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The Impact of Participation in Athletics on Neurological and Psychological Health and the Ability to Compete

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The Impact of Participation in Athletics on Neurological and Psychological Health and the Ability to Compete

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Through the analysis of data pooled from multiple studies, we identify the relationship between participation in athletics and the likelihood of developing a mental illness or brain injury and how this may impact the longevity of an athlete's career. Using data from various studies, we find that the prolonged exposure to athletics results in a higher likelihood of developing a psychological or neurological illness both in the short and long term. Additionally, we find that this is often the result of accumulated injuries, both neurological, such as concussions, and physiological, such as tearing muscles or breaking bones. The results, however, suggest that youth, high school, collegiate, and professional athletes, alike, are more likely to experience sports-related depression or anxiety, misuse prescription drugs or develop addiction, or suffer from diseases such as chronic traumatic encephalopathy, all of which are actually unlikely to impact the length of their careers.

I. Introduction

In terms of scientific study, the idea of studying mental health is relatively new and often difficult to examine due to the majority of data being collected from self-reporting. Additionally, the idea that sports related injuries can be more than physical is also new and on the forefront of concerns for professional and collegiate leagues across the United States and the world. With the advanced technology and the ability of the media to cover anything and everything, there has been several stories and headlines over the recent years about former professional athletes suffering from mental illnesses, and in some cases, taking their own lives or the lives of others. This has forced many league offices in professional sports to look into the mental wellness of its players. The first of these findings was that there has been a clear increased risk of developing chronic traumatic encephalopathy (CTE) for athletes who suffered concussions or repeated head trauma in their careers as opposed to non-athletes. Results such as this have led to the retirement of several professional athletes, most famously Chris Borland, a promising NFL talent who retired midway through his rookie year, despite performing better than all other rookies in the NFL. After actions such as this, many other questions had been posed. The U.S. became extremely concerned with preventing concussions in all sports, specifically football, however, athletes in all sports are at an increased risk of exposure to head trauma. More recently, there have been studies indicating that depression rates among athletes are actually higher than expected and the average athlete shows more signs of mild to clinical depression than a non-athlete. Lastly, there is minimal studies in any fields indicating a relationship between addiction and athletics. The studies that do exist have conclusive evidence that athletes who participate in contact sports are much more susceptible to opioid addiction or misuse than the average person.

The problem that the minor attention this issue gets is that there has not yet been a conclusive study to suggest that playing sports puts athletes at a high risk of developing mental health issues, or a way to measure the risk that they face when beginning to play sports. Since there are several conclusive studies to show the likelihood of misusing drugs as an athlete, there should also be a study representing how this may impact a career of an athlete. Studies from reputable sources such as the American College of Sports Medicine, the U.S. National Library of Medicine, and even a conference held to discuss Concussion in Sport that was held in Zurich, have all drawn links between sports and mental health issues. A major issue with these studies, though, is that they are specific to one sports league or one age group of athletes. They are also very strict to which mental illness or health issue they are studying. For example, studies will measure the rate of substance abuse in NFL players, rather than the rate of addiction in a pool of athletes from different backgrounds and comparing this to the likelihood of an athlete failing a drug test, checking into rehab, or retiring early. By showing this information using data, there is a better chance that athletes think about their careers before popping a painkiller to practice harder. Similarly, knowing the impact of concussions and depression/anxiety on career longevity rather than simply the percentage of athletes who suffer from these, may help an athlete seek help early when showing symptoms of either.

Research Idea and Goals

The goal of this research will be to provide readers with a single source that has pooled together information in order to educate about all of the affects participation in athletics could potentially have on the athletes. By doing this, athletes and their friends and family will be able

to recognize early signs of these health issues by being more aware of what they are susceptible to and they will be able to take preventative measures by learning that preventing injury means more than just physiologically. The idea in order to reach this goal will be to analyze three key areas of mental health that sports have been shown to impact. These areas will be concussions/CTE, depression, and addiction/substance abuse. Additionally, suicide and suicidal thoughts will be considered, however, suicide is linked to all of the previously stated mental illnesses and should be considered in relation to them as there is no evidence to suggest that playing sports will result in an increased risk of suicidal thoughts. It is simply important to note that suicidal thoughts have been linked to CTE, depression/anxiety, and addiction/substance abuse and it is not something that can be overlooked. To analyze each of these areas of mental health, 3-4 studies linking sports to rates of the specific mental illness will be used to provide raw data about the percentage of athletes, based on gender and competition level, who suffer from these health problems. The goal will be to have studies that span across multiple age groups and sports in order to see how prevalent each mental illness is in every competition level. Then, a regression will be run with “Years Competing,” being the dependent variable. As this could not be exactly the same for every athlete in each of the studies providing data, an average has been used for this column in the regression table, assuming the athletes started competing at age 10.

