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## History of Involvement with Combat Sports and Severity of Subtypes of Psychopathy

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HISTORY OF INVOLVEMENT WITH COMBAT SPORTS AND SEVERITY  
OF SUBTYPES OF PSYCHOPATHY

by

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A thesis submitted in partial fulfillment of the requirements  
for the degree of Bachelor of Science  
in the Department of Psychology  
in the College of Sciences  
at the University of Central Florida  
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## ABSTRACT

Combat sports can be defined as sports that involve the physical domination of the opponent in order to win. Previous research on participation in combat sports in relation to psychopathy and anti-social behavior has produced limited information regarding subtypes of trait psychopathy. While there is evidence suggesting participation in certain combat sports can lead to an increase in anti-social behavior (Endresen & Olweus, 2005), there has been no direct investigation with primary psychopathy, which has different features such as fearless dominance and lack of remorse. In the current study, a history of involvement with combat sports was examined in relation to levels of primary and secondary psychopathy. Empathy for the opponent, age range(s) of involvement, and perceived level of violence within the sport were observed as moderators, as well as a history of watching violent shows/movies and playing violent video games. A sample size of 55 participants was obtained, with 23 reporting a history of participation in combat sports (56.5% male) and 32 stating that they have never participated (34.4% male). Results revealed a statistical trend for higher primary psychopathy among males who had participated in a combat sport, as well a positive relationship between secondary psychopathy level and age of first participation in males. This research provides preliminary findings on the relationship between combat sports and psychopathy and potential factors that influence the relationship. If replicated in a larger community sample, the findings could provide useful information on the formation and/or development of this trait in individuals who have involvement in combat sports, as well as investigating motivational factors for individuals with a high level of psychopathy to engage in these sports.

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## INTRODUCTION

The term *psychopathy* refers to a personality construct that includes traits such as selfishness, remorselessness, and exploitive use of others, as well as an unstable and antisocial lifestyle (Gough, 1948). Many researchers and clinicians agree that there are two primary subtypes of psychopathy (e.g., Karpman, 1948; Hare, 2003). Primary (or “Factor 1”) psychopathy refers to affective-interpersonal traits such as fearless dominance, lack of remorse, and manipulateness, while secondary (or “Factor 2”) psychopathy pertains mainly to impulsive-antisocial traits such as criminal/antisocial behavior, impulsivity, and lack of tolerance for frustration (Levenson 1995; Hare, 2003).

Combat sports have been a topic of interest in relation to psychosocial behavior. These are sports that involve a goal pertaining to the physical domination of an opposing person in order to win ([https://en.wikipedia.org/wiki/Combat\\_sport](https://en.wikipedia.org/wiki/Combat_sport)). The one-on-one combat nature of the sport provides a good framework to investigate certain aspects of personality, because it partially isolates the physical aggression present in many sports by removing potential confounding variables such as cooperation with others to pursue a goal-oriented task. Naturally, these sports draw the interest of studies involving traits like aggression and antisocial behavior because of the need for aggression toward another person to win, and the lack of need to cooperate as a unit with others. It appears that all related studies investigate areas overlapping secondary psychopathy, such as antisocial/criminal acts in relation to participation in combat sports. However, to the author’s knowledge, there are no published studies examining the relationship between primary psychopathy severity and involvement or interest in combat sports. Some

studies overlapping secondary psychopathy involve the link between criminal behavior and participation in combat sports, as well as the combat sport serving as an intervention mechanism to decrease the problematic behavior, which, while useful, have not included a direct measure of either subtype of psychopathy in the study. Others investigate general trends among people participating in the sports, most often looking at aggression and antisocial behavior and attitudes. Furthermore, the limited number of existing studies conflict with one another, and remain relatively inconclusive as to whether there is a link between the sports and antisocial behavior. One study found several mediating factors that may influence social-psychological outcomes in combat sports, such as socio-economic status, emphasis on moral reasoning within the sport, and relationship with the instructor (Vertonghen, 2014).

There may be more to consider, however, as these sports involve controlled physical aggression. Variations exist across a broad spectrum of sports, all of which qualify as a combat sport. For example, the amount of violence, defined as the use of force intended to injure or damage another person, can vary hugely between combat sports. Not all combat sports contain the same amount of violence due to the structuring of the rules and the various techniques and strategies that have arisen because of them. For instance, Fencing involves the physical domination of one person by another in order for a victory to be achieved, however, it is apparent that the risk of obtaining an injury by any means other than an accident is lower than that of a sport such as Mixed Martial Arts (MMA) which requires the intention of damaging another opponent in order to achieve victory. The relative level of violence within combat sports may have a link with a profile of severity across primary vs. secondary psychopathy in the participants.

A study conducted by Vertonghen (2014) investigated mediating factors such as the type of sport, socioeconomic status, and characteristics of the individual. They found that the type of combat sport (e.g., Boxing, Kickboxing) had different implications about participating individuals. For example, the choice to participate in certain types of sports that have a lower number of rules and a higher emphasis on physical contact correlated with a lower socioeconomic status. This is why an inquiry into multiple psychosocial aspects of an individual drawn to the posited combat sports would be a helpful addition in determining factors that are connected to them. Furthermore, Vertonghen found that factors such as the moral reasoning within the sport, as well as the relationship with the sport's coach or instructor were also moderators when looking at social psychological outcomes as they pertain to combat sports.

