzing different profiles of MMA athletes considering the psychological aspects of resilience, state of stress and coping strategies, and sociodemographic data.

## METHODOLOGY

*Type of study and Participants*

This research is characterized as a descriptive, cross-sectional research. The athletes who participated in the study were part of the 11 teams registered in the Federation of Mixed Martial Arts in the state of Paraná, numbering 62 fighters of high performance athletes. After the initial contact, 12 athletes did not consent to participate in the survey or answered the instruments incompletely and were excluded during data analysis. Fifty athletes (80.6% of the population) competed at national and international levels. The athletes were all males, mean age of 25.0 years (± 4.8 years), mean modality practice time of 7.8 years (± 4.7 years), average of 4.4 daily training hours (± 1.7 training hours), with a mean of 23.0 training hours (± 9.7 training hours) per week. All athletes participanted in official competitions for 5.2 years (± 3.9 years).

*Instruments*

Resilience was assessed through the Connor-Davidson Resilience Scale (CD-RISC-10) (Connor & Davidson, 2003) and validated for the Brazilian context by Lopes and Martins (2011). The exploratory factorial analysis confirmed a one-factor structure with the ten items of the scale and the internal consistency reached a good index (α = 0.82). It is worth noticing that the instrument is composed of a Likert scale of 0 to 4 points, which evaluates the subjects' perception of their ability to adapt to changes, overcome obstacles, recover from illness, injury or other difficulties. Its score ranges from 0 to 40 points: the closer to 40 the greater the athlete's resilience.

The Stress and Recovery Questionnaire for Athletes (RESTQ-76 Sport) was created by Kellmann and Kallus (2001) and validated by Kellmann et al. (2009) for the Brazilian context to measure the occurrence of stress state. The questionnaire comprises 77 items, including an introductory item (number 1) not included in the final score of the test. The instrument is subdivided into 19 subscales: general stress (general stress, emotional stress, social stress, conflicts / pressure, fatigue, lack of energy, somatic complaints), specific stress (disturbed breaks, burnout/emotional exhaustion, fitness/injuries), general recovery (success, social relaxation, somatic relaxation, general well-being, sleep) and specific recovery (fitness/being in shape, burnout/personal accomplishment, self-efficacy and self-regulation). The values of the scales are calculated

by the average scores of the respective items. Each RESTQ-76 Sport subscale consists of four items evaluated by a Likert scale with values between 0 and 6 points (0 = never to 6 = always), indicating the incidence of events and reported activities. In the Brazilian validation (Costa & Samulski, 2005), there was substantial reliability in 16 (Conflicts / pressure α = 0.61, Success α = 0.58, burnout/personal accomplishment α = 0.64) of the 19 RESTQ-Sport scales (α > 0.70). However, scales with values below expectations were not excluded from the instrument.

For the investigation of the coping strategies, the Athletic Inventory of Coping Strategies (ACSI-28) developed by Smith et al. (1995) and validated for the Portuguese language by Coimbra (2011) was applied. It consists of 28 items on a 4-point Likert scale, ranging from "almost never" to "almost always." The results are classified into 7 sub-scales that evaluate the following psychological competences: Peaking under pressure, Freedon from worry, Coping with adversity, Concentration, Goal setting, Confidence and achievement motivation and Coachability. In the Brazilian validation (Coimbra, 2011) good reliability was obtained in all subscales (alpha values between α = 0.54 and α = 0.81).

To complement the information about the athletes, a questionnaire containing questions related to: age, marital status, category, practice time, daily training time, weekly training time and time of participation in competitions was applied.

*Procedures*

After the authorization of the Mixed Martial Arts Federation from the state of Paraná, the project was submitted and approved by the Standing Committee on Ethics in Research with Human Beings (No. 267,975) of the State University of Maringá - Paraná. The data collection occurred in the training places, after the end of the training, through prior appointment with coaches and athletes. All subjects signed the Free and Informed Consent Form. The instruments application was performed by the researcher individually and had an average duration of 30 minutes.

*Analysis*

For the description of the results, we used median (Md), interquartile range (Q1-Q3) and absolute (n) and relative (%) frequencies. To analyze the coping strategies and stress and recovery status of athletes, the Friedman and Dunn multiple comparison tests were used. The multivariate analysis of the data was performed through Cluster analysis. It is worth mentioning that the Anova one-way test was used to identify, through the criterion of R2 (R squared), the appropriate number of groups that should

be considered in the analysis (Maroco, 2007). After the identification of the groups, the Kruskal-Wallis test was used to analyze the relationship between groups identified in Cluster Analysis with resilience, coping strategies, athlete stress and recovery status, and sociodemographic variables. To verify the association between the sociodemographic variables and the level of resilience according to the clusters, the Chi-Square test was used. the level of significance adopted in the study was 95.0% ($p < 0.05$).

