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MOTIVATIONAL DYNAMICS AND TRAINING EXPERIENCES AMONG FEMALE BRAZILIAN JIU-JITSU PRACTITIONERS

ABSTRACT

The practice of martial arts has historically been a male-dominated endeavour. Although this is beginning to change, many female practitioners still face unique challenges in their martial arts journey. The present study explored the motivational dynamics in active female practitioners, aiming to shed light on the factors that drives their continued involvement in martial arts. To this end, we assessed achievement goal orientations, perceptions of the motivational climate, and experiences during training in 137 female Brazilian jiu-jitsu (BJJ) practitioners from 28 countries. Additionally, we used previously published data on male practitioners in comparative analyses. Our findings revealed that female BJJ practitioners shared a similar emphasis on mastery approach goals compared to their male counterparts. A notable difference was observed for perceptions of the motivational climate, with female practitioners perceiving the climate as more mastery-oriented than males. We also found relationships between motivational dynamics and factors such as rank, training duration and experience, instructor status, and competition participation. Overall, female BJJ practitioners exhibit a strong emphasis on mastery goals and generally perceive the training climate as mastery-orientated, suggesting an inclination towards adaptive behaviour in challenging situations. These results demonstrate similarities in the goal orientations of male and female practitioners, yet differences in how the training climate is perceived, which may have implications for how training sessions should be structured. Moreover, they reaffirm the compatibility between mastery goals and competitive martial arts practice and provide a novel characterization of the motivational dynamics of active female grapplers.



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KEYWORDS

Brazilian jiu-jitsu; martial arts; goal orientation; motivational climate; training experience; female athletes

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INTRODUCTION

The male practitioner is usually considered the norm in studies on martial arts (Harwood et al., 2017; Kavoura et al., 2012). Combat has traditionally been associated with men and martial arts have predominantly been male-dominated due to their historical roots (Kavoura et al., 2012). Follo (2012) asked, 'Where is the female martial artist?' (p. 715) and addressed this partially because female practitioners had theretofore been hidden from academic research. Female martial arts practitioners are a relatively underexplored population in research (Follo, 2012; Halbert, 1997), often relegated to the margins or analyzed solely through the lens of gender (Follo, 2012; Harwood et al., 2017; Kavoura et al., 2012). Female martial arts practitioners who enter this male-dominated arena are particularly intriguing, as they navigate their passion for martial arts while uniquely challenging gender norms, questioning traditional assumptions about male protectors and female victims by learning to protect themselves (Channon et al., 2018; Kavoura et al., 2015b). Many women find solace in training together in a supportive and safe environment (Channon, 2014; Channon & Jennings, 2013). Currently, there is an increasing number of women participating in martial arts competitions (Spencer, 2009), with countless examples of women that have excelled as athletes and instructors in various martial arts (Channon, 2014; Jennings, 2021).

One of the most rapidly growing martial arts in recent years, Brazilian jiu-jitsu (BJJ), is also experiencing a surge in popularity among women. It is a modern martial art that focuses on grappling-based combat, utilizing joint locks and chokeholds to force opponents into submission (Spanias et al., 2022; Øvretveit, 2018b). The sport first gained recognition and legitimacy on the world stage through Royce Gracie's exploits in the Ultimate Fighting Championship in the early-to-mid 90s (Gracie & Danaher, 2003; Snowden, 2008). Up until then, the sport and art of BJJ was largely unknown before suddenly becoming recognized as one of the most effective defensive and offensive martial arts disciplines (Baum, 2022; Jennings, 2021). In recent years, BJJ has also gained traction as a topic of research, primarily from a physiological and technical-tactical perspective (Andreato et al., 2016; Andreato et al., 2017; Williams et al., 2019; Øvretveit, 2018a, 2020b; Øvretveit & Toien, 2018). Less attention has been given to psychological aspects of these practitioners (Albuquerque et al., 2015; Øvretveit et al., 2018), and the intersection between psychology and physiology (Øvretveit, 2020a; Øvretveit et al., 2019). Given its unique blend of physical and mental challenges along with overall high drop-out rates, understanding the motivational dynamics of BJJ practitioners can lead to better coaching practices and increased participation. The overall literature on the psychological aspects of BJJ is scarce, with female practitioners being particularly underrepresented. To promote recruitment across genders, reduce drop-out rates (Le Bars et al., 2009), challenge gender norms (Channon et al., 2018; Kavoura et al., 2015b), and contribute to greater equality in BJJ (Halbert, 1997; Harwood et al., 2017), it is crucial that female practitioners are represented in research.

