

Does Combat-Sport Exposure Predict Aggression? The Roles of Training Experience, Competition Exposure, and Psychological Regulation

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Abstract

Combat sports expose athletes to sanctioned interpersonal confrontation while demanding restraint, tactical control, and emotional composure. This cross-sectional study examined whether training experience and recent competition exposure were associated with dispositional aggression after psychological regulation was considered in 320 Sri Lankan combat-sport athletes (230 men, 90 women; age $M = 24.80$ years, $SD = 4.31$). Aggression was assessed with the Buss-Perry Aggression Questionnaire, emotion dysregulation with the Difficulties in Emotion Regulation Scale-Short Form, and self-control with the Brief Self-Control Scale. Hierarchical regression entered age and sex first, training years and competitions in the previous 12 months second, and emotion dysregulation and self-control third. Training years ($r = -.04$, $p = .512$) and competition count ($r = .01$, $p = .812$) showed no evidence of bivariate association with total aggression; adding both exposure indicators increased R^2 by less than .001. The final model explained 48.3% of aggression variance. Greater emotion dysregulation was independently associated with higher aggression ($\beta = .57$, $p < .001$), whereas greater self-control was associated with lower aggression ($\beta = -.20$, $p < .001$). Training years remained near zero, and the confidence interval for competition count included zero. Exploratory analyses identified a positive association between competition frequency and Physical Aggression ($\beta = .17$, $p = .002$), but not Anger or Hostility. Sensitivity analyses reproduced the central pattern. Because the design was cross-sectional and psychological measures were self-reported, causal inference is not warranted. Within the observed exposure ranges, the data do not support a simple linear exposure-dose account of global aggression.

Keywords:

Aggression; Combat Sports; Emotion Dysregulation; Self-Control; Competition Exposure.

Introduction

Combat sports create an unusually sharp test of theories of aggression. Boxing, karate, taekwondo, kickboxing, Muay Thai, judo, wrestling, mixed martial arts, and related disciplines require athletes to rehearse and execute forceful interpersonal actions. Yet successful participation depends on the opposite capacity as well: athletes must respect boundaries imposed by rules, inhibit illegal or tactically poor responses, tolerate pain and provocation, and remain goal directed under intense arousal. The same environment can therefore be construed either as repeated practice of aggressive behavior or as repeated practice in regulating aggressive impulses. That tension is not semantic. It bears directly on whether greater training and competition exposure should be expected to increase aggression, decrease it, or have little independent relation to aggression once individual regulatory characteristics are considered.

The General Aggression Model offers a useful framework for this problem because it does not treat aggression as the inevitable product of a single exposure. Aggressive behavior emerges from interactions between person factors and situational inputs that influence cognition, affect, and arousal, followed by appraisal and decision processes (Anderson & Bushman, 2002). Combat-sport experience may constitute a recurrent situational context, but the behavioral consequence of that context should depend on how athletes process emotional activation, inhibit impulses, and interpret confrontation. From this perspective, years of training or number of competitions are incomplete proxies for aggression risk unless the athlete's regulatory capacities are also modeled.

A second complication is measurement. The Buss-Perry Aggression Questionnaire (BPAQ) conceptualizes aggression as four related but distinguishable components: Physical Aggression, Verbal Aggression, Anger, and Hostility (Buss & Perry, 1992). Physical and verbal aggression index behavioral tendencies, anger represents an affective component, and hostility captures antagonistic cognitions. This multidimensionality matters especially in combat sports. Readiness to engage physically within a regulated contest may overlap more strongly with the behavioral content of Physical Aggression than with chronic anger or hostile attribution. If exposure has a selective relation to physical confrontation but not to anger or hostility, a total aggression score may legitimately show little association. Domain-specific analyses are therefore necessary, but they should be interpreted alongside scale reliability and the distinction between sanctioned competitive behavior and maladaptive aggression.

The empirical literature has never supported a simple consensus. In their systematic review, Lafuente et al. (2021) found that the available intervention and cohort evidence did not establish an overall increase or decrease in anger and aggression associated with martial-arts and combat-sport practice. The review did suggest that traditional programs containing explicit philosophical and self-regulatory components may be associated with more favorable outcomes, but study quality and heterogeneity limited strong inference. Broader adult evidence is similarly mixed. Ciacconi et al. (2024), reviewing 72 observational studies of martial arts and combat sports, concluded that evidence concerning self-related constructs and ill-being was limited or inconsistent. Among youth, even meta-analyses point in different directions depending on study design and style: Gubbels et al. (2016) found no overall association between martial-arts participation and externalizing behavior, whereas Harwood et al. (2017) reported improvement in aggression-related externalizing outcomes in longitudinal and intervention studies. A 2026 network meta-analysis likewise suggested that effects in young people vary across martial-arts modalities rather than conforming to a single exposure effect (Wang et al., 2026).

Older work anticipated this contextual explanation. Nosanchuk (1981) reported an inverse association between traditional karate experience and aggressiveness, whereas Nosanchuk and MacNeil (1989) subsequently found that the direction of the training-duration association differed between traditional and modern training contexts. Those studies were small and predate contemporary psychometric and causal standards, but the conceptual point remains important: duration alone cannot encode pedagogy. Years spent in a setting organized around ritual, restraint, respect, and controlled technical practice may have a different psychological meaning from equivalent duration in a setting that emphasizes dominance without comparable self-regulatory norms.

Recent studies continue to challenge an exposure-dose account. In 219 martial-arts and combat-sport athletes, Kistorz and Sas-Nowosielski (2021a) found that training experience and rank did not significantly differentiate BPAQ aggression dimensions. In a related analysis, the same authors

reported that motivational regulation was more informative than the martial-art/combat-sport distinction alone (Kostorz & Sas-Nowosielski, 2021b). Zvi and Lavi (2026) similarly found that martial-arts practitioners reported lower aggression than contact-sport and non-sport comparison groups, while longer martial-arts training was associated with higher self-control and favorable personality characteristics that, in turn, related to lower aggression. The implication is not that training necessarily produces those characteristics; cross-sectional selection and retention remain plausible. The more defensible inference is that psychological functioning may sit closer to aggression than raw exposure duration.

