



Modern unexplored martial arts – what can mixed martial arts and Brazilian Jiu-Jitsu do for youth development?

Tony Blomqvist Mickelsson

To cite this article: Tony Blomqvist Mickelsson (2019): Modern unexplored martial arts – what can mixed martial arts and Brazilian Jiu-Jitsu do for youth development?, European Journal of Sport Science, DOI: [10.1080/17461391.2019.1629180](https://doi.org/10.1080/17461391.2019.1629180)

To link to this article: <https://doi.org/10.1080/17461391.2019.1629180>



© 2019 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Accepted author version posted online: 06 Jun 2019.
Published online: 16 Jun 2019.



Submit your article to this journal [↗](#)



Article views: 559



View related articles [↗](#)



View Crossmark data [↗](#)

Modern unexplored martial arts – what can mixed martial arts and Brazilian Jiu-Jitsu do for youth development?

TONY BLOMQVIST MICKELSSON 

Faculty of Education, Kristianstad University, Kristianstad, Sweden

Abstract

Contemporarily, two martial arts have emerged as highly popular among youth; Mixed Martial Arts (MMA) and Brazilian Jiu-Jitsu (BJJ). Despite their popularity, we know little of how they affect individuals sociopsychologically. The current study sought to explore how the currently underexplored martial art disciplines may contribute to sociopsychological development among young people. In addition, it was investigated whether individuals who are predisposed to different traits may favour one sport over the other. This study was conducted with a longitudinal design; over the course of 5 months, 113 participants completed training in either condition. The results show that both groups displayed increased self-control and pro-social behaviour; however, MMA practitioners also reported increased aggressiveness, whereas BJJ practitioners experienced a decline in aggression. Accordingly, individuals who trained in MMA displayed substantially higher pre-existing aggression levels than the BJJ practitioners. The current results further corroborate research suggesting that modern martial arts and MMA may not be suitable for at-risk youth to practice, whereas traditional martial arts and sports with a healthy philosophical foundation may be effective in reducing antisocial behaviour while enhancing socially desirable behaviour among young people.

Keywords: Brazilian, mixed martial arts, aggression, self-control, pro-social, martial arts

Highlights

- BJJ-training may increase socially desirable behavior and decrease aggression levels.
- MMA-training may increase socially desirable behavior, but elevate aggression levels.
- Youths with higher pre-existing aggression levels may be more inclined to train MMA, than BJJ.

Martial arts have emerged as a controversial addition to sports interventions. Opinions on the practice of martial arts and its suitability for youth is highly divided; so is the empirical research around the sociopsychological outcomes due to practicing martial arts. In a well-cited longitudinal study, Endresen and Olweus (2005) reported disturbing results in power- and martial arts amongst youths. Endresen and Olweus's (2005) findings, in terms of aggression among martial artists, have since been corroborated in several articles (e.g. Kreager, 2007; Mutz, 2012; Sofia & Cruz, 2017). The critique has indeed been addressed towards martial arts and youth involvement; Pearn (1998) argued that boxing and youth do not mix well in our

contemporary society and suggested there are ethical dilemmas associated with the sport. This critique has been further developed by Dixon (2015), who presents a wide array of moral dilemmas related to the practice of MMA.

However, martial arts have also been shown to produce socially desirable effects. Lakes and Hoyt (2004) found that martial arts promoted self-regulation, pro-social behaviour, and decreased conduct problems in a school-based programme. Similarly, Twemlow et al. (2008) report that children's aggressive behaviour decreased as a result of martial arts training. Moreover, these findings have been substantiated (e.g. Steyn & Roux, 2009; Zivin et al., 2001). In addition, a recent metanalysis indicates that martial

Correspondence: Tony Blomqvist Mickelsson, Faculty of Education, Kristianstad University, Viggengatan 5, Järfälla 17745, Sweden. E-mail: tony.blomqvist_mickelsson0002@stud.hkr.se

This article has been republished with minor changes. These changes do not impact the academic content of the article.

© 2019 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

arts do reduce aggressive and externalising behaviour (Harwood, Lavidor, & Rassovsky, 2017).

These paradoxical results have been argued to be the product of inadequate differentiation between different disciplines inside martial arts (Chinkov, 2014). Indeed, while traditional martial arts (e.g. aikido, taekwondo, karate) seem to reduce delinquent and aggressive behaviour, modern competitive martial arts (e.g. boxing, Thai boxing, wrestling) may enhance such behaviour (Nosanchuk & MacNeil, 1989). Karatekas have been reported to display less aggressive behaviour than boxers (Graczyk, Hucinski, Norkowski, Pęczak-Graczyk, & Rozanowska, 2010), wrestlers (Mroczkowska, Kownacka, & Obmiński, 2008) and kickboxers (Boostani & Boostani, 2012), while aikido practitioners displayed less aggressive behaviour than boxers (Graczyk et al., 2010) and less delinquent behaviour than Thai-boxing practitioners (Vertonghen, Theeboom, & Pieter, 2014).

