Sports Injury and Recovery Analyzed Using Blum's Model of Health Determinants

By

Daniella Batarseh

****

Submitted in partial fulfillment of the requirements for Honors in the Department of Sociology

UNION COLLEGE

March, 2018

ABSTRACT

This study explores the effects of various health determinants on the ability of a college athlete to recover from a sport's injury. Blum's Model of Health Determinants explains that there are four factors that contribute to the overall health of an individual: lifestyle, environment, medical services and heredity. Blum argued that each factor affects health to a different degree. To understand how each of these determinants affects an athlete's recovery, different people involved in this process were interviewed, including coaches, trainers, athletes and sports psychologists. These interviews illustrated the need for an expansion within this model of health. While all four of these determinants are critical for the athlete to recover, one aspect that is not discussed in this model is mental health. The mental aspects discussed by every individual interviewed emphasized how significant this mental health role is within the recovery of an athlete. Implications of this research include the movement towards a more holistic understanding of health. By highlighting the mental aspects of recovery, the field of orthopedics has pioneered the need for a restructure of how health care views mental health, fielding the need for changes within various organizations such as the government, medical schools, and the American Medical Association. Currently, society and practitioners within fields of medicine beyond orthopedics are grappling with the link between mind and body. The results of this study indicate the need for this recognition within the orthopedic field as well as throughout other fields of medicine.

CHAPTER ONE: LITERATURE REVIEW

1.1 Introduction

Sports have long been a part of global culture, bringing individuals together through both formal and informal settings. The rise of organized sports, primarily within the United States, has been coupled with an increase in number of individuals participating in organized sports throughout his/her life. With this rise in number of athletes, injury from sports has become more commonplace within the field of healthcare. The recovery process for an athlete to return to health is a long and strenuous in many cases, varying considerably from individual to individual. The road to overall health, with *health* having varied definitions, is impacted by an amalgam of factors. One method of classification of health is Blum's Model of Health Determinants. This model defines "health" as a combination of four factors: lifestyle, heredity, environment and access to medical services.

The effects of this study conclude that Blum's model of health determinants fails to account for certain factors, specifically mental health, within the consideration of what classifies the overall health of an athlete through their injury and recovery process. The focus of this study involves college athletes who have suffered a physical injury during their collegiate sports career. After interviewing a variety of individuals involved in the recovery process of these athletes, the role of mental health on the ability of an athlete to fully recover was illustrated to a significant degree. The field of medicine must be willing to expand its current definition of health to better include factors such as mental health. The first steps in this process of expansion must be the destigmatization of mental health. Currently, healthcare is moving to a more holistic approach to treatment, encompassing more and more movements that look at the connection

between the mind and the body, not just as separate entities. This is guided by progressions in this field such as the trend towards complementary and alternative medicine as a form of treatment. The presented thesis uses qualitative data in the form of interviews to explain the need for an expansion of Blum's current model of health.

1.2 Sports History

Sports emerged in the United States (U.S.) history during the early 19th century. The years before the early 1800s consisted mainly of unorganized sports such as strength contests between individuals. The rise of organized team sports occurred during the years of the urban revolution (1820-1870). As more and more individuals moved into urban settings, with a 92.1% increase in population in cities during the 1840-1850 decade, societal changes accompanied these physical changes in living (Riess 1991:13). Urbanization led to a more capitalistic society and the intensification of the movement from informal to formal organization of sports. Within these urban settings, groups of people came together who shared common values or beliefs and primarily formed these informal organizations. Due to the distinct differences in setting, individuals who moved from rural to urban locations found themselves companionless and had difficulty getting to know their neighbors. This starkly contrasts the way of life in rural settings where it is more common for individuals to build friendships with their neighbors and with others in the community. In order to find a place in the urban settings, individuals turned to organizations such as structured sports to form community. This sparked the movement from groups of individuals coming together in an informal manner to the rise of organized sports between the groups as a form of more than just play.

With the rise in urbanization, there was a simultaneous rise in immigration to the U.S. Immigrants brought with them their cultures and in their attempts to create ethnic communities

within these urban settings, they came together to play sports. These immigrants brought the types of sports from their respective countries. For example, to preserve their culture and to connect with other English immigrants, English immigrants brought the sport of cricket. Playing cricket brought them together in urban settings where meeting other people was more difficult. In the 1830s it was extremely common for English workers in the Northeast cities such as Boston, Brooklyn, New York, and Philadelphia to create organized cricket teams. The first of these cricket organizations was created in New York in 1840 and named the St. George Cricket Club (SGCC). This started off as an organization exclusively for those of English ethnicity but eventually by the 1850s it expanded to include U.S. natives as well (Riess 1991:21).

With the creation of various ethnic communities during this time, there was also a class divide that had impacts within the organization of sport in the U.S. The wealthy used organized sport to define their wealth during the mid-19th century. In order to meet others of their same class status, clubs were created in urban settings that centered around sports that required high costs to participate. Examples of these were seen through the creation of jockey and yacht clubs, bringing the sport of racing to these groups of individuals (Riess 1991:24). As urbanization became more prevalent throughout the US, sports emerged as a result of groups coming together to unify. Although these groups were created to create community, in many cases the emergence of these sports created barriers between groups of people such as the class divide and the immigrant divide.

Another factor that impacted the rise of sports was linked to the advancements in medical knowledge. Journals started publishing recommendations that supported the idea that workers who were involved in sports or athletics were more capable of being productive during their workday. This was especially prominent during the public health movement in the 1840s. When

employers heard of this, they advocated for their workers to engage in physical activity, bringing more of a focus on sports during the 1830s. It was estimated that around $240 million dollars were lost annually due to workers being sick (Riess 1991:27). With poor sanitation, living conditions, diet, and working conditions, individuals were incessantly getting sick. The cholera outbreaks set in motion the need for change within these urban settings to prevent further diseases and epidemics. With increased levels of illness around this time, physicians began to recommend physical activity to build immunity to disease (Riess 1991:28). As medical practitioners began to recognize the value of physical activity for the health of individuals, people began to look for more outlets for physical activity. This significantly impacted the rise in organized sports as a means to engage in physical activity. These situations urged urbanites to become more active, promoting the creation of organized sports as a means of exercise.

As time went on, these sports became more than a means to create community and increase physical well being. By the mid 1800s commercialization of sports became prominent. This commercialization was supported by the changing societal work patterns through the 19th century. Individuals began to have more free time during the day due to industrialization and the creation of more specialized jobs with the rise of technology. As technology began to perform functions that were previously only performed by humans, there was less of a need for individuals to work in certain fields. Furthermore, their roles decreased within these fields, particularly shifting from labored works to a more technology based monitoring work field. The invention of this technological equipment has reduced the number of hours needed for a laborer to work in their occupational field. The creation of this increased free time turned sports from a leisurely activity played during the limited time workers had free to a competitive game for

longer periods of a time. As the years progressed, especially during the early 1900s, sports progressed from a game to an actual profession (Furst 1971:156).

	BASEBALL	FOOTBALL	HOCKEY	BASKETBALL	GOLF	TENNIS	BOWLING
PLAY	1831—1845 (14 yrs.)	1874—1882 (8 yrs.)	1855—1875 (20 yrs.)	—	1779—1786 (7 yrs.)	1874—1881 (7 yrs.)	1825—1875 (50 yrs.)
GAME	1845—1869 (24 yrs.)	1882—1895 (24 yrs.)	1875—1903 (28 yrs.)	1891—1898 (7 yrs.)	1786—1894 (108 yrs.)	1881—1926 (45 yrs.)	1875—1895 (20 yrs.)
WORK	1869—1970 (101 yrs.)	1895—1970 (75 yrs.)	1903—1970 (67 yrs.)	1898—1970 (72 yrs.)	1894—1970 (76 yrs.)	1926—1970 (44 yrs.)	1895—1970 (75 yrs.)

Figure 1. Progression of various modern sports as a movement from play to game to work. The play aspect represents a time when this sport was played as a leisurely activity to create community between individuals. The game aspect represents a period of time when the sport was played with a competitive nature between groups with a monetary incentive. The work aspect represents the current nature of sports as a profession (Furst 1971:156).

This progression from game to profession was aided by increased levels of education and the development of technology. As the urbanization of society continued and society became significantly more capitalistic, individuals chose higher levels of education. This movement was a result of the societal trend towards a greater utilization of technology. The need for individuals to be able to produce and monitor these advancements created more of a push for a higher level of education within the overall population. This was also accompanied by the movement from physical labor work to greater amount of work that required mental stimulus rather than physical.

With higher levels of schooling being reached, the nature of sports progressed to a greater degree and college sports became commonplace (Furst 1971:159). Because more individuals were attending college than previous years, the population of students in college increased and so did the number of student athletes. Furthermore, as sports became more prevalent within society, the frequency of individuals playing sports during their youth increased. This increase during youth made those individuals more inclined to continue to play throughout their years in college.

Another aspect that promoted more engagement in sports is the increase in television prominence. Revenue from televised sporting events promoted a larger audience for these sports as well as an increase in the number of individuals playing these sports (Furst 1971:164). Televised sports brought more awareness to these institutions, generating more revenue for the college and increasing the distinction of sports on college campuses. As these sports became more and more commercialized through the use of technology, there was another movement towards the commodification of sports.

Modern society views sports as predominantly a business (Bell 2016). With individual players being traded between teams, owners selling their teams to other owners, and the Super Bowl having one of the highest TV viewing rates in the country, it is evident that the impact of sports has been shaped by modern capitalism, making the game of sports a business venture for many. Humanity has progressed to an era where playing a sport is focused on monetary gains rather than a form of leisure activity as it was in the past. Accompanying this, there was also a movement towards specialized forms of participating in sports as a form of play. This was seen in the creation of travel teams or club teams which were more competitive than school sports. These often led the way for athletes who later on in life entered the professional leagues. Regardless of if the sport was performed for money or as a form of play, commodification of sports was accompanied by a greater number of athletes throughout the country (Bell 2016).

Throughout history, sports were and are primarily still are dominated by certain groups of individuals depending on a variety of factors. One factor that impacts sports participation is gender. There is a great disparity in not only the types of sports available to the certain genders but also the existing opportunities for women to participate in these sports. In many ways women have only recently become a part of the sports culture. Before the year 1870, women who

engaged in any type of sport-like activity did so in a non-competitive manner with the main focus of leisure physical activity. In the following years, around the time ranging from the late 19th century to the early 20th century, women began to form athletic clubs and men's athletic clubs began to allow women to be part of certain events/activities (Bell 2016).

Before the formation of Title XI amendment in 1972, the National Collegiate Athletic Association (NCAA) only recognized male athletes and this organization was not concerned with female sports whatsoever (Bell 2016). After this amendment was implemented, the NCAA extended to cover female athletes as well as male athletes. This drove a significant increase in female sport participation on the collegiate level and even augmented female sport participation on the high school level. From the years 1972 to 2001, women who participated in collegiate sports increased from 15% to 43%. Furthermore, the number of high school female sports participants also increased with 295,000 female athletes in 1972 increasing to 2.8 million female athletes by 2003. Three decades after the implementation of the amendment, the NCAA emerged from a point of only supporting male sports championships to supporting thirty-eight men championships and forty female championships (Bell 2016). In terms of college and professional sports, however, women still do not have the same opportunities to excel in sports as men are given. Nationwide, men's sports professionals are paid a higher salary than their female counterparts in the same sport and men's sports games are viewed more than women sports (Bell 2016).