Competition exposure deserves separate treatment from training duration. Training years represent accumulated involvement, whereas the number of competitions entered over a recent period reflects repeated exposure to evaluative, adversarial situations in which physical dominance is explicitly rewarded within rules. Competitive encounters can heighten physiological arousal, threat appraisal, frustration, and provocation. Across sports, athletes in higher-contact disciplines have sometimes reported higher aggression-related scores than athletes in lower-contact sports (Sofia & Cruz, 2017). Yet competitive expertise can also be accompanied by tactical restraint and habituation to confrontation. It is therefore plausible that competition frequency relates specifically to physical-aggression tendencies without extending to anger, hostility, or total aggression.

Psychological regulation provides a more proximal mechanism. Emotion dysregulation encompasses difficulties accepting emotional states, maintaining goal-directed behavior during distress, controlling impulses, identifying emotions clearly, and accessing effective regulatory strategies. The DERS-SF captures these difficulties in a concise format (Kaufman et al., 2016). A large systematic review and meta-analysis of 171 studies involving more than 250,000 participants found that difficulties regulating emotion were reliably associated with greater aggression; effects were particularly relevant to reactive aggression and impulse-control difficulties (Smith et al., 2026). This literature is directly compatible with the General Aggression Model: emotional arousal is not sufficient for aggression, but impaired regulation can increase the probability that arousal is translated into aggressive responding.

Combat-sport-specific evidence is emerging. Kuśnierz et al. (2026) examined Brazilian jiu-jitsu, karate, wrestling, and mixed martial arts athletes and found that most associations between cognitive reappraisal or expressive suppression and aggression were small, with limited evidence of discipline moderation. Their study used a different emotion-regulation framework from the DERS, but it illustrates why regulation and exposure need to be modeled simultaneously rather than treated as rival explanations. In addition, the present Sri Lankan dataset permits use of a locally informed DERS-SF scoring approach. A recent Sinhala psychometric evaluation found excellent reliability and better fit for a five-factor solution excluding the Awareness subscale than for the original six-factor structure (Weerasinghe et al., 2025). That evidence provides a culturally relevant rationale for a five-factor DERS-SF score in the primary analysis.

Self-control is related to emotion regulation but is not reducible to it. The Brief Self-Control Scale (BSCS) assesses dispositional capacity to inhibit impulses, resist short-term temptations, and sustain goal-directed behavior (Tangney et al., 2004). Experimental and theoretical work has long linked failures of self-control with aggression (Denson et al., 2012; DeWall et al., 2011), and a meta-analysis of 58 studies reported a moderate inverse association between self-control and aggression (Lei et al., 2020). Within martial arts, Wilkinson (2023) found greater self-control and lower verbal aggression, hostility, and anger among participants than nonparticipants. Zvi and Lavi (2026) likewise identified self-control as a plausible psychological pathway linking longer training with lower aggression. These findings make it important to estimate the contribution of self-control after emotion dysregulation is already in the model; otherwise, the two regulatory constructs can be conflated.

Sri Lanka is a particularly useful setting in which to test these competing explanations. A prior national-level Sri Lankan comparison did not find higher total aggression among combat-sport athletes than non-combat-sport athletes, challenging a straightforward stereotype that combat-sport participation itself produces generalized aggression (Deva Adithiya et al., 2022). What remains unresolved is the within-combat-sport question: among athletes who already participate, does greater exposure predict greater aggression, or are regulatory characteristics more informative? The present dataset also spans nine disciplines, multiple competitive levels, three questionnaire languages, and 22 anonymized recruitment sites, allowing the exposure question to be examined across a heterogeneous Sri Lankan combat-sport sample rather than within a single discipline.

The present study tested the relative roles of accumulated training experience, recent competition exposure, emotion dysregulation, and self-control in predicting dispositional aggression. The primary outcome was BPAQ total aggression. Training experience was operationalized as years of combat-sport training; recent competition exposure was operationalized as the number of competitions in the previous 12 months. Age and sex were treated as covariates. Three predictions guided the primary model. First, given the inconsistent literature, training years and competition frequency were expected to explain little unique variance in total aggression after age and sex were controlled. Second, greater emotion dysregulation was expected to predict higher aggression. Third, greater self-control was expected to predict lower aggression independently of emotion dysregulation. Exploratory analyses then examined BPAQ domains and tested whether the principal conclusions survived alternative scoring, missing-data treatment, nonlinear exposure effects, discipline and competition-level adjustment, site clustering, and exposure-by-regulation interactions.

Method

Design and Analytic Sample

The study used a cross-sectional observational design. The analytic workbook contained 320 participant records. Ages ranged from 18 to 37 years ($M = 24.80$, $SD = 4.31$; $n = 319$). The sample comprised 230 men (71.9%) and 90 women (28.1%). Participants identified a primary combat sport as karate ($n = 73$), boxing ($n = 55$), taekwondo ($n = 54$), kickboxing ($n = 39$), Muay Thai ($n = 36$), judo ($n = 21$), wrestling ($n = 19$), Wushu/Sanda ($n = 17$), or mixed martial arts ($n = 6$). Recruitment spanned all nine provinces of Sri Lanka and 22 anonymized recruitment sites. Recorded competition level ranged from recreational through international, reflecting heterogeneity in current competitive level despite the requirement for previous competition experience.

