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Prior sport-related injury and the long-term physical and psycho-social consequences associated with injury may contribute to declines in physical activity (PA) and the health-related quality of life (HRQoL) of former collegiate athletes (Cowee & Simon, 2019; Filbay, et al., 2013; Russell, et al., 2017; Simon, et al., 2019). Given that women's soccer has some of the highest rates of injury in collegiate sports, the purpose of this study was to assess the current perceived health of former Division I women's soccer players and to determine what role prior injury plays in their current health outcomes. A web-based survey assessing physical (PS) and mental (MS) dimensions of HRQoL and disablement and self-reported PA was administered to former Division I women's soccer players ( $n = 382$ ). Participants ranged in age from 22-59 ( $M_{\text{age}} = 36.41$ ,  $SD = 7.76$ ). About two-thirds (68.3%) of the total sample reported suffering a severe injury during their soccer career, with knee (42.9%) and ankle (23%) injuries being the most common. Those with a history of previous severe injury had significantly ( $p < .01$ ) lower HRQoL-PS ( $M = 16.47$ ) and higher levels of disablement-PS ( $M = 13.77$ ) compared to those who did not report a severe injury ( $M_{\text{HRQoL-PS}} = 17.03$ ,  $M_{\text{DPA-PS}} = 8.86$ ). There was no significant difference in PA between the injured and non-injured group; however, lower HRQoL-PS ( $r = .303$ ), lower HRQoL-MS ( $r = .197$ ) and higher levels of physical ( $r = -.152$ ) and mental ( $r = -.148$ ) disablement were associated with less PA. Physical disablement was inversely correlated with HRQoL-PS ( $r = -.640$ ) and HRQoL-MS ( $r = -.305$ ). Findings suggest there is a possibility of continued long-term consequences to sports injury for some athletes long past retirement from sport. Continued research is needed to help former athletes manage these challenges and to find ways to minimize potential long-term consequences from injury with current athletes.

PERCEIVED HEALTH OF FORMER DIVISION I  
WOMEN'S COLLEGE SOCCER  
PLAYERS

by

Shannon J. Cross

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Approved by

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Committee Co-Chair

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Committee Co-Chair

This project is dedicated to the wonderful athletic trainers, physical therapists, and doctors who kept me playing and helped try to keep me healthy through my soccer career. Also, to all the past, present, and future soccer athletes that put their hearts and body on the line for the game that they love.

APPROVAL PAGE

This dissertation written by Shannon J. Cross has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

Committee Co-Chair \_\_\_\_\_  
Committee Co-Chair \_\_\_\_\_  
Committee Member \_\_\_\_\_

\_\_\_\_\_  
Date of Acceptance by Committee

\_\_\_\_\_  
Date of Final Oral Examination

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## CHAPTER I

### PROJECT OVERVIEW

While collegiate athletes are often viewed as the quintessential picture of health, when the days of competition end there is a growing body of evidence that suggests former student-athletes do not necessarily live longer, healthier lives. In some cases, a history of competitive sport participation may instead hinder the maintenance of a physically active lifestyle and place former athletes at risk for developing negative health outcomes (Friery & Bishop, 2007; Simon & Docherty, 2013; Simon & Docherty, 2016; Simon & Docherty, 2017; Simon, et al., 2019; Sorenson, et al., 2015). For example, former college athletes report lower health-related quality of life (HRQOL) than age matched non-athlete alumni (Simon & Docherty, 2013).

Prior sport-related injury may play a key role in the development of negative health outcomes and declines in physical activity (PA). Disablement, or the inability to perform activities that are important to the individual, as a result of prior injury suffered while participating in athletics is a factor that has been identified as a likely link to the decrease in both HRQOL and PA seen in former athletes (Russell, et al., 2017; Tracey & Elcombe, 2004). Lower HRQOL scores have been found in current college athletes who have suffered an injury, even once they return to full participation (Hoch, et al., 2015; Houston, et al., 2017; Lam, et al., 2017; Marshall, et al., 2018; Weber, et al., 2018). These scores then appear to remain low across the lifespan. Studies of diverse cohorts of former college athletes show a relationship between prior injury and lower HRQOL scores (Cowee & Simon, 2019; Filbay, et al., 2013; Simon, et al., 2019). Soccer is one of the most popular sports in America with high participation rates at the youth, high school, and collegiate levels (Kerr, et al., 2015; NCAA, 2019; US Youth Soccer,

n.d.). Soccer also has some of the highest injury rates across all contact sports (DiStefano, et al., 2018; Kerr, et al., 2015). This is especially true for female soccer players, with knee injuries, such as anterior cruciate ligament (ACL) tears, being especially common (Kerr, et al., 2015; NCAA, 2009). Despite the popularity of the sport and prevalence of injuries, most soccer-specific research into the health of former players has been conducted with male athletes (Drawer & Fuller, 2001; Lohmander et al., 2004, Lohmander, et al., 2007; Turner, et al., 2000; von Porat, et al., 2004), thereby hindering the ability to address barriers and experiences specific to former women's college soccer players' long-term health.

### **Review of Relevant Literature**

Former collegiate athletes are at risk for negative health outcomes following the conclusion of their competitive sport career (Friery & Bishop, 2007; Simon & Docherty, 2013; Simon & Docherty, 2016; Simon & Docherty, 2017; Simon, et al., 2019; Sorenson, et al., 2015). For example, they may experience declines in physical activity (PA) and fitness (Reifsteck, et al., 2013; Simon & Docherty, 2017; Sorenson, et al., 2015), decreased health-related quality of life (HRQOL) scores (Filbay, et al., 2019), and high rates of osteoarthritis (OA) compared to general population norms and age matched non-athlete alumni (Friery & Bishop, 2007; Simon & Docherty, 2016; Simon, et al., 2019). These health consequences, particularly decreases in PA levels, have the potential to put former athletes at higher risk for development of chronic diseases (Witkowski & Spangenburg, 2011). Further, research suggests former collegiate athletes suffer from prevalent medical conditions like anxiety, high cholesterol, depression, and alcohol dependence (Kerr, et al., 2014). There is a need to understand the many factors that play a role in health outcomes of former collegiate athletes. In particular, the role of prior injury should be explored.