Literature Review

A multitude of studies will be used in order to analyze this topic, however, the most important one for data collection will be “Depression in Athletes: Prevalence and Risk Factors,” (Wolanin, 2015). This study compared the rate of depression in the average adult to that of collegiate athletes competing at the NCAA Division 1 Level. The presentation of the data was ideal for gathering data for both male baseball players and professional male athletes, however,

this study could have had a larger sample. One of their samples was 61 male baseball players and 51 non-athletes. Firstly, they could have had more observations, secondly, they limited who they were asking to baseball players. The results would be more convincing if they had, at the very least, asked male athletes from other sports, or extended their questioning to include athletes from schools across the country.

Other studies that will be used for this research have the same issue in terms of sample size or variability in who is being interviewed/evaluated. “Painfully Obvious: A Longitudinal Examination of Medical Use and Misuse of Opioid Medication Among Adolescent Sports Participants,” (Veliz, 2013) only draws conclusions about the links between male adolescent athletes and opioid usage. “Injury, pain, and prescription opioid use among former National Football League (NFL) players,” (Cottler, 2011) is a very insightful and useful study about why opioid usage is high with athletes and how that often increases the likelihood of addiction, however, it is limited to retired NFL players, who suffered more bodily harm than most other athletes, making it more likely that they use pain killers and develop addiction.

In order to improve almost all of these studies, the samples need to be much broader, which is why this study looks to analyze all of them. The results of this study will allow for a conclusive result about the affects of all sports on mental health.

II. Data

The data used in this section was obtained primarily from studies on what percentage of athletes in a certain group suffer from a certain problem, found using Google Scholar, a search engine that grants access to several thousand studies by professionals in their respective fields. The data collected was also taken from the data collected for the studies found on Google

Scholar. Data comes from the American College of Sports Medicine, U.S. National Library of Medicine, International Conference for Concussion in Sport, and the Journal of Adolescent Health.

Concussions and CTE

There is a plethora of data that links concussions to sports, however, the majority of the data comes from football-based studies. The primary source for this area of research will be “Epidemiology of Concussions Among United States High School Athletes in 20 Sports,” (Marar 2012). This study showed the link between concussions and sports for 20 different high school sports and drew many conclusions about this. The results varied and showed that football is not the only sport in which concussions can be an issue. In ice hockey, concussions make up the highest percentage of injuries. In gender comparable sports, girls had a higher rate of concussion than boys. This led the study to draw the conclusion that “Although interest in sports-related concussions is usually focused on full-contact sports like football and ice hockey, concussions occur across a wide variety of high school sports. Concussion rates vary by sport, gender, and type of exposure. An understanding of concussion rates, patterns of injury, and risk factors can drive targeted preventive measures and help reduce the risk for concussion among high school athletes in all sports.” (Marar, 2012). This leads us to believe that concussions may have a larger impact on career longevity than just in the sport of football. The research will also feature several articles linking CTE and concussions and explain that in order to avoid CTE later in life, concussions need to be prevented early on. Thus, knowing how likely your sport is to put your career at risk is useful for the purpose of this paper.

Depression / Anxiety

The two most important studies for depression and anxiety will be both sides of the argument about depression in sports. “Sports Participation as a Protective Factor Against Depression and Suicidal Ideation in Adolescents as Mediated by Self-Esteem and Social Support,” (Babiss, 2009) which concludes that participation in sports at a young age decreases the likelihood of becoming depressed at an early age, specifically, in pediatric patients. This, however, is not supported by several other studies analyzed, which show a surprisingly high level of anxiety in youth athletics due to competition-related anxiety. Next, “Depression in Athletes: Prevalence and Risk Factors,” (Wolanin, 2015) concludes that there is a relatively high likelihood that a collegiate athlete is depressed or shows symptoms of depression. This illustrates the importance of having a varying age range for this research. The younger age range showed a lower risk to develop anxiety/depression but the collegiate athletes were significantly higher, likely as a result of their difficult schedules between school and sports. Another huge cause for the depression is the change between being a college athlete and a graduate moving on to their career outside of sports. This is a major life change that every college athlete who does not play professionally undergoes and it can often result in the athlete showing signs of depression because they no longer do something that they love. This is useful because it will help us understand why depression can occur for athletes and how it could be preventable if you know the early signs or even some causes.