A couple of studies examined whether participation in combat sports could serve as an effective intervention to reduce antisocial and criminal behaviors of at-risk individuals, particularly in older children and juvenile adolescents. Both studies found a reduction in antisocial-related behaviors following the combat sport participation intervention (Jenkins & Ellis, 2011; Palermo, 2006). These results support the notion that despite the combat involvement in these sports, there is a relative decrease in some secondary psychopathy traits after participation. However, the mechanism for how this participation reduced secondary psychopathy traits remains unclear. These findings may be summed up with Vertonghen's work (2014) by attributing the decrease in antisocial behavior to factors such as relationship with the instructor and emphasis on moral reasoning within the program. Additionally, these studies put an emphasis on participants that have already portrayed antisocial behavior or that have been diagnosed with a conduct disorder. However, these two preliminary studies suggest a possible

link between a decrease in some secondary psychopathy traits after participating in a combat sport.

There appears to be only one published study that investigates factors related to psychopathy on a sample from the general population both before and after combat sport involvement. A longitudinal investigation examined nonpsychiatric adolescent boys who had never participated in power sports (defined as Martial Arts, Boxing, Wrestling, and/or Weightlifting) and had similar low scores on a measure of antisocial behaviors at baseline (Endresen & Olweus, 2005). Results showed that the subset of boys who decided to participate in a power sport following the baseline measure had a significantly higher antisocial behavior score at the end of two years than the boys who chose not to participate in power sports. As the boys were not assigned to participation groups, the results are potentially more representative of the general population than research conducted for the purpose of discovering useful interventions. The results suggest that participation in combat sports may increase antisocial behavior in a subset of pre-adolescent and adolescent boys. Alternatively, it may be that the boys who were pre-disposed to have a later onset of antisocial behavior are the ones who chose to participate in those sports.

While no study has directly examined primary and secondary psychopathy severity as it relates to individuals drawn to combat sports, there is information to help create hypotheses. Endresen and Olweus (2005) provided useful information as their results suggest that participation in a few related sports, at least in young adolescents with low baseline antisocial scores, related to a later increase in antisocial behaviors. However, this study did not assess participation in sports that are technically considered to be combat sports such as Fencing or

Kendo, combat sports that have arguably lighter contact than most of the sports they assessed. Because of the relatively reduced risk of heavy contact or injury, these sports could be perceived to have significantly lower levels of violence. Examination of participation in and viewership of these sports, along with heavier contact sports, may help determine whether perceived level of violence moderates the relationship between participating in combat sports and antisocial behavior/secondary psychopathy.

The studies mentioned show mixed results. However, the design for each of them was different in a way that implies the possibility of an interaction dependent on the level of antisocial behavior before participation. Jenkins & Ellis (2011) as well as Palermo (2006) both had individuals with high scores pertaining to antisocial behavior. Their participants took part in a clinical setting while the longitudinal research conducted by Endresen and Olweus (2005) did not. The 2005 study contained a population with low baseline scores and existed outside of a clinical setting. It is possible that these factors introduce an interaction that could explain the pattern of results.

In the present study, the examination of how the level of violence in these combat sports relates to severity of psychopathy was taken a step further. While studies have compared different combat sports, there has not been an effort to make clear distinctions on the level of violence perceived by the participant. This would allow a subjective but precise way to determine if individuals high in psychopathy have a tendency towards participating in or viewing combat sports which they perceive to be high in violence. It was speculated by Vertonghen (2010) that individual who viewed injury to their bodies as “a means to an end” tend to be drawn more towards sports with a high level of contact, and cited sports such as Boxing as having a

large number of people with this perspective. Coinciding with this view, it may also be that individuals who are high in psychopathy are also drawn to sports they perceive to be more contact-heavy and violent, with an increased physical risk to participants, because of aspects relevant to both primary and secondary psychopathy such as lack of empathy for an opponent or impulsivity.

Because the present study focuses on engagement in sports that can be described as inherently violent, participants completed questions about a history of regular use of violent video games and violent shows/movies to clarify if findings with combat sports are specific or extend to violence/aggression in general. Ferguson (2010) suggests that there is no evidence to suggest that violent videogames have a significant effect on aggression. Another meta-analysis conducted by Savage (2008) reveals that exposure to violence through popular media is ambiguous, but does not suggest a significant effect on violence or aggression. Even though both violent video games and violent TV shows show little evidence to suggest a significant influence on behavior, they are included because of potential similarities in the portrayal and engagement with violent actions or behavior.

Furthermore, we also examined biological sex as a potential moderator between participation in combat sports and psychopathy. While there is one study that has shown no differences between males and females in motivational reasons for participating in Martial Arts (Jones, 2006), psychopathy is more prevalent in males (Cale, 2002). This may then influence relationships between participation in combat sports and psychopathy.