Injury is likely to negatively impact HRQOL. HRQOL is a measure of health domains that usually incorporates physical, mental and social components and is uniquely personal to the individual (Parsons & Snyder, 2011; Vela & Denegar, 2010a). The disablement process incorporates this uniqueness by describing the interrelated factors that result in disability, including how the functioning of the body systems are affected and the resulting physical and mental consequences (Verbrugge & Jette, 1994). Disability, or level of disablement, is characterized by the inability to perform physical activities or social responsibilities that are of importance to the individual due to a health or physical problem (Verbrugge & Jette, 1994). The World Health Organization's disablement model (2001) describes the process and interrelated components that occur with injury resulting in impairments, functional limitations, and disability (Vela & Denegar, 2010a). Additionally, HRQOL has been found to be highly connected to PA, as HRQOL is enhanced by PA (Gill, et al., 2015). There are short and long-term effects of sports injury that usually include impairments like physical pain and stiffness, but also functional limitations like impaired activities of daily living and fitness related PA (Vela & Denegar, 2010a). The disablement model, thus, offers a framework for understanding how injury can have lasting impact on former athletes' PA levels and, subsequently, additional HRQOL deficits (Russell, et al., 2017).

Disablement as a result of prior sports injury is a likely contributing factor to the negative health outcomes seen in former athletes. Current collegiate athletes have reported declines in HRQOL following injury, which often remain lower even after returning to full sport participation (Hoch, et al., 2015; Houston, et al., 2017; Lam, et al., 2017; Marshall, et al., 2018; Weber, et al., 2018). Consequently, HRQOL appears to then continue to decline into retirement from sport, with a history of sports injury linked to decreased HRQOL scores and difficulty performing activities of daily living (Cowee & Simon, 2019; Filbay, et al., 2013; Simon, et al.,

2019). In particular, a history of ankle and knee injury and surgery has been linked to dramatically high rates of OA and subsequent decreases in HRQOL (Filbay, et al., 2013; Houston, et al., 2014; Lohmander, et al., 2004; Lohmander, et al., 2007; Simon & Docherty, 2018; Simon, et al., 2019).

As demonstrated by previous research, negative health outcomes in former college athletes appear to be linked to their prior sport experiences that include a history of injury. However, every sport has unique experiences and injury risks. Soccer is one of the most popular sports in the US and also has one of the highest rates of injury at the collegiate level (Kerr, et al., 2015). Women's soccer, in particular, had the second highest total injury rate and the highest injury rate in competition for women's sports in the NCAA from 2009-2014 (Kerr, et al., 2015). Despite women's soccer experiencing these high rates of participation and injury, most of the research on former collegiate athletes' health has been on mixed sport cohorts. Additionally, most of the soccer-specific research has been done on male players.

Knee injuries, ankle injuries, and concussion are three of the most common injuries in women's college soccer, with women's soccer accounting for the third highest rate of ACL injury in all of NCAA sports (NCAA, 2009). These injuries are also linked to declines in HRQOL in collegiate athletes even after returning to full participation (Hoch, et al., 2015; Houston, et al., 2017; Lam, et al., 2017; Marshall, et al., 2018; Weber, et al., 2018). ACL injuries are especially concerning for former female soccer athletes: 82% report OA within 12 years of suffering an ACL injury and 75% report challenges to knee-related quality of life (Lohmander, et al. 2004). Prien and colleagues (2017) identified health concerns specific to former elite women's soccer players and found they are related to knee, ankle, and head injuries. This study by Prien and colleagues (2017), however, looked at former German professional women's players, not players from the American collegiate system. This is an important distinction because the American

system essentially peaks at the NCAA Division I level with only a small fraction of women's players continuing on to the American professional league (NCAA, 2019; NWSL, 2018).

Therefore, the most equivalent comparison group for American soccer athletes to the European professional is the Division I collegiate player.

### **Purpose and Aim**

The purpose of this study was to assess the current perceived health of former Division I collegiate women's soccer players, and specifically to examine the role prior sports injury plays in the health and PA behaviors of these former athletes. By determining the relationships among prior sport injury, current disablement, PA, and health related quality of life of former women's college soccer players, this information can be used to promote lifespan wellness and improved health outcomes through the development of evidence-based interventions.

### **Methods**

To address the aim, this study employed a survey approach to examine the current physical activity, health-related quality of life, and level of disablement in former Division I women's soccer players, and to explore differences based on prior sports injury.

### **Participants**

The sample was comprised of 382 former Division I women's soccer players. The participants ranged in age between 22-59 ( $M_{\text{age}} = 36.41$ ,  $SD = 7.76$ ) and were predominantly White/Caucasian ( $n = 316$ ; 82.7%), with other racial/ethnic identities also represented including Hispanic/Latino ( $n = 13$ ; 3.4%), Black/African American ( $n = 9$ ; 2.4%), Asian ( $n = 10$ ; 2.6%), Native Hawaiian/Pacific Islander ( $n = 3$ ; 0.8%) and Other ( $n = 1$ ; 0.3%). Additional participants ( $n = 31$ ; 8.1%) selected two or more racial/ethnic identities or did not state ( $n = 2$ ; 0.5%).

## Measures

**Demographics.** Demographic information collected included age, race/ethnicity, occupation, and current physical limitations.

**Soccer playing history.** The number of years the participants played Division I, semi-professional, and professional soccer was reported along with the number of years removed from playing collegiate and competitive soccer. Participants reported their current level of participation in soccer (e.g., play recreationally, coach, referee, no involvement), and the reason behind why they terminated their soccer playing career.

**History of injury.** The participants provided a detailed background of their injury history, including number of severe injuries, specific body part(s) affected, and whether or not surgery was required. Participants were asked to specify and focus on injuries sustained specifically while playing soccer. Participants were asked if they had ever suffered a minor injury while playing soccer, but severe injury was the primary focus. Severe injury was defined as any injury that kept an athlete out of participation 21 or more days (Cowie & Simon, 2019). Patient reported recall of injuries has been used in similar studies (Cowie & Simon, 2019; Marshal, et al., 2018).

**DPA.** The Disablement of the Physically Active Scale (DPA) is a reliable and valid multidimensional instrument developed to measure level of disablement in physically active populations (Vela & Denegar, 2010b; Houston, Van Lunen & Hoch, 2014). The DPA is a 16-item Likert scale (1 = *no problem*, 5 = *severe problem*) survey with the first 12 items assessing physical summary (PS) components (e.g. impairment, activity limitations) and the last four items assessing mental summary (MS) components (e.g. psychosocial & emotional well-being) (Houston, et al., 2015). The questions are to be answered based on how much of a problem the athlete has had within the past 24 hours. Each item and domains are scored and adjusted so the floor is zero, with higher scores indicating higher levels of disablement (Houston, et al., 2015).