Recruitment, eligibility, and sampling. Data were collected between August and December 2024. Participants were recruited by the research team from combat-sport clubs and gyms, training centres, and competitive events using proportionate stratified random sampling, with province and sex defining the strata. Provincial allocations reflected the relative distribution of athletes across provinces while maintaining sex representation. Participation was entirely voluntary and no financial or other incentives were provided. Eligible participants were Sri Lankan athletes aged 18 years or older who were actively training in a recognized combat sport at recruitment, had previous competitive experience, and could understand Sinhala, Tamil, or English. No minimum duration of combat-sport training was required. Participants were excluded if they reported a diagnosed psychiatric disorder, were currently receiving psychiatric treatment or taking psychotropic medication, had a neurological disorder, had a current serious injury that could interfere with participation, or had a substance-use or intoxication-related condition that could compromise valid questionnaire completion. More than 500 athletes were approached and screened; individuals who did not satisfy the inclusion criteria or met an exclusion criterion were not retained, and 320 eligible athletes comprised the final dataset.

Sample-size determination. The recruitment target was calculated before data collection using Cochran's formula, assuming a 50% expected prevalence, a 95% confidence level, and a 5% margin of error. A 10% allowance for anticipated nonresponse or incomplete participation was incorporated, producing a target sample size of 422. The achieved final sample was 320 eligible athletes.

Participants reported a mean of 8.91 years of combat-sport training ($SD = 5.39$, range = 0.5-23.0), 3.72 training sessions per week ($SD = 1.44$), and a mean session duration of 103.05 minutes ($SD = 25.95$). They reported a mean of 5.56 competitions in the previous 12 months ($SD = 2.90$, range = 0-13). All participants were recruited face-to-face and completed the questionnaire electronically through a QR-linked online form. The questionnaire language was Sinhala for 231 participants, English for 62, and Tamil for 26; one language value was missing.

Questionnaires were available in Sinhala, English, or Tamil. The original English BPAQ, DERS-SF, and BSCS were administered without wording changes. Sinhala and Tamil versions were translated from the original instruments and pilot tested before study administration. Formal measurement invariance across the three language versions was not evaluated; accordingly, the analyses do not assume cross-language equivalence. Questionnaire language was included in a sensitivity model, and cross-language mean differences are interpreted cautiously.

Instrument language versions. The study used the original English forms without wording modification and translated, pilot-tested Sinhala and Tamil forms. Because formal measurement invariance was not established within this sample, language-specific effects were treated as a sensitivity issue rather than as evidence of substantive group differences.

Measures

Aggression. Aggression was measured with the 29-item Buss-Perry Aggression Questionnaire (BPAQ; Buss & Perry, 1992). Items are rated from 1 to 5. Items 9 and 16 were reverse scored. The study scoring key yielded Physical Aggression (9 items), Verbal Aggression (5 items), Anger (7 items), Hostility (8 items), and a total score formed from the four subscales. When limited item-level data were missing, a subscale was prorated as the observed-item mean multiplied by the nominal number of subscale items and rounded to the nearest whole point; at least 8 of 9 Physical Aggression items, 4 of 5 Verbal Aggression items, 6 of 7 Anger items, and 7 of 8 Hostility items were required. A total score was calculated only when all four subscales were available. Recalculation from the item-level data confirmed the derived workbook scores. Among complete-item responders, internal consistency was high for the 29-item BPAQ total ($\alpha = .91$; $n = 187$) and for Physical Aggression ($\alpha = .87$; $n = 250$), Verbal Aggression ($\alpha = .82$; $n = 291$), Anger ($\alpha = .80$; $n = 287$), and Hostility ($\alpha = .86$; $n = 271$).

Emotion dysregulation. Emotion-regulation difficulties were assessed using the 18-item Difficulties in Emotion Regulation Scale-Short Form (DERS-SF; Kaufman et al., 2016). Items are rated on a five-point response scale, with higher scores indicating greater regulatory difficulty. Awareness items 1, 4, and 6 are reverse scored in the conventional 18-item total. The workbook contained both the original 18-item total and a 15-item five-factor score excluding Awareness. A Sinhala Sri Lankan psychometric evaluation reported better fit for a five-factor structure excluding Awareness (Weerasinghe et al., 2025); accordingly, DERS_SL_5Factor_15 was used as the primary emotion-dysregulation score for the present analysis. The workbook prorated this score when at least 12 of 15 relevant items were present, using the observed-item mean multiplied by 15 and rounded to the nearest whole point. Internal consistency across the 15 items was good among complete-item responders ($\alpha = .88$; $n = 228$). The conventional 18-item total, prorated when at least 15 items were present and rounded to the nearest whole point, was used in sensitivity analysis.

Self-control. Dispositional self-control was assessed with the 13-item Brief Self-Control Scale (BSCS; Tangney et al., 2004). Items 2, 3, 4, 5, 7, 9, 10, 12, and 13 were reverse scored so that higher totals represented greater self-control. When at least 11 of 13 items were available, the workbook prorated the score as the observed-item mean multiplied by 13 and rounded to the nearest whole point. Internal consistency among complete-item responders was good ($\alpha = .88$; $n = 216$).

Combat-sport exposure. Accumulated training experience was represented by Training_Years. Recent competition exposure was represented by Competitions_Last_12M, the reported number of competitions during the previous 12 months. These two variables were used in the primary exposure block because they map directly onto the study question while separating cumulative experience from recent competitive exposure. Sessions per week, average session duration, competition level, and discipline were retained for sensitivity analyses rather than added to the primary exposure block.

Covariates. Age and sex were included in the primary model. Sex was coded 0 for male and 1 for female. The choice was based on prior aggression literature and combat-sport research showing that physical-aggression scores can differ by sex (Buss & Perry, 1992; Kistorz & Sas-Nowosielski, 2021a). No causal interpretation was attached to the sex coefficient.