With the rise of sport, both organized and unorganized, comes a range of risks that are assumed when practicing or competing. This medical risk generates numerous medical injuries that compromise the overall health of these athletes. The road back to recovery after being injured is highly dependent on different components that influence if an athlete can return to

playing their sport. Within these components, each individual athlete varies greatly, making each road to recovery different from person to person. To understand the individualistic nature of recovery back to health after being injured, the definition of *health* must be defined.

1.3 Blum's Model of Health Determinants

The definition of health has long been long debated, with various variables attributing to what constitutes this term. According to the World Health Organization (WHO), health can be defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (Olden 2015:2). Each individual will have his or her own personal definition of what constitutes health & well being but one common standard that is used to define how healthy an individual is known as Blum's Model of Health Determinants. This model refers to four facets of health that together affect the wellbeing of an individual. These components include hereditary, medical services, environment and life-style. Although each has an impact on the individual's health, some aspects have a larger effect than others. Figure 2 illustrates the various aspects that encompass each facet of this model.

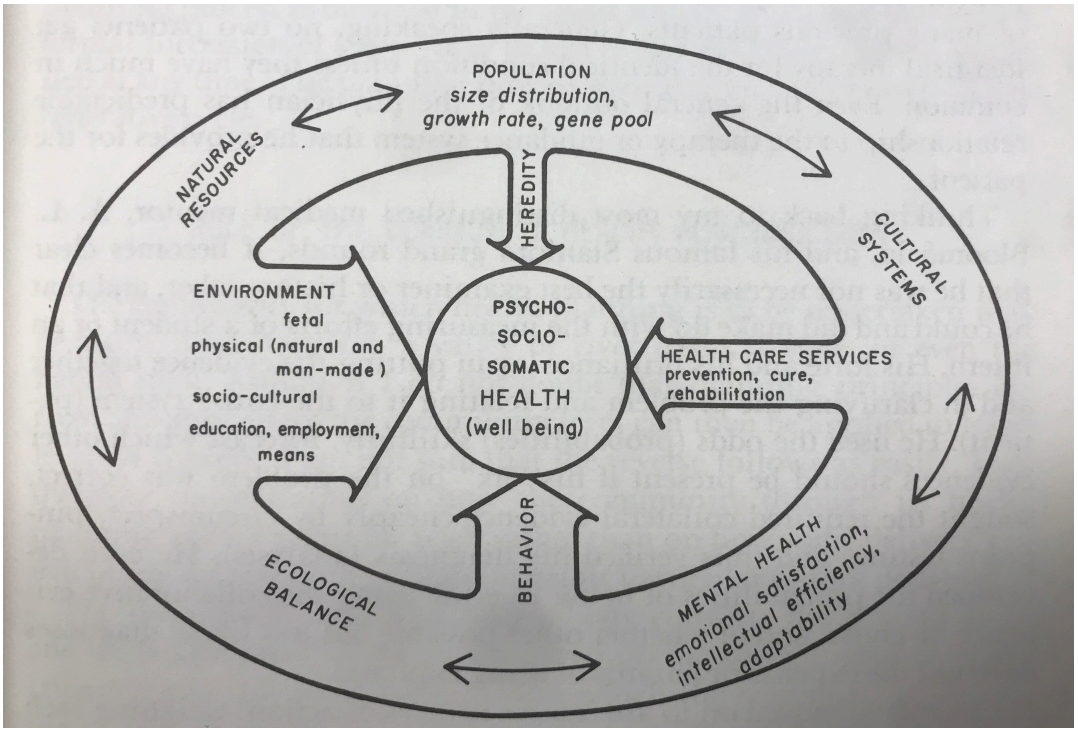

Figure 2. Four facets of Blum's Model of Health Determinants that together establish the health of an individual (Blum 1974:3). The thickness of each arrow indicates the magnitude of the impact of that characteristic in this model.

1.4 Medical Services

The magnitude of the thickness of the arrows in Figure 2 for each characteristic is indicative of the strength of the effect of this aspect on the health of individuals. Therefore, since medical care services has the smallest arrow in terms of thickness, it is considered to have the least influence on the overall health of an individual. This may seem counterintuitive at first, but in many cases due to the fragmented nature of our healthcare system, individuals are not always treated in the right manner or provided with the appropriate knowledge for prevention of diseases. In the past, society was fixated on the idea of treating illness because impediments on an individual's health usually presented as an acute illness rather than a chronic illness. Since then there has been a significant shift in nature of diseases with chronic illnesses responsible for the largest amount of deaths around the world (Yach et. al. 2004:2616).

With the rise of chronic illness, there has also been a shift in the way physicians have been addressing their patients. In the past, physicians were very focused on aspects of treating and curing diseases due to the nature and prevalence of acute illnesses during the time. On the other hand, with the rise of chronic diseases currently, physicians have been focusing on informing patients about the risks of developing these chronic illnesses. To do so, physicians are presenting a variety of preventative services to their patients in the hopes that the patient will decrease their likelihood of developing a chronic disease in the future. Although this is the case, there are many variables that affect this, with patient compliance being a significant piece. If a patient doesn't follow the physician's advice on how to prevent these chronic illnesses, the lack of compliance impacts the patient's possibility of developing a chronic disease in the future. Within Blum's model, this lack of compliance attributes to the size of the arrow for medical care services. For athletes, the level of compliance is dependent on the medical practitioners approach caring for the athlete. For athletes, this may consist of a trainer or physical therapist that is responsible for ensuring the athletes are always in the best physical condition as possible. Preventative care against injuries varies depending on the ability to access this care and the medical professional who provide this guidance.

Another aspect that impacts the size of this arrow includes the fragmented nature of the current healthcare system in place in the United States. Our system includes a combination of both private and public health care services that aim to provide coverage for individuals throughout the country. Although this is the aim and there have been various health care bills that have worked to achieve this goal of universal coverage, there are still many gaps within our system (Maruthappu 2013:15). These gaps have significant effects on an individual’s ability to receive medical care when necessary. Therefore, from person to person the amount, type and

quality of medical care that an individual receives varies significantly based on different barriers to access. Due to the fact that access is not universal, this also contributes greatly to the smaller arrow associated with medical services in Blum's Model.

Within the field of sports, the ability to access medical services appreciably affects athletes. Within the field of professional sports, athletes commonly have an assigned physician that provides care for these athletes throughout the season. As mentioned, due to the shift from acute to chronic care, there is a greater focus now on prevention of injuries rather than treating the injuries that are present. In terms of prevention of injuries, the physicians as well as other medical personnel, work to keep the athletes healthy to prevent injuries. For example, a physical therapists for a sports team might recommend stretching before and after each game or practice to decrease muscle soreness as well as decrease likelihood of injury incidence (Behm et. al. 2016:9). Although this is the case, evidently there are various injuries that do arise, even with the use of preventative services, and thus require medical attention.

The ability to access this preventative care varies depending on the type of athlete. For professional sports, there is more than likely going to be a team physician on duty all the time to treat and assist in any injuries acquired by the athletes. On the other hand, for college sports this may not be the case. Some schools may have a health center or a trainer where injured individuals can seek care, but at these locations the physicians provide generalized care, rather than the care provided by a sports medicine physician/surgeon. Therefore, for college athletes, they commonly are referred to other specialists to receive their care outside of the university or college. Thus, depending on the individual's insurance and ability to pay out of pocket, there may be barriers to receiving medical care following an injury. Furthermore, for individuals who play sports for recreation rather than on a professional or school team, there is no call physician

to refer or treat, leaving these individuals to fend for themselves to find a solution to their injury. In these cases, depending on a variety of factors, individuals may be more deterred from seeking medical services due to lack of guidance or lack of insurance.

Furthermore, another aspect of medical services that greatly impacts the field of sports includes the ability to access rehabilitation facilities after injuries. For a majority of sports related injuries there is a rehabilitation component to the recovery process that provides the athlete with the greatest chance of gaining maximal function post injury. For example, for foot and ankle injuries physical therapy is used to allow the individual to regain his/her muscle strength and range of motion in a timely manner that prevents him/her from reinjuring themselves (Chinn & Hertel 2010:157). Within the healthcare field, access to rehabilitation services is dependent greatly on the type of insurance an individual has. Additionally, some insurance companies may cover physical therapy costs to a certain extent but after a certain maximum will no longer cover these costs. Due to coverage constraints, physical therapists must alter their treatment plan for their patients to accommodate for this, hindering the full recovery of the patient (Richardson 2015:118).

The lack of universal insurance coverage also impedes the ability for varying athletes to receive the necessary treatment, varying the way individual's in different situations recovery from injuries. For individuals without insurance or with insurance that doesn't cover rehabilitation, they are forced to pay out of pocket for these costs. Similar to prior explanation of preventive services via a team physician, professional athletes typically have rehabilitation medical personnel on duty to provide them with this type of care following an injury. In comparison, a college athlete might have a trainer at the school but may likely be referred to a rehabilitation program outside of the school. Finally, in terms of individuals that play sports for

recreation, a physician, must refer him or her to a rehabilitation program, making this process even more complicated. With these varying circumstances, it is clear how just the ability to access medical services has a great impact on the overall well-being of an individual.

In terms of medical services, there are evidently great impediments to accessing care as well as the route by which the individual receives this care. Furthermore, the shift from acute to chronic illustrates a great transition from the approach of directly curing an acute illness versus the method of care treating a chronic illness that has no immediate remedy (Whelan 2002:1237). Due to this, the impact of these medical services on an individual's overall health shifts from dealing with an illness for a short period of time to a society that is impacted heavily by illnesses that affect his/her for a long period of time. Within the field of athletes, sports injuries vary greatly in terms of their recovery but many serious injuries require at least 6 months of recovery followed by other precautions that impact the athlete's ability to regain full function.

1.5 Heredity

Another facet of Blum's model is heredity. This portion of the model is something that is uncontrollable as individuals may be more or less susceptible to certain diseases depending on their parent's genes. Due to this uncontrollable nature, it has the smallest effect on the overall health of an individual, with heredity having the smallest sized arrow in the model. Since a child is a product of his/her parent's genes, this factor of the model is an aspect that illustrates that some characteristics of health are defined even before birth. The ability to manipulate genes has become a place of interest for defining a greater population of healthy individuals. Currently there are various methods being developed to allow for genes to be altered through various *in vivo* and *in vitro* techniques during the pregnancy period. Although this is the case, this is still

very uncommon. In terms of athletes, varying hereditary may play a role in susceptibility of an athlete to injury. Furthermore, although genes are usually uncontrolled, this factor has a small impact on the overall health of an individual. Blum's model works to accentuate the environmental factor that he portrays to have the greatest impact on the individual's health followed by the lifestyle factor which plays the second biggest role in health.

1.6 Lifestyle

The third facet in Blum's model is lifestyle. This is a general term used to reflect a variety of different factors. This aspect encompasses not only the individual but also a plethora of different people that interact with the individual throughout his/her life. One example of this is seen through the impact of a parent/guardian on an individual's well being. As a child, a person's health is in the hands of whoever is caring for that child. Since at a young age children do not have the knowledge or resources to care for themselves, they rely on someone to ensure they receive the proper care at the right time. Within each family there are various pieces that affect a parent's ability to care for his/her child. In some cases there may be certain behaviors that the parent may believe is beneficial to the child when they are younger and this continued habit may reduce their risk in the future of developing certain diseases. A prominent example of this is seen in the increased risk of chronic disease as a result of diet. Especially as an infant, children usually eat what is given to them. If the parent decides to feed his/her baby food that is nourishing and healthy throughout their lifetime, this will have different health implications in the future over a parent who decides to feed their baby food that is not filled with essential nutrients for growth.