The reliability for the current study was high for both the Physical Score ( $\alpha = 0.95$ ) and Mental Score ( $\alpha = 0.83$ ).

**PROMIS.** Health related quality of life (HRQOL) was measured through the Adult Global Health version of the Patient Reported Outcome Measurement Information System (PROMIS). The PROMIS Scale version 1.2-Global Health by *HealthMeasures* was used. This is a 10-item measure that was validated for diverse clinical and research populations and includes Physical and Mental Function domain scores (PROMIS, 2017). The PROMIS asks participants to report their answers on a five-item Likert for nine questions; the final question on average pain in the past week is reported on a scale of 1-10. This pain score is converted to new recoded response based on a table provided in the PROMIS Global Scoring Manual (PROMIS, 2017).

The raw scores for each domain are calculated by summing the four questions targeted for Physical Health and the four questions targeted for Mental Health. The raw physical scores (PS) and mental score (MS) are then converted to a T-score through a standardized table. The standardized T-scores are rescaled to have a mean score of 50 and a standard deviation (SD) of 10. This allows for comparison against the general population. A higher score equates to a higher level of health. The remaining two questions not combined in the domain scores are to be left in the raw form and reported separately (PROMIS, 2017). The raw scores were used for data analysis, but the descriptive t-scores are provided across all injury types (see Appendix B). The reliability for Mental Function was acceptable ( $\alpha = 0.80$ ). Physical Function was low ( $\alpha = 0.63$ ), but all four items correlated and contributed to the total reliability.

**Godin.** Weekly PA was measured through the Godin Leisure Time Physical Activity Questionnaire (Godin) which assesses the number of times individuals have participated in strenuous (e.g. running, vigorous swimming), moderate (e.g. fast walking, biking), and light (e.g. yoga, easy walking) activities for at least 15 minutes. These values are then used to create a total

score based off metabolic equivalent task (MET) values through a standard equation. Because a summary score of only strenuous and moderate activities has been suggested as a better indicator of health contribution (Godin, 2011), weekly PA levels were computed using the equation: (frequency of strenuous activity/week X 9) + (frequency of moderate activity/week X 5). Higher total scores represent greater participation in PA, with scores > 24 considered active with substantial health benefits, 14-23 moderately active with some benefits, and < 14 units insufficiently active with low benefits.

**Exploratory questions.** Participants were asked to rate on a 5-point scale how much their injury history impacted their health and quality of life (*0 = Not at all, 4 = A Great Deal*) as well as their ability to participate in sports and PA on a 4-point scale (*0 = Never, 3 = Almost Always*). Concerns regarding the health of various body systems (e.g. joint, skin, mental, cardiovascular health) of the former athletes were also reported. Open-ended questions were included to provide additional insight into the participants' perceptions of their current health and PA participation in relation to their soccer playing experience (see Appendix A for full survey).

## **Procedures**

The survey was first piloted with former Division II women's soccer players to refine the instruments used in the current study. Following Institutional Review Board approval, former NCAA Division I women's soccer players were then invited to complete a web-based survey administered through Qualtrics software after they provided consent to participate. Participants were recruited through email and/or social media (e.g. Facebook, Instagram, Twitter, LinkedIn). The only requirements for participation were to be female, must have played NCAA Division I women's soccer, and must no longer be playing elite competitive soccer (e.g., collegiately, semi-professionally, professionally). Participants were recruited through a large network of personal contacts from the principal investigator's former playing and coaching experience. Snowball



sampling was also utilized by asking the survey participants to forward on to other former Division I women's players and by asking other coaches and contacts involved in the women's game to share study information with former Division I women's players.

The survey was accessed 467 times within the three-month study window. Participants were excluded from analysis if they reported that they were still playing competitive soccer ( $n = 15$ ), did not complete any of the three primary outcome measures ( $n = 68$ ), or did not provide consent ( $n = 2$ ). The final sample for data analysis included 382 participants, with 372 participants completing the full survey (79.6% overall completion rate) and 10 additional participants completing at least one of the three primary measures.

### **Data Analysis**

Upon completion of data collection through Qualtrics, the data were downloaded into SPSS for data reduction, scoring, and analysis. Scores that were reported in minutes of PA rather than frequency of PA were removed from analysis ( $n = 5$ ). Descriptive analysis was completed for the demographics, playing history, injury history, current health concerns and perceptions of health, as well as primary outcome measures. Independent t-tests were used to compare PA, DPA, and HRQoL between those who reported a history of severe injury and those who did not. Correlations were used to look at the relationships among the main outcome measures. The open-ended, exploratory questions were grouped into common responses and reported as frequencies.

### **Results**

The playing and injury history of the former women's college soccer players are presented first followed by relationships among and differences in their current perceived health-related outcomes.

## **Playing History**

The participants played on average 3.87 years of Division I soccer. Most of the individuals ( $n = 308$ ; 80.6%) reported that they were starters during the best season of the collegiate career. The breakdown by primary position played was forward ( $n = 69$ ; 18.1%), midfield ( $n = 132$ ; 34.6%), defender ( $n = 117$ ; 30.6%), and goalkeeper ( $n = 64$ ; 16.8%). The majority of the sample ( $n = 298$ ; 78.0%) was 10 or more years removed from their NCAA playing career. Many participants were still involved in the game of soccer, with most citing recreational play ( $n = 138$ , 36.1%) or coaching ( $n = 140$ , 36.6%). However, over a third of the sample ( $n = 135$ ; 35.3%) were no longer involved in soccer in any capacity. Reasons for terminating their soccer careers included graduating college ( $n = 27$ ; 7.1%), injury-related reasons ( $n = 92$ ; 24.1%), lack of opportunity/no monetary compensation ( $n = 51$ ; 13.4%), work or career not related to soccer ( $n = 78$ ; 20.4%), and change in desire/burnout ( $n = 47$ ; 12.3%).

## **Injury History**

Of the 382 participants, 86.4% ( $n = 330$ ) reported suffering one or more minor injuries and 68.3% ( $n = 261$ ) reported suffering at least one severe injury at some point in their playing career. Only 10.2% ( $n = 39$ ) reported never suffering any type of injury. Of the 261 participants who suffered a severe soccer-related injury, 78.2% ( $n = 204$ ) reported returning to their pre-injury level of play; however, 21.8% ( $n = 57$ ) did not return to their previous level of play. As shown in Table 1, knee and ankle injuries were the most common reported severe injuries by the former soccer players, with most who sustained knee injuries required at least one surgery.