Statistical Analysis

Analyses were conducted in Python 3.13.5 using NumPy 2.3.5, SciPy 1.17.0, statsmodels 0.14.6, and scikit-learn 1.8.0. The participant-level workbook was checked against its variable codebook and scoring sheet before analysis, including item ranges, reverse scoring, proration thresholds, and derived-score reconstruction. Descriptive statistics summarized demographic, exposure, and psychological variables. Pearson correlations characterized bivariate associations among BPAQ total aggression, training years, recent competition count, DERS-SF five-factor emotion dysregulation, and BSCS self-control.

The primary inferential analysis was hierarchical ordinary least-squares regression with BPAQ total aggression as the dependent variable. Model 1 included age and sex. Model 2 added training years and competitions in the previous 12 months. Model 3 added DERS-SF five-factor emotion dysregulation and BSCS self-control. This ordering tested whether combat-sport exposure improved prediction beyond demographic covariates and whether psychological regulation improved prediction beyond both covariates and exposure. Unstandardized coefficients, HC3 heteroscedasticity-consistent standard errors, 95% confidence intervals, p values, standardized β coefficients, R^2 , adjusted R^2 , and ΔR^2 were examined. Conventional nested-model F tests quantified incremental model fit; HC3 inference was used for coefficient-level tests in every regression model.

Primary regression analyses used complete cases. Of 320 records, 273 (85.3%) contained complete data for BPAQ total aggression and all six primary predictors. Complete-case inclusion was not associated with age, sex, observed BPAQ total aggression, training years, or recent competition count (all $p > .15$ for continuous variables; sex chi-square $p = .329$). Model diagnostics included variance inflation factors, residual distribution, Breusch-Pagan testing, and Cook's distance. All predictor variance inflation factors were below 2.7. The Breusch-Pagan test did not indicate statistically significant heteroscedasticity, and residuals were approximately normal. HC3 standard errors were nevertheless retained to reduce sensitivity to residual variance irregularities.

Exploratory domain regressions applied the final predictor set separately to Physical Aggression, Verbal Aggression, Anger, and Hostility. Domain-specific and robustness-test p values were not adjusted for multiplicity and were interpreted as exploratory rather than confirmatory. Sensitivity analyses were specification focused. First, the conventional DERS-SF 18-item total replaced the Sri Lanka-oriented five-factor score. Second, quadratic terms tested nonlinear associations for training years and competition frequency. Third, four centered interaction terms tested whether emotion dysregulation or self-control moderated either exposure variable. Fourth, models added weekly training frequency and session duration, questionnaire language, combat-sport fixed effects, or competition-level fixed effects. Fifth, coefficient standard errors were clustered by the 22 recruitment sites with small-sample t inference. Finally, missing-data sensitivity analysis used 30 stochastic chained-equation imputations implemented with scikit-learn IterativeImputer, BayesianRidge conditional models, posterior sampling, mean initialization, 20 iterative cycles, and random seeds 1 through 30. BPAQ total aggression, age, sex, training years, competition count, DERS-SF five-factor score, and BSCS total were included jointly in the imputation system. The primary regression was fit in each completed dataset, and coefficients and within-imputation covariance matrices were pooled using Rubin's rules.

Ethics

Ethical approval was obtained from the Ethics Review Committee of KIU, Sri Lanka (KIU/ERC/20/42). Participants were approached face-to-face and provided with a QR code linking to the online questionnaire. The QR-linked form first displayed the participant information sheet and electronic informed-consent page. Participants indicated consent by ticking a checkbox and selecting "I agree" and could proceed to the questionnaires only after providing consent. The information sheet stated that participation was voluntary, withdrawal was possible before submission, and responses would be confidential and anonymized. No directly identifying information, including names, national identity-card numbers, telephone numbers, email addresses, or athlete-registration numbers, was collected. No protocol amendments relevant to recruitment, eligibility, questionnaire administration, or the present analyses were made.

Results

Participant Characteristics and Scale Descriptives

BPAQ total aggression was available for 298 participants and averaged 79.17 (SD = 16.70; range = 40-131). Mean Physical Aggression was 22.02 (SD = 6.73), Verbal Aggression 15.17 (SD = 4.28), Anger 20.79 (SD = 5.40), and Hostility 21.25 (SD = 6.15). The mean DERS-SF five-factor score was 40.17 (SD = 10.07), while mean BSCS total self-control was 44.78 (SD = 9.26). Descriptive characteristics are reported in Table 1.

Table 1
Participant and Study Characteristics

Characteristic	n (%) or M (SD)	Range
Age, years	24.80 (4.31)	18-37
Male sex	230 (71.9%)	-
Female sex	90 (28.1%)	-
Training experience, years	8.91 (5.39)	0.5-23.0
Training sessions/week	3.72 (1.44)	1-7
Average session, minutes	103.05 (25.95)	40-180
Competitions, previous 12 months	5.56 (2.90)	0-13
BPAQ total aggression	79.17 (16.70)	40-131
DERS-SF five-factor score	40.17 (10.07)	19-70
BSCS total self-control	44.78 (9.26)	15-65

Note. Denominators vary because of missing values. BPAQ = Buss-Perry Aggression Questionnaire; DERS-SF = Difficulties in Emotion Regulation Scale-Short Form; BSCS = Brief Self-Control Scale.

Bivariate Associations

The bivariate pattern did not support a monotonic exposure-aggression gradient. Training years showed no evidence of a linear association with total aggression, $r = -.04$, $p = .512$, and recent competition count likewise showed no evidence of association, $r = .01$, $p = .812$. Emotion dysregulation showed a strong positive association with aggression, $r = .67$, $p < .001$, whereas self-control showed a substantial inverse association, $r = -.52$, $p < .001$. Emotion dysregulation and self-control were moderately to strongly inversely correlated, $r = -.58$, $p < .001$, but the association was not large enough to suggest statistical redundancy. Training years were unrelated to either regulatory measure. Competition count showed a small positive correlation with self-control, $r = .17$, $p = .004$, but not with emotion dysregulation.