Because there is a vast pool of combat sports, it is likely the case that any particular participant with a history of involvement participated in a small fraction of them. It is not likely that a person would be significantly influenced by a sport that they have not been involved with for a substantial amount of time. Because of this, we only evaluated the perception of combat sports in participants endorsing ongoing participation for longer than three consecutive months.

In this study, participants completed an online survey that asked whether they had previously participated in or viewed combat sports on a regular basis. For those who participated in combat sports, they responded to questions about perceptions of an array of combat sports they participated in, including age range(s), perceived level of violence, and level of empathy when injuring the opponent. They also completed a validated self-report scale to assess their dimensional level of primary and secondary psychopathy.

The primary aim of this experiment is to determine whether there is a difference in primary and/or secondary psychopathy severity scores between groups of participants who have, at some point in time: 1) participated in at least one combat sport (PCS) for at least three consecutive months, or 2) never substantially participated in a combat sport (NVP), including the potential moderation of biological sex. A secondary aim is to examine, within the PCS group, relationships between level of each psychopathy type with the age the participant first participated in a combat sport, the perception of level of violence of the sport, and the level of empathy experienced from injuring an opponent or viewing an injured opponent, including potential moderation of biological sex. We have also included covariates of a history of engagement with both violent video games and violent TV shows. We also included a variable of

participants who viewed, but never participated, in combat sports to examine in exploratory analyses.

Based on the limited existing literature on the topic area, as well as known traits of primary and secondary psychopathy, the following relationships were hypothesized:

Hypothesis 1: The PCS group will score higher in both primary and secondary psychopathy than the NVP group.

Hypothesis 2: Biological sex will moderate relationships found in hypothesis 1, as males will show stronger group differences in primary and secondary psychopathy than females.

Hypothesis 3: A younger age of first starting participation in a combat sport will relate to higher scores on both primary and secondary psychopathy.

Hypothesis 4: Individuals in the PCS group who perceive the level of violence in the combat sport that they participate in as relatively low will have lower primary and secondary psychopathy.

Hypothesis 5: Individuals from the PCS group with higher levels of affective empathy toward injured opponents will have lower scores on both primary and secondary psychopathy.

## METHOD

### Participants

Participants were university undergraduate students enrolled in a Psychology course that offered academic credit for participation in Psychology Department research studies, which was accessed via an online portal (i.e., Sona Systems). Participants were required to be at least age 18. An initial sample of 93 participants completed the study. Participants were first excluded if they completed the study in faster than the 10<sup>th</sup> percentile for the entire sample (< 5.51 min;  $n = 8$ ). Participants were then excluded if they failed to pass the criteria for any of three validity scales ( $n = 6$ ; see Measures section for description of each). Following this, two participants were excluded for not answering the question about participation in a combat sport and eight were excluded for writing in names of sports that do not qualify as a combat sport (e.g., volleyball). Participants who did not participate in a combat sport were then excluded if they endorsed a question that asks whether they have ever had a chronic physical or sensory impairment, which lasted more than one year, that could prevent them from participating in combat sports ( $n = 4$ ). As only 10 participants remained who endorsed a lifetime history of regular viewership, but not participation, of combat sports, those individuals were excluded from analyses. Therefore, the remaining participants in the group who did not endorse a history of participating in a combat sport also denied a history of regular viewership of those sports.

This resulted in a final sample size of 55 used in the analyses (mean age = 20.02, SD = 3.2; range: 18 to 34; 56.4% Females). Of these 55, 23 (41.8%) reported that they had previously participated in a combat sport and 32 denied previous participation. Participants endorsed the

following categories for race: Caucasian/White (72.7%), African American/Black (5.5%), Asian (9.1%), Mixed (3.6%), Other (7.3%), preferred not to say (1.8%) Separately from race, 32.7% endorsed an ethnicity of Hispanic/Latinx. The groups did not significantly differ on age, sex, race, ethnicity, or either psychopathy factor score (see Table 1).

Table 1 Descriptive Statistics for Individuals Who Have Participated in A Combat Sport Compared to Those Who Have Never Participated.

	Participated	Did not participate	Group comparison <sup>#</sup>
<i>n</i>	23	32	
Age	19.87	20.13	$t(53) = 0.29$
% Males	56.50%	34.40%	$\chi^2(1, N = 55) = 2.67$
% Caucasian/White	65.20%	78.10%	$\chi^2(1, N = 55) = 1.12$
% Hispanic/Latino	39.10%	28.10%	$\chi^2(1, N = 55) = 0.74$
Race	34.80%	21.90%	$\chi^2(1, N = 55) = 1.12$
Primary psychopathy factor score <sup>^</sup>	$M = 1.89$ $SD = 0.49$	$M = 1.81$ $SD = 0.40$	$t(53) = 0.66$
Secondary psychopathy factor score <sup>^</sup>	$M = 1.91$ $SD = 0.45$	$M = 1.93$ $SD = 0.42$	$t(53) = 0.13$
% Played violent video games	69.60%	56.30%	$\chi^2(1, N = 55) = 1.01$
% Watched violent shows	95.70%	78.10%	$\chi^2(1, N = 55) = 3.31$

# all *p* values > .05

<sup>^</sup> from the Levenson self-report psychopathy scale. Mean and SD represent average item-level score on a Likert scale ranging from 1-4.