## RESULTS

The distribution of the number of fighters per cluster was established as follows: 21 athletes in Cluster I (42%), 18 athletes in Cluster II (36%) and 11 athletes in Cluster III (22%). The resilience level of Cluster I athletes was 34.0 (33.0-36.0) points, which can be considered high. The Cluster II presented a resilience level of 29.5 (29.0-31.0), being considered moderate. Finally, Cluster III obtained the resilience level of 24.0 (22.0-26.0), being considered low.

In the evaluation of the Coping construct (Table 1), it was observed that Cluster I and Cluster II athletes used more strategies like "Coachability" (Md = 3.0) ($p = 0.01$), "Coping with adversity" (Md = 2.5) ($p < 0.01$) and "Concentration" (Md = 2.5) ($p = 0.01$). However, Cluster III athletes sought more of the "Freedon from worry" strategy (Md = 2.0) ($p < 0.01$).

**Table 1**
*Comparison of Coping Strategies of MMA Athletes (n = 50) According to the Groups Identified in the Cluster Analysis.*

| Coping Strategies | Cluster | | | | | | p* |
|---|---|---|---|---|---|---|---|
| | I (n=21) | | II (n=18) | | III (n=11) | | |
| | Md | (Q1-Q3) | Md | (Q1-Q3) | Md | (Q1-Q3) | |
| 1. Peaking under pressure | 2.2 | (1.8-2.7) | 2.0 | (1.2-2.2) | 1.7 | (1.2-2.0) | 0.11 |
| 2. Freedon from worry | 1.2 | (1.0-2.0)[a] | 1.7 | (1.2-2.2)[a] | 2.0 | (1.7-2.7)[b] | <0.01 |
| 3. Coping with adversity | 2.5 | (2.0-2.7)[a] | 2.0 | (1.7-2.5)[a] | 1.7 | (1.5-2.0)[b] | <0.01 |
| 4. Concentration | 2.5 | (1.8-2.8)[a] | 2.0 | (1.7-2.5)[a] | 1.5 | (1.2-2.0)[b] | <0.01 |
| 5. Goal setting | 2.2 | (1.7-2.7) | 2.0 | (1.7-2.2) | 2.5 | (1.5-3.0) | 0.43 |
| 6. Confidence and achievement motivation | 2.5 | (2.2-2.8) | 2.2 | (2.0-2.7) | 15 | (1.5-2.7) | 0.08 |
| 7. Coachability | 3.0 | (2.2-3.0)[a] | 2.5 | (2.0-3.0)[a] | 2.0 | (1.7-2.5)[b] | 0.01 |

* p=Probability estimated by the Kruskall-Wallis test. [a]Similarities between Cluster I and II. [b]Diferences between Cluster I and II.

When assessing the Clusters according to the state of stress and recovery (Table 2) of the fighters, there were significant differences between the groups. Cluster I and II athletes showed higher scores in comparison with Cluster III for "Success" dimensions (p = 0.01), "Social relaxation" (p = 0.01), "General well-being" (p <0.01), "Fitness/ Being in shape" (p = 0.01), and "Self-efficacy" (p = 0.03), all of which indicated good recovery by athletes.

**Table 2**

*Comparison of the Stress State and Recovery Activities of MMA Athletes (n = 50) According to the Groups Identified in the Cluster Analysis.*