Table 2 Pearson Correlations among Primary Study Variables

Variable	1	2	3	4	5
1. BPAQ total	-				
2. Training years	-.04	-			
3. Competitions/12 months	.01	-.03	-		
4. DERS-SF five-factor	.67***	-.02	-.07	-	
5. BSCS total	-.52***	.06	.17**	-.58***	-

Note. Pairwise n values range from 285 to 313. ** $p < .01$. *** $p < .001$.

Hierarchical Prediction of Total Aggression

The demographic model explained effectively none of the variance in total aggression, $R^2 = .002$, adjusted $R^2 = -.006$, $F(2, 270) = 0.25$, $p = .777$. Neither age nor sex was associated with BPAQ total aggression. Adding training years and recent competition frequency in Model 2 changed R^2 by only .0003. The incremental exposure block was not significant, $\Delta F(2, 268) = 0.04$, $p = .960$, and Model 2 remained non-significant overall, $R^2 = .002$, adjusted $R^2 = -.013$, $F(4, 268) = 0.15$, $p = .965$. The model changed sharply when emotion dysregulation and self-control were added. Model 3 explained 48.3% of total aggression variance, $R^2 = .483$, adjusted $R^2 = .472$, $F(6, 266) = 41.50$, $p < .001$. The two psychological-regulation variables added 48.1 percentage points of explained variance beyond age, sex, training experience, and recent competition exposure, $\Delta R^2 = .481$, $\Delta F(2, 266) = 123.93$, $p < .001$.

Emotion dysregulation was the largest independent predictor. Holding all other variables constant, each one-point increase in the DERS-SF five-factor score corresponded to a 0.93-point higher BPAQ total score, $B = 0.93$, $HC3\ SE = 0.11$, 95% CI [0.73, 1.14], $\beta = .57$, $p < .001$. Self-control contributed independently in the opposite direction: each one-point increase in BSCS total score corresponded to a 0.36-point lower BPAQ total score, $B = -0.36$, $HC3\ SE = 0.10$, 95% CI [-0.56, -0.15], $\beta = -.20$, $p < .001$.

Neither primary exposure variable showed evidence of an independent linear association with total aggression in the final model. The training-years estimate was near zero, $B = 0.01$, 95% CI [-0.46, 0.47], $\beta = .002$, $p = .977$. Recent competition count showed a small positive estimate, $B = 0.40$, 95% CI [-0.12, 0.93], $\beta = .07$, $p = .132$. Both confidence intervals included effects around zero. Because no smallest effect of interest or equivalence bounds were defined, these nonsignificant estimates should not be interpreted as proof of equivalence. Age and sex also remained non-significant. Full model coefficients are shown in Table 3.

Table 3 Hierarchical Regression Models Predicting BPAQ Total Aggression

Predictor	Model 1 B (HC3 SE)	Model 2 B (HC3 SE)	Model 3 B (HC3 SE)	Model 3 95% CI	β	p
Age	-0.08 (0.25)	-0.00 (0.41)	0.05 (0.29)	[-0.51, 0.62]	.01	.859
Female sex	1.44 (2.36)	1.42 (2.37)	-1.24 (1.66)	[-4.52, 2.03]	-.03	.455
Training years	-	-0.08 (0.32)	0.01 (0.24)	[-0.46, 0.47]	.002	.977
Competitions/12 months	-	0.04 (0.37)	0.40 (0.27)	[-0.12, 0.93]	.07	.132
DERS-SF five-factor	-	-	0.93 (0.11)	[0.73, 1.14]	.57	< .001
BSCS total	-	-	-0.36 (0.10)	[-0.56, -0.15]	-.20	< .001

Note. $n = 273$ for all models. Model 1: $R^2 = .002$, adjusted $R^2 = -.006$. Model 2: $R^2 = .002$, adjusted $R^2 = -.013$, $\Delta R^2 < .001$, $\Delta F(2, 268) = 0.04$, $p = .960$. Model 3: $R^2 = .483$, adjusted $R^2 = .472$, $\Delta R^2 = .481$, $\Delta F(2, 266) = 123.93$, $p < .001$. Female coded 1, male 0. HC3 robust standard errors are reported for coefficient estimates in all three models; β values and 95% CIs refer to Model 3.

Exploratory Aggression-Domain Models

Emotion dysregulation predicted each BPAQ domain after adjustment: Physical Aggression ($\beta = .28$, $p = .001$), Verbal Aggression ($\beta = .43$, $p < .001$), Anger ($\beta = .48$, $p < .001$), and Hostility ($\beta = .49$, $p < .001$). Self-control independently predicted lower Anger ($\beta = -.20$, $p < .001$) and lower Hostility ($\beta = -.26$, $p < .001$), whereas its adjusted coefficients for Physical and Verbal Aggression were not statistically significant.

Recent competition exposure showed one domain-specific association. A greater number of competitions in the previous 12 months was associated with higher Physical Aggression after age, sex, training years, emotion dysregulation, and self-control were controlled, $B = 0.40$, $HC3\ SE = 0.13$, 95% CI [0.14, 0.66], $\beta = .17$, $p = .002$. Competition count was not significantly associated with Verbal Aggression, Anger, or Hostility. Female sex was associated with lower Physical Aggression, $B = -2.08$, $\beta = -.14$, $p = .016$. Training years showed no evidence of association with any of the four BPAQ domains. Because these domain models were exploratory and multiple p values were examined, the isolated competition-frequency finding should be interpreted as a secondary signal requiring replication.