Race = percent of participants who identified as “Caucasian/White” as compared to all other race categories, % played violent video games = percent of participants who regularly played violent video games for at least 3 consecutive months, % watched violent shows = percent of participants who regularly watched violent shows for at least 3 consecutive months.

### Measures

## Demographic Scale

Questions include age, biological sex, gender identity, race, and Hispanic/Latinx ethnicity. This scale also includes a question regarding a participant's ability to either participate in combat sports (e.g., particular physical handicaps, problems with vision). See Appendix A.

## Validity Scale #1: Infrequency Scale

This scale includes 8 items that ask about highly improbable events (e.g., "I eat cement, occasionally."; Huang, 2015). Participants who endorse two or more items in the wrong direction were excluded from the analysis of data in order to reduce the likelihood of insufficient attention to items in scales of interest ( $n = 1$ ).

## Validity Scale #2: Self-Report of Attention to Study Questions

At the end of the study, participants were provided with a statement about how important attention is to the study and are asked whether we should use their data in the study. We customized the wording used in Meade & Craig's study (2012), based on their findings and recommendation to be: "Lastly, it is vital to our study that we only include responses from people that devoted their full attention to this study. Otherwise years of effort (the researchers and the time of other participants) could be wasted. Often there are several distractions present during online studies (e.g., other people, television, music). You will receive credit for this study no matter what. In your honest opinion, should we use your data in our analyses in this study? YES/NO. We appreciate your honesty!" We excluded participants who answer with "No," which may be approximately 10% of the sample based on findings from Meade & Craig (2012). That study reported that this single item had high sensitivity to poor attention based on its relationship

with several more sophisticated indices. In our sample, 5.4% ( $n = 5$ ) were excluded based on this question.

#### Validity Scale #3: Abbreviated Marlow-Crowne Social Desirability Scale (MCSDS)

The MCSDS was used to exclude participants who are unwilling to endorse common minor personal shortcomings (Reynolds, 1982). Participants who score greater than two standard deviations above the mean of the sample were excluded from the analysis of data. No participant met this criterion.

#### Levenson Self-Report Psychopathy Scale (LSRP)

The LSRP is a 26-item self-report scale that provides subscale scores for primary and secondary psychopathy, with higher scores indicating greater severity (Levenson, 1995). Items are rated on a four-choice Likert scale ranging from “Strongly Disagree” to “Strongly Agree” and include both positive and negative attributes that prompt trait, rather than state, responses. A number of studies have supported the validity of the two-factor (i.e., primary and secondary) model of psychopathy (Friedman et al., 2018; Hauck-Filho and Teixeira, 2014; Miller et al., 2008; Shou et al., 2019), and research using the LSRP with prison inmates supported the dimensional, rather than categorical, nature of the latent construct of psychopathy (Walters et al., 2008).

#### History of Combat Sports Questionnaire (HCSQ)

The HCSQ was created by the author for the purpose of this study. This survey asked participants about their engagement with a list of combat sports and record participation and

viewership of each sport, as well as duration and age ranges engaged. If a participant endorses participation in a given sport for at least three consecutive months, the online questionnaire then asked additional questions for that sport as described below, skipping the section related to viewership. If the participant indicated that they have not participated for the stated time, the same question was asked about their routine viewership. On both questions, the participant was instructed to select the sport that they perceived to be the most violent. If the participant had neither participated in or viewed a combat sport for the specified time no further information was gathered about for the HCSQ. If a sport is endorsed, via participation or viewership, the participant then answered questions about their perceptions on the level of violence surrounding the sport in general. Subsequently, questions regarding the age while participating and empathy for combatants was asked. Additional questions were presented, asking the participant about their participation in violent video games and their viewership of violent television shows or movies so they can be accounted for in the analysis of interest. The full questionnaire can be found in Appendix B.

### Procedure

Participants began the online study by providing informed consent and completed the Demographic Scale and MCSDS. Pairs of the eight Infrequency Scale items were placed in between other scales. The LSPS and HCSQ were presented in a random order by participant to avoid order effects. After all measures had been completed, participants completed the Self-

Report of Attention to Study Questions followed by a debriefing form which provided more details about the purpose of the study.

### Statistical Analyses

A MANCOVA was used to address Hypotheses 1 and 2 with the dependent variables of primary and secondary psychopathy severity, independent variables of group membership (PCS, NVP) and the interaction of group and sex, and covariates of current age, sex, and history of playing violent video games on a regular basis. A second MANCOVA on just the PCS group addressed Hypotheses 3-5. This included the independent variables of age started sport, perceived level of violence, and level of affective empathy, along with their interactions with sex, and the covariates of current age, sex, and history of playing violent video games on a regular basis, with dependent variables of level of primary and secondary psychopathy.