This type of correlation between diet and health has been studied extensively throughout the scholarly literature. In the book *Health and Behavior: The Interplay of Biological, Behavioral and Societal Influences*, the authors report that there are various factors that impact health, some of which include pieces of the lifestyle component of Blum's model. It was reported that physical activity and diet "exert a strong influence on health" (Institute of Medicine 2001:5). Since obesity is a serious risk factor for many chronic diseases such as diabetes and hypertension, the impact of diet and exercise on an individual's health extends beyond the day to day. The habits and attitudes an individual establishes while he/she are in their adolescence significantly impact the manner in which they view the necessity of eating a healthy balanced diet and maintaining an active lifestyle. Therefore, an individual who was educated during childhood about proper diet and exercise establishes a greater advantage over other individuals who were not taught this habit (Institute of Medicine 2001:6). In terms of athletes, lifestyle is extremely important to the overall performance of individuals. Athletes who play sports as a profession tend to live very active lifestyles complemented by healthy eating habits because they are monitored more heavily by the media and by their coaches. In comparison, those who engage in sports as a manner or play or as a game may or may not be inclined to always eat well and may have more sedentary behavior.

In terms of the effect of lifestyle on the overall health, there are many ways these lifestyle choices impact the future of athletes. This is seen prominently throughout the field of sports due to a variety of aspects that impact the ability for athletes to perform. One aspect that greatly impacts an athlete's development of their bone is the maintenance of high calcium levels for optimal bone strength. This is especially significant in current society because it has been found that the average American is unaware of the required levels of daily calcium intake (Office of

Surgeon General 2004:12). This has led to a major issue where individuals are eating/drinking levels of calcium that are considerably below the necessary levels for peak bone health. This issue could stem from lifestyle components such as a child's upbringing and whether or not calcium was a part of the meals provided by the parents. Calcium for bone growth is especially important during these adolescent years, establishing the relevance of lifestyle habits early in a child's life and their future implications.

Another aspect that impact bone healthy is consumption of vitamin D. Similar to calcium, vitamin D is responsible for a variety of mechanisms, such as assisting in the absorption and use of calcium, to create healthy bone. There is a known correlation with Vitamin D insufficiency and patients who suffer from hip fractures. Again, the consumption of the required levels of Vitamin D stems from the need for this daily intake level to be instilled in the child's mind from the beginning (during early childhood). There are recommended levels of calcium and vitamin D intake depending on the individual's age, with these values promoting the daily intake required for optimal bone growth (Office of Surgeon General 2004:121). Depending on whether or not an athlete was brought up following these recommended values, the effect of this impacts the susceptibility of an athlete to a bone injury. Decreased bone strength will affect not only the athlete's performance but also his/her recovery process if they are injured.

Bone strength is also affected by smoking/drinking. Until now a common theme of lifestyle habits has been centered around the idea that the parents or guardians play a large role in the development of these practices in the future of the child. While this was the case for previous examples, there is also a secondary issue at hand. When growing up children tend to look at their guardians as role models, frequently mimicking their actions. If a parent were an avid smoker, this could influence the child in a series of ways. Primarily, the child is susceptible to secondary

smoke if the parent were to smoke in the presence of the child. Smoking and excessive drinking have been known to reduce overall bone mass and thus increase the risk of an individual developing a fracture (Office of Surgeon General 2004). This portion refers to the environment factor in Blum's model that will be discussed in greater detail following lifestyle. However, the presence of the parents smoking/drinking could also have implications that extend to the future behaviors of the child. Various studies have shown that children with parents who heavily smoke or drink are more likely to develop the same issues in their future (Solis 2012:137). The prevalence of this habit while the child is growing up creates a higher likelihood they also begin smoking or drinking, thus affecting their health.

For athletes smoking could also impede a variety of other issues, not just overall bone health. Smoking promotes a plethora of chronic issues such as asthma, lung cancer and heart disease (Centers for Disease Control and Prevention 2015:4). The effects of the customs that individuals acquire during their childhood extend to impact life of the individual at that moment but also far in the future. For athletes, this could mean giving up the sport they love because of health implications that stem from lifestyle habits in their childhood. As children, people are unaware of how many factors could potentially impact their health and realistically, it is not possible to monitor all of these influences. Much of these developments lie in the impact of the guardian on the child's upbringing and how that affects the behaviors and habits the child expresses as an adult. Although the parental role does play a significant role, habits are ultimately formed as a result of the individual’s own personal decision.

1.7 Environment

The final factor in the model is broadly referred to as environment, constituting the factor that Blum refers to as having the biggest influence on overall health of an individual. This environment is made up of the direct effects in terms of where an individual is physically but it also encompasses past environment such as fetal environment during pregnancy. Along with this, this portion of the model also refers to the sociocultural environment which consists of variations in education, socioeconomic class, employment, ect. (Olden 2015:3). Since this category spans a variety of influences, each will be analyzed independently as well as in relation to each other. To begin with, similar to the effects of parental supervision on an individual's lifestyle, parental choices during pregnancy also affect the fetal environment. Whether the mother is nourishing the fetus throughout the three-term pregnancy affects the health of the newborn baby and has implications that extend past just newborn phase.

An example of this is seen in the effect of the mother's diet on the neurological development of the child. It has been found that there is a link between the consumption polychlorinated biphenyl (PCB) from certain seafood to neurocognitive defects within the fetus. Likewise, it has been determined that the consumption of certain essential fatty acids by the mother is associated with a lower newborn birth weight (Kinsella & Monk 2009:425), further supporting the effect of fetal environment on an individual's health. For athletes this negative fetal environment could have implications that extend beyond birth. For example a low birth weight has been seen to be associated with neuromotor impairment. This could impede the baby progression of gross motor skills such as crawling, walking or jumping and it could also affect their development of perceptual motor skills. These impediments during childhood development

would continue to affect the individual throughout his/her life, affecting the performance of athletes during their participation in sports.

Another aspect of environment is the physical location of where an individual resides. The magnitude of this environmental effect on health has been calculated by the World Health Organization (WHO), which estimates that around 13 million deaths per year can be categorized as preventable environmental situations (Remoundou & Koundouri 2009:2161). Although physical environment is a separate element, it can be linked to the sociocultural portion of environment as well. In terms of socioeconomic status and education, an individual who is more educated has a higher likelihood of obtaining a higher paying job, making more annual income than an individual with less education. A larger income thus allows individuals to reside in locations with greater concern for health hazards. People who are under financial constraints when choosing their living situations tend to overlook aspects such as environmental effects.

Socioeconomic status (SES) is impacted by three elements that together influence an individual's standing in a society: education level, annual income, and occupation (Hernandez & Blazer 2006:26). The combination of these factors works to illustrate how individuals with higher education, income and occupation are more likely to live in areas where health hazards are considered more meticulously. Furthermore, the people with higher SES are capable of obtaining more access to medical care, linking the environment and medical services facets of Blum's model. Discrepancies between living environments are seen in aspects such as air quality/pollution, water quality, and housing conditions (Hernandez & Blazer 2006:25). An individual who has a lower SES, is more likely to experience health issues due to their living conditions. An example is seen in various health conditions ranging from a higher chance of

morbidity due to increased risk of infectious disease, chronic disease, and mental health conditions.

These infectious diseases can arise from overcrowded living arrangements which spread bacteria and transmit illness, more specifically as respiratory infections. In terms of chronic illnesses, one common disease found in low-income housing arrangements is the development of asthma due to moldy housing conditions such as dirty carpeting, prevalence of dust, and pest infestations (Krieger & Higgins 2002:758). This is combined with poor air quality, which also causes asthma in these environments, increases the risk for individuals living in these arrangements to acquire asthma. Coupled with poor air quality and poor housing conditions, another aspect of environment is also seen through poor water quality. Lack of high water quality in poor living conditions has been found to be associated to a variety of illnesses, one of which being increased coronary heart disease mortality. Additionally, these conditions paired with low SES lend a household to a greater likelihood the individuals residing in this household suffer from inadequate nutrition (Krieger & Higgins 2002:759).

Physical environment places a significant role but social environment is also noteworthy when discussing this facet of Blum's model. The effect of social cohesion within a community affects the health of individuals through different ways. It has been found that cities with high rates of violence had a significant impact on the community member's willingness to engage in physical activity (Krieger & Higgins 2002:760). By deterring the community members to engage in physical activity, this is puts a significant strain on the health of these individuals. According to the American College of Sports Medicine and the American Heart Association, it is recommended that "to promote and maintain health, all healthy adults aged 18 to 65 yr needs moderate-intensity aerobic physical activity for a minimum of 30 min on five days each week or

vigorous-intensity activity for a minimum of 20 min on three days each week" (Haskell et. al. 2007:1081). There are great benefits that come with meeting these requirements as well as exceeding them to a certain degree. It has been found that greater amounts of physical activity has been linked to supplementary health benefits that includes decreased risk of premature chronic illness. Furthermore, individuals who participate in physical activity that is has impact or additional weight added to the body, increase their chance of improving their bone health (Haskell et. al. 2007:1084). Although social forces are not the only reason that people choose not to engage in physical activity, it has been shown that this does discourage certain individuals in violent communities.

Athletic performance is also reliant on physical environment. The conditions of housing and the SES of a household affect the ability of athletes to participate in certain sports over others. If an individual grew up in a house of low SES with mold in his or her house, he/she has a higher likelihood of developing asthma. With low SES groups, access to medical services is limited, leading to the possibility that the individual would poorly control his/her asthma. Furthermore, since high levels of physical activity could induce an asthma attack, there may be certain sports that would not be feasible for the individual to play due to their asthma (Chandratilleke 2012:001116). There are many reasons that deter individuals from choosing a specific sport to play but coupled with asthma, SES also significantly affects this choice. Due to the fact that certain sports require more expensive materials or cost more to participate in, SES weighs in on the type of sport an individual chooses. Furthermore, social effects also play a significant role in the sport choice. As mentioned in the sports history, sports came to be partially as a result of groups of immigrants coming together to pass time. From this, certain communities, ethnicities, and genders are more inclined towards one sport over another. This aspect is

important when analyzing health of an injured athlete because of risk of injury varies from sport to sport.

1.8 Injuries

Within each sport there are certain injuries that are more or less common based on various factors that impact the susceptibility of an athlete to be injured. These aspects include age, type of sport, and gender. Within each of these categories, the likelihood of incurring a certain injury is varied. Due to the nature of bone growth and maturity, at varying points in a person's life the force exerted on the body when playing sports is managed differently. During adolescent development, athletes are less likely to handle a large contact force than they are when they are they are older (Hootman et. al. 2007:311). With age, however, also comes increased risk for the development of chronic diseases such as osteoarthritis. Osteoarthritis is extremely prevalent in modern society, with 30-50% of adults over the age of 65 affected by this illness. This disease affects individuals through the "wear and tear" of the protective cartilage in between bones. Overtime, especially due to the natural process of aging, this cartilage diminishes, causing pain from bone on bone interaction. This lack of protective cushion between bones also decreases the amount of force an individual can handle (Loeser 2010:371). However at certain point, the amount of force an individual can handle starts to diminish. Due to chronic illnesses such as osteoarthritis, age greatly affects an athlete's likelihood of getting injured.