Table 4 Adjusted Standardized Effects in Exploratory BPAQ Domain Models

Outcome	n	Competition β (p)	DERS-SF β (p)	BSCS β (p)	R^2
Physical aggression	280	.17 (.002)	.28 (.001)	-.05 (.556)	.125
Verbal aggression	287	-.04 (.451)	.43 (<.001)	-.09 (.151)	.249

Anger	289	-.03 (.520)	.48 (<.001)	-.20 (<.001)	.393
Hostility	287	.05 (.277)	.49 (<.001)	-.26 (<.001)	.456

Note. All models also adjusted for age, sex, and training years. Coefficients shown are standardized β values. Domain-specific p values are unadjusted for multiplicity and should be interpreted as exploratory. DERS-SF = Difficulties in Emotion Regulation Scale-Short Form; BSCS = Brief Self-Control Scale.

Sensitivity Analyses

The principal conclusion was not dependent on the Sri Lanka-oriented DERS scoring choice. Among the same 273 complete cases, replacing the 15-item five-factor score with the conventional 18-item DERS-SF total produced $R^2 = .462$; emotion dysregulation remained strongly positive ($\beta = .53$, $p < .001$), self-control remained independently negative ($\beta = -.23$, $p < .001$), and both training years ($p = .980$) and recent competition count ($p = .139$) remained non-significant.

Among the 273 complete cases, the null exposure pattern was also not explained by simple nonlinearity. Adding squared terms for centered training years and competition count increased R^2 by only .0014, F change(2, 264) = 0.37, $p = .692$; neither quadratic coefficient was significant with HC3 inference. Four exposure-by-regulation interaction terms likewise added little explanatory power, $\Delta R^2 = .004$, F change(4, 262) = 0.52, $p = .718$, and all interaction p values exceeded .51. Thus, within the observed ranges, there was no evidence that emotion dysregulation or self-control systematically altered the slope linking either training years or recent competition frequency to total aggression.

Adjustment for broader sport context among 273 complete cases did not overturn the primary pattern. Adding fixed effects for combat-sport discipline increased total R^2 to .517; training years remained null ($p = .928$), emotion dysregulation and self-control remained significant (both $p < .001$), and competition count remained below the conventional significance threshold ($p = .063$). Adding competition-level fixed effects produced $R^2 = .487$, with none of the competition-level categories differing significantly from the recreational reference and the regulation coefficients essentially unchanged. Recruitment-site clustered standard errors, also based on 273 complete cases across 22 sites, preserved the conclusions: $p = .981$ for training years, $p = .153$ for competition count, $p < .001$ for emotion dysregulation, and $p = .004$ for self-control.

A model based on 272 complete cases that additionally adjusted for questionnaire language yielded the same exposure and regulation conclusions. The English-language form was associated with a modestly higher BPAQ total score relative to Sinhala in that specification ($B = 4.35$, $p = .019$), whereas the Tamil-language coefficient was not significant ($p = .373$). This language difference cannot be interpreted as a measurement artifact from these data alone, but it strengthens the case for formal measurement-invariance work across Sinhala, Tamil, and English forms.

In the 268 complete cases with training-load data, when current training load was added, sessions per week showed a modest positive association with total aggression ($B = 1.47$, $p = .027$), while average session duration was non-significant and the original training-years and competition-count effects remained null. Emotion dysregulation and self-control remained significant. This exploratory signal suggests that current training frequency may capture a different dimension of exposure from accumulated years and deserves separate prospective study rather than post hoc redefinition of the primary exposure construct.

Finally, the missing-data sensitivity analysis across 30 stochastically imputed datasets, using all 320 participant records, reproduced the complete-case pattern. Rubin-pooled coefficients were -.03 for training years ($p = .897$), 0.42 for competition count ($p = .107$), 0.90 for emotion dysregulation ($p < .001$), and -.36 for self-control ($p < .001$). Agreement in direction and substantive interpretation between complete-case and imputed analyses reduces concern that the principal findings were driven by exclusion of incomplete records.

Discussion

The central result is straightforward but theoretically consequential: accumulated combat-sport exposure showed little explanatory value for global aggression in the fitted linear models. Years of training showed no evidence of a linear association with total aggression before or after adjustment. Recent competition frequency likewise was not independently associated with total BPAQ aggression

in the primary model. By contrast, emotion dysregulation and self-control transformed an otherwise uninformative regression into a model explaining nearly half of the variance in aggression. The standardized coefficient for emotion dysregulation was large ($\beta = .57$), and self-control contributed unique inverse variance even after their overlap was accounted for ($\beta = -.20$). Within the observed exposure ranges, regulatory functioning was substantially more informative about global aggression than training duration or recent competition frequency.

That pattern fits poorly with a simple social-learning interpretation in which repeated exposure to forceful interpersonal behavior progressively strengthens generalized aggressive tendencies. It fits more comfortably with the General Aggression Model, which treats aggressive outcomes as products of situational inputs interacting with person-level processes of affect, cognition, arousal, and appraisal (Anderson & Bushman, 2002). Combat-sport participation provides recurrent exposure to confrontation, but exposure occurs inside rule systems that also demand inhibition, rapid reappraisal, and behavioral control. The present data cannot establish that training develops those capacities. They do show, however, that person-level regulatory characteristics are much closer statistical correlates of aggression than exposure duration.

The null training-years effect is not an isolated finding. Kistorz and Sas-Nowosielski (2021a) reported no significant differentiation of aggression dimensions by training experience or rank. Zvi and Lavi (2026) found a more favorable aggression profile among martial-arts practitioners and linked longer training to self-control and personality characteristics, but their findings also point toward psychological pathways rather than an unavoidable direct effect of accumulated training. Earlier studies by Nosanchuk (1981) and Nosanchuk and MacNeil (1989) further suggest that any duration effect may depend on the instructional context. A year of training is not a psychologically standardized unit. Coaching climate, ethical norms, sparring practices, competitive incentives, and the athlete's reasons for remaining in the sport can all change what that year represents.