| **Stress and Recovery** | | **Clusters** | | | | | | **p*** |
|---|---|---|---|---|---|---|---|---|
| | | **I (n=21)** | | **II (n=18)** | | **III (n=11)** | | |
| | | **M** | **(Q1-Q3)** | **M** | **(Q1-Q3)** | **M** | **(Q1-Q3)** | |
| General stress | GE | 0.7 | (0.0-1.5) | 1.2 | (0.4-1.7) | 2.2 | (0.7-4.0) | 0.06 |
| Emotional stress | GE | 1.2 | (0.8-2.8)[a] | 1.6 | (1.2-2.0)[a] | 2.7 | (2.0-3.0)[b] | 0.03 |
| Social stress | GE | 1.2 | (0.5-2.0) | 1.2 | (0.6-2.5) | 2.0 | (0.5-3.7) | 0.44 |
| Conflicts / Pressure | GE | 2.7 | (2.0-3.5) | 2.3 | (1.9-3.1) | 3.5 | (2.7-4.5) | 0.07 |
| Fatigue | GE | 3.0 | (1.7-4.1) | 2.1 | (1.0-3.2) | 2.2 | (1.5-3.7) | 0.17 |
| Lack of energy | GE | 1.7 | (0.8-2.5) | 1.0 | (0,5-1.7) | 2.7 | (2.0-3.5)[b] | <0.01 |
| Somatic complaints | GE | 2.1 | (1.5-2.9) | 2.1 | (1,1-2.5) | 1.7 | (0.7-3.5) | 0.78 |
| Success | GR | 4.0 | (3.6-5.0)[a] | 4.0 | (3,6-4.7)[a] | 3.5 | (2.5-3.7)[b] | 0.01 |
| Social relaxation | GR | 4, 4.7 | (( (4.3-6.0)[a] | 4.5 | (3,9-5.0)[a] | 4.0 | (3.0-4.2)[b] | 0.01 |
| Somatic relaxation | GR | 4.2 | (2.7-5.1) | 3.2 | (2,0-3.9) | 3.2 | (2.0-3.7) | 0.08 |
| General well-being | GR | 5.0 | (4.3-5.8)[a] | 4.3 | (3,5-5.2)[a] | 3.5 | (2.7-4.2)[b] | <0.01 |
| Sleep | GR | 3.5 | (3.0-5.0) | 3.0 | (2,0-4.0) | 3.0 | (2.0-4.0) | 0.15 |
| Disturbed breaks | SSS | 2.7 | (1.6-3.6) | 2.1 | (1,4-3.0) | 2.5 | (1.2-4.0) | 0.57 |
| Emotional Exhaustion | SSS | 1.5 | (0.3-2.7) | 1.6 | (0,2-2.5) | 2.0 | (0.5-2.2) | 0.88 |
| Fitness/Injuries | SSS | 4.0 | (2.3-4.7) | 3.8 | (2,8-5.1) | 3.5 | (1.2-5.0) | 0.58 |
| Fitness/Being in shape | RE | 5.0 | (4.2-5.7)[a] | 4.2 | (3,5-4.7)[a] | 4.0 | (3.5-4.5)[b] | 0.01 |
| Personal Acceptance | SSR | 4.7 | (4.2-5.7) | 4.5 | (3,6-5.5) | 4.0 | (3.5-4.7) | 0.11 |
| Self-efficacy | SSR | 4.7 | (4.1-5.7)[a] | 4.6 | (4,0-5.2)[a] | 3.7 | (3.5-4.7)[b] | 0.03 |
| Self-regulation | SSR | 5.2 | (4.5-5.8) | 5.2 | (3,9-5.5) | 4.0 | (2.7-5.2) | 0.16 |

p=Probability estimated by the Kruskall-Wallis test. GE: general stress; GR: general recovery; SSS: Sport Specific Stress; SSR: Sport Specific Recovery. [a]Similarities between Cluster I and II. [b]Diferences between Cluster I and II.

In assessing clusters according to resilience level and sociodemographic variables (Table 3), there were significant differences between the groups of athletes and the level of resilience (p <0.01). It was verified that all the athletes of Cluster I and Cluster II presented high level of resilience (100.0%). However, most athletes in Cluster III (90.9%) were not resilient to stressors, and the level of resilience was considered low. The variable marital status (p = 0.06) showed an association close to the significance level adopted in this study when compared to the clusters. Cluster I athletes, who were more resilient, mostly had companions. On the other hand, most athletes of Clusters II (resilient) and III (non resilient) had no companions.