Another factor that affects injury likelihood is gender. Studies have shown that certain injuries such as a torn anterior cruciate ligament (ACL) have a four to eight times higher likelihood of tearing for females rather than males. The reason behind this is still unknown but many researchers have attributed it to certain female sex hormones that impact structure of the

ACL (Lui et. al. 1996:526). This discrepancy in risk plays a role in the overall health of a female athlete versus a male athlete and has implications that extend beyond just injury. Although this is the case for ACL injuries, overall males are more likely to be injured than females. One study reported over the course of 7 years, 80.3% of injury cases seen at the University of Rochester Section of Sports Medicine were reported to be males while 19.7% were females. The most common sport injury for males was found to be a sprain/strain, accounting for 33.4% of all injuries. Furthermore, the joints most affected by these sports injuries were the knee and ankle (DeHaven et. al. 1986:221). Likewise, the most common sport injury for females was found to also be a sprain/strain, accounting for 28.7% of female sports injuries and the most common joints injured were the knee and ankle (DeHaven et. al. 1986:222). Differences in biological composition also have significant effects on which genders participate in certain sports.

Depending on the contact nature of the sport, what parts of the body are utilized, and the type of sport, the likelihood of injury varies. Injury mechanism varies not only depending on the nature of the contact but also varies between games and practices. Figure 3 illustrates the different percentages of injuries based on their mechanisms and when these injuries happened.

Figure 3. Percentage of injuries based on various mechanisms during sport games or practices from 1988-2004 for 15 different NCAA sports (Hootman et. al. 2007:314).

1.9 Objective

Healthcare in the United States is a constantly evolving field that is seemingly comprised of a multitude of policies coupled with medical advancements. The unique system implemented in the United States is a result of decades of controversy and little unanimous agreement. Analyzing this field from a sociological point of view, it can be seen that although healthcare seems to be a societal problem for many, it is treated on a very individualistic basis with each patient having different circumstances than the next. Leaders in the field of healthcare are constantly working to provide access to medical care at the right quality while maintaining low costs. This is a tall order due to various barriers such as the lack of agreement between these leaders on how to achieve this goal. Many of these barriers are rooted in the fact that medicine is constantly evolving simultaneous with society's progression. The dependence on society to allow for changes in healthcare indicates the relevance of societal effects within the field of medicine. For each person, there are varying factors that impact overall health, to different degrees. This

individualistic nature of medicine demonstrates that the health of each person is defined differently, through facets established by Blum's model of health determinants.

Due to the sizeable prevalence of injuries within the field of sports, sports injuries are significant contributors to the healthcare industry. Analyzing the rationale behind how each of the facets of Blum's model impacts an athlete before, during and even after their time engaging in that sport describes the great variation that is associated with the term "health". Because so many traits are involved in the "health" of an athlete, each of these must be understood independently as well as in relation to each other. It is important to emphasize the combined effects of these traits due to the nature of Blum's model. Since the model itself is a circular, it symbolizes the constant interaction between each of these facets, not their singular effects.

The formation of behavioral habits established in the lifestyle factor is rooted in another factor of Blum's model, access to medical services. Children rely heavily on their parents to ensure they are properly care for medically. This consists of various services such as annual physicals or seeing the pediatrician for other health concerns and advice. Patients who are given the opportunity to access these medical resources and had the means to see their pediatrician would be better equipped to know how to deter themselves from forming these "bad" lifestyle habits such as smoking or drinking and would feel more comfortable in their knowledge of the "good" lifestyle habits such as healthy eating and an active lifestyle. It is important to recognize the distinction between each of these facets of Blum's model, but ultimately there is much overlap and many instances where more than one factor comes into play when explaining a health problem.

For example, for an adult athlete with an ankle stress fracture, the higher risk of this injury could have stemmed from the fact that he/she is an active smoker. It could have also been

attributed to the fact that during his/her childhood, he/she experienced an unhealed ankle stress fracture that was never addressed due to the lack of access to medical services. Within this scenario, heredity also plays a role in the genetic makeup of the individual being more or less susceptible to bone injury. Furthermore, the last factor, environment, is also a key part of this situation. The lack of access to medical services could stem from the socioeconomic status of the family that raised this athlete during his/her childhood. Lower socioeconomic status individuals tend to be uninsured or underinsured, utilizing the health care system to a lesser extent. Leaving this unresolved stress fracture during childhood, the adult athlete's health was comprised of a combination of characteristics within the four health determinants that impacted his/her overall health and thus ability to perform the sport.

The goal of this thesis is to provide a means to analyze the recovery process of an athlete who was injured through the effects of the facets of Blum's model. To do this, the recovery process back to "health" will be viewed from each of the facets of this model independently as well as how they come together as a whole in this recovery. Furthermore, certain sports will be used to compare the recovery process for athletes of one sport to athletes of another sport with the same injury. Additionally, within the same sport athletes with one injury will be compared to athletes or another injury. While literature does demonstrate efforts to show how some factors affect recovery, there has yet to be a cohesive analysis of all of these factors separately as well as how they interact together. Using environment, lifestyle, heredity and medical services, the impact of each of these, independently as well as combined, will be determined to analyze the recovery of an athlete from an injury.

CHAPTER TWO: METHODOLOGY

Purpose

The purpose of this study was to determine the effect of Blum's Model of Health Determinants on the ability of an athlete to recover from a sports injury. Various athletes experience a sports injury at least once in their athletic career. Recovery from these injuries varies due to a combination of factors that affect health. Blum's model of health determinants explains how four factors impact a person's overall health: lifestyle, environment, medical services and heredity. This research study analyzed these factors individually and collectively to explain how recovery from sports injuries differ from athlete to athlete.

Procedures

After receiving permission from the Human Subjects Review Committee, coaches and trainers in the northeastern United States were contacted to explain the study and see whether they would be willing to be interviewed. These coaches and trainers were asked whether they would share information about my study (and my contact information) with any athletes who they know have been injured. Second, I reached out to prior contacts as a pre-medical student to ask orthopedic surgeons and physical therapists in this area to see whether they would be willing to participate. Snowball sampling was also used for any additional contacts that these orthopedic surgeons and physical therapists may recommend.

In all cases, I explained that all information would be kept confidential and that their participation was voluntary. The interview consent form reinforced that participation was voluntary. The consent form can be found in Appendix A. It was made clear that they can refuse

to answer any questions or end the interview at any time. I promised confidentiality. If they agreed to be interviewed, an appointment was made to conduct the interview. These face-to-face interviews were conducted in a public setting in a place where respondents felt comfortable. The participants signed the consent form before the interview was conducted. The participants were asked whether the interview could be tape recorded, and they were informed that they can ask me to stop the tape recorder at any time. The interviews lasted about thirty to forty minutes with various open-ended questions. No deception of any kind was used. Interview guides are found in Appendix B. Different guides were used for each category of participants. Interview with sports psychologist was conducted using the coaches interview guide.

Interviews and Data Analysis:

In total, 11 subjects were interviewed for this study, with 6 coaches, 1 athletic trainer, 3 athletes and 1 sports psychologist. Unfortunately, I could not interview any orthopedic surgeons or physical therapists. The data from the reordered interviews were transcribed and quotations and paraphrased material were used for the results section. The data were organized into 4 main sections, each of Blum's health determinants, with an amalgam of the responses from the various groups interviewed. After addressing the four main determinants, other aspects that were common through the interviews were also addressed in other sections. This qualitative approach was utilized because it provides relevant information regarding each of Blum's health determinants. By isolating these determinants then asking broader questions, other factors that impact an athlete's health and recovery from injury that were not discussed through the model were explored. This provided a means to recognize the gaps within this model. These factors were recorded in the results with the four determinants of the original model.

CHAPTER THREE: RESULTS AND DISCUSSION

3.1 Overview

Throughout this study, various coaches, athletes and trainers were interviewed to determine what affects college athletes in their recovery process from a sports injury. Using Blum's model of health determinants, different individuals involved in the athlete's recovery had varying outlooks on the significance of each factor in the overall health of the athlete. Although Blum's model places a certain amount of emphasis on each of these factors, individuals interviewed in this process had wavering responses, primarily due to the individualistic nature of medicine and how health presents in varying ways. Generally, the four aspects of Blum's model seemed to play an equally equivalent role, with many of these aspects presenting through a significant interplay during the injury and recovery process.

One aspect not discussed by Blum's model but was evidently discussed during every interview was the mental health component of a physical injury. Results of these interviews led to the need for a questioning of this model to describe modern society’s view on health. This model dating back to 1974 requires an expansion to encompass aspects that have become more prominently understood. It also calls for a restructuring of healthcare's approach to treating physical injuries and dealing with an athlete's recovery process. Extending beyond just the field of orthopedics, this study provides evidence for a need for a shift in healthcare towards a more holistic understanding of health, treating the mind and body as a single and connected entity rather than two distinct entities.

3.2 Heredity

Some coaches deemed this aspect the biggest and most important to the recovery of the individuals and for the susceptibility of these athletes to actually get injured. Coach #1 indicated that athleticism and strength are determined in part by heredity/genes. This presents in a variety of way. Primarily, if an athlete's parents are both duck-footed, this increase their chances of also being duck-footed. With duck-feet there are a variety of factors that impact the performance of the individual and the likelihood of him/her obtaining an injury. Specifically, there is a greater chance for injuries to the MCL and ankle tendons. This not only impacts the ability of an athlete to obtain this injury but also prevents the athlete from exceling within their sport or may also discourage them from continuing to play.

Furthermore, other aspects that also impact an athlete's performance include the genetics that permit/prevent the athlete from excelling in his/her sport. Examples of factors controlled by genetics are endurance and VO_2 max, which give certain players leverage over others. Heredity also impacts the build of the athletes. The physical characteristics of the athlete as a result of their genes impact how an athlete builds muscles and how he/she plays the sport. For example, whether the athlete is bottom heavy or top heavy, this could affect the way the athlete plays and could also potentially lead to knee issues during to differences in the way he/she carries weight. The combination of the variety of factors that are coordinated through the makeup of one's genes are prominent in not only determining the athlete's performance within the sport but also their likelihood of getting injured.

Through the recognition of how heredity is impacting an athlete's ability to play and likelihood of getting injured, coaches and trainers have become more aware on techniques to reduce this chance of injury. According to the *Clinical Journal of Sports Medicine*, "the

incidence rate of injuries among National Collegiate Athletic Association (NCAA) athletes is approximately 15.47 per 1,000 athlete exposures" (Goodlin et. al. 2015:1). With this rate of injury prevalence combined with the technological era of modern society, there has been a growing demand for the potential use of genetic testing for athletes. Just as coaches mentioned various predetermined heredity aspects have been seen to affect injury and the ability to utilize this genetic information prior to injury is growing to be more of a trend. A recent pilot study conducted to predict this injury risk in athletes concluded that genetic research "provides valuable information to reduce sports injuries and to optimize nutrition... providing useful information to athletes about their individual risk for relevant injuries" (Roos et. al. 2015:1). This is accompanied by the overall trend in healthcare that moves from an acute care model to more of a chronic care model (Yach et. al. 2004:2616). With a greater emphasis on chronic care, providers have become more focused on preventative services. This extends into the field of sports as well, through the recognition and hopefully the prevention of injury by understanding the heredity aspects that impact this risk.

Another characteristic that comes with this biological difference in gender is coming back to the game after an injury varies significantly from females to males. According to one of the coaches, over 1/3 of the team's players were injured throughout the season, each with their own recovery period and their own progression back into the game. This coach has seen the differences between how the male athletes recover from their injuries versus how female athletes recover. One significant difference between the two was that the physical demands of the sports usually prevent females from coming back before they feel 100% ready and they may feel more inclined to wait longer before fully returning. On the other hand, males are more likely to jump back into the game after an injury with less resistance. This respondent believed that this is a

result of cultural differences (perception of males vs females) as well as biological differences (build of females vs males).