The sociopsychological outcome differences between the martial arts may have several causes; one of which has been argued to be the philosophical foundation associated with the sport (Zivin et al., 2001). Traditional martial arts are primarily focused on developing “inner” strength and character, with strong associations to a deep pacifistic nature (Zivin et al., 2001), whereas modern martial arts seem to have a more competitively oriented scope. In an early intervention, Trulson (1986) found that participants who were traditionally taught taekwondo reduced aggressive behaviour, whereas the group who were taught taekwondo without the associated values *increased* aggressive behaviour.

Furthermore, different sports may not only develop different traits among individuals; they may also attract individuals with pre-existing differences in traits, such as aggression (Vertonghen et al., 2014). Adhering to the philosophy of traditional martial arts, aggressive behaviour arguably has no place in these disciplines, whereas it has been positively correlated with success among competitive contact sports (Sheldon & Aimar, 2001). In the light of these results, practitioners of modern competitive martial arts may facilitate and benefit from increased levels of aggression, whereas traditional martial arts neither endorse nor encourage aggressive behaviour. These pre-existing differences may partially set the premise for how an individual develops in her current sport context. Some research has focused on the temporal aspect; aggression seems to decline over time in traditional martial arts (Nosanchuk & MacNeil, 1989; Skelton, Glynn, & Berta, 1991; Zivin et al., 2001) while modern martial artists have reported increased aggressiveness (Nosanchuk & MacNeil, 1989).

Martial arts and their sociopsychological contributions have been extensively studied; however, this

research has primarily explored sports such as judo, karate, taekwondo, etc. In contemporary society, two martial arts have emerged as highly popular among youth; MMA and BJJ. As the BJJ and MMA communities continue to grow, there is a need to explore how the two sports affect the sociopsychological development of youth. While the research regarding BJJ and MMA is scarce, the evidence suggests that BJJ may have the appropriate philosophical foundation needed to improve socially desirable traits. Indeed, in Chinkov and Holt’s (2016) study, BJJ practitioners stated that characteristics such as empathy and respect for others were deeply associated with the practice of BJJ; traits that developed through training and carried over in their day-to-day lives.

Furthermore, according to BJJ-coaches, it is essential for BJJ-gyms to contain an atmosphere that is characterised by trust and calmness. Additionally, prior research reports how BJJ-training may strengthen social identity (Rodrigues, Evans, & Galatti, 2019), increase executive functioning (Bueno & Saavedra, 2016) and promote learning transfer and motivation (David, 2015); however, no developmental pathways, in terms of aggression, self-control or pro-social behaviour have been made. In addition, both Bueno and Saavedra’s (2016) and David’s (2015) studies lacked adequate statistical power ($n = 59$, respectively $n = 39$) and had no control group (Bueno & Saavedra, 2016).

While MMA training has been shown to increase internal control (Massey, Meyer, & Naylor, 2013), it has also been the subject of moral critique and investigation. In contrast to the values associated with BJJ, MMA has been argued to be commercially influenced, sensation-seeking, and somewhat de-civilising (Van Bottenburg & Heilbron, 2006). In addition, qualitative studies show how MMA may serve as a platform for men to construct masculinity (e.g. Channon & Matthews, 2015).

Concerning philosophical foundations and the different trajectories are associated with martial arts in terms of aggressiveness, there is reason to believe that individuals with higher levels of aggression may favour one sport over the other. One might argue that we now must turn our focus to these novel martial arts which are being extensively practiced, in order to explore who is attracted to them and how they may shape individuals in sociopsychological ways.

The current study sought to explore how MMA and BJJ training affects both antisocial and socially desirable traits amongst adolescents and young adults who were new to the sports over the course of 5 months and if there are pre-existing differences between participants which may make them more inclined to participate in one sport over the other.

The following questions were asked about these issues (1) how do MMA, and BJJ practice affect the practitioners' aggression levels, pro-social behaviour, self-control, and crime frequency and (2) are there pre-existing differences between the groups which seek to train in MMA compared to BJJ?

Furthermore, three hypotheses were formulated: (1) BJJ practitioners will enhance socially desirable behaviour more than MMA practitioners, (2) MMA practitioners will increase aggressive behaviour, and (3) practitioners seeking to train in MMA will have higher levels of pre-existing aggression than those seeking to train in BJJ.