**Table 3**

*Association Between Resilience, Sociodemographic Data of MMA Athletes (n = 50) According to the Groups Identified in the Cluster Analysis.*

| Level of resilience and sociodemographic data | | Clusters | | | | | | p |
|---|---|---|---|---|---|---|---|---|
| | | I (n=21) | | II (n=18) | | III (n=11) | | |
| | | *f* | % | *f* | % | *f* | % | |
| **Resilience** | High | 21 | 100.0 | 18 | 100.0 | 0 | 0.0 | **<0.01*** |
| | Low | 0 | 0.0 | 0 | 0.0 | 11 | 100.0 | |
| **Marital Status** | Without companion | 09 | 45.0 | 12 | 75.0 | 09 | 81.8 | 006** |
| | With companion | 11 | 55.0 | 04 | 25.0 | 02 | 18.2 | |
| **Salaries per fight** | Yes | 16 | 88.9 | 14 | 77.8 | 09 | 81.8 | 0.67* |
| | No | 02 | 11.1 | 04 | 22.2 | 02 | 18.2 | |
| **Main source of income** | Yes | 08 | 53.3 | 09 | 60.0 | 06 | 60.0 | 0.92** |
| | No | 07 | 46.7 | 06 | 40.0 | 04 | 40.0 | |
| **Level of competition** | National | 15 | 71.4 | 12 | 66.7 | 08 | 72.7 | 0.93* |
| | International | 06 | 28.6 | 06 | 33.3 | 03 | 27.3 | |
| **Practice time** | Up to 5 yeras | 07 | 33.3 | 08 | 44.4 | 04 | 36.4 | 0.77* |
| | More than 5 years | 14 | 66.7 | 10 | 55.6 | 07 | 63.6 | |
| **Weekly training** | Up to 20 hours | 12 | 57.1 | 09 | 50.0 | 04 | 36.4 | 0.54** |
| | >20 hours | 09 | 42.9 | 09 | 50.0 | 07 | 63.6 | |
| **Training period** | General preparation | 11 | 52.4 | 14 | 77.8 | 06 | 54.5 | 0.23* |
| | Pre-competitive | 10 | 47.6 | 04 | 22.2 | 05 | 45.5 | |
| **Category** | Flyweight - Lightweight | 11 | 52.4 | 10 | 55.6 | 04 | 36.4 | 0.17** |
| | Welterweight - Heavyweight | 10 | 47.6 | 08 | 44.4 | 07 | 63.3 | |

* Probability estimated by Fisher's exact. ** Probability estimated by Chi-Square.

The sociodemographic variables, when compared with the clusters, showed a significant difference for the age, namely that Cluster I athletes (p = 0.02) were the oldest (28 years) when compared to the remaining groups (Cluster II - p = 0.02 (23 years), Cluster III - p = 0.03 (25 years). It is important to note that the variable number of dependents (p = 0.05) also presented a significant value, since Cluster I athletes claimed to have dependents, while the fighters of Clusters II and III have no dependents.

**Table 4**
*Comparison Between Sociodemographic data of MMA Athletes (n = 50) According to the Groups Identified in the Cluster Analysis.*

| Sociodemographic data | Clusters | | | | | | P* |
|---|---|---|---|---|---|---|---|
| | I (n=21) | | II (n=18) | | III (n=11) | | |
| | M | (Q1-Q3) | M | (Q1-Q3) | M | (Q1-Q3) | |
| Age | 28.0 | (23.5-30.5)[a] | 23.0 | (20.7-27.0)[b] | 25.0 | (20.0-26.0)[c] | 0.03 |
| Practice time | 8.0 | (5.0-11.0) | 7.5 | (2.7-12.7) | 10.0 | (5.0-11.0) | 0.82 |
| Daily training | 4.5 | (3.0-5.0) | 4.2 | (3.0-6.0) | 5.0 | (4.0-6.0) | 0.83 |
| Weekly training | 20.0 | (18.0-28.5) | 22.5 | (17.5-31.2) | 25.0 | (20.0-30.0) | 0.74 |
| Participation in competitions | 5.0 | (2.0-8.0) | 3.5 | (2.0-9.2) | 5.0 | (2.0-7.0) | 0.96 |
| Number of Dependents | 1.0 | (0.0-3.0) | 0 | (0-0) | 0 | (0-1.7) | 0.05 |

* Probability estimated by the Mann-Whitney U-Test.

## DISCUSSION

Three distinct groups were observed to have their aspects related to resilience, coping strategies, state of stress and recovery investigated. The first group revealed that athletes had a high level of resilience (Table 3) by using strategies of coachability, coping with adversity, and concentration (Table 1). In addition, they had low levels of stress and good recovery (Table 2), moreover, they were older, had partners and reported having dependents (Table 4). Cluster II athletes had a moderate level of resilience, were more likely to use the coping strategy (Table 1), had low levels of stress and had good recovery (Table 2). These were younger and had neither partners nor dependents (Table 4). The third group identified with low resilience (Table 3) used freedom from worry strategy (Table 1) and presented higher levels of emotional stress and lack of energy (Table 2), besides having neither companions and dependent (Table 4).