Differences between the likelihood of injury for female and male athletes is also seen through distinctions in hormonal balance. One coach indicated that it was found that females on their menstrual cycle were more likely to be injured. This was explained to be possibly related to an influence of low levels of estrogen and progesterone hormones during the first few days of the menstrual cycle. It is believed that the body reacts to injuries in a different manner during this time of hormonal imbalance. The heredity health determinant also encompasses the differences in biological sex that come about as a result of genes. Different sexes have varied susceptibilities to injuries, making females more inclined towards certain injuries and males more inclined to suffer from other injures. Based on genetic differences, one coach indicated that women's knees are more susceptible to ACL tears, for example.

Although Blum's model places the least significance on heredity and indicates this factor has the smallest impact on overall health, many coaches and trainers believe this part plays a considerable role. This is supported by prior literature. According to Dr. Robert Shmerling (2015), injuries to the anterior cruciate ligament (ACL) are up 6 times more common in women than in men. Through the recognition of this difference, as well as various other susceptibilities to injuries based on sex, athletes can be guided by their coaches and trainers on prevention techniques. For example, the greater susceptibility of females to ACL tears would make coaches as well as trainers more conscious to the fact that their athletes must strengthen the muscles surrounding the ACL in order to reduce risk of a tear. Training programs focused on strengthening the surrounding muscles such as the hamstrings and vastus medialis have shown to

be significantly effective in preventing these ACL tears with a greater than 50% reduction in females and an 85% reduction in men (Shmerling 2015).

Within college sports, the heredity aspect plays a significant role in recruiting as well. Trainer #1 stated that some individuals have an "internal drive that not every kid has, a drive that can't be taught". This "internal drive" refers to the genetic predisposition of some athletes to have a natural inclination to excel within a sport. It is a type of drive that not only affects their ability to play a sport but also continue with this sport over time. The trainer explained that this drive plays a role on the field as well as in the recovery process. The genetic makeup of an athlete makes them more or less inclined to excel at a sport, no matter how much effort is put into the game. Furthermore, the trainer noted that some genes result in an easier recovery period due to the body's ability to repair at a faster rate than other athletes with different genetic makeups. In contrast, when athletes were asked about heredity, it didn't seem to play as big of a role. Athlete #2 indicated that her injury is mainly caused by outside factors and the recovery is centralized on the amount of effort put in by the individual.

The reason for these discrepancies in injury rates between females and males is still not completely understood. There are various theories that include higher estrogen levels (which promote less muscle mass and more body fat), a wider pelvis (which impacts the knee/ankle alignment), looser ligaments that support a higher flexibility of the body, and changes in hormones during menstrual cycles (Shmerling 2015). With no concrete data supporting these theories, there is a need for more research to determine the significance of heredity and biological factors on the risk of injury. The technological era makes determining the impact of heredity on health of an athlete more feasible. With new research supporting the impact of heredity, Blum's model recognizing this factor as the smallest effect on overall health is put into

question. Technology has provided a means to recognizing heredity differences and moving towards a more complete understanding of how each individual/athlete varies in their athletic abilities and susceptibilities.

3.3 Lifestyle

This factor within Blum's health determinants model is comprised of an amalgam of features that give rise to the lifestyle component on this model. One feature that was highly discussed by a variety of coaches, athletes and trainers was the upbringings by parents. Coach #1 emphasized that when a family places an emphasis on education rather than financial earnings, the children are more motivated to attend after school programs and engage in activities such as sports. On the other hand, the families that place a greater emphasis on financial earnings may require the children to work after school rather than play sports for recreation. Furthermore, if parents put an emphasis and have the means to provide for healthy foods to properly nourish the athlete's body during his/her upbringing, he/she will be less likely to be injured in the future. It is evident, however, that this lifestyle factor is significantly intertwined with the environment factor.

Drinking and eating habits of individuals are also a part of lifestyle. Coach #2 stated, "if you put cheap gas into a car, you will not get the same driving experience as if you use premium gas; the better you fuel the car, the better the performance". This coach always advises athletes to ensure they are properly fueling their bodies with the right nutrition. Furthermore, with smoking and binge drinking being common habits for college students, coach #4 indicated that these types of practices take a significant toll on the body during injury recovery as well as pre-injury. An athlete who is not taking care of his/her body will be more likely to suffer from an injury because

their internal health is suffering from bad habits. Furthermore, these aspects were shown to greatly affect the recovery process. Trainer #1 indicated these could severely delay and impede the potential for a full recovery of an injured athlete. Smoking and binge drinking also affect longevity of athlete within that sport; the athlete is more likely to stop playing.

These statements are supported by prior scholarship. Athletes understand the repercussions of bad lifestyle habits and the benefits of partaking in good habits that boost their athletic performance. One athlete stated, "a night of binge drinking on a Saturday will affect my athletic performance for the entire next week, both at practice and during games". For those who participate in a team sport, their decisions not only affect their performance but also how the team performs as a whole, making athletes more cautious in their lifestyle. During the recovery process, this is also a thought for athletes. In order to get back to the team, they stated they must be diligent in their ensuring they adopt the proper habits that will foster the best recovery. Athlete #2 was motivated to recover properly and not put toxins into her body during her recovery to ensure she could return back to her team as soon as possible.

Alcohol has a significant effect on the ability of an athlete to perform to the best of his/her ability. Prior to sports practice, ingestion of alcohol can lead to decreased coordination and motor skills, delayed reactions, decreased endurance, and increased risk of injury. It also has significant effects on the ability of an athlete to recovery from exercise as well as from injury. After exercise, replenishing glycogen is essential to prompt muscle protein synthesis (MPS). When an athlete drinks alcohol after exercise, the alcohol has the ability to "displace carbohydrate and protein intake... which can potentially inhibit muscle growth and repair" (Siekaniec 2018:10). Furthermore, it has been found that even if the athlete were to consume

sufficient amounts of protein, the alcohol directly reduces MPS within the body, prolonging the recovery of the athlete from injury or after a workout.

Not only does it impact the athlete on the day of drinking, but alcohol consumption also significantly impacts the ability of an athlete the next few days. Binge drinking has effects that carry on past the immediate day of drinking. These symptoms are classified as a "hangover". In terms of athletes, the hangover period can have a variety of effects such as "electrolyte imbalance, hypoglycemia, gastric irritation, vasodilation, and sleep disturbances" (Siekaniec 2018:10). These consequences are also accompanied by significant decreases in aerobic capacity during exercise (11% reduction). Not only does excessive drinking impact the athlete during the hangover period, but it also takes a toll on the body over time, resulting in the increase in damaging behaviors such as increased intake of unhealthy foods and detrimental health effects such as nutritional deficiencies. These deficiencies are manifested in the fact that alcohol affects the ability for the intestines to absorb several nutrients such as vitamin B12. It also has negative effects on vitamin D activation, destroys the vitamin B6 within the body and makes the body more prone to illness through a compromised immune system (Siekaniec 2018:11).

3.4 Environment

Socioeconomic status (SES) remains a large factor of an athlete's career. This factor however presents in a variety of ways throughout an athlete's life. The first way is through the resources that are available for the athlete in terms of upbringing and how he/she is able to obtain the necessary equipment and training to participate and excel in his/her sport. One coach spoke about being raised within a community that was not very financially wealthy. Youth league soccer was played on a field that had about 75% dirt and rocks. Furthermore, the goal posts were not placed in the right places and were not true soccer posts. This put these individuals playing in

this league at a significant disadvantage compared to the soccer fields in other areas. Outside of the inner city, this coach mentioned that the suburban areas that were financially well off had the resources to create a soccer field for the youth league that would reduce risk of injury.

Even from the beginning of an individual's career within sports, depending on his/her physical location and the economic standing of the individual and their family but also that of the community. Coach #1 emphasized that SES is not only limited to the ability of the family to pay for resources but also of the community to provide for the residents. Although this is the case, this respondent stated that the "neighborhoods reflect the demands of the residents". Thus, if the residents were not advocating/supporting better fields, the community wouldn't change the norms. Athletes also had a similar outlook on this health determinant. The sport that the individual chose to pursue varied based on the SES of the family. Since some sports are more economically burdensome, the environment affects the progression of the athlete through a sport.

Another aspect that is present within the SES factor is the ability to fund a sport with high monetary requirements for practice, space, and equipment. This not only affects the types of sports that an athlete will engage in, but will also affect the likelihood of being injured. Coach #1 indicated that sports like lacrosse and hockey require lots of expensive equipment that deter certain individuals from playing that sport. Soccer, a sport that requires much less equipment than lacrosse and hockey, is more likely to be the sport of choice for those with a limited SES. Furthermore, depending on the community where the individual resides, his/her choice to play soccer may be harmful to their development due to the varied conditions of the field based on resources that was already mentioned. This scenario highlights the distinction between individual SES and community SES and the interplay between these two factors, impacting the choice of

sport an individual pursues as well as the resources available for this individual to excel within his/her sport.

Multiple studies have reported on the association between household income and the level of physical activity of children within the household. These studies have revealed "children living in poverty have limited access to resources and areas for play and physical activity than children whose families are producing higher incomes" (Cottrell et. al. 2015:99). The varied levels of socioeconomic status factor into not only the ability of an athlete to play a sport but the likelihood of them engaging in physical activity, limiting the population of individuals engaging in sports. This brings up a noteworthy disparity between children raised in differing geographical settings, specifically, the differences between rural settings versus urban settings as discussed by coach #1. Literature reports that although rural schools had more space and safer environments to exercise and engage in physical activity outdoors, the urban areas are provided with more access to exercise equipment and transportation to allow them to be physically active (Constantinos et. al. 2004:138). This suggests that not only must this factor consider the SES of the geographical area, but it must also consider the urban vs rural discrepancies that impact a child's engagement in sports.

3.5 Medical Services

One of the most unique aspects within collegiate athletics includes the fact that athletes are provided with all of the same access to medical services. When an athlete gets injured, no matter the sport or demographics (such as SES), the athlete receives the same treatment. The athlete is seen by the trainer, who then recommends either he/she see the team physician or gives them a plan of action. If the athlete requires a surgery, it is typically performed by the unofficial

team orthopedic surgeon at a local orthopedic practice. Furthermore, physical therapy is the same for all athletes and is conducted by the team trainer. The trainer stated the athlete's insurance or ability to pay does not factor into the care delivered. Since there is little discrepancy between how an athlete is treated as a patient, this factor does not play such a significant role within the college sports realm.

Athlete #1 stated that although when she was injured she followed the school protocol and listened to the trainers and team physician, she knows of other athletes who have sought out other forms of treatment to treat their injuries. Although an individual's ability to seek expert care elsewhere is a factor within the college community, the fact that all athletes are provided with treatment is a distinct aspect primarily found through organized sports at higher levels. Coach #2 stated that medical services and SES play the biggest role in an athlete's recovery due to the ability for those who are "upper to middle class to seek care for these medical issues faster than others who may not have the immediate means". In the college realm there is a protocol whenever an athlete is injured. The athlete is immediately evaluated by the trainer then seeks care at a local facility where the physician and orthopedics team recommend a course of action. There is little to no time between getting hurt and getting treatment. On the other hand, in places outside of college sports, the ability to seek care immediately varies a great deal.