ACHIEVEMENT MOTIVATION

Investigating motivational dynamics in achievement settings can increase our understanding of how individuals set goals, approach challenges, and respond to success and failure. Among the many frameworks with which to do so, Achievement Goal Theory (AGT) has emerged as one of the most popular. Building on the works of Nicholls (1984, 1989), Ames (1984b, 1992), Dweck (1986) and Maehr (1984; 1980), AGT operates from two fundamental achievement goal constructs, mastery (task) and performance (ego), which broadly refers to developing and demonstrating competence, respectively. Elliot and Harackiewicz (1996) expanded on the dichotomy between mastery and performance by proposing a trichotomous framework that divides the performance goal into approach and avoidance components. This led to the creation of the 2 × 2 achievement goal framework by Elliot and McGregor (2001) which categorized the mastery goal construct similarly. In a more recent study, Elliot et al. (2011) introduced a new perspective on AGT which divided the mastery goal into task- and self-based goals, that includes competence evaluation standards separated by approach (positive) and avoidance (negative), that resulted in a 3 × 2 framework. This 3 × 2 framework was subsequently extended to the sports domain by Masciet et al. (2014), who argued that it could provide more insight into the impact of achievement goals on athletes' performance and well-being.

The concept of achievement goals has been studied both as states and traits in various performance contexts (Kaplan & Maehr, 2007). It is important to differentiate between goal states and orientations, where the former refers to the dominant goal during a specific task, while the latter refers to the general inclination towards engagement in a task or domain. While states of involvement are mutually exclusive, meaning that an individual can only have one dominant goal state at a given time, goal orientations are not (Roberts, 2012). The dominant goal state during sport performance is known to be constantly changing (Gernigon et al., 2004), however, practitioners can simultaneously approach an activity with both mastery- and performance-oriented goals (Pensgaard & Roberts, 2000). It has been suggested that to understand achievement behavior fully, one must assess both the dispositional level of goal orientations and the situational factors that interact with them to determine goal involvement state (Roberts, 2012).

Investigations of achievement goals should ideally have an integrated approach that includes both dispositional goal orientations and the perceived motivational climate, as they are both part of the same theoretical platform and the energizing force for motivated behavior is the resultant state of involvement (Roberts et al., 2018). Therefore, when assessing goal orientations in an achievement setting, it is important to also evaluate the motivational climate, which can provide a more comprehensive understanding of the factors that influence achievement behavior (Ames, 1984a; Roberts, 2012).

Several investigations have shown that facilitating a mastery-oriented climate is beneficial for promoting adaptive engagement patterns in achievement settings (Ames, 1984a, 1992; Dweck, 1986; Kaplan & Maehr, 2007; Ntoumanis & Biddle, 1999; Pensgaard & Roberts, 2000). An adaptive pattern encourages individuals to set and achieve personally challenging and valued goals, while maladaptive patterns are associated with a lack of effort in pursuing such goals (Dweck, 1986). In the context of a performance-oriented climate, the research is more divided. From a dichotomous perspective, researchers believe that a performance-oriented climate leads to more maladaptive strategies and patterns, and therefore has a negative relationship with achievement behavior (Dweck & Leggett, 1988). With the more recent separation of performance goals into approach (i.e., seeking competence) and avoidance (i.e., avoiding incompetence) components, it is argued that performance-approach goals could lead to positive outcomes (Elliot, 1999). Therefore, achievement settings that promote approach goals are likely to produce more favorable outcomes compared to those that stimulate avoidance goals (Elliot & Harackiewicz, 1996; Roberts, 2012).

ACHIEVEMENT MOTIVATION AND TRAINING EXPERIENCES OF THE FEMALE MARTIAL ARTIST

The AGT framework has been applied in various sports disciplines, but its utilization in the context of martial arts has been very limited. Gernigon and le Bars (2000) found that judo, a highly competitive sport, can accommodate mastery goals alongside the emphasis on competitive success as it provides opportunities for individuals to focus on mastering techniques and progressing through belt ranks. They also noted that earlier research indicated that female practitioners were more mastery-oriented, while males lean towards a performance-oriented mindset. However, no significant difference in goal orientation was observed between genders in their study. The authors suggested that combat sports, often associated with masculine values, may contribute to a certain level of homogeneity in goal orientations among both males and females participating in the study.