It is observed that resilience is an essential factor for athletes to have good development in the sport. Fletcher and Sarkar (2013) indicate that a resilient athlete is able to better evaluate stressors, uses metacognition to manage their emotions and selects appropriate stress coping responses (Bicalho, Melo & Noce, 2020). Therefore, athletes with a higher level of resilience have low levels of stress.

Resilient athletes (Clusters I and II) reported having a good perception of the stress scales associated with success, social relaxation, well-being, feeling in shape, and self-efficacy, in addition to the use of a larger variety of coping strategies. Bryan et al. (2017) pointed out that resilience is associated with the use of other psychological resources, which are considered as agents capable of minimizing stressors. These resources are social support, self-efficacy, optimism, coping skills, motivation, perspective, self-regulation, endurance, proactivity, adaptability, sense of control, positive mentality, hope, and self-sufficiency.

High resilience indices associated with age and the responsibilities of having dependents and companions seem to influence the coping strategies utilization and recovery status of these athletes. The results found in the study by Berbetz (2015) performed in MMA fighters were similar to those of Cluster I in this study. These fighters used the memory of family members as a strategy to increase levels of resilience and coping in at least some of the fighting. During the struggle, family memories provided intrinsic motivation which helped to increase the level of concentration and to deal with unfavorable situations, so that, after the fight, the fighter could be well and able to reunite with their loved ones. This fact may also have influenced physical and mental recovery in order to return to their homes after the fights in the expectation of pursuing their daily routines after the fight (Berbetz, 2015).

Therefore, high-resilience athletes can develop strategies to help mobilize resources that will help them cope with the demands of situations in an active way (Secades et al., 2016). In addition, using positive emotions makes athletes better able to cope with the pressures they are exposed to (Belem et al., 2014).

Life events which bring new experiences can also be considered as stressors capable to induce ruptures or adversities. New adversities can lead the athlete to present a positive or negative response, depending on their psychological abilities. For Richardson et al. (1990), such influences are socioenvironmental and include community, family, church, peers, gangs, living conditions, and the media. The way athletes deal with these challenges make them able to cope with these situations, thus becoming resilient, and seeking to do their best during competitions due to their assumed responsibility.

In contrast, Cluster II athletes demonstrated that the levels of resilience and age have an impact on coping strategies and the recovery status of these athletes, while not having a partner or dependentes has little influence. A possible explanation may be associated with the fact that the majority of athletes participating in the study have practiced the sport for more than five years. Thereby, because they started practing sport while still young, these athletes have become resilient and, despite their young age, due to their experience, they are better able to cope with the stressful demands of the sport. As these athletes do not have companions or dependents, their focus is on training and participating in competitions. Therefore, socioenvironmental influences (Richardson et al., 1990) are lower for this group of athletes considering that the responsibility assumed by them is directed towards their career in the sport.

Athletes are subject to various stressors associated with their performance. These demands can be related to training (preparation, fights, expectations and opponents), the organization to which the modality is conveyed, or events that may occur in your personal life (family responsibilities, changes, illness, death, etc.) (Wagstaff et al., 2017). However, in our study these demands were not confirmed since athletes had no focus on "non-sports" responsibilities.

However, because they are younger and have practiced sport for a longer period of time, such an experience may have been a preponderant factor for the high level of resilience. According to Richardson et al. (1990), exposure to adversity and change allows individuals to initiate a process that can lead to resilient reintegration as well as the addition of new qualities to promote resilience for further adversities. Experiences with the sport practice are a key factor in the resilience process since the perception of positive results occurring in the face of adversity helps to develop resilience. Thus, athletes with personal and sociocultural resources successfully respond to adversity in sport and gain more resources to enable them to do the same in the future (Galli & Vealey, 2008).

The third Cluster made evident that low levels of resilience combined with the absence of dependents or companions negatively influenced the use of coping strategies and the stress levels of the athletes. Even though they do not have the responsibility of caring for a family, factors from their personal life can influence stress levels, such as depending on the sport financially, competitive level, and availability for training in a negative way (Belem et al., 2016).