## RESULTS

Across all participants, primary and secondary psychopathy scores showed relatively normal distributions (skewness  $< \pm 0.08$ , kurtosis  $< \pm 0.79$ ) with no statistical outliers (all  $Z_s < \pm 2.30$ ). While there was good variability in the frequency of participants endorsing a history of playing violent video games on a regular basis (34 = Yes, 21 = No), only 8 participants denied a history of watching violent shows or movies on a regular basis. Due to this lack of variability, only the variable related to violent video games was included as a covariate in MANCOVAs.

The initial MANCOVA found that study groups did not differ on primary psychopathy,  $F(1,49) = 0.29, p = .59, \eta^2 = .01$ , or secondary psychopathy,  $F(1,49) = 0.05, p = .83, \eta^2 = .001$ . There was no difference between the sexes on either type of psychopathy (both  $p_s > .86$ ). There was a significant main effect for age as older participants had lower scores for primary psychopathy,  $F(1,49) = 4.49, p = .04, \eta^2 = .08$ , which was a statistical trend in the same direction for secondary psychopathy ( $p = .07$ ). There was also a significant main effect of a history of playing violent video games as those who endorsed this history had higher primary psychopathy scores,  $F(1,49) = 4.38, p = .04, \eta^2 = .08$ , which was not significant for secondary psychopathy ( $p = .76$ ). There was a significant study group by sex interaction on primary psychopathy,  $F(1,49) = 5.44, p = .02, \eta^2 = .10$ , but not secondary psychopathy,  $F(1,49) = 0.06, p = .80, \eta^2 = .001$ . Simple effects of the significant interaction showed that males who had participated in combat sports showed a statistical trend for scoring higher in primary psychopathy than males who did not participate (see Table 2). The group difference did not approach statistical significance for primary psychopathy in females.

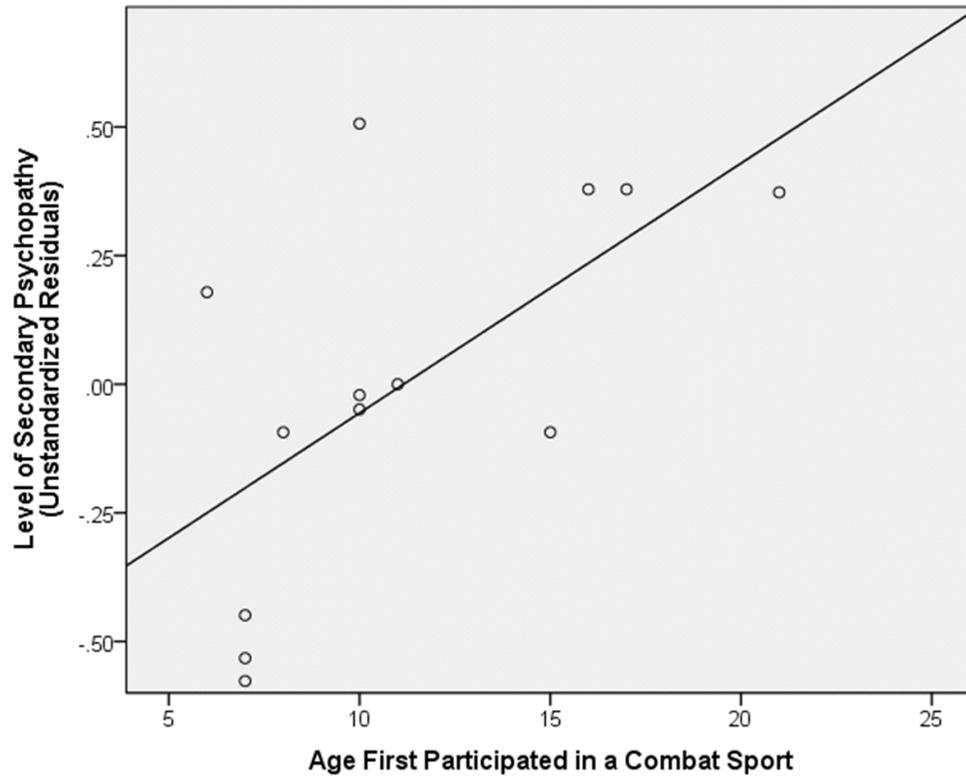
Table 2. Primary and Secondary Psychopathy Scores by Sex and Study Group.