Many individuals experienced multiple injuries to the same body part throughout their careers (see Table 2). For those with two or more joint injuries the overwhelming majority involved the same side limb (81.4% Ankle, 71.1% Knee, 80.0% Hip).

Table 1. Frequency of Severe Injury and Surgery

Injury Location	Participants with At Least 1 Severe Injury	%	Participants Requiring At Least 1 Surgery	%
Knee	164	42.9%	131	79.8%
Ankle	88	23.0%	29	32.9%
Soft Tissue	61	15.9%	5	8.2%
Lower Leg	47	12.3%	22	46.8%
Head/Concussion	45	11.7%	---	---
Upper Body	44	11.5%	23	52.3%
Spine (Neck/Back)	22	5.7%	4	18.1%
Hip	19	4.9%	8	42.1%
Other	16	4.2%	8	50.0%

Table 2. Frequency of Repeated Injury

No. of Injuries over career	Ankle (n = 88)	Knee (n = 164)	Head (n = 45)	Hip (n = 19)	Spine (n = 22)	Soft Tissue (n = 61)	Upper Body (n = 44)	Lower Leg (n = 47)
1	18	87	9	14	14	23	27	29
2	22	39	9	4	7	15	8	14
3	13	17	13	---	1	7	4	3
4+	35	21	14	1	---	16	5	1

### Health-Related Outcomes

The main health-related outcome measures were the general health-related quality of life (PROMIS), disablement (DPA), and self-reported moderate-to-vigorous PA (MVPA) from the Godin. Descriptive information and correlations across all primary health outcomes for the sample can be found in Table 3. Greater PA was associated with HRQoL (both PS and MS) and lower levels of disablement (both PS and MS). Additionally, disablement (both PS and MS) and HRQoL (both PS and MS) were inversely related.

Perceived health outcomes were compared between individuals who reported at least one severe injury and those who had no history of severe injury (see Table 4). Those who reported a

severe injury reported lower HRQoL-PS and higher physical disablement. However, there were no significant differences in MVPA based on injury history  $M_{diff} = 2.41$ ,  $t(364) = 0.964$ ,  $p = .336$ .

Table 3. Correlations Among Health Outcomes

Variable	1	2	3	4	5	6
1. Age						
2. MVPA	-.047					
3. PROMIS-PS	-.072	.303**				
4. PROMIS-MS	.108*	.197**	.550**			
5. DPA-PS	.154**	-.152**	-.640**	-.305**		
6. DPA-MS	-.130*	-.148**	-.472**	-.678**	.405**	
<b>M</b>	36.41	38.84	16.65	16.12	12.25	2.95
<b>SD</b>	7.76	22.27	1.95	2.66	11.54	3.36

Note: \*Significant,  $p < .05$  (two-tailed). \*\*Significant,  $p < .01$  (two-tailed). PS = physical score; MS = mental score.

Table 4. Comparison of Health Outcome Measures by Injury History

	No Severe Injury		Severe Injury		<i>p</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
PROMIS-PS	17.03	1.79	16.47	2.00	.009*	0.30
PROMIS-MS	16.20	2.73	16.08	2.64	.675	0.07
DPA-PS	8.86	10.69	13.77	11.60	.0001*	0.44
DPA-MS	2.94	3.26	2.95	3.41	.971	0.003
MVPA	40.49	23.54	38.08	21.66	.336	0.11

Note: \* Significant,  $p < .01$  (two-tailed). PS = physical score; MS = mental score.

Further analysis, based on the type of injury showed that those who had suffered at least one concussion had worse mental HRQoL scores ( $M_{diff} = 1.06$ ,  $t(379) = -2.534$ ,  $p = .012$ ) compared to those with no history of concussion. When looking at average scores by injury type those with a history of spinal injuries reported the highest average DPA-PS ( $M = 20.27$ ,  $SD = 13.95$ ) and lowest HRQoL-PS ( $M_{Raw} = 15.05$ ,  $SD = 2.77$ ) of all injury types (See Appendix B for *M/SD* by injury type).

### Current Concerns and Perceptions of Health

Most of the sample ( $n = 314$ ; 82.2%) rated their current health as very good or excellent overall; however, many ( $n = 231$ ; 60.5%) listed at least one area of concern, with concerns related to joint health ( $n = 149$ ; 39%) and mental health ( $n = 69$ ; 18.1%) cited most often (Appendix C). When the severe injured group were asked how they felt their prior injury experience currently impacted their quality of life, most ( $n = 182$ ; 69.7%) felt their prior injury had little or no impact. Only 9.2% ( $n = 24$ ) stated they felt their prior injury impacted their quality of life *A Lot* or *A Great Deal*. When asked how often their prior injury currently limited or hindered their ability to participate in recreational activities, sports or physical activity, 28.4% ( $n = 74$ ) reported *Often* or *Almost Always*, 44.4% ( $n = 116$ ) stated *Rarely*, and 25.7% ( $n = 67$ ) reported *Never*.

### Impact on Physical Activity and Health

In the final part of the survey the former soccer players were asked, “How has your experience playing collegiate soccer positively/negatively impacted your physical activity and health?” For the positive question, responses from 310 participants were grouped into 13 common categories (see Table 5), with the most common responses being that soccer fostered a *Desire to be Active* and *Taught Healthy Habits/ Created a Desire to be Healthy*.

Table 5. Responses to Positive Impact of Collegiate Soccer Experience

	# of Responses	% of Respondents ( $n = 310$ )
Desire to be Active	108	34.8%
Taught Healthy Habits/Desire to be Healthy	80	25.8%
Taught Competitiveness/Ability to Push Self	52	16.8%
Taught how to Exercise/Coach	39	12.6%
Instilled Work Ethic/Discipline/Dedication	32	10.3%
Developed Toughness (Mental & Physical)	32	10.3%
Relationships/Teamwork	29	9.4%
Other (Life Lessons, Professional Impact, Manage Physical Recovery)	28	9.0%

Realized PA Benefits Mental Health	18	5.8%
Developed Body Awareness	14	4.5%
Instilled Confidence	13	4.2%
Generic Yes (No Explanation)	14	4.5%
It Didn't/No Positives	18	5.8%
Response Did Not Match Question	6	---
Blank/No Response	66	---

Note: Total responses are greater than the number of respondents as many participants provided multiple responses. PA = physical activity

Results for the negative impact are based on 279 respondents whose answers were grouped into 17 common categories (see Table 6), with *Physical Impairments* and *Limited in PA/Forced to Make Adjustments to PA*, being the most common responses.