Addiction/Substance Abuse

Addiction is the most prevalent, yet least talked about, issue regarding mental health among athletes at all levels. With participation in sports dramatically increasing the likelihood of serious

physiological injury, that also means it is increasing the likelihood of prescription opioids ending up in the hands of injured athletes. Due to these drugs being highly addictive, many athletes begin to develop both a tolerance and need for the drugs in order to remain pain free and continue to perform at a high level or be pain free after their career is over. “Painfully Obvious: A Longitudinal Examination of Medical Use and Misuse of Opioid Medication Among Adolescent Sports Participant,” (Veliz, 2013) determined with a 95% confidence interval that male adolescents who compete in sports were more likely to misuse opioids than male adolescent non-athletes. The conclusion of this survey was that they “may have greater access to opioid medication,” due to the common injuries that require surgery in sports. Another study, “Injury, pain, and prescription opioid use among former National Football League (NFL) players,” (Cottler, 2011) conducted phone interviews with 644 retired NFL players in which more than half, approximately 52%, admitted to using opioids during their career. Of those, 71% admitted to misuse. Additionally, 15% of interviewees admitted to current misuse, which is a sign of addiction, as they are relying on opioids to get them through the day despite not being prescribed these drugs. This is useful to this paper because it will use a regression table to show if there is a link between the length of a career and substance abuse.

Limitations

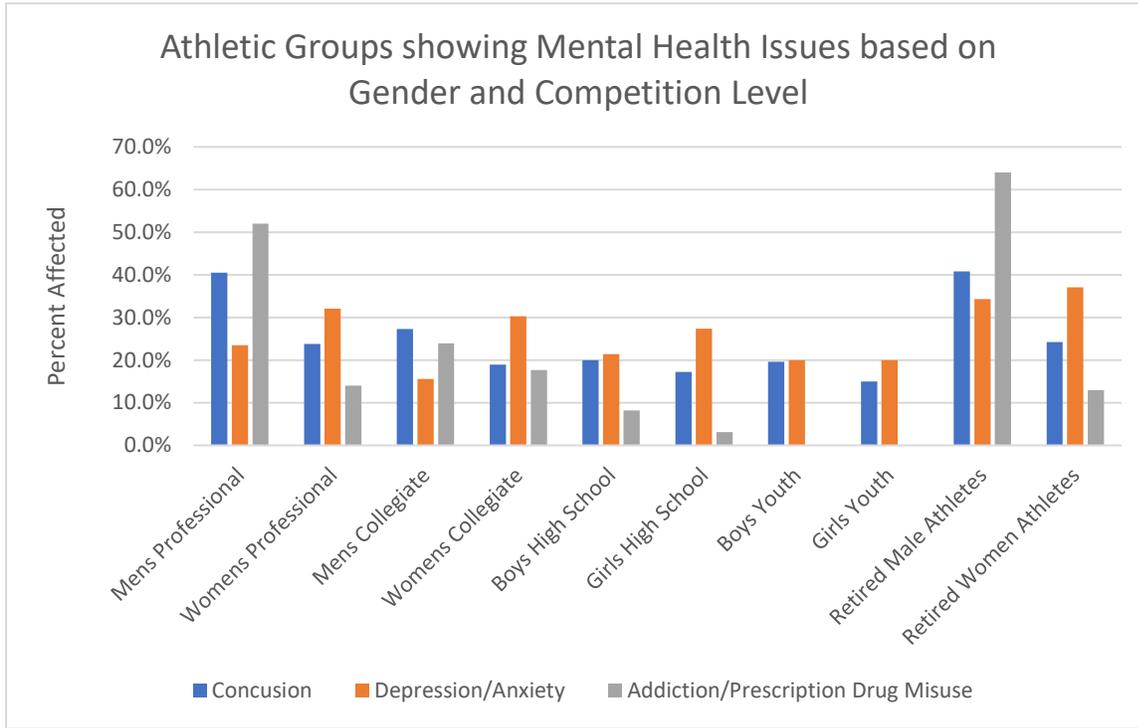
The most prevalent limitation is the availability of data. Since mental health studies are relatively new and athletes are usually thought of as mentally healthy and outgoing people, studies in this area are limited. Another huge problem is that there is little information on sports outside of football. Since football is a major contact sport, is known to have its athletes suffer from CTE, and has been in the media with some retired players taking their own lives, the public only looks at football. It is easy to see that it is the sport that leads to the most head trauma so the

affects it has on the brain are scrutinized more than any other sport. Other sports are often overlooked, despite having similar or higher rates of concussions.

