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Do People Who are More Aggressive Sustain More Injuries Than Their Less Aggressive Counterparts: A Study of Participants of Medieval Combat Games in the United States?

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Introduction

Currently in the United States there are several initiatives to make Americans more active like the Let's Move Initiative as well as the Play 60 initiative (Letsmove.gov, aha-nflplay60challenge.org). As Americans become more active the types of injuries and diseases they will sustain will change, especially if people are making large lifestyle changes. This paper will explore some of the long and short term injuries people sustain if they change their lifestyle to become more active in sports. The reason why this paper looks towards sports is because many team sports encourage aggression; while historically aggression has been the reason people were encouraged to do sports there might be greater risk for injury in aggressive people. In addition to changes in people's attitude towards sports there is also the importance of noticing the issues involved with traumatic brain injuries (TBI) or concussions and their relation to sports as well as aggression.

According to the CDC an estimated 8.6 million sports related injuries are reported a year (CDC 2017). Of the sports related injuries, 50% required the treatment by a medical professional. Interestingly enough men accounted for 61.3% of those injured and people within the range 5-24 years old accounted for 64.9% of those injured as well. Additionally 300,000 sports related traumatic brain injuries occur in the U.S. most of them affecting people between the ages 15-24 years old (Yahtyng Sheu, Li-Hui Chen, & Holly Hedegaard, 2016). As people are encouraged to be more athletic and participate in sports we must also consider what injuries will occur and figure out why they occur. Injuries are a result of individual risk factors which together increase the chance for injury. The risk factor this study is trying to determine is the personality risk factor of aggression.

Many studies have been done to look at what risk behaviors are. A study on 11,329 Canadian adolescents showed that the more risk behaviors the one has the higher risk one has for injury (Pickett et al., 2002). Additionally a person's personality is an important risk factor for risk taking (Zuckerman et, al. 2000). As such aggression could be a common and often overlooked risk factor to injury. And while aggression is a single multifaceted risk factor it can easily cause other risk taking behaviors that may lead to injury. As the article by Rachel Adelson says "stress and aggression work[s] in a fast positive feedback loop" (Adelson, 2004). This means that high amounts of stress increases aggression and vice versa. If stress and aggression create a positive feedback loop why do we push children and adolescents to use sports as a means of releasing stress and controlling aggression?

Whenever a child is poorly behaved or often gets into fights with others many schools and parents decide that the child should do a sport so as to channel their energy and/or aggression in a positive way. When a child does do a sport for this reason and is taught self-control skills as part of the sport, the child will have a decrease in aggressive behaviors (Shachar et al., 2016). However, aggression is only lessened if the children are being taught self-control in tandom with the sports and not separate. This means that if the societal and social risk factors that encourage aggression are more prevalent than the teaching of self-control then aggression will win out. Additionally a study from the Islamic Azad University Tiran Branch also looked at aggression in sports. This study looked at and compared aggression rates across 25 different sports, and found no difference in aggression across non-contact and full contact sports (Reza, 2012). This means that even in non-contact sports there may be higher risk for injury in those who are more aggressive.

While there are many risk factors for injuries especially athletic injuries the one that was focused on in this study is aggression. A similar study looked at the risk factors of hockey injuries. This study looked at what external factors influenced the players' behaviors. The study found that the external societal and social forces reinforced aggressive behavior (Michael D Cusimano et al., 2016). A systematic review of minor hockey leagues done a few years earlier by Dr. Cusimano noted that when rules were put in place to limit aggressive acts injuries related to aggression declined (Michael D Cusimano et al., 2013). Which is why this study was designed to look at the specifics of aggression and injury in a way that helped more accurately pin point what aggressive behaviors in sports are greater risk factors for different types of injuries.