Table 6. Responses to Negative Impact of Collegiate Soccer Experience

	# of Responses	% of Respondents (n =279)
Physical Impairments (Pain, Stiffness, Worn Down)	111	39.8%
Limited in PA or Forced to Make Adjustments to PA	69	24.7%
Negative Mental Health Impact	26	9.3%
Fear of Health Issues in Future	18	6.5%
Issues with PA	12	4.3%
Struggled to Adjust to Life/PA After College	8	2.9%
Body Image/Food Issues	6	2.2%
Fear of Injury/Pain	6	2.2%
Physical Consequences to Concussion/Headaches	5	1.8%
Regrets from College	5	1.8%
More Susceptible to Re-Injury	4	1.4%
Mental/Emotional Issues Related to Game of Soccer	4	1.4%
Sleep Issues	3	1.1%
Impacts ADL	2	0.7%
Hormonal Disorder	1	0.3%
Generic Yes (No Explanation)	4	1.4%
None/No Negatives or N/A	77	27.6%
Response Did Not Match Question	7	---
Blank/No Response	96	---

Note: Total responses are greater than the number of respondents as many participants provided multiple responses. PA = physical activity; ADL = activities of daily living

The open-ended responses also revealed an overlap in PA and the mental and physical health of the former players. Some individuals noted the benefit that PA had on mental health, like “Physical activity is my form of stress relief and helps with my mental health” and “Fitness is something that clears my mind and helps me manage stress.” Others noted despite physical limitations, staying active still had a benefit, like “Lots of pain playing soccer or doing long distance running (marathons). Overall aches and pains every day. But the more I stay active the better I feel.” Those no longer able to participate in their desired form of PA also reported negative consequences that span mental, social, emotional and physical, including:

Too many knee issues and pain. The worst part is not being able to play the game I love anymore. It hurts mentally. In every way. Would love to just play rec with friends again. It was more of a social thing. Would love to play with my kids.

I’m incredibly frustrated that I can’t do a lot of things I’d like to do, therefore I’m not as mentally healthy as I could be as I’m still incredibly bitter. I’m also not able to exercise and train to my fullest which is further frustrating since I cannot go after my goals.

Additionally, participants were asked at survey completion to “Please provide any other thoughts you'd like to share on your experiences playing competitive soccer” and 196 provided a response. While this was not a direct question that was asked, 86.2% of respondents expressed thoughts surrounding how they felt about their experience. Of those 196 respondents, 62.8% ( $n = 123$ ) said they “Loved it,” “wouldn’t change for the world” or some variation of “great experience.” In addition, 20.9% ( $n = 41$ ) also said they had a *great experience, or no regrets, but* . . . then listed things they realize do limit them currently. For example, “I wouldn’t trade it for the world but so many years of soccer did take a toll on my body. Some of which I still notice today,” “It was an amazing experience but I wish I could do more with my kids and not be in pain everyday,” and “If I had to do it again, I would! Even with the issues I have today.” Only, 2% of

respondents ( $n = 4$ ) made a point of stating they would not do it all over again or that their experience was unfortunately more negative than positive.

### **Discussion**

In this study, while looking to assess the current perceived health of former women's soccer players and the role injury might have played, it was found that the former soccer players reported high levels of injury overall, and those with a history of injury reported lower physical HRQoL and higher levels of physical disablement with effect sizes ranging between small and moderate. While no difference was found in MVPA between the injured and non-injured group, a significant relationship between MVPA and all of the main outcome measures was found showing that worse HRQoL and disablement scores are correlated with less MVPA. In addition, higher levels of disablement were correlated with lower HRQoL.

These results are consistent with previous research indicating that former collegiate athletes suffer from health consequences (Friery & Bishop, 2007; Kerr, et al., 2014; Simon & Docherty, 2013; Simon & Docherty, 2016; Simon & Docherty, 2017; Simon, et al., 2019; Sorenson, et al., 2014), with a history of sports injury being related to these decreased health outcomes (Cowee & Simon, 2019; Filbay, et al., 2013; Simon, et al., 2019). Prior research has also indicated that former elite women's soccer players should be concerned about the long-term impact of knee, ankle, and head injuries (Prien, et al., 2017). Findings from the current study are consistent with previous research as the current sample reported high rates of injuries at those same locations and cited joint and mental health being their areas of greatest concern.

These findings align with the disablement theory model that HRQoL has many interrelated factors that contribute to a person's perceived level of health (Russell, et al., 2017; Vela & Denegar, 2010a). Additionally, a significant association between PA and HRQoL was observed, with the former players commenting that PA played a role in their physical and mental



health regardless of whether prior injury occurred or not. While not all previously injured athletes will suffer extreme disablement or health deficits, something like prior sports injury that has lingering physical, emotional, social, and mental health consequences can play a role in current HRQoL. In addition, some injury types potentially will have greater impact than others on HRQoL and its interrelated factors like disablement and ability to participate in PA, with concussions and spinal injuries emerging from this study as two injuries that possibly can have a greater long-term impact.

Interestingly, despite emerging data suggesting that injury can impact long-term perceived health, when the former athletes were asked directly about their health and quality of life, most rated themselves with good health and did not think their injury history greatly impacted their quality of life. This indicates there is a possible cognitive disconnect for the former athletes on how much their prior injury history currently influences them. Regardless, the large majority does not seem to care, as they either noted their experience was “worth it” or that the positives of their collegiate experience far outweigh the negatives. This finding may be indicative of sports culture and that most athletes are used to feeling pain and playing hurt (Curry, 1993). Pain is thus normalized and may not be viewed by the former athletes as an area of concern. This could be tied to the idea of the “sport ethic,” which Hughes and Coakley (1991) described as overconforming to cultural sport norms and what it means to be an athlete by sacrificing well-being, accepting risks, and playing through pain in order to be a part of “the athletic fraternity.”

It is also worth noting that while these former athletes are showing declines in HRQoL-PS when compared to their uninjured peers, the injury group was still above the general population norms and in the *Very Good* range (Hays, et al., 2015). When looking at the PROMIS scores for HRQoL-PS the total sample was almost a half standard deviation higher than the general population (See Appendix B). This is consistent with other studies that found that former

athletes were not much different from the general population (Kerr, et al., 2014; Simon & Docherty, 2016; Filbay, et al., 2019). Therefore, it is important for clinicians to be mindful of the fact that former athletes may show deficits or declines in HRQoL, but these declines appear to be population specific and only recognized when compared against uninjured peers, not necessarily against the general population. Additionally, while some studies have found former athletes are no more active than their non-athlete peers (Reifsteck, et al., 2013; Sorenson, et al., 2015), the amount of PA reported in this cohort of former women's soccer players regardless of prior injury history was well above the minimum amount for health benefits (Godin, 2011). However, this may be considerably less PA than what these athletes participated in college as student-athletes.