Coach #1 provided a scenario in which there was an individual who got hurt playing soccer while a teenager and because of a variety of factors such as SES as well as insurance, the family insisted that he wait to decide if he actually needed to seek medical care. The boy then went a few weeks before he eventually had to seek treatment due to lack of ability to walk. It was then found that the boy suffered from a torn tendon in his ankle. The waiting period that ensued, due to lack of access to immediate medical care, impacted the severity of his injury and made it

more difficult to treat. On the other hand, if a family had the means and access to support their child immediately after a potential injury, there would be a better prognosis for recovery and potentially a faster recovery as well. Furthermore, along with faster and easier access into the system, the second family would also be able to provide better quality of care to their son/daughter as a result of their ability to hypothetically pay out of pocket.

Coach #1 also mentioned that within families who have greater access to medical resources, there is a higher likelihood that there is a better and more established relationship between the family and their primary care provider (PCP). In comparison, those who do not utilize medical services as frequently or without the same ease, may not have this established relationship with their PCP. It was stated that the quality of the medical care thus varies depending on the extent to this patient-physician rapport. Coach #1 stated that a "doctor that knows you and your family can tailor your treatment or diagnosis based on his/her knowledge of your family history and other factors that impact your individualized health". This tailoring becomes more difficult for families that do not have this established patient-doctor relationship with their PCP and thus may have a lower quality of care.

Blum's model scratches the surface of the impact of medical services. Changes in society over the past few decades have influenced significant changes in healthcare. There has been a greater focus on greater access to care, a decrease in cost and an increase in quality of care. Although there are various healthcare bills in place that attempt to push towards universal coverage of care, there still remains to be greater discrepancies between how different individuals are able to access care. One unique aspect of this study includes the fact that it is limited to collegiate athletes who are provided with the same access to medical services through the college, regardless of their ability to pay or any other factors that impede on the ability to

utilize medical care. Since this aspect is not variable within the college athlete population, it is difficult to predict its impact on health from the results of this study.

3.6 Factors Not Covered by Blum's Model

The most significant portion of each interview conducted, regardless of whether the interview was with a coach, trainer, or athlete, was the mental aspect of recovery. For coaches, many of them indicated that their biggest advice to athletes is to push through and keep working hard on the recovery process. Coach #1 stated, "athletes must be able to commit to their rehab, making sure that even when they feel like they don't need to go anymore, that's when they actually have to go". Much of the guidance given from the coaches to their athletes stems from the fact that recovery back to health comes primarily from a mental standpoint rather than physical. Of course, there are great physical barriers that come with an injury but what usually prevents athletes from recovering 100% is not their physical strength but rather their mental ability to push through and keep going. Coach #2 stated that the greatest challenge to athletes includes the "mental aspect of dealing with setbacks" during the injury rehabilitation. Coach #3 spoke of a similar struggle, expressing that athletes "cannot get ahead of their rehab but they *can* get behind".

With this focus on mental health of the athletes within each interview, the coaches also acknowledged the role of teammates and engagement in the sport during the injury process is crucial to athlete recovery. One coach stated that their role as a coach is mainly to "comfort and mentally help the athletes stay connected and engaged throughout their recovery process". Coaches require their injured athletes to still attend practices and games as well as any outside commitments that are expected of any of the players. With this requirement, the coaches hope to

motivate the injured athletes to maintain their engagement with the sport, motivating them to put in the right effort to get back to the game. Coach #3 stated that the greatest concern for athletes was that "they would slip into a depression and spend their time behaving in actions that negatively affect their recovery". In order to prevent this change in mental stance, coaches try to keep their injured athletes as involved as possible, checking in with the trainer as well as the athletes on a daily basis.

Furthermore, the mental health aspect does extend beyond just the coaches ensuring the athletes are on the right track. Many times, whether to deal with an injury or just to talk about other factors in life, athletes seek guidance from a sport's psychologist. Coach #5 stated that players are constantly speaking to the psychologist for a variety of different reasons, ensuring their mental health is maintained appropriately. The coaches emphasized that the physical health of the athletes is just as important as their mental health, making sure to keep communication with the psychologist and referring athletes when necessary. Trainer #1 also specified that the roles of a physical therapist extends beyond what is required for an athlete's physical recovery. If someone is slipping during their recovery process, the trainer will reach out to the athlete and then to the psychologist to ensure the athlete's mental health is protected.

According to the American Physical Therapy Association (APTA), the role of a physical therapist is to "diagnose and treat individuals... who have medical problems or other health-related conditions that limit their abilities to move and perform functional activities in their daily lives" (Gardner 2016). With this established definition, there is a distinct placement of responsibility on just the physical aspects of treatment. Within the collegiate atmosphere, however, it was demonstrated through the results of this study that the trainer not only acknowledges the need for the athlete to keep up with their physical workouts and trainings after

an injury, but it is just as important to maintain their mental health. Although it is not described in the physical therapist's job description, the trainer works to stay aware of any changes within the athlete's mental health and refer this athlete to mental health professionals for assistance.

Athlete #1 mentioned that the "first three days are the hardest, then after getting over that hump it gets better". She stated that this mental struggle of passing the three-day mark post-surgery is the biggest hurdle to full recovery. She kept reiterating, "the first three days are when you feel the most pain and are most likely to feel like giving up". Throughout all interviews mental health was a topic that was greatly addressed.

3.7 Sports Psychologist

Due to the fact that mental health was a significant topic throughout each interview, a sport psychologist that works with college athletes was contacted. This psychologist reported that while Blum's model does address necessary aspects of injury recovery, mental health also plays a significant role in this process, stating there is an "optimism and sense of self-worth wrapped up in being an athlete" that gets impacted when an athlete suffers from an injury. The sense of self-worth is clouded with fear and worries that they have potentially lost their identity through this injury. This affects the athlete in various respects. "When an athlete is injured they must think and behave in a way that allows them to fully recover". The mental aspect is just as important as the physical aspect of returning to the way the athlete was pre-injury. The psychologist detailed the effect on an individual's emotions/mood as a result of an injury. With individuals who strongly associate themselves with an athletic identity, there is a greater risk for mental health concerns during injury recovery. Furthermore, sometimes this is the opposite case

with those who identify greatly with their sport being more likely to adhere to the proper process for the best outcome after injury.

The psychologist advises athletes to try to find a way to "repurpose their injury", suggesting that they don't look at recovery process as a daunting and challenging journey. Rather, this psychologist guides the athletes to separate "who I am" from "what I do". In other words, although individuals may identify as athletes, that is not the only part of them that makes them who they are. The sports psychologist works to utilize the injury and its challenging recovery to allow the athlete to figure out what is core to them in terms of their values, beliefs, and future goals. Recovery is a "jigsaw puzzle that requires all of the right pieces to reach the final goal". The psychologist's role in this process is to teach injured athletes how to use their thoughts and behaviors in a positive manner. This means learning to manage the anticipated and unanticipated stressors that arise in an injured athlete's life by providing them with support mechanisms.

Struggles with mental health can also arise as a result of an injury. The sports psychologist stated that there are many cases of individuals with no history of mental illness and after suffering a physical injury, his/her mental health takes a toll as well. In some cases, an injury will not affect an athlete, but others times it could impact his/her entire life. This psychologist explains that the role of the psychologist is to be the person who is willing to listen to athletes when they try to make sense of their injury and how it will affect them. Furthermore, there are also cases of athletes who suffer from mental health problems, and after being injured these issues are intensified. This exacerbation makes it even more difficult for the athlete during the recovery process. After the physical aspects of an injury are fixed, there is also a large mental component to getting back to the sport, according to this respondent. If an athlete is ready

physically it does not mean he/she is completely ready mentally to put his/herself back into a situation where he/she could get hurt again.

Overall, this study confirmed the idea that Blum's four health determinants play a significant role in the recovery of an athlete from an injury. The interviews demonstrated that there isn't truly a consensus on which factor(s) play the biggest role, with many of the individuals interviewed responding that it's truly an amalgam of the four factors in equal representation. Although this was the case, all of the people interviewed mentioned, in some shape or form, the need to acknowledge mental health within this four-factor model. The need for expansion and reorganization of this model of health was demonstrated through the results of this study.

CHAPTER FOUR: CONCLUSIONS, IMPLICATIONS AND FUTURE RESEARCH

4.1 Conclusions

In an article published in the *New York Times* titled, "Athletes' Injuries Go Beyond the Physical", the author, Laurie Tarkan, explains the stories of various athletes that lose their identities as a result of their physical injuries. One story is of Picabo Street, an Olympic athlete who suffered significant injuries to her left leg and right knee. Picabo details her injury through her mental health struggle rather than the physical implications of this injury. She suffered from a significant depression that she details as "all the way to rock bottom... never thought that I ever would experience anything like that in my life" (Tarkan 2000). After this injury took her athletic identity away, Picabo felt as if she was left with nothing. She went "from being a very physical person, a very powerful athlete, to barely having any strength to get from my room to the kitchen" (Tarkan 2000:1). This article also provides information on how common post-injury depression is among male college athletes. A study conducted that looked at "343 male college athletes from a variety of sports found that 51 percent had some symptoms of depression after being injured, and 12 percent became moderately to severely depressed" (Tarkan 2000:1).

This article, coupled with various other studies, show the significance of the mental aspect within a physical injury. It not only prevents an individual from having full functional movement but it also takes away a part of the individual's identity. This leads to the recognition of how the body is connected with the mind in more ways than what is currently understood. In healthcare, there are many instances where providers limit their treatment to *fixing* the injury or illness at hand. In reality, however, many of these injuries or illnesses are coupled with a mental aspect as well, forcing the providers to treat each case more holistically rather than just an

isolated incident. This movement in healthcare symbolizes a shift in treatment technique from *fixing,* what seems to be an isolated injury, to a *broader* understanding of how this isolated injury impacts more than just one area within the body.

This study extends beyond just orthopedics, spanning what should be every field in healthcare. Slowly, more providers are recognizing the need for more of a whole-body approach to treating patients. Implications of this type of approach within the healthcare field extend beyond just the patient. Holistic care is defined as "a behavior that recognizes a person as a whole and acknowledges the interdependence among one's biological, social, psychological and spiritual aspects" (Zamanzadeh et. al. 2015:214). By identifying this interplay between these various factors, medical practitioners are able to provide a better quality of care to their patients and allow for other benefits such as diminishing the probability the patient would seek more care in the future. This movement towards more of an integrated care method of healthcare delivery is popular due to the progression in medicine that incorporates the recognition of the benefits of complementary and alternative medicine.

This study also lends to a bigger picture idea that focuses on how to teach this connected mind-body health care model to a variety of people/institutions. Primarily, the American Medical Association (AMA) must be willing to expand their medical school education requirements. Currently, medical schools are organized in different ways depending on the facility. For example, one medical school may organize their first and second year medical school education curriculum based on themes. These different themes include topics such as cardiology, neurology, pediatrics, and various others. Separating these topics individually makes it easier to fail to recognize their interplay. In this study, a separation of the orthopedics theme from the psychiatry theme could lend an orthopedic surgeon to only acknowledge the physical injury

without addressing the mental aspects that come with the loss of identity after a collegiate sport injury.