Method and materials

Participants

Participants were recruited at local martial arts academies in Sweden. Participants were approached in conjunction with ongoing or completed training sessions. All of the recruited participants had self-selected the sport in which they intended to train. Since the majority of research in sport sees it as a social vehicle for change that targets youth, this study targeted participants between 15 and 24 years of age.

Furthermore, all participants were required to state that they had: (1) an intention to train in BJJ or MMA for at least 5 months onwards, (2) an intention to train in the selected sport at least twice a week, (3) to assure they were novices in the selected sport, and (4) to be mentally and physically healthy. The original sample included 145 participants, (125 males, 20 females) with 79 (*n*) in the MMA group and 66 (*n*) in the BJJ group. The majority of the sample were high-school educated (*n* = 85) while 20 participants were university graduates, and three participants reported having finished elementary school. No demographic differences between the groups were found. The mean age for the full sample was 20.23 (SD = 2.43). Furthermore, participants stated that they had the intention to complete a mean of 3.24 (SD = 1.1) training sessions per week.

Procedure

All participants were recruited within a two-week timeframe. Seven of the martial art clubs were located in an urban environment in a Swedish city centre, while three of them were in a suburban area. All measurements were administered to the participants twice. A pretest was completed upon accepting participation, and posttest was completed at the end of the intervention either in paper form or through

e-mail. The intervention lasted 5 months; in order to control for preliminary data attrition, an e-mail was sent midway through the intervention to confirm that the participants were still active and maintaining the minimum number of training sessions per week.

Measurements

Aggression. Aggression was measured with the Buss-Perry Aggression Questionnaire (BPAQ; Buss & Perry, 1992). The BPAQ consists of 29 items with four subscales. These are physical aggression (e.g. "Given enough provocation, I may hit another person"), verbal aggression (e.g. "I often find myself disagreeing with people"), hostility (e.g. "I am suspicious of overly friendly strangers") and anger (e.g. "I have trouble controlling my temper"). The items are rated on a Likert scale, ranging from 1 (*extremely uncharacteristic of me*) to 5 (*extremely characteristic of me*). These subscales were analysed as a total score. The available scores range from a minimum of 29 to a maximum of 145. In the original article, the average total score for men was 77.8 and 68.2 for women; thus, scores above that level may be considered high and vice versa. The BPAQ is a well-known and validated measurement of aggressive behaviour.

Pro-social behaviour. Pro-social behaviour was measured with the Prosocialness Scale for Adults (PSA; Caprara, Steca, Zelli, & Capanna, 2005). The PSA consists of 16 items and is analysed as a total score in the current study. Items included are such as "I am emphatic with those who are in need" and "I try to help others." The scale deploys a Likert scale, ranging from 1 (*never true*) to 5 (*almost/always true*). The available score ranges from a minimum of 16 to a maximum of 80. The PSA was validated with adequate results in the original article.

Self-control. Self-control was measured with the Self-Control Scale (SCS; Alvarez-Rivera & Talbot, 2010). The scale deploys 31 items. Items to be rated include "I get upset easily," "I usually act without thinking" and "It is okay to have unprotected sex with a person you barely know." SCS utilises a Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The available score ranges from a minimum of 31 to a maximum of 155.

Criminal frequency. The frequency and severity of the participants' criminal behaviour and activities were measured with the Total Delinquent Acts Measure (TDAM; Elliott, Huizinga, & Ageton, 1985). Originally, individuals estimated their frequency in a wide array of criminal activities over the

course of 12 months. The length of time was modified from 12 to 5 months. The TDAM consists of 34 items, where participants freely estimate their frequency. As such, 10 offenses committed was equal to 10 units in the statistical analysis. Items included e-crimes measured at various severity levels such as involvement in gang fights and extortion, but also minor theft and general nuisance crimes.

Statistical analysis

In order to explore how BJJ and MMA affected the participants over time, a mixed ANOVA tests were deployed. Furthermore, a series of *t*-tests were performed to investigate any preliminary differences that may indicate certain predispositions to participation in either BJJ or MMA. All analysis was performed in IBM SPSS. 23. In addition, a power calculation was performed in G*Power 3.1 (for a detailed discussion about G*Power 3.1; see Faul, Erdfelder, Lang, & Buchner, 2007).

The following settings provided the basis of the calculation: an effect size of Cohen's $d = .15$, alpha level = .05 and a power of .95. Furthermore, four measurements would be utilised with an allowed intercorrelation of .5. Given these settings, the required sample size was a total of 98 (n) participants.