The DPA scores reported in this study are similar to a recent study ( $M_{PS} = 12.3$ ;  $M_{MS} = 3.7$ ) with former Division II athletes (Wright & Snyder Valier, 2019). While the DPA has not been used much to date with former athletes, Russell, et al. (2017) suggested the DPA scale provides a more distinct understanding of the barriers former athletes suffer in physical activity when compared to generic HRQoL scales that have been found to have floor-to-ceiling effects. In addition, the DPA measures constructs that are more important to a physically active population (Vela & Denegar, 2010b). With a high Cronbach's Alpha for both the physical ( $\alpha = 0.95$ ) and mental ( $\alpha = 0.83$ ) scores for the DPA, this study supports this idea that the DPA is a reliable tool to use with former athletes and was able to show the continued limitations in global functioning these athletes suffer due to prior sport related injury. Interestingly, the impact of concussions was only apparent with the general HRQoL measure, which may suggest that concussions may have more of an impact on general everyday life functioning than on PA-related disablement. Consideration of different measures may be more appropriate depending upon the injury history.

Wiese-Bjornstal (2009) described injury as a far-reaching adverse event and that the long-term effects of injury are more significant for athletes than those suffered by non-athletes

because of the role physical activity participation plays in an athlete's life and well-being. These far-reaching adverse effects can persist for former athletes and the results of the perceived health outcomes and the open-ended responses of the former soccer players in this study demonstrate that sports related injury can have long-lasting consequences for athletes. The responses also demonstrate that the former athletes desire to be active and realize the benefits of PA but have found some additional challenges to maintain activity—as evident by the quarter of the respondents listing challenges in being forced to find alternatives to their desired form of PA due to physical limitations as a negative impact of their college soccer experience. Weise-Bjornstal (2009) also described the benefits on mood, motivation and return-to-health that alternative forms of PA have on physically active populations like athletes. This would seemingly be the same for former athletes struggling with the inability to perform desired forms of PA. Thus, they would benefit from practitioners assisting in activity modification and support in understanding the psycho-social factors surrounding the importance of PA on mental, physical and social health.

### **Limitations and Recommendations**

While other studies have used self-reported recall (Cowee & Simon, 2019; Marshal, et al., 2018), there is always the possibility of incorrect reporting of injuries. Additionally, the age of this sample is relatively young, and not necessarily generalizable to an older group. Finally, the injury-related care received before, during, and after college likely varied immensely across the sample; gathering more information related to this would be beneficial for promoting the care of future athletes.

Due to the evident long-term consequences of sports injury an emphasis should be placed on prevention first and foremost. The importance of strength training, injury prevention programs, and adequate rest/not overtraining as a preventative measure to decrease the risk of injury should be highlighted. When an injury does occur the importance of a quality rehabilitation

program should also be emphasized. The additional finding that those with a history of concussion are showing worse mental health further highlights the importance of prevention and management of head injuries, especially in a sport like soccer that has such a high incidence of concussions. Coaches, sports medicine staff and players should evaluate the appropriateness of when the player should return to play after an injury. Current players (youth & collegiate) and their parents should also be educated on potential long-term injury implications. Former athletes who have suffered an injury should be educated on these potential consequences to their health and encouraged to receive follow-up medical care following retirement from sport.

Future research should include more emphasis on which type of injury might have the greatest negative health implications. Tools and specific interventions to help manage the long-term physical and psychological consequences of prior sports injury are needed and should be implemented and evaluated to determine if they can improve HRQOL and other health outcomes of former athletes. This would include things like pain management tools, PA modification, and relaxation and mindfulness techniques to assist in mental health.

## **Conclusion**

Based on the reported rates of previous injury, women's soccer players are suffering high rates of injury and these injuries are subsequently associated with lasting physical and mental health consequences in some athletes. Transitioning out of competitive athletics is a complex issue and maintaining a physically active lifestyle across the lifespan may be challenging for former collegiate athletes (Reifsteck & Brooks, 2018). However, recognizing that prior injury is playing a role with many of these former athletes' ability to participate in PA or in their desired form of PA demonstrates the need for future research and interventions to assist these former athletes with the complex interdisciplinary issues involved with retirement from sport, especially in maintaining their health and PA.

## CHAPTER II

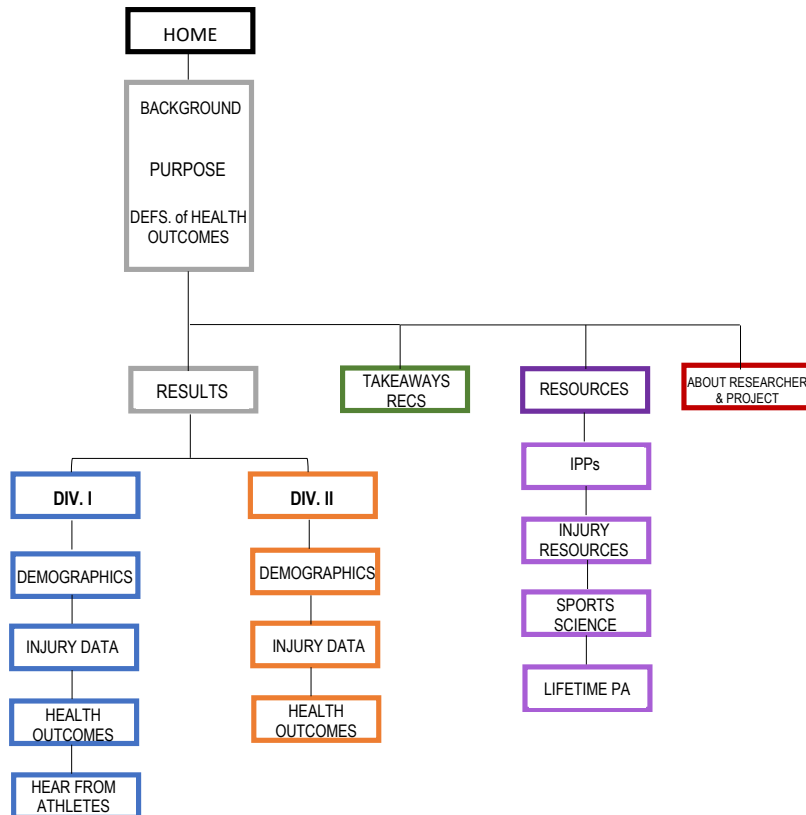
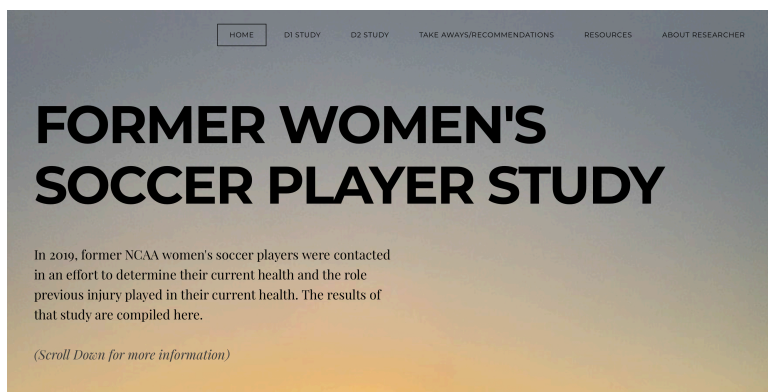
### DISSEMINATION