Albuquerque et al. (2015) found that male BJJ practitioners demonstrate higher levels of both mastery and performance orientation compared to females. The authors further suggested that men might be better prepared for fight engagement due to their superior performance average compared to women, consistent with the findings of others (Klain et al., 2014). Studies on gender differences in achievement motivation in martial arts yield mixed results, with a general trend suggesting that men are more performance-oriented while women tend to be mastery-oriented. These disparities are attributed to the supposedly masculine nature of martial arts (Albuquerque et al., 2015; Duda, 1988, 1989; Gernigon & le Bars, 2000; White & Duda, 1994). Women's motivations and incentives for participating in martial arts differ from those of men (Gernigon & le Bars, 2000; Kavoura et al., 2012; Mroczkowska, 2009), making direct comparisons

challenging (Burke, 2022; Channon, 2014; Channon & Jennings, 2013; Maclean, 2015; Maor, 2019). Gernigon et al. (2004) investigated states of involvement in judo practitioners and found that the emergence and fluctuation of goal involvement occurred rapidly and seamlessly during sparring. The authors concluded that states of mastery, performance approach, and performance-avoidance involvement could be interrelated in various patterns.

Duda (1988) observed a positive correlation between mastery goals and the duration of sport participation. Gernigon and le Bars (2000) found the opposite trend; with increased experience level, aikido practitioners become less mastery-orientated. White and Duda (1994) previously pointed out a relationship between competition level and performance orientation. Castro-Sánchez et al. (2019) examined judokas' perceived motivational climate based on competition level. They found a strong prevalence of a task-oriented climate among all participants. As competition level increased, ego goal orientation became more important and prominent. The study concluded that competitors showed greater differentiation between personal improvement and effort (task orientation) and demonstrated superior physical ability compared to non-competitors. Ortega et al. (2017) found that the correlation between task climate and ego climate is greater in female than in male judokas. They suggest that when the motivational climate increases, one's own physical self-perception also increases, which generates an increase in feelings of satisfaction with the task.

Through semi-structured interviews with female BJJ practitioners, Kavoura et al. (2015a) identified three common training strategies among these practitioners: 'taking responsibility and showing initiative', 'building an inclusive and supportive environment', and 'persistence' (p. 140). These strategies appeared to be conducive to female participation in BJJ by influencing gender dynamics, facilitating relationships, and supporting perseverance. The authors note that the strategies were implemented by the women themselves, indicating that substantial changes can occur from bottom-up efforts. Although inclusion in martial arts practice is a collective responsibility, these observations outline some of the strategies applied by individuals and groups that may contribute to greater female participation in BJJ.

More recently, Øvretveit et al. (2018) expanded upon the scarce literature on achievement goals and perceptions of the motivational climate in BJJ. The study described the achievement goal profiles of 40 male BJJ practitioners, who generally appeared to emphasize mastery-approach goals, despite the competitive nature of BJJ training. Rank was also associated with both goal orientations and climate perceptions, and weekly training duration and style preference was linked to task-approach goals. Although this study sheds light on the motivational dynamics of male BJJ practitioners, it has limited generalizability due to the small sample size and relative homogeneity, warranting further research.

PURPOSE OF THE STUDY

Given the general lack of research on female BJJ practitioners despite a growing interest in the sport as a field of research, there is a clear need for studies that elucidate potential gender differences. This may help clubs and coaches create training environments that facilitate both enjoyment and development in heterogeneous athlete populations with different baselines and goals. The main aim of the present study was to describe achievement goal orientations and perceived motivational climate among female BJJ practitioners. Additionally, it sought to explore differences in male and female BJJ practitioners by incorporating previously published data by Øvretveit *et al.* (2018). We also applied the recently developed Martial Arts Inventory (MAI) by Sandford *et al.* (2021), a novel questionnaire which enables the measurement of several aspects of martial arts training, to quantify the training experiences among the participants and explore their associations with achievement goals. Based on previous research from other martial arts, we hypothesized that there would be gender differences in goal orientations and perceptions of the motivational climate in BJJ practitioners. Furthermore, we also expected orthogonality of the achievement goals and a positive association between mastery-approach goals and rank, increased BJJ training experience, competitors, and weekly BJJ training duration.

MATERIAL AND METHODS

Participants

We reached out to female BJJ practitioners worldwide through social media platforms such as Instagram and Facebook, as well as directly communicating with active athletes in person and online, and corresponding with BJJ academies with a large female athlete population. All currently active female BJJ practitioners were eligible for participation. Those eligible were invited to complete a comprehensive questionnaire available through a secure online research platform. We received responses from athletes from 28 countries spanning six continents. The net sample consisted of 137 females with a mean age of 31.6 ± 7.2 years, a mean training experience of 4.5 ± 3.5 years, and a weekly training duration of 6.7 ± 3.8 hours per week at the time of the study. 72% had competitive experience, 31% taught BJJ classes, and 58% preferred training in the gi. All belt ranks (white, blue, purple, brown, and black) were represented. The study also included data from 40 male BJJ practitioners for comparative analyses, whose description is provided in a separate article by Øvretveit *et al.* (2018). The data were obtained and analyzed in accordance with the data protection policies of the Norwegian Centre for Research Data (NSD). All participants provided written informed consent.