Results

Data attrition

The original sample consisted of 145 participants; however, four participants failed to complete the first survey. Additionally, six dropouts could not be reached at the time of posttest, and the remaining 22 dropouts stated that they had stopped attending the classes. Thus, the remaining sample consisted of 113 participants (MMA: $n = 63$, BJJ: $n = 50$) with a total of 105 men and 8 women.

The dropouts were younger ($M = 18.32$, $SD = 1.68$) than the maintainers ($M = 20.23$, $SD = 2.43$), $t(143) = 3.9$, $p < .001$. The dropouts also reported less aggressive behaviour ($M = 67.18$, $SD = 3.9$) than the maintainers ($M = 77.67$, $SD = 13.31$), $t(143) = 3.99$, $p < .001$. No other demographic or psychosocial variables differed significantly between the dropouts and maintainers.

Descriptive statistics

Descriptive statistics for pre- and posttest sociopsychological values are displayed in Table I. After data attrition, participants did not differ in any demographic variable. Finally, the MMA practitioners ($M = 2.56$, $SD = .41$) did not differ significantly in the number of average training sessions completed each week compared to the BJJ practitioners ($M = 2.6$, $SD = .33$) (Table II).

Mixed anova

In order to explore how the sports affected the participants over time, a mixed ANOVA was conducted. The between variable was the type of sport practiced (i.e. BJJ or MMA), and the within variables were aggression, pro-social behaviour, self-control, and crime frequency.

Aggression. There was no significant main effect of aggression as a result of training, $F(1, 111) = 326.36$, $\eta_p^2 = .03$, $p = .1$. However, the interaction between aggression and sport was significant, $F(1, 111) = 30.97$, $\eta_p^2 = .1$, $p < .001$. Whereas MMA practitioners slightly increased their levels of aggression, BJJ practitioners reduced theirs (Figure 1).

Pro-social behaviour. A significant main effect of training was found, $F(1, 111) = 36.02$, $\eta_p^2 = .257$, $p < .001$. In addition, the interaction between pro-social behaviour and sport was also significant, $F(1, 111) = 5.1$, $\eta_p^2 = .05$, $p = .03$. Both MMA and BJJ

Table I. Descriptive statistics of dropouts.

	MMA-dropouts (16 n)		BJJ-dropouts (16 n)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age	18.38	1.15	18.25	.85
Male/female	13 (n) / 3 (n)		11 (n) / 5 (n)	
Education	2	0.00	2.13	.34
Intended number of sessions a week	2.56	.63	3	.36
Baseline aggression	68.31	4.1	66.06	3.54
Baseline pro-social behaviour	46.37	2.21	44.81	2.37
Baseline self-control	73.75	3.83	74.31	2.86
Baseline criminal frequency	2.75	5.23	1.12	2.02

Note: Education was coded as 1 = elementary school, 2 = high school, 3 = university.

Table II. Sociopsychological descriptive statistics of participants.

	MMA		BJJ	
	M	SD	M	SD
Baseline aggression	83.4	12.49	70.48	10.62
Posttest aggression	84.32	14.44	67.74	11.02
Baseline pro-social behaviour	45.01	10.04	47.1	8.45
Posttest pro-social behaviour	46.28	9.57	49.82	9.51
Baseline self-control	73.08	16.7	74.36	10.65
Post-test self-control	77.71	16.36	79.74	11.79
Baseline criminal frequency	4.81	8.93	1.78	3.74
Posttest criminal frequency	4.27	7.94	.94	2.07

practitioners seemed to improve their pro-social behaviour, where the increase was more significant among the latter (Figure 2).

Self-control. A significant main effect was present, $F(1, 111) = 135.57, \eta_p^2 = .57, p < .001$. However, there was no significant interaction between self-control and sport, $F(1, 111) = .77, \eta_p^2 = .007, p = .38$. These results indicate that self-control improved among all practitioners, independent of what type of sport was practiced.

Crime frequency. There was a significant main effect present $F(1, 111) = 5.15, \eta_p^2 = .05, p = .03$. However, no interaction between sport and crime frequency was found $F(1, 111) = .23, \eta_p^2 = .002, p = .64$. These results indicate that both groups reduced criminal behaviour moderately; however, the reported crime frequency in both groups was low at both baselines (MMA: $M = 4.81, SD = 8.93$; BJJ: $M = 1.79, SD = 3.74$) and posttest (MMA: $M = 4.27, SD = 7.94$; BJJ: $M = .96, SD = .3$). Furthermore, the data were not normally distributed. Both MMA (Mdn = .00) and BJJ

practitioners (Mdn = .00) generally did not commit any crime, thus, these results ought to be carefully interpreted.