	Primary	Secondary	Primary	Secondary
Participated - Male	M = 2.04, SD = 0.46	M = 1.89, SD = 0.48	$F(1,20) = 3.89,$ $p = .06, \eta^2 = .16\#$	$F(1,20) = 0.16,$ $p = .69, \eta^2 = .01\#$
Did not participate - Male	M = 1.70, SD = 0.47	M = 1.93, SD = 0.49		
Participated - Female	M = 1.69, SD = 0.48	M = 1.95, SD = 0.44	$F(1,27) = 1.50,$ $p = .23, \eta^2 = .05\#$	$F(1,27) = 0.02,$ $p = .90, \eta^2 = .001\#$
Did not participate - Female	M = 1.87, SD = 0.35	M = 1.93, SD = 0.38		

# = Comparison to participants who did not participate in combat sports within respective sex.

Based on findings from the first MANCOVA we then examined only male participants who had participated in a combat sport in a second MANCOVA to examine the independent variables of age first participated, level of perceived violence of the sport, and level of empathy for the opponent when participating in the sport, using covariates of age and history of playing violent video games, and primary and secondary psychopathy as dependent variables. There was a significant positive relationship between age of first participating and secondary psychopathology,  $F(1,13) = 5.68, p = .049, \eta^2 = .45$ . The older the male participant was when first participating, the higher they scored in secondary psychopathy (see Figure 1). The level of perceived violence of the sport and level of empathy for opponents did not relate to either primary or secondary psychopathy (all  $ps > .27$ ).

Figure 1. Secondary Psychopathy in Males Who Participated in A Combat Sport (N = 13) By Age of First Participation



Unstandardized residuals on the Y-axis represent level of secondary psychopathy after accounting for age, primary psychopathy, and history of playing violent video games.

Table 3. Zero-Order Pearson Correlations for Males Who Have Previously Participated in a Combat Sport (N = 13)

	1	2	3	4	5
Primary psychopathy factor score <sup>^</sup>	<i>M</i> = 1.85, <i>SD</i> = 3.45				
Secondary psychopathy factor score <sup>^</sup>	.61**	<i>M</i> = 1.92, <i>SD</i> = 0.43			
Empathy rating	.02	.20	<i>M</i> = 3.70, <i>SD</i> = 1.64		
Age first participated	-.02	.10	.19	<i>M</i> = 10.43, <i>SD</i> = 4.22	
Perception of violence rating	-.02	-.05	-.35	.16	<i>M</i> = 3.70, <i>SD</i> = 1.30

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ; unless otherwise indicated values in the cells represent Pearson  $r$  values.

<sup>^</sup> From the Levenson Self-Report Psychopathy Scale. Mean and SD represent average item-level score on a Likert scale ranging from 1-4.

Empathy = self-reported empathy towards injured opponent when participating in the combat sport, age first participated = the age at which participant began combat sports for the first time, perception of violence = the self-reported perceived level of violence of the combat sport.

## DISCUSSION

Results did not support Hypothesis 1 as there were no significant main effects across all participants for either primary or secondary psychopathy. However, the MANCOVA revealed a significant interaction between sex and study group on primary psychopathy scores, which is broadly consistent with Hypothesis 2. For males, participating in a combat sport showed a statistical trend for higher primary psychopathy scores, while no significant or trend relationship was found in females. As primary psychopathy relates to fearlessness and dominance, it is possible that participation could be used as an outlet for this behavior as an objective of combat sports involves dominance of an opponent. Additionally, it is also possible that males are more likely to participate in combat sports for this reason than females, who may have different motivations for engagement (e.g., self-defense, social interaction, etc.). It is also possible that this relationship would have been statistically significant, rather than a trend, in a larger sample which allows for more statistical power. This is contrary to what was found in Jones (2010) who claimed that there was no evidence to suggest there was a difference in motivation for participation between sexes. However, Jones did not include questions pertaining to fearless dominance as it relates to primary psychopathy. The study was also done only on participants of Martial Arts and not combat sports in general, so the findings may also be variable depending on the sport. This information could be useful for future research because it allows for a closer examination of the moderation of biological sex and provides a novel investigation of the relationship between combat sport participation and primary psychopathy severity.

Additionally, among males, there was a significant relationship between increased secondary psychopathy with increasing age of a participant's initial participation in a combat sport (see Figure 1). This is contrary to what was predicted in hypothesis 2, in which the prediction was in the opposite direction and involved both types of psychopathy. The reason for this prediction was due to the idea that there would be a greater influence of behavior necessitated in a combat sports on the personality (e.g., psychopathy) of a young and still developing child. Results showed the opposite effect to be true.

Potential reasons for this discrepancy could be the degree of agency and different motivation for joining a combat sport when choosing at an older age. When a child is involved in combat sports, particularly before adolescence, it is likely that parental influence was a factor in participation. Specific combat sports included in the list presented within the study, such as Taekwondo, do have variants among them that are geared towards initiation into self-defense and operated from a more child-safe and protective environment. Eleven of the 17 participants who had participated in combat sport specified their involvement to be Karate or Taekwondo. It is possible that the participation in these instances were primarily a means of introduction into the aforementioned purpose of self-defense. Additionally, the statistic found is of greater importance when investigating combat sports because while it is true that the sport pertains to combat, it could be the case that this particular type of Karate/Taekwondo, started at a young age, simulates combat in a way that does not actually result in competition with the objective of physically dominating the opponent. Many places that practice Martial Arts with children are often used as more of an aftercare system to supervise children while teaching them aspects of self-defense, rather than treat the sport as a competitive, objective-based activity.