The AMA, responsible for providing the medical curriculum for medical schools, must recognize this change and be receptive to the need for more of a whole-body approach to learning. This can be done through more integrative theme lesson plan or a restructure in the themes method of teaching. Furthermore, since physician assistants (PAs) play a significant role in the treatment of patients, it is crucial to recognize this same mind-body connected approach must be implemented in the curriculum of physician assistants. This can even be extended to physical therapists, collegiate trainers, and the college athletic staff. Furthermore, after informing these parties of the mind-body relationship, descriptions of each provider's role should be clarified. Future studies should include the determination of whether orthopedic surgeons are aware of this interplay between the mind and body as a result of injury. Then, it should be determined if it is the role of the orthopedic surgeon to address the mind component or should it remain in the care of a psychiatrist to address this concern.

At a college or university, this study has demonstrated that the coaches, trainers, and sports psychologists all recognize the impact of mental health on an injury. This network of individuals prepared and equipped to handle an athlete injury work to ensure the athlete is both physically and mentally recovering. The coaches constantly check in with the trainers who frequently communicate with the sports psychologist and with the athlete. With each player informed on the possibility of a suffering mental state after a physical injury, each member in this process is taking an active and holistic approach to treating the athlete.

This study also extends beyond just the recognition of the mental aspect of a physical injury. It also suggests there should be a shift in thinking within collegiate sports. Since the

prevalence of injuries from organized sports is high and varied within each sport, college athletics should make sure they are focused on prevention, not just treatment. Trainers, as well as the coaches in this study were aware of various prevention mechanisms for their athletes. This needs to be adopted as common practice. For example, knowing that ACL injuries are more common in women than in men, trainers and coaches of female teams should focus on strengthening the muscles surrounding this ligament in order to reduce future injuries. Furthermore, knowing that hormones could potentially play a role in risk of injury, trainers and coaches should advise their female athletes to exercise caution during their menstrual cycle. Implementing these and other preventative care methods and programs within the organized sports will reduce injury to these athletes.

Additionally, as important as it is to distinguish the roles of each of these medical providers, it is just as critical to maintain a connected network of providers to allow the patient to receive the best quality of care. Within the current system in place, there is great fragmentation that lends to inconsistencies in how individuals access medical services and what type of services they are able to access. Differences in SES, geographical location, insurance plans, and various other factors, all contribute to this fragmentation of care. Since the United States healthcare system is run through an interplay of both private and public insurance companies, the lack of one universal plan/coverage impacts the distribution of care. This inconsistency creates a distinct separation between differing providers and makes it harder for a patient to navigate the system.

One example of this fragmentation is rooted in the fact that primary care providers (PCP) are supposed to be the "gatekeepers" of the healthcare system, determining whether the patients should see a specialist or if the problem can be solved by the PCP. Within the fragmented system in place, this is not the case for many patient's experiences. Depending on the insurance plan of

the patient, some patients are able to skip the gatekeeper aspect and directly see a specialist. Others may have the means to skip seeing their PCP and pay out of pocket for a specialist. The variety of ways that an individual patient can reach a specialist and navigate through any part of the healthcare network make it difficult for these different specialty providers to communicate about the well-being of the patient. This calls for a dire need for an integrated care model that encompasses an organized progression of the patient through the healthcare system.

The results of this study have shone light on fields within healthcare that are acknowledging this mind-body connected method of treatment while also recognizing the need for an expansion of this thinking process to other fields beyond just orthopedics. As society struggles to provide more access to healthcare while maintaining quality of care and reducing costs, there are countless changes that have been implemented into the healthcare system over the past few decades. These changes stem from the government, making them a powerful in instituting change within any field.

4.2 Limitations

As with any study, this research does have certain limitations that may have impacted the overall results. With any significant injury, there are many players that impact the overall recovery of a patient. Although the main players in an athlete's recovery were addressed, there were individuals that may have played a role that were not considered in this study. Some examples of individuals who were not considered include orthopedic surgeons and physician assistants (PA). With an increase in patient contact hours moving from physicians to physician assistants, the role of these physician assistants within overall care of the patient have become more significant. Many times, the patient is seen not by the physician who will or did the actual

surgery, but rather their physician assistant, both before and after the surgery. Therefore, much of the guidance within this surgical process falls on the physician assistant.

More and more, it has been seen that orthopedic surgeons are moving towards a model of care where the PA is the gatekeeper, focusing on treating mainly the nonsurgical cases as well as getting background information for the orthopedic surgeon for surgical cases. On the other hand, the orthopedic surgeon is primarily focused on the surgical cases and is utilized in patient care when needed (Lane 2017). This difference in the distribution of care affects the ability of the patient to recover. Therefore, this shift should be addressed in future research, reaching out to physician assistants to determine their viewpoint on these injured patients and their return to health. Furthermore, although there have been increases in the number of physician assistants within the healthcare field, ultimately the orthopedic surgeon is the one conducting the surgery and guiding the PA. Because of this, the orthopedic surgeon's input should also have been considered during this study; however, I was unable to secure any interviews due to lack of free time within many orthopedic surgeon's schedules.

Another limitation is the uneven distribution between the interviews. More coaches were interviewed than athletes, trainers and sports psychologists. In order to extend this model to make it more applicable to current society, more interviews need to be conducted with individuals that are part of the recovery of an athlete. Furthermore, since these interviews were conducted in the Northeast United States, there may be differences between the collegiate nature of athletes in different geographical areas around the country and the world. Varying universities and colleges may have different standards and protocols for athletic injuries. This type of study should also not be limited to just collegiate athletes. It should extend to all types of organized sport athletes as well.

Recognizing this mind-body relationship, future studies focusing on these limitations would allow for a great progression in health care towards recognizing the holistic care model and applying it to not only a college athlete's injury but also extending this model to encompass the method of addressing any medical injury or illness.

4.3 Future of Mental Health

Within college atmospheres, the National Collegiate Athletic Association (NCAA) has made great strides within the healthcare movement towards a more holistic view of the individual. This perspective is emphasized in the article "An Introduction to Mind, Body and Sport" by Dr. Brian Hainline, the NCAA's chief medical officer (CMO). In his address to public, he explained "NCAA member institutions have committed to supporting student-athlete health and safety and ensuring that athletics departments are an integral part of the institutional mission for more than 100 years. But only recently have we begun to fully understand the mental health component of being a student athlete" (2017:1). This realization led him to take the initiative to begin a NCAA publication that allows the various groups of individuals involved in college athletics (such as coaches, athletes, trainers) to better understand and support mental health awareness. This publication has begun a movement within athletics that extends beyond just the walls of a college or university. It has brought society to realize and recognize that the "student-athletes have spoken: mental health is their No. 1 concern-and it is our responsibility to provide the services and care to help each student-athlete reach his or her full potential" (Hainline 2017). Dr. Hainline's words have been influential in the understanding of this mind-body connections and how to properly address this for overall better health of athletes.

This movement towards acknowledgement of mental health and its effects on athletes is not limited to the college population. Kevin Love, a professional basketball player, puts it simply, "mental health isn't just an athlete thing... No matter what our circumstances, we're all carrying around things that hurt -- and they can hurt us if keep them buried inside" (Schad 2018:1). Professional athletes, such as Kevin Love, as well as a variety of other individuals are beginning to acknowledge that mental health plays a significant role in the overall health of an individual. After suffering from his first panic attack during a game, Love stated, "It came out of nowhere. I didn't even know if they were real. But it was real --as real as a broken hand or a sprained ankle. Since that day, almost everything about the way I think about my mental health has changed" (Schad 2018:1). With professional athletes beginning to equate mental health issues with physical health issues, society is seeing a significant shift in the definition of overall health. Blum's model of health determinants provides a basic outline to some of the factors that affect health but has failed to incorporate mental health.

With this greater understanding of mental health and how it impacts each individual to a different extent, there must be an associated movement that destigmatizes mental health. Examples of this destigmatization process include "We're All A Little 'Crazy'" which is "a global mental health movement of athletes, celebrities, influencers & expert practitioners normalizing mental health conversations and providing the best treatment practices, as well as programs available" (Kussin 2017). The founder of this organization and movement is Eric Kussin, a former sports executive who experienced mental health issues throughout his life. Using his personal experience, he, coupled with other influential voices around the world, have begun a revolution within the field of mental health. After recognizing the role of mental health in society and seeing "suicides at a 30-year high and drug opioid abuse out of control", Kussin took on the

role to start a global movement to attack these issues (2017). In this attempt, he began with the destigmatization of mental health, with the overall message being "We're All A Little Crazy" (Kussin 2017). This undertaking focused on creating a network of individuals that have a resource to share and hear about others who are suffering from mental health issues. It provides a safe haven for those who are struggling as well provides a means for those who are unaware of the effects of mental health issues to understand its significant impact.

Learning from production of the "We're All A Little Crazy" movement and the creation of a NCAA publication for mental health awareness, society must make more strides towards the destigmatization of mental health. This should also be complemented by the recognition of mental health within the model of overall health. Health should not just be limited to the four factors discussed by Blum. Moving forward, society must be more cognizant of the mental health issues and their impact. Previously, mental health was something that tended to be concealed by individuals or family members due to the stigmatization around this type of illness. With the rise of various movements that are destigmatizing mental health, society is becoming more aware of this issue and how to properly address these increasing rates of mental illness. Steps such as creation of movements to connect individuals struggling and efforts to destigmatize mental health are critical for the incorporation of this type of well-being into a health model such as Blum's. Although this study has various limitations, the results have very clearly emphasized the need for healthcare to broaden its view on the definition of health and incorporate aspects that in the past have been neglected, primarily mental health.

REFERENCES:

Behm, David G., et al. "Acute Effects of Muscle Stretching on Physical Performance, Range of Motion, and Injury Incidence in Healthy Active Individuals: a Systematic Review." Applied Physiology, Nutrition, and Metabolism, vol. 41, no. 1, 2016, pp. 1–11., doi:10.1139/apnm-2015-0235.

Bell, Richard C. "A History of Women in Sport Prior to Title IX." The Sport Journal, Sports Management, Women and Sports, 12 Oct. 2016.

Blum, Henrik L. Planning for Health: Development and Application of Social Change Theory. Human Sciences, 1974.

Centers for Disease Control and Prevention (US); National Center for Chronic Disease Prevention and Health Promotion (US); Office on Smoking and Health (US). How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking Attributable Disease: A Report of the Surgeon General. Atlanta (GA): Centers for Disease Control and Prevention (US); 2010.

Chandratilleke MG, et al. "Physical Training for Asthma." The Cochrane Database of Systematic Reviews, vol. 5, no. 5, 2012, p. 001116, doi:10.1002/14651858.CD001116.pub3.

Chinn, Lisa, and Jay Hertel. "Rehabilitation of Ankle and Foot Injuries in Athletes." Clinics in Sports Medicine, vol. 29, no. 1, 2010, pp. 157–167.

Constantinos A. Loucaides, Sue M. Chedzoy, Neville Bennett; Differences in physical activity levels between urban and rural school children in Cyprus, Health Education Research, Volume 19, Issue 2, 1 April 2004, Pages 138–147, https://doi.org/10.1093/her/cyg014

Cottrell, Lesley, et al. "The Relationship between Children's Physical Activity and Family Income in Rural Settings: A Cross-Sectional Study." Preventive Medicine Reports, vol.

2, 2015, pp. 99–104., doi:10.1016/j.pmedr.2015.01.008.

Dehaven, Kenneth E., and David M. Lintner. “Athletic Injuries: Comparison by Age, Sport, and Gender.” The American Journal of Sports Medicine, vol. 14, no. 3, 1986, pp. 218–224, doi:10.1177/036354658601400307.