This study titled *Do people who are more aggressive sustain more injuries than their less aggressive counterparts: A study of participants of medieval combat games in the United States* is aimed at finding a connection between aggression and injury within a sports setting. In this case the sport being studied is a niche group of athletes who participate in full contact medieval combat games. Combat games much like full contact sports This population was chosen because it is similar to conventional full contact sports in that aggression is encouraged. What makes this population also useful for study is that there is no separation of combatants based on age or sex during competition. This means that all participants whether they be 16 or 60, man or woman,

Methods

This study was based off participants of medieval combat games. The games this study primarily looked at were combat games that are considered full contact. In the case of medieval combat games this means that there is some sort of sufficient force rule that clarifies what constitutes a hit and/or the use of grappling/shield manipulation. This means that most live action role-plays (LARPs) were not considered as medieval combat games. The games that were included as immediate options were Amtgard, Belegarth, Dagorhir, and Society for Creative Anachronism (SCA), and Battle of Nations (HMB). Participants of these sort of games were chosen because men and women fight on the same field all with varying amounts of experience and in some of the sports varying amounts of protective equipment. In sports such as Amtgard, Belegarth, and Dagorhir foam weapons and shields are used. Despite the padding many minor injuries occur amongst participants especially because personal protective equipment is not required to be worn (Book of War, Viridian 2017, Dagorhir Manuel of Arms). The SCA

uses various types of period accurate armor to protect their combatants but use weapons significantly less padded than the foam weapons of the previously mentioned games. The SCA also allows the head to be targeted as a legal hit zone (Marshal's Handbook 2018). HMB uses steel armor and steel weapons, despite the safety of full steel armor the use of steel weapons can still cause injury to the participants. HMB also allows the head to be a legal hit zone (Rules and Regulations, botn.info).

In this study the independent variable is aggression. Everyone is aggressive to some extent and in different ways. The extent of one's aggression and type of aggression one uses most was measured in this project using a modified Buss-Perry Aggression questionnaire (Buss, 1992). This questionnaire was modified to use less colloquialisms and had questions added or slightly modified for better reader interpretation and easier calculations. The Buss-Perry aggression questionnaire is used to denote how aggressive someone is overall as well as break the aggression into four categories: Physical aggression, hostility, verbal aggression, and anger. For each of the statements in the questionnaire the respondent could say that the statement never, sometimes, occasionally, usually, or always applies to them on a five point scale. The scale gives a numerical value from zero to four. Zero being non-aggressive (never) and four being most aggressive (always). The scoring of the questionnaire ranges from 120 (most aggressive) to zero (least aggressive). The aggression score in total and as the individual categories was compared to the responses for the second part of the questionnaire which asked about the dependent variable (injury).

The dependent variable in this study was injury. This questionnaire was asking about any and all injuries not just those incurred during combat games as aggression is

a personality trait that may cause injury in everyday life. Respondents were asked about the number of minor injuries they incurred in the past six months, the number of broken bones they had sustained in the past six months, the number of dislocations they had sustained in the last six months, the number of concussions they had sustained in the past six months, the total number of concussions they have had in their lifetime, and if they have an overuse injury currently and where said injury is. In this study minor injuries are considered bruises, scrapes, scratches, and burns. Overuse injuries were asked about because this study wanted to see if aggressive people had higher rates of overuse injuries in addition to the regular injuries people incur from being active.

This study was broadcast to individuals via a survey monkey shared on Facebook. The study relied on the snowball sampling method in order obtain participants. The survey was spread online because the participants of medieval combat games have large online communities. Sharing the survey on Facebook allowed for responses from individuals all across the United States and thus getting as many participants as possible from multiple social, climate, and geographic settings creating a more diverse population. Another reason why an online survey was used and spread on Facebook is because only the more active participants are consistently online which helps make sure the sample population includes people who actively go to local fighting practices and national fighting events.

Results

This study was conducted upon 115 individuals between the ages 18-60 from across 26 states. However, people who listed their gender different from their sex were removed from the sample to prevent the possibility of hormonal therapy from affecting

the results. As such the total population was narrowed to 112 people .Of the sample population 78 were men and 34 were women. 79 of the participants were between the ages 18-28, 28 were between the ages 29-39, and 5 were between the ages of 40-60. 66.7% of the men were between the ages of 18-28, 28.2% were men between the ages 29-39, and 5.1% were men between the ages 40-60. The average amount of time for participation in combat games was 6 years. More specific population data is it Table 1 below.