Pre-existing differences

A series of *t*-tests were performed in order to reveal pre-existing differences. All values reported are the practitioners' baseline levels.

MMA practitioners did not differ in self-control ($M = 73.08, SD = 16.7$) compared to BJJ practitioners ($M = 74.36, SD = 10.65$), $t(111) = -.45, p = .65$, neither did they differ in pro-social behaviour significantly (MMA: $M = 45, SD = 10.04$; BJJ: $M = 47, SD = 8.45$), $t(111) = -1.091, p = .28$. However, the MMA practitioners did report significantly higher crime frequency ($M = 4.81, SD = 8.93$) than BJJ practitioners ($M = 1.78, SD = 3.74$), $t(111) = 2.173, p = .02$. Finally, the MMA practitioners displayed higher aggressive levels ($M = 83.4, SD = 12.49$) than the BJJ practitioners ($M = 70.48, SD = 10.62$), $t(111) = 5.64, p < .001$.

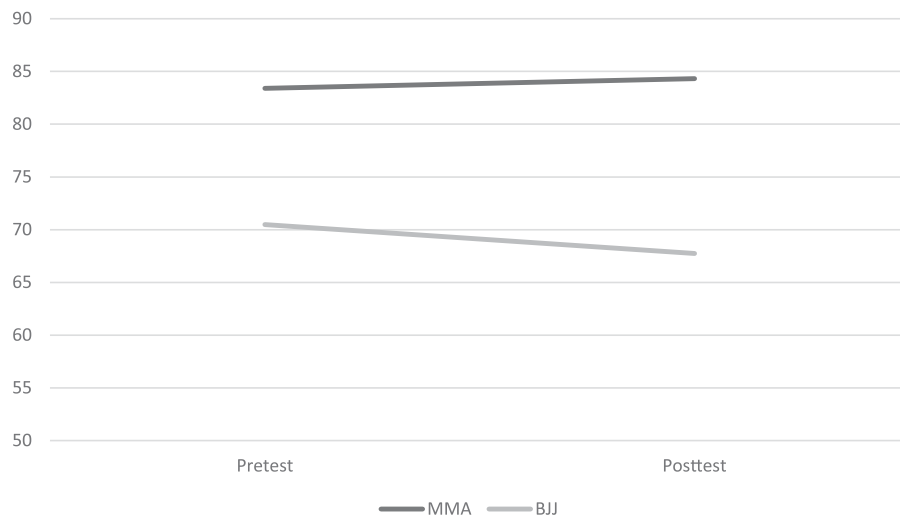


Figure 1. Changes in aggression amongst MMA and BJJ practitioners.

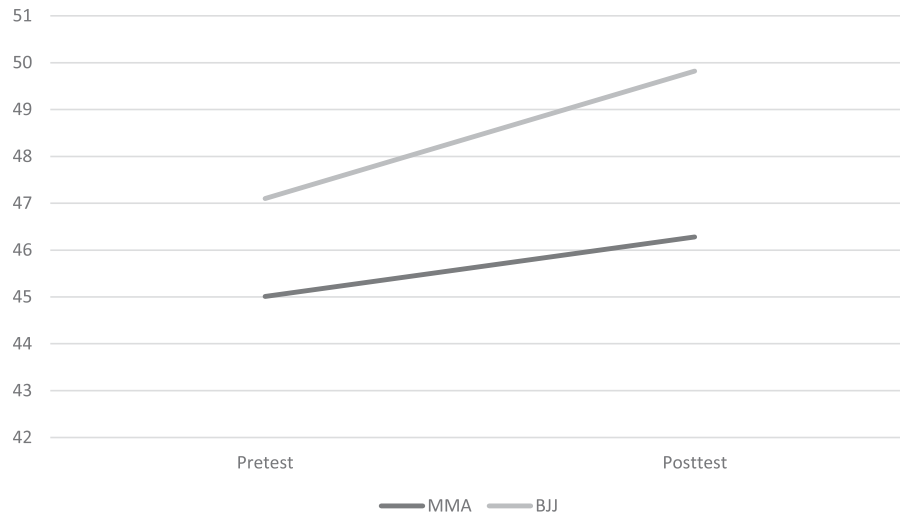


Figure 2. Changes in pro-social behaviour amongst MMA and BJJ practitioners.

In conclusion, there was no difference in socially desirable traits between MMA and BJJ practitioners. However, the MMA practitioners did seem to engage in more criminal and aggressive behaviour than the BJJ practitioners at baseline.

Discussion

The current study sought to explore how MMA and BJJ affect both deviant and socially desirable traits among adolescents and young adults who were new to the sports over the course of 5 months and how individuals predisposed to certain traits may be more inclined to train in one sport than another.