Measures

Achievement Goal Questionnaire for Sport. The 3×2 Achievement Goal Questionnaire for Sport (3×2 AGQ-S) was used to measure achievement goal orientations, where participants gave their answers on a 7-point scale ranging from strongly disagree (1) to strongly agree (7) (Mascret *et al.*, 2014).

Perceived Motivational Climate in Sport Questionnaire. The Perceived Motivational Climate in Sport Questionnaire (PMCSQ-2) was used to measure the perceptions of the motivational climate, where participants gave their answers on a 5-point scale ranging from strongly disagree (1) to strongly agree (5) (Newton *et al.*, 2000).

The Martial Arts inventory. The MAI questionnaire was used to quantify students' training experiences during martial arts training (Sandford *et al.*, 2021). The original 11-point scale was converted to a 5-point scale (1 = never; 5 = always) to align it more closely with the other scales in the questionnaire. To ensure the viability of this conversion, we consulted the corresponding author of the original MAI study, who confirmed that reducing the scale could be a feasible approach, with some loss of nuance compared to the full scale.

Descriptive variables. Descriptive variables were assessed in a separate section of the questionnaire, which gathered data on training history and habits, competitive experience, and style preference. This additional questionnaire allowed for the inclusion of relevant factors that could potentially influence the study's variables and outcomes.

Statistical analyses

The statistical analyses were performed using STATA MP version 17 (Stata Corp LP, College Station, TX, United States). A quantile-quantile plot was used to assess the normal distribution of the variables. Despite some variables deviating from the normal distribution, the conventional method of calculating confidence intervals (CIs) using the arithmetic mean was employed, as the sample size was deemed sufficiently large (Skog, 2004; Skovlund, 2017). Parametric methods are robust to non-normality given a sufficient (≥ 30) sample size (Skovlund, 2017). The independent samples t-test was used to examine the means from multiple Likert scales and evaluate gender differences in motivational dynamics. Levine's test assessed variance equality, and the variables with equal variances were compared with the t-test. Welch's t-test offers improved control over type 1 error with variables with unequal variances compared to the traditional Student's t-test (Mehmetoglu & Jakobsen, 2022). To replicate the analysis conducted on male BJJ athletes (Øvretveit *et al.*, 2018) for comparison, a pairwise deletion method was employed. Comparisons between goal orientations, motivational climate, and MAI with the descriptive variables ranks were performed with one-way analysis of variance (ANOVA) with post-estimation pairwise comparisons. Reliability was assessed with Cronbach's α . Bonferroni corrections were applied to comparisons involving the 3×2 AGQ-S and PMCSQ-2 measures to account for the family-wise error rate. A bivariate correlation matrix is provided to display the relationships between variables in the data. The data are reported as the mean \pm standard deviation and most frequent value (MFV; the most frequently occurring value in the sample for that variable). Differences between male and female BJJ practitioners were assessed using Cohen's d effect sizes (ES), 95% CIs, and a p-value threshold of $p < 0.05$.

RESULTS

A comparison between the female and male BJJ practitioners

Females reported a higher frequency of additional strength and conditioning training and involvement in other sports than their male counterparts (Table 1). No differences were observed in the other reported variables. The questionnaire for the females investigated the instructor role further than for the males: whether they were current instructors and whether they had been one in the past. Both groups reported very similar achievement goal orientations (Table 2). The results indicate a difference between the groups, as the females appeared to perceive the overall training climate as more mastery-oriented than males and rated the following factors higher than men: Cooperative Learning, Important Role, Effort Improvement. They also rated Intra Team Rivalry lower than men, but with a lower effect size for the difference. Furthermore, the difference did not remain below the significance threshold after Bonferroni correction (Table 2).

The female BJJ practitioner

A correlation matrix between the subscales of MAI and 3 × 2 AGQ-S are presented in Table 3 and 4, respectively. The mastery goals, the higher-order motivational scale mastery climate, and MAI, all correlated positively with each other. Performance climate correlated negatively with mastery climate.

Table 1. Descriptive statistics from the female and male Brazilian jiu-jitsu practitioners.