Table 1	
Sex	n (%)
Male	78 (69.6%)
Female	34 (30.4%)
Age	
18-28	79 (71%)
29-39	28 (25%)
40-60	5 (4%)
States	
California	34 (30.6%)
Idaho	15 (13.5%)
Iowa	11 (9.7%)
Tennessee	9 (7.9%)
Ohio	4 (3.6%)
Arizona	4 (3.6%)
Illinois	3 (2.7%)
Wisconsin	3 (2.7%)
Minnesota	3 (2.7%)
Montana	3 (2.7%)
Pennsylvania	3 (2.7%)
Michigan	2 (1.8%)
Florida	2 (1.8%)
Washington	2 (1.8%)
Nevada	2 (1.8%)
Utah	1 (0.90%)
Kentucky	1 (0.90%)
South Carolina	1 (0.90%)
Texas	1 (0.90%)
Maryland	1 (0.90%)
Oregon	1 (0.90%)
Alabama	1 (0.90%)

Vermont	1 (0.90%)
Oklahoma	1 (0.90%)
Indiana	1 (0.90%)
New York	1 (0.90%)
Colorado	1 (0.90%)
Sport	
Belegarth	97 (86.6%)
Dagorhir	58 (51.8%)
Amtgard	27 (24.1%)
SCA	11 (9.8%)
HMB	1 (0.89%)
Other	10 (8.83%)

First I looked at the difference in aggression between men and women. In order to be considered generally aggressive one must have scored 63 or higher on the overall Buss-Perry aggression questionnaire. There was no statistical significance in general aggression between men and women. To be considered an angry person one must score 14 or more on the anger section of the Buss-Perry aggression questionnaire. The results of which can be found in Table 2. There was no statistically significant difference between men and women for this section. In order to be considered physically aggressive one must have scored 19 or more on the physical aggression section of the Buss-Perry aggression questionnaire. In this case men were statistically more aggressive than women (p=0.009, CI 95%). In order to be considered hostile a person must score 18 or higher on the hostility section of the Buss-Perry aggression questionnaire. Once again there was no difference between men and women for this section. Finally in order for someone to be considered verbally aggressive one must score 14 or above on the verbal aggression section of the Buss-Perry aggression questionnaire. In this instance men were more verbally aggressive than women (p=0.043, CI 95%). After looking at differences between the sexes in aggression, injury

and concussion rates were compared between the sexes with no statistically significant results.

Table 2		Aggressive		
Aggression Category		Yes	No	p- value
Generally Aggressive	Male	40 (78.4%)	38 (62.3%)	0.064
Angry	Male	32 (69.9%)	46 (69.7%)	0.988
Physically Aggressive	Male	39 (83%)	39 (60%)	0.009
Hostile	Male	32 (66.7%)	46 (71.9%)	0.553
Verbally Aggressive	Male	39 (79.6%)	39 (61.9%)	0.043

Table 3			
Injury	Male	female	p- value
All injury types	3.95 (±6.98)	5.35 (±9.34)	0.381
Minor injuries	2.78 (±6.17)	4.29 (±9.28)	0.312
Overuse Injury	0.46 (±0.51)	0.47 (±0.51)	0.930
Dislocation	0.33 (±1.12)	0.26 (±0.67)	0.741
Broken Bone	0.14 (± 0.67)	0.06 (±0.24)	0.342
Concussions	1.86 (±2.18)	2.12 (±2.42)	0.578

After comparing aggression and injury rates amongst the sexes, aggression was looked at as a contributing factor to injury. The results of the aggression and injury calculations can be found in Table 4. People who were deemed generally aggressive did indeed incur more injuries than their less aggressive counterparts (p=0.035, CI 95%). People who were considered angry by the anger section of the Buss-Perry aggression questionnaire also incurred more injuries at a statistically significant rate (p=0.026, CI 95%). Interestingly enough people who were more physically aggressive did not incur more injuries, despite physical aggression being a large part of combat (p=0.427, CI 95%). However the same cannot be said for concussions.