Another important factor to be highlighted is the low level of resilience presented by the athletes of this group. Athletes with a low level of resilience are more susceptible

to the negative effects of stress (Belem et al., 2017) and may have more negative thoughts. For these athletes, focus during fights and competitions seems to be natural since they do not observe other important information in the environment. Therefore, athletes increase their concentration for some physical sensations and perceptions, such as anxiety, pain, doubts about oneself as to their performance (Stefanello, 2009; Weinberg, 2008).

Seeking to identify different profiles of the fighters from the cluster analysis, we observed three distinct groups regarding the use of coping strategies, stress and recovery status, and sociodemographic variables. The athletes of the first group were older, resilient, which seems to directly influence the use of coping strategies and stress levels. This is because the athletes of this group have sought to listen more to the corrections of their coaches, face the adversities on their way, and concentrate more. In addition, they have positive values regarding their recovery, both focused on sport and on other dimensions of their lives, in addition to having low levels of stress.

Cluster II observed that athletes were resilient, used coping strategies to confront adverse situations, sought concentration, and were dedicated to training. Levels of stress were emphasized as low, while social and personal recovery was high, especially regarding perception of success, well-being, and self-efficacy. In contrast, they were the youngest athletes, had no companions or dependents.

The third group was also influenced by resilience, but in a negative way since athletes demonstrated a low level of resilience. Fighters of this cluster have adopted the lack of concerns strategy more frequently, a situation in which athletes do not worry too much about their performance, even if it is not satisfactory, not caring about what others think of their failures. In addition, stress and lack of energy levels were higher in these athletes. Finally, it is important to observe that they have no dependents and no partners.

Therefore, it is important to understand that the different profiles found among athletes seem to be modified according to some key points, such as resilience level, age, marital status, and number of dependents. Resilient athletes are able to learn from the stressful situations they encounter throughout their careers, improve their psychological skills, or acquire new ones. Age, as well as having a commitment with companions and dependents, seems to be related to the decision making about the career, such as dedication to training and participation in competitions, also influencing the athlete's commitment to both aspects related to the sport, as well as their personal life.

Thus, the analysis of the different profiles revealed that Cluster I athletes have some factors such as being resilient, having companions, dependents in addition to

being older which influence their preparation to seek better results. Consequently, they use more coping strategies (trainability, concentration, and confrontation with adversity) and have a better recovery, which is why they have a better perception of their well-being, physical form, self-efficacy, social recovery, and success.

Being resilient, younger and not having companions or dependents are factors which seem to influence Cluster II athletes regarding the use of coping strategies and their recovery. The athletes in this group use more strategies of trainability, concentration, and confrontation with adversity, have higher levels of perception regarding their self-efficacy, being in shape, social recovery, success, and general well-being.

Finally, Cluster III is constituted of athletes with lower resilience level, who do not have companions or dependents and are also young. These factors seem to directly influence the psychological aspects of the fighters considering their poor coping strategies (lack of concerns), stronger emotional stress, and lack of energy.

The different profiles allow knowledge of various psychological and personal life issues that impact the development, support and success of athletes. In this way, understanding the different clusters allows for a more refined and effective approach in developing training programs and psychological and social support, adjusting to the specific needs of each group and increasing the performance and general well-being of athletes. For example, for athletes in Cluster III, interventions focused on developing resilience can be provided to improve their ability to face adversity and stress. Coping strategies can also be worked on, as Cluster II athletes may need different types of psychological and emotional support compared to Cluster III athletes, who face greater challenges in terms of stress and recovery.

It should be noted that this study had some limitations, including the following aspects: absence of a ranking of the modality to complement the sociodemographic data, which made the comparisons between the results and the psychological aspects investigated in this study unfeasible; the number of participants, since athletes of only one state were evaluated. However, it is important to observe that the federation of this modality has been created only recently and still lacks an exact number of athletes who participate in national and international competitions. Nevertheless, it is equally worth mentioning that the state of Paraná is among the Brazilian states with a large number of outstanding athletes of this national and international MMA scene.

Finally, it is worth mentioning how important new studies should be to investigate the relationship between sociodemographic variables, especially having partners and

dependents since our study indicates that such variables can influence the development of resilience, coping with adverse situations in addition to the level of stress in athletes.

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## CONTRIBUTION STATEMENT

Author 1 participated in the conceptualization (lead), research, methodological design, data curation, writing of the manuscript and analysis. Author 2 participated in the conceptualization (support), review and editing of the final manuscript. Author 3 participated in the conceptualization (lead), analysis, project management, review, and editing of the final manuscript. All the authors participated in the elaboration of this article.