	Females (n = 137)	Males (n = 40)
Age (years)	31.6 ± 7.2	32.1 ± 6.1
Training experience in years	4.5 ± 3.5	5.3 ± 3.8
Weekly training duration in hours	6.7 ± 3.8	7.8 ± 3.4
Number of tournaments	7.4 ± 13.3	6.6 ± 9.9
Competitors	72.3	80.0
Former martial arts experience	57.9	85.0
Additional strength training	74.2	50.0
Additional conditioning training	51.2	25.0
Involvement in other sports	35.9	17.5
Instructor experience		
<i>No, never</i>	69.3	70.0
<i>Yes</i>	30.6	30.0
<i>Current</i>	24.8	
<i>Former</i>	5.8	
Style preference		
<i>Gi</i>	58.1	62.5
<i>Nogi</i>	22.1	27.5
<i>No preference</i>	19.9	10.0
Rank distribution		
<i>White belt</i>	31.6	32.5
<i>Blue belt</i>	44.1	40.0
<i>Purple belt</i>	16.9	20.0
<i>Brown belt</i>	3.7	5.0
<i>Black belt</i>	3.7	2.5

Data are presented as mean ± standard deviation or frequency (%).

Table 2. Comparison of achievement goals and perceptions of the motivational climate between female and male Brazilian jiu-jitsu practitioners.

	Females			Males			Comparison			
	Mean	± SD	MFV (%) n	Mean	± SD	MFV (%) ^a n	Mean diff.	95% CI	Cohen's D	P-value
3x2 AGQ-S (scale: 1-7)										
Task-approach goals	5.95	± 1.04	7.00 (33) 126	5.91	± 0.84	6.67 (36) 39	-0.041	-0.40, 0.32	0.04	0.822
Task-avoidance goals	4.61	± 1.64	7.00 (16) 137	4.68	± 1.37	5.33 (31) 39	0.073	-0.49, 0.64	0.05	0.800
Self-approach goals	5.92	± 1.13	7.00 (31) 136	5.88	± 1.10	7.00 (25) 40	-0.042	-0.44, 0.36	0.04	0.837
Self-avoidance goals	4.89	± 1.79	7.00 (20) 137	4.52	± 1.73	5.33 (15) 39	-0.372	-1.01, 0.27	0.21	0.251
Other-approach goals	3.69	± 1.88	1.00 (13) 136	3.66	± 1.26	4.33 (15) 39	-0.029	-0.54, 0.49	0.02	0.913
Other-avoidance goals	3.34	± 1.90	1.00 (19) 137	3.30	± 1.36	3.33 (18) 39	-0.042	-0.58, 0.50	0.02	0.879
PMCSQ-2 (scale: 1-5)										
Mastery climate	4.36	± 0.59	5.00 (9) 133	3.99	± 0.50	4.07 (20) 40	-0.371	-0.57, -0.17	0.65	<0.001*
Cooperative Learning	4.50	± 0.63	5.00 (41) 135	4.13	± 0.66	4.25 (15) 41	-0.376	-0.60, -0.15	0.59	0.001*
Important Role	4.26	± 0.75	5.00 (23) 137	3.86	± 0.60	3.60 (23) 40	-0.397	-0.65, -0.14	0.55	0.002*
Effort Improvement	4.30	± 0.57	4.75 (16) 135	3.94	± 0.52	4.13 (25) 40	-0.359	-0.56, -0.16	0.64	<0.001*
Performance climate	1.79	± 0.65	1.00 (9) 132	1.84	± 0.41	1.78 (25) 40	-0.051	-0.12, 0.22	0.08	0.558
Punishment for Mistakes	1.39	± 0.48	1.00 (35) 136	1.50	± 0.44	1.67 (24) 241	0.112	-0.05, 0.28	0.24	0.187
Unequal Recognition	1.98	± 0.93	1.00 (16) 134	1.73	± 0.52	1.76 (44) 41	-0.252	-0.48, -0.03	0.30	0.029#
Intra Team Rivalry	1.97	± 0.84	1.00 (22) 136	2.29	± 0.60	2.33 (23) 40	0.319	0.08, 0.56	0.40	0.009#

SD, standard deviation; MFV, most frequent value; CI, confidence intervals; female and male BJJ practitioners derived from two independent data collections and compared with the independent-samples t-test.

^aSome of the items had multiple values tied for the most frequently ranked; in these cases, we averaged the values and summarized the frequency.

#Below the Bonferroni-corrected p-value threshold; *Above the Bonferroni-corrected p-value threshold.

Table 3. Correlation coefficients between subscales of the Martial Arts Inventory (MAI).