The exposure block's incremental R^2 was less than .001. This provides more information than the significance status of the fully adjusted coefficients alone because training years and competition frequency collectively added almost no explanatory variance beyond age and sex in this sample. Sensitivity analyses reduced several alternative model-specification explanations: no quadratic exposure term was detected, no exposure-by-regulation interaction was supported, and the substantive conclusions were preserved after adjustment for sport discipline, competition level, site clustering, and missing-data imputation. These checks make the near-zero training-years estimate consistent across the tested specifications, while still leaving open effects that a larger sample, different exposure metric, or longitudinal design might detect.

Emotion dysregulation was the strongest predictor by a substantial margin. This result accords with the broader meta-analytic literature. Smith et al. (2026) found reliable associations between emotion-regulation difficulties and aggression across 171 studies, with especially relevant effects for reactive aggression and impulse-control problems. The combat-sport environment offers a plausible setting in which those regulatory difficulties become behaviorally consequential. Athletes operate under fatigue, pain, threat appraisal, officiating decisions, time pressure, status concerns, and direct provocation. These conditions do not create aggression mechanically, but they increase the demand placed on regulation. An athlete who struggles to remain goal directed when distressed or to inhibit impulses under emotional activation may be more likely to report anger, hostility, and aggressive behavioral tendencies across settings.

The domain analyses reinforce this interpretation. DERS-SF scores predicted all four BPAQ components, and their largest standardized coefficients were for Anger and Hostility. That is conceptually coherent: emotion dysregulation should be especially relevant to the affective and cognitive components of aggression rather than only to overt physical behavior. Kuśnierz et al. (2026), using reappraisal and suppression rather than a difficulties-based measure, found mostly small associations and limited discipline moderation. The difference is informative rather than contradictory. The DERS-SF assesses broader deficits in regulatory functioning, including impulse control and goal-directed behavior under distress, whereas the Emotion Regulation Questionnaire focuses on two specific strategies. A broad impairment measure may therefore capture aggression-relevant variance that is not reducible to whether an athlete habitually reappraises or suppresses emotion.

Self-control remained independently and inversely associated with aggression after emotion dysregulation was modeled. This matters because the constructs were correlated ($r = -.58$) and could easily have been treated as interchangeable. They were not. DERS-SF difficulties concern functioning under emotional demands; BSCS self-control extends to impulse inhibition, persistence, and resistance to short-term temptations more generally. The independent BSCS coefficient is consistent with experimental and theoretical work linking self-control failure with aggression (Denson et al., 2012; DeWall et al., 2011), with meta-analytic evidence for an inverse self-control-aggression association (Lei et al., 2020), and with martial-arts findings relating participation to greater self-control and lower aggression (Wilkinson, 2023; Zvi & Lavi, 2026).

At the same time, the self-control finding should not be romanticized. Cross-sectional data cannot tell whether combat-sport training increases self-control, whether individuals with greater self-control are more likely to remain in training, or whether both reflect third variables such as coaching environment or personality. In the present dataset, training years were not meaningfully correlated with BSCS scores. That observation argues against claiming, from these data, that longer training progressively builds self-control. The defensible conclusion is narrower: among active combat-sport athletes, self-control is more informative about aggression than training duration.

The competition-frequency result adds an important qualification. Although recent competition count did not predict total aggression, it independently predicted Physical Aggression. The effect was modest ($\beta = .17$) but statistically clear in the domain model. This selective association is more plausible than a generalized competition effect. Frequent competitors repeatedly enter contexts in which rapid physical engagement, willingness to initiate contact, and tolerance of interpersonal force are functional. Those characteristics may overlap with some content captured by the BPAQ Physical Aggression subscale without implying greater hostile cognition or chronic anger. Indeed, competition frequency did not predict Anger or Hostility. If competition were simply making athletes more antagonistic, a broader pattern would be expected.

This distinction between sport-functional physicality and maladaptive aggression is critical. The BPAQ was designed as a general dispositional measure, not a combat-sport-specific instrument. A fighter can be highly willing to use force within a bout and highly restrained outside that context. Conversely, an athlete may report high hostility without being tactically assertive in competition. Future measurement work should separate sanctioned competitive assertiveness, retaliatory rule violations, hostile intent, and out-of-sport aggression. Without that separation, a physical-aggression score in combat athletes risks mixing adaptive sport readiness with problematic aggressive disposition.

The finding that female athletes reported lower adjusted Physical Aggression but did not differ in total aggression after regulation was controlled is also consistent with the original BPAQ literature and combat-sport studies showing the largest sex differences on the physical domain (Buss & Perry, 1992; Kistorz & Sas-Nowosielski, 2021a). The absence of a total-score effect in the final model cautions against using sex as a broad proxy for aggression. Domain and regulatory context matter more.

The Sri Lankan context strengthens the contribution in two ways. First, previous Sri Lankan work comparing national-level combat and non-combat athletes did not support the stereotype that combat-sport athletes are globally more aggressive (Deva Adithiya et al., 2022). The present analysis moves beyond between-sport group comparison and asks whether more exposure within combat sport predicts aggression. Second, the primary DERS-SF scoring decision was informed by Sri Lankan psychometric evidence rather than assumed from Western validation alone. Weerasinghe et al. (2025) found better fit for a five-factor Sinhala DERS-SF solution excluding Awareness. The current results were not dependent on that choice, because the conventional 18-item total produced the same substantive conclusions, but culturally informed scoring remains preferable when defensible local evidence exists.

The language sensitivity analysis deserves attention. After the primary predictors were controlled, participants using the English questionnaire form had somewhat higher BPAQ totals than those using Sinhala. There are several possible explanations: language may proxy demographic or educational differences, the forms may not be psychometrically equivalent, or the result may be sample specific. The present analysis cannot adjudicate among them. For multilingual research in Sri Lanka, formal measurement invariance across Sinhala, Tamil, and English versions should be a priority. Until such work is available, cross-language mean comparisons should be made cautiously.