The immediate dissemination of findings will be targeted toward stakeholders. This will include former women's soccer players, women's college soccer coaches, youth and high school coaches, and sports medicine professionals (e.g., athletic trainers, physical therapists) that work with the women's soccer population through personal networks. Participants from both the pilot research (former Division II players) and full study (former Division I players) that were interested in the study results provided their email addresses. Over 40% of those that completed the survey (Division I & II combined) provided their email address, demonstrating an interest in the results. These participants were the first to receive access to the dissemination through an emailed link that also included the suggestion to forward onto anyone that might be interested or impacted by the results. A large percentage of the former players that participated in this study are still involved in the game of soccer as coaches. This provides a unique opportunity to get this information out to the next generation of impacted players (and their parents) through the generation that is currently impacted by these health consequences of injury.

Findings will be disseminated through a website that provides a summary of the current perceived health status of former women's college soccer players in a format that is approachable and understandable to the layperson (website: [www.formersoccerplayerstudy.weebly.com](http://www.formersoccerplayerstudy.weebly.com)). Web-based content is now the norm. It is the way most people consume information, particularly the younger generations. Additional benefits to using a website as the format for dissemination include being completely interactive and controllable by the user. The visitors are thus able to unfold the material in their desired order and engage with the material that is most interesting or

relevant to them, which is not possible with other mediums like handouts or summary papers. A web-based format also lends itself to the content to be re-visited and shared forward in addition to being accessible in any environment with a mobile friendly format. See Figure 1 for an outline of the website.

Figure 1. Sitemap for Former Soccer Player Study Website



From the homepage, the website includes a brief introduction to the purpose of the study, the participants, and the definitions of the main outcome measures (see Appendix D). The *Results*, *Takeaways/Recommendations*, *Resources*, and *About* sections are accessible from the homepage. The results section was separated by Division I and Division II, as the data collected for the pilot study with Division II former soccer players was also included. The results section begins with an infographic of the demographics of the participants, then progresses into a summary of the findings regarding injury history and the health outcomes. These again were presented in infographic form designed to be visually appealing and easy to understand. Reminders of what the main outcome measures were and their definitions were also included with the graphics. With the Division I results, a section of “Hear from the Former Athletes” was added that summarizes the participants’ open-ended responses which include their thoughts on what they would change looking back on their injury and/or experience, the positives and negatives of their experience as related to their current health and physical activity, and any final thoughts the former players wanted to share. This “final thoughts” section includes representative quotes taken directly from the former athletes.

Final take-aways from the study and recommendations are included on a single navigation page with a descriptive heading. This section is listed as the final stop for those that navigate all the way through the website, but also would be a likely place for a brief visitor to target. The recommendations are bullet points on how to limit the long-term consequences of soccer-related injury. Some of these were recommendations that came directly from the former players in things that they wish they would have done differently during their playing careers. These are sectioned off into four main suggestions: preventing injuries, recommendations when injuries do occur, recommendations on deciding when to return to play, and suggestions for planning for a lifetime after soccer. These recommendations include things like implementing an

injury prevention program (IPP) at all levels. Post-injury, emphasis should be on a high-quality rehabilitation program, taking time to properly recover, and taking head injuries seriously. When deciding when to return to play athletes should not feel rushed; consulting with the athlete and sports medicine professionals on the athlete's mental and physical readiness should be emphasized. When planning for a lifetime it is recommended to stay active and be aware that activity modification might be necessary, and resources like physical therapists can help.

Finally, a list of helpful/relevant resources and links are also included. These include links to two well-known, evidence-based soccer specific injury prevention programs (FIFA 11+ and Santa Monica Sports Medicine Research Foundations PEP program). Injury resources from the National Federation of High School Sport Associations (NFHS), the National Collegiate Athletic Association (NCAA), and National Athletic Training Association (NATA) were also included. This section concludes with links to resources from the Moving On! program, which helps student-athletes transition from sports into a physically active and healthy lifestyle, the American Physical Therapy Association's (APTA) resource on physical therapy, and the Center for Disease Control's (CDC) resource page on physical activity.

For those that are interested, an About section was included that offers more information about the study as well as a brief biography of the researcher (e.g., education and collegiate soccer playing background, current teaching and coaching involvement). Contact emails were also provided for those that may have questions or would like more information.



## CHAPTER III

### ACTION PLAN

There is significant potential for this project to contribute to addressing the problem of decreased health-related quality of life (HRQOL) and physical activity (PA) in former collegiate athletes, beginning with the women's soccer population. Identifying factors that former women's soccer players feel have played a role in their long-term health and PA will open the door to be able to develop policies and interventions that address issues like injury, recovery from injury, and returning to play post-injury.