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. Meditative Training	-							
2. Respectful Discipline	0.18*							
3. Positive Training Environment	0.21*	0.05						
4. Streaming	0.26**	0.12	0.30**					
5. Training Behavior	0.29**	0.15	0.20*	0.29**				
6. Heavy Training	0.01	0.11	-0.17	-0.07	0.04			
7. Goal Orientation	0.22*	0.12	0.26**	0.18*	-0.04	0.06		
8. Physical Challenge	0.13	0.14	0.28**	0.17	0.08	0.17	0.21*	
9. MAI	0.63**	0.32**	0.51**	0.63**	0.58**	0.29**	0.53**	0.47**

*p < 0.05; **p < 0.01

Table 4. Correlation coefficients between goal orientations and higher-order motivational climate scales and the higher-order scale of Martial Arts Inventory (MAI).

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. Task-approach	-							
2. Task-avoidance	0.53**							
3. Self-approach	0.52**	0.47**						
4. Self-avoidance	0.47**	0.79**	0.63**					
5. Other-approach	0.40**	0.51**	0.25*	0.39**				
6. Other-avoidance	0.34**	0.58**	0.30*	0.54**	0.88**			
7. Mastery climate	0.28*	0.23*	0.25**	0.24*	0.10	0.12		
8. Performance climate	0.01	-0.05	0.02	0.01	0.10	0.04	-0.52**	
9. MAI	0.36**	0.24*	0.26*	0.27*	0.07	0.14	0.34**	0.03

*p < 0.05; **p < 0.001

All belt ranks except the black belt scored high on self-avoidance, who had a mean of 1.9 ± 0.6 ($p < 0.001$ for comparison). White belts had 5.1 ± 1.6 , blue belts 4.8 ± 1.8 , purple belts 5.3 ± 1.6 , and brown belts reported 5.9 ± 1.0 . There was no difference in perceived motivational climate among the different belt ranks ($p > 0.05$).

Those who had been an instructor previously perceived the climate as less mastery-orientated (3.8 ± 0.8) than those who were not an instructor (4.4 ± 0.6 , $p = 0.012$) and those who currently were an instructor (4.5 ± 0.5 , $p = 0.006$). The current instructor group had longer BJJ training experience compared to those who had previously been instructors (7.4 ± 4.0 vs. 4.4 ± 2.0 , $p = 0.013$). Competitors and non-competitors differed in goal orientation, with competitors reporting a higher mean of 6.1 ± 0.8 in task-approach goals than non-competitors (5.5 ± 1.3 , $p = 0.002$). Style

preference had no influence on differences in goal orientations, perceived motivational climate and MAI for this female group of BJJ practitioners ($p > 0.05$).

Weekly BJJ training duration had a positive correlation with task-approach goals ($r = 0.21$, $p < 0.05$) and with the higher order scale of MAI ($r = 0.24$, $p < 0.05$). Training experience had a negative correlation with the mastery avoidance goals, task- and self-avoidance ($r = -0.17$ and $r = -0.22$, $p < 0.05$).

Internal consistency

Most of the questionnaire outcome measures had satisfactory internal consistency ($\alpha > 0.7$). The two higher-order scales and most of the subscales on the PMCSQ-2 showed satisfactory internal consistency. In the subscale 'Intra-team member rivalry' ($\alpha = 0.49$) there was observed a low Cronbach's α . There was also

satisfactory internal consistency in the higher-order scale of MAI. Low internal consistency among the subscales 'Respectful discipline' ($\alpha = 0.48$), 'Physical challenge' ($\alpha = 0.29$), 'Streaming' ($\alpha = 0.60$), and a borderline acceptable consistency in 'Meditative training' ($\alpha = 0.67$) were observed. The remaining MAI subscales had acceptable internal consistency.

DISCUSSION

Contrary to our hypothesis, we found that women and men generally reported similar achievement goal orientations. This also contradicts the findings of Albuquerque *et al.* (2015), who found that male BJJ practitioners exhibited higher levels of mastery and performance orientation compared to females. This difference was attributed to men's better preparedness for combat due to their superior average performance, which aligns with previous research (Albuquerque *et al.*, 2015; Duda, 1988, 1989; Gernigon & le Bars, 2000; White & Duda, 1994). Despite the competitive nature of the context, female BJJ practitioners demonstrated a similar emphasis on mastery-approach goals as their male counterparts. This finding is consistent with Gernigon and le Bars (2000) which suggests that a competitive sport that emphasizes winning and performance, also provides opportunities for individuals to focus on mastery goals. Promoting mastery goals in a BJJ setting can seem challenging since a practitioner is pitted against a resisting opponent whose objective is to dominate and potentially harm them (King & Williams, 1997; White & Duda, 1994).