Partially in accordance with hypothesis one, the BJJ practitioners did display increases in both pro-social behaviour and self-control; however, the increase in self-control was not significantly different from that of the MMA practitioners. This finding is more salient in the light of hypotheses two and three. As hypothesis two expected, aggressiveness did increase amongst MMA practitioners, whereas, it was reduced among the BJJ practitioners. In addition, in line with hypothesis three, the participants who sought out training in MMA displayed substantially higher baseline levels of aggression.

The primary finding may be arguably that the contrasting effects MMA and BJJ training had on levels of aggression. In accordance with previous literature on modern martial arts (e.g. Nosanchuk & MacNeil, 1989), the MMA training seemed to facilitate aggressive behaviour, whereas the BJJ participants experienced a decline in aggressiveness. These findings may indicate that the underlying philosophy in BJJ is suitable for the development of socially desirable traits (Chinkov & Holt, 2016). While the current study does not directly measure

the philosophies that may have been experienced by the participants, the results provide some substance which could be explained by earlier work. It was evident that the BJJ practitioners developed more pro-social behaviour and reduced aggression compared to MMA practitioners. According to Chinkov and Holt (2016), BJJ-practitioners developed respect and empathy for one another; something they credited to the practice and philosophy of BJJ. The current results do support this finding.

In contrast, MMA has been portrayed as de-civilising as well as being associated with masculinity and sensation-seeking (Van Bottenburg & Heilbron, 2006). Such characteristics are plausibly intimately connected to aggression, which was clearly evident among the MMA practitioners in the current study. The MMA practitioners also increased pro-social behaviour; however, the increase was minor. One should not assume that values such as empathy and respect are non-existent in MMA, but the overall research suggests that such values may be less promoted in MMA communities compared to BJJ-communities.

Furthermore, the research on martial arts revolves around enhanced aggression or elevated self-control. This remarkable paradox was replicated in the current study; only this time, both findings were present among the same participants. The MMA practitioners displayed *both* elevated aggression and self-control. While modern martial arts, indeed, seem to be associated with elevated aggression, Massey et al. (2013) report that MMA practitioners also increased internal control as a result of their training; however, this internal control was only relevant in a sporting context. This finding may shed light on the current results. Whereas the BJJ practitioners experienced an increase in socially desirable

traits, MMA practitioners may have improved traits deemed exclusively relevant for their sporting participation. As Sheldon and Aimar (2001) report, aggressiveness has been linked to successful outcomes in contact sports. Thus, the violent nature of MMA suggests that this positive correlation may also hold true for MMA practitioners. Drawing from Massey et al. (2013) and Sheldon and Aimar (2001), MMA practitioners may have developed self-control in order to successfully complete the challenging training of MMA while developing aggressiveness, which in turn maybe relevant in terms of success inside the sport. Furthermore, the dropouts displayed substantially less aggression than the maintainers. This result further indicates that higher levels of aggression seem to be a natural element in MMA.

The current study may have practical implications for future interventions that aim to target youth-at-risk in programmes which utilise BJJ or MMA-training. Whereas the prior research reports how traditional martial arts may contribute to socially desirable improvements, MMA is still under researched and provides ambivalent results. The current contrasting results between the elevated aggression and increased self-control and pro-social behaviour generates a somewhat diffuse indication of its suitability as an intervention. Thus, MMA must be further researched under conditions which control for external factors (e.g. coaches, peers) which may be relevant. In contrast, BJJ has accumulated almost exclusively positive, but scarce, evidence for its effect. As such, BJJ may prove to be an effective intervention, if implemented with the associated values, inherent norms, and explicit philosophy connected to the sport. However, given the preliminary sociopsychological differences in the current study, the question still stands whether youth-at-risk will self-select a sport such as BJJ over MMA. Despite the promising results regarding BJJ, the research around the sport is still in its infancy. Thus, further research with improved methods is required.

In conclusion, the current study provided preliminary results that showed how different martial arts generally facilitate the same positive trends in sociopsychological traits to a different extent, the exception being the developmental pathway of aggression. This research was done in two underexplored martial arts in that respect. The primary findings are that both MMA and BJJ increased self-control and pro-social behaviour; however, whereas the MMA practitioners increased levels of aggression, the BJJ practitioners reduced theirs. Furthermore, individuals who sought out to practice MMA were more predisposed to having higher levels of aggression, whereas the dropouts generally had lower levels of aggression. This result further indicates

that MMA facilitates aggression. Drawing from the current results, BJJ may be a potential platform for youth to manage problematic behaviour.