Furst, R. Terry. “Social Change and the Commercialization of Professional Sports.” International Review of Sport Sociology, vol. 6, no. 1, 1971, pp. 153–173.

Gardner, Kelly. “Role of a Physical Therapist.” APTA, 2016.

Goodlin, Gabrielle T. et al. “The Dawning Age of Genetic Testing for Sports Injuries.” Clinical journal of sport medicine : official journal of the Canadian Academy of Sport Medicine 25.1 (2015): 1–5. PMC. Web. 27 Feb. 2018.

Hack M, et al. “Long-Term Developmental Outcomes of Low Birth Weight Infants.” The Future of Children, vol. 5, no. 1, 1995, pp. 176–96.

Hainline, Brian. “An Introduction to Mind, Body and Sport.” NCAA.org - The Official Site of the NCAA, 18 July 2017.

Haskell WL, et al. “Physical Activity and Public Health: Updated Recommendation for Adults from the American College of Sports Medicine and the American Heart Association.” Circulation, vol. 116, no. 9, 2007, pp. 1081–93.

Hootman, Jennifer M, Randall Dick, and Julie Agel. “Epidemiology of Collegiate Injuries for 15 Sports: Summary and Recommendations for Injury Prevention Initiatives.” Journal of Athletic Training 42.2 (2007): 311–319. Print.

Institute of Medicine; Board on Neuroscience and Behavioral Health; Committee on Health and Behavior: Research; Practice and Policy. “Health and Behavior: The Interplay of Biological, Behavioral, and Societal Influences.” The Interplay of Biological, Behavioral,

and Societal Influences | The National Academies Press, 15 Feb. 2001.

Kinsella, Michael T., and Catherine Monk. "Impact of Maternal Stress, Depression & Anxiety on Fetal Neurobehavioral Development." *Clinical obstetrics and gynecology* 52.3 (2009): 425–440. *PMC*. Web. 30 Oct. 2017.

Kussin, Eric. "About Us | The Formation Story & Mission | We're All A Little 'Crazy.'" Were All A Little Crazy. Web. 2017.

Lane, Steven. "PAs Are Key to Ortho Urgent Care Model." AAPA, 11 Sept. 2017.

Liu, Stephen H., et al. "Primary Immunolocalization of Estrogen and Progesterone Target Cells in the Human Anterior Cruciate Ligament." Journal of Orthopaedic Research, vol. 14, no. 4, 1996, pp. 526–533., doi:10.1002/jor.1100140405.

Loeser, Richard F. "Age-Related Changes in the Musculoskeletal System and the Development of Osteoarthritis." Clinics in geriatric medicine 26.3 (2010): 371–386. PMC. Web. 14 Nov. 2017.

Maruthappu, Mahiben, Rele Ologunde, and Ayinkeran Gunarajasingam. "Is Health Care a Right? Health Reforms in the USA and Their Impact Upon the Concept of Care." Annals of Medicine and Surgery 2.1 (2013): 15–17. PMC. Web. 2 Nov. 2017.

Office of the Surgeon General (US). Bone Health and Osteoporosis: A Report of the Surgeon General. Rockville (MD): Office of the Surgeon General (US); 2004.

Olden, Peter C. Management of Healthcare Organizations an Introduction. Health Administration Press, 2015.

Remoundou, Kyriaki, and Phoebe Koundouri. "Environmental Effects on Public Health: An Economic Perspective." International Journal of Environmental Research and Public Health, vol. 6, no. 8, 2009, pp. 2160–2178.

Richardson, Robert W. “Ethical Issues in Physical Therapy.” Current Reviews in Musculoskeletal Medicine 8.2 (2015): 118–121. PMC. Web. 2 Nov. 2017.

Riess, Steven A. City Games: the Evolution of American Urban Society and the Rise of Sports. University of Illinois Press, 1991.

Roos AK, Goodlin GT, Roos TR, Hawkins C, Beache S, et al. (2015) Correction: Applying Personal Genetic Data to Injury Risk Assessment in Athletes. PLOS ONE 12(1).

Sabato, Todd M, Tanis J Walch, and Dennis J Caine. “The Elite Young Athlete: Strategies to Ensure Physical and Emotional Health.” (2016): 99–113. PMC. Web. 1 Mar. 2018.

Shmerling, MD Robert H. “The Gender Gap in Sports Injuries.” Harvard Health Blog, 3 Dec. 2015.

Siekaniec, Claire. “The Effects of Alcohol on Athletic Performance.” National Strength and Conditioning Association, 2018.

Solis, Jessica M. et al. “Understanding the Diverse Needs of Children Whose Parents Abuse Substances.” *Current drug abuse reviews* 5.2 (2012): 135–147. Print.

Tarkan, Laurie. “Athletes' Injuries Go Beyond the Physical.” The New York Times, The New York Times, 25 Sept. 2000.

Whelan, Jo. “WHO Calls for Countries to Shift from Acute to Chronic Care.” BMJ : British Medical Journal 324.7348 (2002): 1237. Print.

Yach, Derek, et al. “The Global Burden of Chronic Diseases.” Jama, vol. 291, no. 21, Feb. 2004, p. 2616., doi:10.1001/jama.291.21.2616.

Zamanzadeh, Vahid et al. “Effective Factors in Providing Holistic Care: A Qualitative Study.” Indian Journal of Palliative Care 21.2 (2015): 214–224. PMC. Web. 2 Mar. 2018.

APPENDIX A:

Informed Consent Form

My name is Daniella Batarseh, and I am a student at Union College in Schenectady, New York. I am inviting you to participate in a research study about sports injury and recovery, which is part of my senior thesis in Sociology under the direction of Professor Melinda Goldner at Union College. There are no foreseeable risks to taking part in this study.

Daniella Batarseh, the project researcher, has explained the purpose of the study, how the interviews will be conducted, analyzed and reported on, and the expected duration of my participation. I have had the opportunity to ask any questions that I may have regarding the study and I have received answers that meet my satisfaction. I understand that my involvement is voluntary, and that I may choose whether or not to participate. I understand that I am free to discontinue participation in this interview at any time without penalty. I understand that my participation will be kept confidential.

By signing below, you indicate that you understand the information above, and that you wish to participate in this research study.

_____	_____	_____
Participant Signature	Printed Name	Date

You may consent to having your interview recorded via an iPhone or you may decline. Please sign your initials by the appropriate statement below to indicate these wishes.

__ I consent to being recorded via iPhone.
__ I do not consent to being recorded via iPhone.

APPENDIX B:

Interview Guide for Athletes:

Heredity
1. What role do you think heredity plays in sports and injury/recovery, if any? Elaborate please.
2. Is there a difference in type of injury or how an athlete recovers from injury based on gender? Do you believe this is due to biological and/or social differences? Please explain.

Environment
3. What role do you think socioeconomic status plays in sports and injury/recovery, if any? Elaborate please.
4. What role do you think physical environment plays in sports and injury/recovery, if any? Elaborate please.

Lifestyle
5. How do you think an athlete's lifestyle/habits (smoking, drinking, calcium intake, etc.) affect how an athlete recovers from an injury, if at all? Elaborate please.

Medical Services
6. What role do you think access to health care services plays in sports injuries, if any? Elaborate please.

Additional Questions for Athletes
7. What do you think affected you the most when you chose what sport to play?
8. Thinking about the four categories above – heredity, environment, lifestyle and medical services - what do you think is the most important and least important aspect of recovery from a sports injury, and why?
9. What do you think affected you the most when you were recovering from your injury? Please explain the type of injury and the typical process for recovery.
10. What were the greatest challenges to full recovery?
11. How do you think your teammates played a role in your recovery, if at all?
12. What role do you think your coach, trainer, physical therapist, orthopedic surgeon and family played in your recovery? Explain which role was the most significant and why.
13. What is your approximate net family income, before taxes?
    a. Less than $29,000
    b. $29,000 - $50,999
    c. $51,000 - $99,999
    d. $100,000 - $200,000
    e. Over $200,000

Interview Guide for Trainers/Physical Therapists:

Heredity
1. What role do you think heredity plays in sports and injury/recovery, if any? Elaborate please.
2. Is there a difference in type of injury or how an athlete recovers from injury based on gender? Do you believe this is due to biological and/or social differences? Please explain.

Environment
3. What role do you think socioeconomic status plays in sports and injury/recovery, if any? Elaborate please.
4. What role do you think physical environment plays in sports and injury/recovery, if any? Elaborate please.

Lifestyle
5. How do you think an athlete's lifestyle/habits (smoking, drinking, calcium intake, etc.) affect how an athlete recovers from an injury, if at all? Elaborate please.

Medical Services
6. What role do you think access to health care services plays in sports injuries, if any? Elaborate please.

Additional Questions for Trainers/Physical Therapists
7. What is the most common injury you see for each sport?
8. What is the most common injury for each gender?
9. Thinking about the four categories above – heredity, environment, lifestyle and medical services - what do you think is the most important and least important aspect of recovery from a sports injury, and why?
10. What is the greatest concern of athletes when they are injured?
11. What factors are the most important for a full recovery?
12. What is your role in the recovery of athletes?
13. Is there any advice/guidance that you give your athletes when they are injured?

Interview Guide for Coaches:

Heredity
1. What role do you think heredity plays in sports and injury/recovery, if any? Elaborate please.
2. Is there a difference in type of injury or how an athlete recovers from injury based on gender? Do you believe this is due to biological and/or social differences? Please explain.

Environment
3. What role do you think socioeconomic status plays in sports and injury/recovery, if any? Elaborate please.
4. What role do you think physical environment plays in sports and injury/recovery, if any? Elaborate please.

Lifestyle
5. How do you think an athlete's lifestyle/habits (smoking, drinking, calcium intake, etc.) affect how an athlete recovers from an injury, if at all? Elaborate please.

Medical Services
6. What role do you think access to health care services plays in sports injuries, if any? Elaborate please.

Additional Questions for Coaches
7. Thinking about the four categories above – heredity, environment, lifestyle and medical services - what do you think is the most important and least important aspect of recovery from a sports injury, and why?
8. What is your role in the recovery of athletes?
9. What is the greatest concern of athletes when they are injured?
10. What were the greatest challenges to full recovery?
11. What is the most common injury you see for your sport?
12. What factors are the most important for a full recovery?
13. Is there any advice/guidance that you give your athletes when they are injured?
14. As a coach, how often do your players get injured? Please elaborate on the severity of these injures and the ability for the athletes to have a full recovery.
15. How do you think teammates play a role in the recovery of an athlete, if at all?

Interview Guide for Orthopedic Surgeons:

Heredity
1. What role do you think heredity plays in sports and injury/recovery, if any? Elaborate please.
2. Is there a difference in type of injury or how an athlete recovers from injury based on gender? Do you believe this is due to biological and/or social differences? Please explain.

Environment
3. What role do you think socioeconomic status plays in sports and injury/recovery, if any? Elaborate please.
4. What role do you think physical environment plays in sports and injury/recovery, if any? Elaborate please.

Lifestyle
5. How do you think an athlete's lifestyle/habits (smoking, drinking, calcium intake, etc.) affect how an athlete recovers from an injury, if at all? Elaborate please.

Medical Services
6. What role do you think access to health care services plays in sports injuries? Elaborate please.

Additional Questions for Orthopedic Surgeons
7. What role do you play in the athlete's recovery from injury? How often do you see them? What guidance do you give?
8. What do you think is the number one factor that impacts the ability of an athlete to fully recover?
9. What is the most common struggle and the greatest barrier for athletes during their recovery?
10. What are the most common injuries for different sports?