One could argue that the motivations to excel in comparison to others differ from those in traditional individual sports. Unlike other individual sports where practitioners are often physically isolated from their opponents, instructors and practitioners measure skill and progress in BJJ interindividually. Mastery-oriented goals, such as attempting to apply a specific technique during sparring, or performance-oriented goals, such as trying to submit the opponent, are always accompanied by the goal of avoiding submission. By its very nature, BJJ fosters an environment that inherently compels practitioners to strive to evade failure continuously, *i.e.*, avoiding positional inferiority and submission. Given that this is not possible for novice, intermediate, and even many expert practitioners in a large and diverse training group, practitioners are repeatedly exposed to defeat. Øvretveit *et al.* (2018) refers to this as a form of desensitization, which results from constantly cycling through positive and negative combat outcomes and may explain why the practitioners emphasize mastery-oriented goals – demonstrating competence is challenging, and at the early stages of training, nearly impossible.

The other-avoidance goal, which refers to the avoidance of performing worse than others, had the lowest score of all goals among female BJJ practitioners, similar to the male practitioners. Elliot *et al.* (2011) note that preventing the pursuit of such goals is likely to be conducive, as they are a negative predictor of performance. The fact that female and male BJJ practitioners have

comparable goal orientations could be supported by Ryba and Wright (2010), who asked whether females are really that different from men, or if this is socially constructed. Indeed, how people perceive differences between men and women, is often given more importance and discussion than the actual differences themselves (Gill & Kamphoff, 2010).

Notably, women appeared to perceive the overall motivational climate as more mastery-oriented than men. This finding partially agrees with the main findings of Ortega *et al.* (2017), who found that the correlation between mastery climate and performance climate is greater in female than male judokas. In that study, there was not a difference in the performance climate, but both genders did seem to report a high perceived mastery climate and a low performance climate – consistent with our findings. Could this finding be due to socialization and actual expectations that females often are encouraged to focus more on personal growth and improvement than their male counterparts (Klain *et al.*, 2014)? Complicating such questions further, Kavoura (2012) argued that female martial artists cannot be seen as a homogeneous group since they have been socialized into combat sports systems in different cultures and are influenced by various factors such as class, race, gender, sexuality, religion, and age.

A barrier to studying female martial arts practitioners is often a lack of access to representative study participants. In the present study, this challenge was dealt with by recruiting broadly using several different platforms and approaches, resulting in multiple nations being represented in the final study sample. The questionnaire did not ask for the composition of the participants' training group, *i.e.*, whether it was an all-female group or a mixed-sex group (where they are presumably a minority). Being in the minority, they may be more likely to connect with others in similar situations through social media groups or forums, as observed during the data collection. Their specific training group, possibly within a larger group, could have had an impact on the results, which highlights the complexity of understanding female participation in martial arts, as it is shaped by a range of individual and social factors (Channon, 2014; Channon & Jennings, 2013). The fact that women generally appear to perceive the motivational climate as mastery-oriented can be seen as positive, since it energizes adaptive strategies and patterns and correlates with having mastery goals (Pensgaard & Roberts, 2000; Roberts *et al.*, 2018), in line with the findings of the present study. The factors that influence goal orientations and training climate perceptions in this context, however, remain to be fully elucidated.

Mastery-oriented goals correlated positively with a perceived mastery climate. This was not observed in male BJJ practitioners, potentially due to the small sample size. This finding lends support to the reciprocal relationship between goal orientations and training climate (Harwood *et al.*, 2015; Pensgaard & Roberts, 2002; Pensgaard & Roberts, 2000; Roberts, 2012; Roberts *et al.*, 2018). All of the goal orientations correlated positively with each other, suggesting that different achievement goals are related and compatible in the context of achievement motivation (Roberts *et*

al., 2018). The higher-order MAI scale was positively correlated with mastery climate. As MAI quantifies practitioners' training experiences during martial arts training (Sandford et al., 2021), some of these results could also shed light on how the training environment is perceived. The higher-order MAI scale comprises multiple subscales to capture overall training experiences (Sandford et al., 2021). Our findings indicate that individuals who have more positive and fulfilling training experiences in martial arts are more likely to perceive their training environment as focused on mastery, skill development, and personal improvement.

We also found a link between belt rank and goal orientation. All belt ranks, except the highest rank of black belt, scored high on self-avoidance. Black belts, with their higher level of proficiency, exhibited lower fear of failure compared to lower ranks. Their extensive training and experience enhance their skills and reduce the likelihood of performing poorly or experiencing defeat in sparring. Somewhat surprisingly, brown belts scored the highest on self-avoidance. The transition from brown to black belt represents the final conventional belt promotion in BJJ and generally reflects a deep understanding of the sport, accompanied by increased expectations associated with the rank. It is important to note that there are large interindividual skill differences at each belt rank, and perhaps the most at the black belt level. However, the expectations associated with higher ranks may give rise to detrimental mindsets and behaviors, such as performance-avoidance. As a practitioner becomes more skilled and experienced, changes in their environment may occur, such as an improvement in their rank and thus placement in the rank hierarchy, which can influence goal orientations.