Limitations

The current study was not without limitations. The participants stated sensitive personal information about their behaviour and (illegal) activities. Thus, there may have been an inclination towards answering in a socially desirable manner; for which there was no control. The nature of the study may also have implications for the issue of selection bias. It is not plausible that individuals who engage in serious crime would be willing to participate in a study such as this one. Thus, the current results suggest rather that practices that may *prevent* antisocial behaviour, whereas no conclusions can be drawn about the practices rehabilitating effects.

Secondly, the sample was predominately men. This gender bias may be specifically important with regards to the variables relating to aggression and developmental pathways since aggression has been known to be more prevalent among men (Buss & Perry, 1992). Because the final sample only included eight females, no measures were taken in order to control for gender differences, which has been reported in previous research (e.g. Lakes & Hoyt, 2004).

Finally, the sociopsychological changes due to sport are not exclusively related to the sport practiced or the individual's characteristics (Coakley, 2011). Factors such as coaches, peers, and other similar factors have been shown to impact the sociopsychological trajectory. The current study did not address such factors, and given the results on aggression, there is reason to believe that practicing BJJ instead of MMA may be associated with spending more time around less aggressive and more pro-social individuals which may impact the individuals own behaviour.

Acknowledgments

All trainers who aided me in the recruiting process; thank you. This research would not have been possible without your help.

Disclosure statement

No potential conflict of interest was reported by the author.