Table 4		
Type of Aggression	Mean number of injuries (std)	p- value
General Aggression	6.05 (±8.62)	0.035
Anger	6.32 (±8.92)	0.026
Physical Aggression	5.06 (±7.45)	0.427
Hostility	4.69 (±6.55)	0.714
Verbal Aggression	4.88 (±6.97)	0.548

Overuse injuries are caused by not using proper body mechanics, in doing so muscles, ligaments, and tendons have to compensate for the improper distribution of force causing injury. Information on overuse injuries and aggression can be found in Table 6. Aggressive people would be less likely to use proper body mechanics when in the heat of combat. This idea is partially proven correct by the results in the table below. People who are more generally aggressive have high rates of overuse injuries (p=0.005, CI 95%). People with angry personalities also had high rates of overuse injuries (p=0.001, CI 95%). Surprisingly however, people who are more physically aggressive did not incur more overuse injuries than their less aggressive counterparts (p=0.109). Hostile people also did not have a statistically significant relationship with overuse injuries (p=0.299, CI 95%). Much like concussions verbally aggressive people had higher rates of overuse injuries than their not as verbally aggressive counterparts (p=0.045, CI 95%).

Table 5	Overuse Injury		
Aggression Category	Yes	No	p- value
Generally Aggressive	31 (59.6%)	20 (33.3%)	0.005
Angry	30 (57.7%)	16 (26.7%)	0.001
Physically Aggressive	26 (50%)	21 (35%)	0.109
Hostile	25 (48.1%)	23 (38.3%)	0.299
Verbally Aggressive	28 (53.8%)	21 (35%)	0.045

Table 6	Yes	No	Total population n (%)
Overuse injury	52 (46%)	60 (54%)	52 (46%)
Arm	28 (54%)	24 (46%)	28 (25%)
Shoulder	23 (44%)	29 (56%)	23 (21%)
Upper extremity	51 (98%)	1 (2%)	51 (46%)
Foot	11 (21%)	41 (79%)	11 (10%)
Leg	21 (40%)	31 (60%)	21 (19%)
Hip	5 (10%)	47 (90%)	5 (4%)
Lower extremity	37 (71%)	15 (29%)	37 (33%)
Back	13 (25%)	39 (75%)	13 (12%)
Neck	3 (6%)	49 (94%)	3 (3%)

Concussions, the hot button issue of athletics were more common amongst people who were aggressive in most categories. Table 5 gives information on concussions and aggression. People who were more generally aggressive had far more concussions than any other group (p=0.002, CI 95%). People who scored high on the anger section of the Buss-Perry aggression questionnaire also had more concussions (p=0.034, CI 95%). Physically aggressive people also had a higher likelihood of having a concussion (p=0.024, CI 95%). People who were more hostile however did not have statistically have more concussions (p=0.451, CI 95%). Interestingly people who were verbally aggressive had the second highest statistically significant amount of concussions (p=0.012, CI 95%). This however, is not the only time the verbal aggression section yielded strange results.

Table 7	Concussion		
Aggression Category	Yes	No	p- value
Generally Aggressive	42 (56%)	9 (24.3%)	0.002
Angry	36 (48%)	10 (27%)	0.034
Physically Aggressive	37 (49.3%)	10 (27%)	0.024
Hostile	34 (45.3%)	14 (37.8%)	0.451
Verbally Aggressive	39 (52%)	10 (27%)	0.012

Discussion

This study was designed to test if aggression had any impact on the incidence of injury. Aggression was broken into four components: Physical Aggression, Verbal aggression, Anger, and hostility. Together the components make up the aspects of one's aggressive personality. Each component was looked at individually as well as collectively to find what aspects of aggression caused injury. While the hypothesis of the study was to find a correlation between general aggression and injury, the aspects of aggression were also important to note in discovering personality risk factors that cause injury.