Offensive and defensive techniques in BJJ are not necessarily associated with any specific achievement goals (Øvretveit et al., 2018). However, female BJJ practitioners, who tend to prioritize mastery approach goals, may view being submitted as an opportunity to enhance their defensive skills. This mindset is reflected in the training dynamics where some practitioners, often higher belts, willingly relinquish dominant positions to less skilled practitioners for training purposes, emphasizing a proactive and defensive approach aligned with self-improvement goals. In contrast, practitioners with avoidance goals may be less inclined to adopt this strategy. Additionally, individual tendencies play a role in how practitioners adjust their use of force during competitions, influenced by factors such as the size and rank of their opponents. This suggests that the application of offensive and defensive techniques can vary based on personal preferences. Practitioners with a mastery approach are likely to respond better to 'failure' in the conventional sense, which may lead to distinctly different training approaches compared to those who prioritize performance. Descriptions of achievement goals and perceptions of the training environment can thus serve as predictors of training approaches, such as embracing the possibility of losing to enhance defensive techniques (Øvretveit et al., 2018).

Training experience had a negative correlation with mastery avoidance goals, task- and self-avoidance. More extensive training

experience was associated with a stronger inclination towards mastery-oriented goals and a greater willingness to tackle challenges, indicating that training experience influences the motivational orientation of BJJ practitioners. This is consistent with some previous research (Duda, 1988), but contrasts the findings of Gernigon and le Bars (2000), who observed that as aikido practitioners gained more experience, their inclination towards mastery-oriented goals decreased. Weekly BJJ training duration was positively associated with the mastery goal task-approach, similar to what has previously been reported in male practitioners (Øvretveit et al., 2018), and with the higher order of MAI, indicative of an association between training volume and a greater focus on mastery-related training objectives.

Perceptions of the motivational climate did not differ as a function of competition status, but did, as hypothesized, as a function of gender. Additionally, there was a discrepancy between female competitors and non-competitors in goal orientations, with competitors scoring higher on task-approach goals, somewhat inconsistent with previous assertions (King & Williams, 1997; White & Duda, 1994). In BJJ, practitioners are routinely forced to tap out, essentially give in, to a submission hold, especially in the early stages of training and competition. The frequency with which they are forced to 'lose' may contribute to the high task-approach scores observed among competitors, where failure might be seen as an opportunity to learn and improve, which can lead to a mastery-oriented approach and a focus on skill development (Ribeiro, 2008).

STRENGTHS AND LIMITATIONS

The present study included a diverse athlete population with nationalities spanning six continents, offering a broad perspective on the training motivations and experiences of female BJJ practitioners. This diversity improves the generalizability of the findings and allows for a more comprehensive understanding of these aspects of martial arts training in similar populations. For the data collection, we used validated instruments that have been applied in similar research previously, enabling direct comparisons with male practitioners and adding to the overall research on motivational dynamics in BJJ practitioners. Although there were BJJ athletes participating in the development of the MAI questionnaire, this is, to the best of our knowledge, the first study that applies it exclusively to a large BJJ population.

The study also had some limitations. As pointed out by one participant, although the questionnaire aimed to explore motivation in the context of BJJ, it did not necessarily fully capture all motivating factors to engage in this specific activity, which is often as simple as having fun and escaping from the pressures of life outside the training mats. Furthermore, not all questionnaire scales had acceptable internal consistency, potentially obfuscating related findings. We also only considered the two biological sexes in the questionnaire, which can be seen as exclusionary as it does not take into account other gender identities that participants may identify with. Lastly, due to the

cross-sectional study design, we cannot determine the direction of the observed associations, e.g., whether BJJ selects for or produces these motivational characteristics.

CONCLUSION

This study investigated motivational dynamics among female BJJ practitioners and found that they share an emphasis on mastery approach goals with their male counterparts. There was, however, a notable difference in the perceptions of the motivational climate, with female practitioners perceiving the climate as more mastery oriented. The MAI was associated with both mastery goals and a mastery climate, suggesting that it is an appropriate tool for assessing training experiences and their association with mastery-oriented motivational factors. Overall, these observations provide a novel description of an underrepresented athlete population, with the inclusion of a comparative analysis with data from a male study sample elucidating both general and gender-specific attributes that can help aid coaches and practitioners in how to approach BJJ training.

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Data Accessibility Statement

The data that support the findings of this study are available upon reasonable request.

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