Another limitation is that the exact data that is needed is not readily available. No one has ever gotten 200 random athletes of varying sports and genders, from high school, college, and professional levels, and conducted interviews to determine their mental status and then evaluated the results. This would be the best way to determine the overall affect of competitive athletics on mental health. Since no one has ever conducted such a study, this paper will be an analysis of a pool of studies that measure factors that are relevant to the topic.

The last limitation is underreporting in the studies needed for data collection. Since mental health can most accurately be evaluated by interviews with athletes, there is a concern about underreporting. Athletes are often seen as superior people who should have everything together, and thus, are more likely to lie when asked about their mental health, in order to preserve the image that everything is going well. Sports often teach athletes that complaining is weak and dealing with any adversity is something you need to be able to do in order to be mentally prepared to compete. This means athletes don't want to admit to themselves that they might not be in a good mental health state, making them more likely to lie in interviews.

Raw Data Summary Statistics:



Years in Competition Used For Ranges in Regression:

Gender/Level	Years Competing
Mens Professional	20
Womens Professional	20
Mens Collegiate	11
Womens Collegiate	11
Boys High School	8
Girls High School	8
Boys Youth	3
Girls Youth	3
Retired Male Athletes	35
Retired Women Athletes	35

III. Methodology

In order to analyze the affect that mental health could have on career longevity, first, raw data will have to be collected from several studies based on 5 different ranges of “Years Competing.” All age ranges will be split into two gender ranges due to the large difference between men and women. Men are more likely to suffer from concussions or abuse substances while women are much more likely to suffer from anxiety and depression. We find these statements to be true for all age ranges. Next, an estimate has to be made in order to determine years competing in the sport for the ranges. For simplicity purposes, we assume that all athletes start competing at 10 years old, since some begin as early as 5 years old and some don’t begin until reaching high school. Next we assume that the average youth athlete is 13 years old, High School Athlete is 18 years old, Collegiate Athlete is 21 years old, Professional Athlete is 30 years old, and Retired Athlete is 45 years old. These assumptions leave us with our table from the Data Section Labeled “Years in Competition Used For Ranges in Regression:” After analyzing several studies, we find the number of athletes in each Gender/Competition Years range that have ever been affected by the three mental health issues we are studying. This leaves us with a raw data table that looks like this:

Gender/Level	Years Competing	Concussion	Depression/ Anxiety	Addiction/Prescription Drug Misuse	D/A Sqr.	IHD 15%
Mens Professional	20	40.5%	23.5%	52.0%	0.06	1
Womens Professional	20	23.8%	32.1%	14.0%	0.10	0
Mens Collegiate	11	27.3%	15.6%	23.9%	0.02	1
Womens Collegiate	11	18.9%	30.3%	17.7%	0.09	1
Boys High School	8	20.0%	21.4%	8.2%	0.05	0
Girls High School	8	17.2%	27.4%	3.1%	0.08	0
Boys Youth	3	19.6%	20.0%	0%	0.04	0
Girls Youth	3	15.0%	20.0%	0%	0.04	0
Retired Male Athletes	35	40.8%	34.3%	64%	0.12	1
Retired Women Athletes	35	24.2%	37.1%	13%	0.14	0

Next, we run a multiple regression with the Years Competing as the Dependent Variable. This will allow us to analyze if there is any statistical significance between the variables and the number of years competing. This will lead us to a conclusion that can explain whether the development of these mental illnesses, which have already been linked to sports competition, actually has an impact on the length of the career of an athlete.