Based on the findings of the study there is a connection between general aggression and injury. This correlation is likely due to the positive feedback loop in the brain relating to the hormones that regulate stress and aggression (Adelson, 2004). Stress and aggression affect how people think and greatly impact the decision making of an individual. As such it makes sense that generally aggressive people incur more injuries. The same can be said for anger for pretty much the same reason. However, there was no connection between physical aggression and short term injury. The reason why physically aggressive individuals did not incur more acute injuries is likely because

they are moving, throwing more shots, and injuring others. Because they're being aggressive and physically controlling the situation they are getting similar number of injuries as their not as physically aggressive counterparts.

Results show that there is a statistical correlation between general aggression, anger, physical aggression, and verbal aggression and concussions. Though all these types of aggression may be the reason why people are getting concussions, it is important to note that brain injuries will affect behavior and may have caused the aggression in the individuals to become higher. In a study that looked at collegate athletes mental health and concussions it was found that the athletes who had three or more concussions were more aggressive than their counterparts who reported no concussions (Kerr et al., 2014). However, as both the study that confirms the relationship between concussions and aggression and this study are both cross-sectional studies the aggression and concussions are still a chicken or egg scenario as taking a snapshot of a population does not control for the over-time effects of conussions on personality.

The alarming amount of concussions that occur in sports, contact and non-contact alike is also important to note. In many full contact sports specific aggressive manuvers are cause for penalty as rules try to limit TBIs and spinal cord injuries. Despite the implementation of rules to help protect players from themselves there is little evidence that the number of concussions has fallen. As such the injury might be a result of body mechanics and how people are aggressive. While in more than half the sports studied in this study did not accept the head as a legal hit target there were many concussions reported. This made sense as many people lead with their head when they

fight. The same can be said for football players who for years were taught to tackle by leading with the head. This in many cases causes the head to be in the line of fire so to speak of an impactful force that may cause a concussion. This relates to physical and also general aggression as it would seem that people who are more physically and generally aggressive move more while fighting, more moving especially when one leads with their head means people are getting hit in the head more, and as most people know multiple head injuries whether they be full concussions or not make the likelihood of concussions happening increase. Thus concussions might not just be rooted in aggression but also how people are taught and the proper use of body mechanics.

How people move their body while participating in sports is an important mechanism of injury and also an important aspect of recovering from sports injuries. In a study that looked at helping golfers, pitchers, and tennis players recover from upper extremity injuries; a key emphasis in getting better was exercises that encourage proper body mechanics (Reinold et al., 2002). Of the people that had an overuse injury 98% had an upper extremity overuse injury. Most likely because that sports studied in this study all include a swinging of a weapon. The constant swinging, especially if one is not using proper body mechanics, can take a massive toll on the body and will cause an overuse injury if not properly treated. When aggression is added to the thought process as to how overuse injuries occur the over use inuries make sense because while they are fighting they may be on “auto-pilot” and not thinking about proper stance or body mechanics which if done for extended periods of time will cause injury.

The most interesting find of this study was a relationship between verbal aggression and overuse injury. However, this connection might be due to coincidence

more than anything else. The people who scored highest for verbal aggression were both older people and people who participated in combat games for a long time. These two groups also had the highest overuse injury reports. As such there is a likelihood that verbal aggression and overuse injury correlation may just be coincidence.

This study was done on a niche population and as such the results may not completely carry over to other sports. However, this study is a good starting point for others who want to look at main stream sports and aggression and how that affects injury rates. The confounders of this study are some questions make little sense or are phrased using some colloquialisms which makes it hard to understand if one does not come from an American English speaking background. Another confounder is that all injuries are self-reported, including the concussions. This means that people may have incurred more or less injuries than they could remember and that the concussions were not all diagnosed by a medical professional meaning not all the concussions may have been real traumatic brain injuries. However, the data does give reasonable results and with larger studies of other sports may firmly display that aggression is a risk taking behavior that causes people to get injured.

This study of over 100 medieval combat game participants proves being more Aggressive does in fact make one more likely to get injured. Not just that being aggressive has a high correlation to not just acute injuries but also to chronic injuries. In addition to acute and chronic injuries aggression is significantly correlated to concussions which is a large problem in all contact sports. Thus it might also be time for our society to step back and think if channeling aggression into a sport is a good idea in the long run for children and teenagers with behavioral problems.

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