ORCID

Tony Blomqvist Mickelsson  <http://orcid.org/0000-0003-2934-9313>

References

- Alvarez-Rivera, L. L., & Talbot, K. (2010). Institutional attachments and self-control: Understanding deviance among Hispanic adolescents. *Journal of Criminal Justice*, 38(4), 666–674. doi:10.1016/j.jcrimjus.2010.04.040
- Boostani, M. A., & Boostani, M. H. (2012). Investigation and comparing aggression in athletes in non-contact (swimming), limited contact (karate) and contactable (kickboxing) sport fields. *Journal of Combat Sports and Martial Arts*, 3(2), 87–89.
- Bueno, J. C. B., & Saavedra, L. (2016). Brazilian Jiu-Jitsu and inhibitory control: Effects of practice on secondary public school students in Abu Dhabi, UAE. *Revista de Artes Marciales Asiáticas*, 11(2s), 96–97. doi:10.18002/rama.v11i2s.4190
- Buss, A. H., & Perry, M. (1992). The aggression questionnaire. *Journal of Personality and Social Psychology*, 63(3), 452–459. doi:10.1037/0022-3514.63.3.452
- Caprara, G. V., Steca, P., Zelli, A., & Capanna, C. (2005). A new scale for measuring adults' prosocialness. *European Journal of Psychological Assessment*, 21(2), 77–89. doi:10.1027/1015-5759.21.2.77
- Channon, A., & Matthews, C. R. (2015). "It is what it is": Masculinity, homosexuality, and inclusive discourse in mixed martial arts. *Journal of Homosexuality*, 62(7), 936–956. doi:10.1080/00918369.2015.1008280
- Chinkov, A. E. (2014). *Personal and social benefits associated with participation in Brazilian Jiu-Jitsu* (Master thesis). University of Alberta.
- Chinkov, A. E., & Holt, N. L. (2016). Implicit transfer of life skills through participation in Brazilian Jiu-Jitsu. *Journal of Applied Sport Psychology*, 28(2), 139–153. doi:10.1080/10413200.2015.1086447
- Coakley, J. (2011). Youth sports: What counts as "positive development?" *Journal of Sport and Social Issues*, 35(3), 306–324. doi:10.1177/0193723511417311
- David, S. (2015). *The effect of traditional method of training on learning transfer, motivation, self-efficacy, and performance orientation in comparison to evidence-based training in Brazilian Jiu-Jitsu* (Doctoral dissertation). University of Southern California.
- Dixon, N. (2015). A moral critique of mixed martial arts. *Public Affairs Quarterly*, 29(4), 365–384.
- Elliott, D. S., Huizinga, D., & Ageton, S. S. (1985). *Delinquency: Total delinquent acts measure* [Database record]. Retrieved from PsycTESTS. doi:10.1037/t18756-000
- Endresen, I. M., & Olweus, D. (2005). Participation in power sports and antisocial involvement in preadolescent and adolescent boys. *Journal of Child Psychology and Psychiatry*, 46(5), 468–478. doi:10.1111/j.1469-7610.2005.00414.x
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191. doi:10.3758/BF03193146
- Graczyk, M., Hucinski, T., Norkowski, H., Pęczak-Graczyk, A., & Rożanowska, A. (2010). The level of aggression syndrome and a type of practised combat sport. *Journal of Combat Sports and Martial Arts*, 1(2), 1–14.
- Harwood, A., Lavidor, M., & Rassovsky, Y. (2017). Reducing aggression with martial arts: A meta-analysis of child and youth studies. *Aggression and Violent Behavior*, 34, 96–101. doi:10.1016/j.avb.2017.03.001
- Kreager, D. A. (2007). Unnecessary roughness? School sports, peer networks, and male adolescent violence. *American Sociological Review*, 72(5), 705–724. doi:10.1177/000312240707200503
- Lakes, K. D., & Hoyt, W. T. (2004). Promoting self-regulation through school-based martial arts training. *Journal of Applied Developmental Psychology*, 25(3), 283–302. doi:10.1016/j.appdev.2004.04.002
- Massey, W. V., Meyer, B. B., & Naylor, A. H. (2013). Toward a grounded theory of self-regulation in mixed martial arts. *Psychology of Sport and Exercise*, 14(1), 12–20. doi:10.1016/j.psychsport.2012.06.008
- Mroczkowska, H., Kownacka, I., & Obmiński, Z. (2008). Study of the indicators of social aggressiveness in competitors practicing combat sports. *Polish Journal of Sport & Tourism*, 15(4), 158–161.
- Mutz, M. (2012). Athletic participation and the approval and use of violence: A comparison of adolescent males in different sports disciplines. *European Journal for Sport and Society*, 9(3), 177–201. doi:10.1080/16138171.2012.11687896
- Nosanchuk, T. A., & MacNeil, M. C. (1989). Examination of the effects of traditional and modern martial arts training on aggressiveness. *Aggressive Behavior*, 15(2), 153–159. doi:10.1002/1098-2337(1989)15:2<153::AID-AB2480150203>3.0.CO;2-V
- Pearn, J. (1998). Boxing, youth and children. *Journal of Paediatrics and Child Health*, 34(4), 311–313. doi:10.1046/j.1440-1754.1998.00231.x
- Rodrigues, A. I. C., Evans, M. B., & Galatti, L. R. (2019). Social identity and personal connections on the mat: Social network analysis within Brazilian Jiu-Jitsu. *Psychology of Sport and Exercise*, 40, 127–134. doi:10.1016/j.psychsport.2018.10.006
- Sheldon, J. P., & Aimar, C. M. (2001). The role aggression plays in successful and unsuccessful ice hockey behaviors. *Research Quarterly for Exercise and Sport*, 72(3), 304–309. doi:10.1080/02701367.2001.10608965
- Skelton, D. L., Glynn, M. A., & Berta, S. M. (1991). Aggressive behavior as a function of taekwondo ranking. *Perceptual and Motor Skills*, 72(1), 179–182. doi:10.2466/pms.1991.72.1.179
- Sofia, R., & Cruz, J. F. A. (2017). Unveiling anger and aggression in sports: The effects of type of sport, competitive category and success level. *Revista De Psicologia Del Deporte*, 26(2), 21–28.
- Steyn, B. J. M., & Roux, S. (2009). Aggression and psychological well-being of adolescent Tae Kwon Do participants in comparison with hockey participants and a non-sport group. *African Journal for Physical Health Education, Recreation and Dance*, 15(1), 32–43. doi:10.4314/ajpherd.v15i1.44636
- Trulson, M. E. (1986). Martial arts training: A novel "cure" for juvenile delinquency. *Human Relations*, 39(12), 1131–1140.
- Twemlow, S. W., Biggs, B. K., Nelson, T. D., Vernberg, E. M., Fonagy, P., & Twemlow, S. W. (2008). Effects of participation in a martial arts-based antibullying program in elementary schools. *Psychology in the Schools*, 45(10), 947–959. doi:10.1002/pits.20344
- Van Bottenburg, M., & Heilbron, J. (2006). De-sportization of fighting contests: The origins and dynamics of no holds barred events and the theory of sportization. *International Review for the Sociology of Sport*, 41(3–4), 259–282. doi:10.1177/1012690207078043
- Vertonghen, J., Theeboom, M., & Pieter, W. (2014). Mediating factors in martial arts and combat sports: An analysis of the type of martial art, characteristics, and social background of young participants. *Perceptual and Motor Skills*, 118(1), 41–61. doi:10.2466/06.30.PMS.118k14w3
- Zivin, G., Hassan, N. R., DePaula, G. F., Monti, D. A., Harlan, C., Hossain, K. D., & Patterson, K. (2001). An effective approach to violence prevention: Traditional martial arts in middle school. *Adolescence*, 36(143), 443–460.