IV. Results

The conclusion of this regression table actually shows that there is little impact of these mental health issues on the longevity of an athlete's career. There are several reasons that the results could be inaccurate or skewed, however, this is the results:

Regression Parameters		(2 tailed tests)		
Estimate	Value	SE	T-stat	P-value
Constant (b0)	-41.75	13.03	-3.20	0.01850
Concussion (b1)	129.22	63.30	2.04	0.08727
Depression/Anxiety (b2)	116.13	22.90	5.07	0.00229
Addiction/Prescription Drug Misuse (b3)	-26.52	26.85	-0.99	0.36135

In this table, we can see that the value column increases for both concussion and depression/anxiety. This means that for every increase in 1 unit in the independent variables, which would be full 100%, the years competing in athletics would increase by 129 years. In order to get a more accurate reading of this, we can divide that column by 100 in order to see the results of increasing the independent variables by 1%. The updated value column appears like this:

Value
-0.42
1.29
1.16
-0.27

The issue here, though, is that there seems to be a positive correlation between both concussions and depression/anxiety and years competing. There is a negative correlation between substance abuse and years competing, which would suggest that an increase in the commonality of substance abuse in sports will lead to shorter careers, however, the p-value is so high that it suggests we should ignore this data as it is actually insignificant.

Results

R Squared	0.8985
Observations	10

An R- Squared Value suggests that the model explains much of the variability in the dependent variable, however, our prediction model suggests that our confidence interval, even at a high percentage, has large variability in the upper and lower boundaries. This means that for predictive purposes, the model does not serve as a good means to make conclusions.

V. Conclusion

We can conclude that the data shown has little affect on the longevity of an athlete's career. This could make sense for multiple reasons. Firstly, a lot of the human population experiences anxiety or symptoms of depression and lives a fine life with these issues. They are common and players who suffer from this may still be able to compete without it greatly affecting them. Concussions are also common in sports. For the most part, athletes are asked to sit out from athletic competition for 1-2 weeks depending on the severity of the concussion before returning to full contact. It is possible that the only way this significantly impacts the career of athletes is if they reach the threshold for brain damage, which is typically 5 concussions, before the doctors will no longer clear the athlete to return to sport. Lastly, it is possible that substance abuse does not have a significant affect on the career of athletes because they misuse opiates in order to remain in

participation of athletics. Much of the substance abuse/addiction in sport comes as a result of an athlete suffering an injury and turning to drugs in order to combat the pain and remain in competition, so it would make sense that this wouldn't have an impact on a player deciding to retire.

While this is all possible, both as an experienced athlete and as a concerned researcher, I believe that there is more to this issue and the data is skewed because of a difficult collection process that does not represent the proper data. The data here shows the amount of people in growing age groups who have experienced these issues at one point in their lives. It would make sense that as the number of years increases, percentage of people who experienced a mental health issue would also increase because they are older and have had more life experiences. If I had more time and was given unlimited resources to get to the bottom of this issue, I think the proper way to do this type of research would be to sit down with athletes who have already admitted to suffering from one of these problems and conduct interviews. First, they would be asked if they considered their issue to be a major reason for deciding to end their career. Next, they would be asked if they were suffering from their issue at the time of retirement. Lastly, they would be asked how many years they would have like to have played longer, had they not retired early. The average of this number for each age group would be the dependent variable for the regression and multiple regressions would have to be run, one for each mental health issue. By doing this, we firstly account for the fact that many careers end simply because an athlete doesn't have the skills to play at the next level. Additionally, I believe that we would see a clear correlation between a higher number of "Years Missed Due to Mental Health" and a larger percentage of suffering athletes. This would be the ideal way to conduct this study in order to find a conclusion through a much better process.

Bibliography

- “Depression in Athletes: Prevalence and Risk Factors : Current Sports Medicine Reports.” *LWW*, Oxford University Press, journals.lww.com/acsm-csmr/Fulltext/2015/01000/Depression_in_Athletes___Prevalence_and_Risk.17.aspx.
- “Epidemiology of Concussions Among United States High School Athletes in 20 Sports.” *Journal of Research in Crime and Delinquency*, journals.sagepub.com/doi/abs/10.1177/0363546511435626.
- “Injury, Pain, and Prescription Opioid Use among Former National Football League (NFL) Players.” *NeuroImage*, Academic Press, 28 Jan. 2011, www.sciencedirect.com/science/article/pii/S0376871611000020.
- “Sports Participation as a Protective Factor Against... : Journal of Developmental & Behavioral Pediatrics.” *LWW*, Oxford University Press, journals.lww.com/jrnldb/Abstract/2009/10000/Sports_Participation_as_a_Protective_Factor.2.aspx.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3438866/>

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