As an individual grows older however, the likelihood of joining a school or group that has a focus on this environment may diminish and be replaced with a more competitive and combative atmosphere. This would be consistent with previous research that suggests specific aspects of the sport such as the direction of moral philosophy and relationship with the instructor play a factor in psychosocial behavior (Vertonghen, 2010).

Additionally, the increased agency of an individual as they grow older and decide what kind of activity they would like to engage in could increase the likelihood that individuals with higher secondary psychopathy may participate. Due to the likelihood that parental influence on a child's activity choice is higher before adolescence, the degree to which personality traits have a connection to that activity may be more limited. At ages in adolescence and beyond, it is possible that the ability to make an independent decision on participation may reflect pre-existing secondary psychopathy. The study conducted by Endresen & Olweus (2005) did show an increase over time in aspects related to secondary psychopathy such as individual criminality and anti-social behavior for adolescent boys who engaged in "powersports." These sports are focused on both combat and individual strength capability, such as Weightlifting or Boxing, and include some of the sports listed in this study, such as Judo. Endresen & Olweus' (2005) speculated that perhaps the boys who participated in this type of sport had a predisposition that might moderate their engagement and their psychosocial behavior as they get older in a manner that motivates them to continue participation. This could also be the case with males who decided to join later on in either adolescence or adulthood in the current study. It suggests that the relationship between aspects of psychopathy and males who participate are less dependent on the effect of combat sports in childhood, but rather males with higher secondary psychopathy by adolescence

may have developed secondary psychopathy that motivates them to join or continue participation combat sports. Factors such as impulsivity and a general tendency towards hostile behavior regarding secondary psychopathy are conducive to combat sports because of the objective presented within the sport, while also being an outlet in which repercussions for this behavior is relatively low if the behavior is not overly excessive. However, based on the correlational nature of the current study, the causal direction of the relationship cannot be determined. Endresen & Olweus did not investigate aspects of primary psychopathy. However, in the present study, there was no substantial change in primary psychopathy between participants engaging for the first time at different ages. The reason for this may be because of the aforementioned factors of secondary psychopathy that make it conducive to combat sports in comparison to primary psychopathy.

Results did not support hypotheses 3 and 4. Perception of violence within one's sport and level of affective empathy towards opponents did not show significant relationships with psychopathy scores. It is possible that, with respect to one's sport, viewing the sport as inherently violent would dissuade a person from participation. Previous research found that lower socioeconomic status (SES) correlated with a higher participation in sports with heavy contact such as Boxing (Vertonghen, 2014). While the current study did not assess SES, it could be a potential improvement for future research to include this variable, especially when examining the perception of violence within the sport. Additionally, the level of affective empathy may not have related to psychopathy because the context of the injury could have interfered with the level of empathy towards the injury. In a sport where injury is more likely to occur, an injury is relatively more expected, which may then lower affective empathy towards the injured person.

This may have lowered affective empathy scores for people who perceived the sport they participate in to be violent.

Limitations of this study include sample size and selection. All participants were undergraduate students enrolled in psychology courses at the University of Central Florida, which limits the potential scope of experience of participation in combat sports and the ability to generalize findings to the larger community. The final sample size was also quite small at 55 participants total used for data analysis, particularly when including covariates and examining moderation of sex. Including more participants would increase the statistical power to detect smaller effect sizes. Additionally, participants in the PCS group who were not currently engaged in combat sports and hadn't been for some time had to rely on memory to assess aspects of the sport we asked about. This could lead to an inaccurate representation of the sport in question.

Potential improvements to this study and related future research would be to add a longitudinal design with a focus on cause and effect. While this would be somewhat similar to what was done in Endreson & Olweus (2005), they focused more on antisocial behavior and criminality, as well as a broader category of sports (i.e., power vs. combat). While there is some overlap with secondary psychopathy in the behavior they examined, as well as the scope of sports, it would be beneficial to use a similar methodology to look at psychopathy using only combat sports for reasons stated in the introduction. In addition, as the expressed purpose of a "combat sport" is to achieve victory through direct physical domination of one's opponent, it would be ideal to control for things such as group cohesion and individual performance.

The findings of this study are useful to future research on psychopathy as it pertains to sports. There are potential avenues that these findings could help develop our understanding of fighting as an activity, sport, or both. For example, a longitudinal design could compare groups that have frequently engaged in physical fighting within and/or outside of a sports context to determine if the context of physical fights relates to a subtype of psychopathy along with the causal direction. A comparison between team and individual contact sports would also be a good addition to this research. This would clarify whether our findings differ by this context, and if aspects of team sports moderate the relationship between participation and primary/secondary psychopathy. This would be useful to increase knowledge about the development or propensity for psychopathy between types of sports, and aid in understanding whether or not aspects of a team sport (e.g., cooperative engagement) moderate the relationship with psychopathy.

In summary, the findings of the study revealed a difference in primary psychopathy in only males regarding participation in combat sports. Males who participated in combat sports had a higher average primary psychopathy score than males who had never participated. Additionally, in males, there was an increase in secondary psychopathy as the age of first participation increased. Additional longitudinal research on this topic could provide insight into how psychopathy relates to both the realm of sports and fighting, and the causal direction and reasons for those relationships.