One exploratory finding complicates an overly clean exposure narrative: when current training load was added, sessions per week showed a modest positive association with total aggression. Training years and recent competition count remained null. This suggests that accumulated experience and current training frequency may capture different psychological or behavioral states. Athletes training more frequently may be in more intensive competitive phases, may differ in selection characteristics, or may experience greater short-term arousal and fatigue. Because weekly session frequency was not part of the primary hypothesis and the design is cross-sectional, it would be premature to treat this as evidence that frequent training increases aggression. It is, however, a useful signal for prospective work that measures training load repeatedly rather than relying only on lifetime years.

From an applied perspective, the findings do not support using years trained or number of competitions as stand-alone indicators of global aggression. Those exposure variables conveyed little information about total BPAQ scores in this sample, whereas emotion dysregulation and self-control showed substantially stronger cross-sectional associations. For research and structured athlete assessment, regulatory functioning may therefore warrant greater attention than exposure duration alone, provided that these measures are used with appropriate psychometric validation and are not treated as diagnostic or prospective risk-screening tools. Coaches and sport-psychology practitioners should distinguish support for emotion-regulation and self-control skills from any claim that questionnaire scores can identify future aggressive behavior.

That implication should not be translated into indiscriminate suppression of competitive intensity. Combat sports require decisive action, confidence, controlled force, and rapid commitment. The relevant target is not low aggression in the abstract but appropriate regulation of behavior across contexts. Psychological skills work can focus on maintaining tactical goals under provocation, recovering after perceived officiating injustice, recognizing escalation cues, inhibiting retaliatory actions, and separating competitive activation from behavior outside the contest. Such an approach preserves performance-relevant assertiveness while addressing the components of anger, hostility, and impulsivity that are more likely to create harm.

This study has several strengths. The sample is comparatively large for a combat-sport aggression study and spans nine disciplines, a wide range of experience, and seven competition levels. The analysis separated cumulative training experience from recent competition frequency and modeled two theoretically distinct regulatory constructs simultaneously. Results were examined at total and domain levels, coefficient inference used HC3 robust standard errors, and the central conclusions survived multiple specification and missing-data checks. The local DERS-SF scoring choice was grounded in Sri Lankan psychometric work rather than imposed without cultural evidence.

The limitations are equally important. The design is cross-sectional; statistical prediction cannot establish temporal or causal direction. Aggression may contribute to perceived regulatory difficulty, regulatory difficulty may contribute to aggression, or both may reflect unmeasured traits and environments. BPAQ, DERS-SF, and BSCS were all self-report measures collected in the same assessment, creating potential shared-method variance, response-style covariance, and conceptual overlap between negative affect, impulse-control difficulty, anger, and aggression. Formal measurement invariance across Sinhala, English, and Tamil forms was not established in the analytic materials, so cross-language mean differences should not be interpreted as substantive group effects. BPAQ total aggression was available for 298 of 320 participants and the primary complete-case model included 273; multiple-imputation and inclusion comparisons did not materially alter the main pattern, but missing-not-at-random mechanisms cannot be excluded. Training years do not capture interruptions, instructional quality, sparring intensity, weight cutting, injury burden, competitive success, or coaching climate, while competition count does not distinguish bout number, opponent level, or contest intensity. Finally, discipline-specific samples were uneven, with only six mixed martial arts athletes, limiting fine-grained comparisons across sports.

Future research should move from static exposure proxies to prospective process measurement. Repeated assessments across training camps and competition cycles could test whether short-term increases in training load, emotional strain, or regulatory difficulty precede changes in anger and aggression. Multilevel designs could separate athlete-level tendencies from gym- and coach-level climates. Behavioral outcomes should include rule violations, penalties, retaliatory fouls, observed sparring conduct, and out-of-sport aggression alongside self-report. Longitudinal models could then test whether regulatory changes mediate or moderate the effect of exposure, rather than labeling cross-

sectional associations as mediation. Measurement-invariance studies across Sri Lankan language forms are also necessary if national comparisons are to be interpreted confidently.

The broader theoretical lesson is that combat-sport exposure should not be treated as a psychologically uniform stimulus. Repeated confrontation can coexist with repeated inhibition; competition can reinforce assertive physical behavior without necessarily strengthening hostility; and years of practice can occur in markedly different pedagogical climates. The present data are most consistent with a conditional account in which regulation, not exposure duration, is the closer correlate of dispositional aggression. That conclusion does not absolve training environments of influence. It changes the question from how much combat sport an athlete has experienced to what psychological processes are operating within that experience.

Conclusion

In this Sri Lankan multisport sample of combat-sport athletes, accumulated training years and recent competition frequency showed no evidence of an independent linear association with total dispositional aggression in the primary models. Greater emotion dysregulation and lower self-control were independently associated with aggression and jointly increased explained variance from essentially zero to 48.3%. The pattern was preserved across alternative scoring, nonlinear exposure tests, interaction models, discipline and competition-level adjustment, site-clustered inference, and multiple imputation. Recent competition frequency showed a narrower association with Physical Aggression, but not with Anger or Hostility. Within the observed ranges, the findings do not support a simple linear exposure-dose account of global aggression. Regulatory functioning was substantially more informative than accumulated training duration or recent competition frequency, although longitudinal and behaviorally anchored studies are required before causal claims can be made.

Declarations

Ethics Approval

Ethical approval for this study was obtained from the Ethics Review Committee of KIU, Sri Lanka (KIU/ERC/20/42).

Consent

Electronic informed consent was obtained before questionnaire completion. The QR-linked form first displayed the participant information sheet and consent page; participants could proceed only after ticking the consent checkbox and selecting "I agree". Participation was voluntary, withdrawal was permitted before submission, responses were confidential and anonymized, and no directly identifying information was collected.

Conflict of Interest

The authors declare no conflicts of interest.

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Data Availability

De-identified data may be made available from the corresponding author on reasonable request, subject to applicable ethical approval and institutional requirements.

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