## APPENDIX A: DEMOGRAPHIC SCALE

- a. What is your age?
- b. What is your biological sex?
  - i. Male
  - ii. Female
- c. What gender do you identify with currently?
  - i. Male
  - ii. Female
  - iii. Mix
  - iv. Other
  - v. Prefer Not to Answer
- d. Which category best describes your race (Please note that Hispanic/Latinx ethnicity is asked as a separate question following this one.)
  - i. Asian
  - ii. African American/Black
  - iii. Caucasian/White
  - iv. American Indian or Alaskan Native
  - v. Mixed (substantial mixture of above)
  - vi. Other
  - vii. Prefer not to say
- e. Do you consider your ethnicity to be Hispanic/Latinx?
  - i. Yes
  - ii. No

- f. At any point in your past did you have any physical or sensory impairment that could prevent you from competing in or viewing combat sports for a period of at least one year? YES/NO

## APPENDIX B: HISTORY OF COMBAT SPORTS QUESTIONNAIRE (HCSQ)

1. Please check the following boxes to indicate a combat sport you have participated in on a regular basis for at least three consecutive months. If the sport is not listed, please indicate what the sport was in the “other” response. If you have participated in more than one for at least three consecutive months, please only choose the one that you perceive as having had the highest level of violence during your participation.

1. Boxing
2. Muay Thai/ kickboxing
3. Mixed martial arts/MMA
4. Taekwondo
5. Judo
6. Wrestling
7. Brazilian jiujitsu/BJJ
8. Historic European martial arts/ HEMA
9. Fencing
10. Kendo
11. Other combat sport (involves a goal pertaining to the physical domination of an opposing person in order to win)
12. I have not participated in any of the above types of sports at any point in my life on a regular basis for at least three consecutive months. (Note: if this is chosen, questionnaire will skip to next section, questionnaire, or debriefing statement – depending on the random order.)

2. How do you perceive the typical level of violence within this sport?

1(not at all violent), 2, 3, 4(moderately violent), 5, 6, 7(extremely violent)

3. Please indicate the age range(s) you have participated in this sport on a regular basis.

(The participant will be able to input multiple age ranges) \_\_\_\_ - \_\_\_\_

4. What was your level of empathy for participants in the sport while they were competing (to what level did you feel negative emotion in response to a combatant being injured or losing during a competition)?

1(not at all empathetic), 2, 3, 4(moderately violent) 5, 6, 7(extremely empathetic)

1. Please check the following boxes to indicate a combat sport you have viewed on a regular basis for at least three consecutive months. If the sport is not listed, please indicate what the sport was in the “other” response. If you have viewed more than one of these sports for at least three consecutive months, please only choose the one that you perceive as having had the highest level of violence from your experience viewing it.

1. Boxing
2. Muay Thai/ kickboxing
3. Mixed martial arts/MMA
4. Taekwondo
5. Judo
6. Wrestling
7. Brazilian jiu-jitsu/BJJ
8. Historic European martial arts/ HEMA
9. Fencing

10. Kendo
  11. Other combat sport (involves a goal pertaining to the physical domination of an opposing person in order to win)
  12. I have not viewed any of the above types of sports at any point in my life on a regular basis for at least three consecutive months. (Note: if this is chosen, questionnaire will skip to next questionnaire or validity statement – depending on the random order.)
2. How do you perceive the typical level of violence within this sport?  
1(not at all violent), 2, 3, 4(moderately violent), 5, 6, 7(extremely violent)
  3. Please indicate the age range(s) you have regularly viewed in this sport through popular media. (The Participant will be able to input multiple age ranges) \_\_\_\_ - \_\_\_\_
  4. What was your level of empathy for participants in the sport while they were competing (to what level did you feel negative emotion in response to a combatant being injured or losing during a competition)?  
1(not at all empathetic), 2, 3, 4(moderately empathetic)5, 6, 7(extremely empathetic)
  1. Have you ever played video games that you perceived to be violent for 3 consecutive months or longer? (YES/NO) (Note: if the participant answers no, the following questions regarding video games will be skipped.)
  2. Please indicate the age range at which you played violent video games most frequently.  
\_\_\_\_ - \_\_\_\_
  3. How frequently did you play violent video games in this timeframe?

1(1-3 hours per month), 2 (1-2 hours per week), 3(3-4 hours per week), 4(5-6 hours per week) 5(about an hour every day), 6(2-3 hours every day), 7(more than 3 hours every day)

1. Have you ever watched television shows or movies that you perceived to be violent for 3 consecutive months or longer? (YES/NO) (Note: if the participant answers no, the following questions regarding television/movies will be skipped.)

2. Please indicate the age range at which you watched violent television shows or movies most frequently. \_\_\_\_\_ - \_\_\_\_\_

3. How frequently did you watch violent shows or movies in this timeframe?

1(1-3 hours per month), 2 (1-2 hours per week), 3(3-4 hours per week), 4(5-6 hours per week) 5(about an hour every day), 6(2-3 hours every day), 7(more than 3 hours every day)

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