#### **Short-Term Plans**

The first step in this action plan involves disseminating the results to stakeholders and policy makers. In addition to former soccer players, potential stakeholders include current women's soccer players, current players' parents, coaches, athletic directors, athletic trainers, and other sports medicine practitioners (e.g., team orthopedics & physical therapists). The soccer governing bodies for every level of competition would also be included. Getting information out to organizations like the National Collegiate Athletic Association (NCAA), US Soccer Federation, and the National Federation of High School Sports (NFHS) will also be important in order to make a move toward a change in policy and develop interventions to benefit the long-term health and active lifestyles of soccer athletes. These organizations already have stated missions to promote long-term athlete development models that foster quality of life and encourage a physically active lifestyle long after the completion of sports competition. However, most organizations offer few specific strategies to deal with the lasting physical consequences of sports injury. By providing this insight and information on the current perceived health of former

players, the level of awareness of the potential long-term consequences of sport injury is increased. This information is vital to current players, as well as parents of current players as it may factor into the decision-making process of how to handle sports injuries. The same is true for coaches and athletic trainers who work with athletes and play an integral role in how initial injuries are treated and how athletes are returned to play post injury. This can begin on a scholarly level, disseminating findings through presentations and/or publication in coaching and/or leadership organizations and journals, as well as sports medicine related organizations, in order to encourage continued research in this area. Reaching parents and current players can be accomplished through presentations at parent nights for local high schools and club teams, as well as by sharing the website with soccer clubs. Reaching coaches and sports medicine practitioners can be accomplished by presenting findings at coaching and leadership conferences as well as sports medicine conferences. Publishing in multidisciplinary sports medicine or athletic training journals would also help increase the level of awareness surrounding the long-term consequences of sport injury within populations that are positioned to make changes to improve these outcomes.

Establishing contacts and developing new partnerships will begin in the short-term but be crucial for long-term plans. Contacts with the entities responsible for the making of policy, like athletic directors and soccer club administrators as well as the NCAA, NFHS, and US Soccer will be imperative for future policy changes. Likewise, contacts with potential interdisciplinary team members, like physical therapists, strength and conditioning specialists, athletic trainers, and orthopedic/sports medicine physicians will be vital to developing intervention strategies.

### **Long-Term Plans**

Long-term goals are to improve life-long health and PA in former athletes and will begin by impacting the way sports injuries in soccer players are approached and managed in current players. This plan would start with establishing and working with an interprofessional team of

sports medicine professionals, sports psychology professionals, and coaches to develop strategies to mitigate the long-lasting negative consequences of sport injury. This would also likely include re-emphasis on the importance of preventing injury whenever possible through already existing injury prevention programs as well as establishing new return to play protocols for sports injury based on the evidence provided in this project.

The transition out of athletics by itself is a complex interdisciplinary issue. When a prior sports injury is added to the equation it increases the complexity. Including elements to existing athlete transition programs that address the unique challenges related to transitioning out with a history of previous injury would only strengthen the foundation these athletes would receive in their transition out of collegiate athletics. This could be accomplished through developing new exercise or strength protocols for former athletes with a history of prior injury, as well as promoting physical activity guidelines that account for prior injury and the psycho-social constraints that come with prior sports injury.

Additionally, in an effort to continue to work to improve the life-long health and PA in all former athletes I would also look to extend my scholarship on the knowledge of the health of former athletes by conducting additional exploratory studies on additional soccer player populations like different divisions and male players. Gathering the same type of data that was collected in this study with former male players and across different divisions would allow for a look across both genders and different competitive levels and see if the results vary or if it is the same consequences across all former college soccer players. Looking at the results from former athletes from additional sports grouped by sport in a cohort manner would also allow for a comparison across type of sport. Injury risk and type of prevalent injuries vary across sports and comparing across different sports would allow for a more complete view of what types of injury

may result in the highest levels of disablement and subsequent decline in HRQoL and physical activity levels in former competitive athletes.

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APPENDIX A  
SURVEY QUESTIONS

**Former Women's Soccer Player Survey**

How many years did you play NCAA Division I Soccer?

I never played

1

2

3

4

5 – Medical redshirt

5 – Other redshirt

8 – Medical hardship & redshirt

How many years removed are you from playing collegiate soccer? \_\_\_\_\_

How are you still involved in the game of soccer? (choose all that apply)

Still play competitively (college, semi-pro or pro)

Still play recreationally (coed, pick-up, indoor)

Coaching

Refereeing

Team Administrator

Other \_\_\_\_\_

Not involved anymore

Please enter the number of years you spent **playing professional** (i.e. WUSA, WPS, FA Women's Premier League, etc.) or **semi-professional soccer** (i.e. WPSL, W-League, UWSL) after college? \_\_\_\_\_

Please enter the number of years you are **removed** from playing competitive soccer (i.e. semi-pro, pro)? \_\_\_\_\_

Why did you stop playing soccer **competitively** (i.e. college, semi-pro, pro)? \_\_\_\_\_

What was your primary playing position?

Forward

Midfield

Defender

Goalkeeper

During the best season of your collegiate playing career, how would you classify the playing time you received/status on your team?

Starter/First team/played majority of the minutes

Regular sub/Second team

Rarely participated in games/Third team  
Participated in practice but did not compete in games

What is your current occupation? \_\_\_\_\_

Race/Ethnicity (Choose all that apply)

White  
Black or African American  
American Indian or Alaska Native  
Asian  
Native Hawaiian or Pacific Islander  
Hispanic or Latino  
Other

Age \_\_\_\_\_

Did you suffer one or more **minor injuries** (kept you out 0-20 days) while participating in soccer? (**at any point in your career:** before, during or after college)

Yes  
No

Did you suffer one or more **severe injuries** (kept you out 21 or more days) while participating in soccer? (**at any point in your career:** before, during or after college)

Yes  
No

Please choose the locations where you suffered a severe injury (kept you out of participation for 21 or more days).

*Choose all that apply*

Ankle  
Knee  
Hip  
Spine (Back/Neck)  
Head (Concussion)  
Soft Tissue (e.g. muscle strains/tears, compartment syndrome, etc.) \_\_\_\_\_  
Upper Body (e.g. hand, wrist, shoulder, etc.) \_\_\_\_\_  
Lower Leg (e.g. foot, tibia, fibula, etc.) \_\_\_\_\_  
Other \_\_\_\_\_

How many severe ankle injuries did you suffer at any point during your competitive career (i.e. pre-college, college, semi-pro, pro)?

1  
2  
3  
4+

Were any of your severe ankle injuries to the same ankle?

- Yes
- No

When did each of your severe ankle injuries occur during your competitive career (i.e. pre-college, college, semi-pro, pro)?

*(If you suffered fewer than 4 injuries just mark those that apply)*

Ankle Injury 1	Before College	During College	After College
Ankle Injury 2	Before College	During College	After College
Ankle Injury 3	Before College	During College	After College
Ankle Injury 4	Before College	During College	After College

During your playing career, did any of your severe ankle injuries require surgery?

- Yes
- No

During your playing career, how many surgeries were required as a result of your severe ankle injuries?

- 1
- 2
- 3
- 4+

How many severe knee injuries did you suffer at any point during your competitive career (i.e. pre-college, college, semi-pro, pro)?

- 1
- 2
- 3
- 4+

Were any of your severe knee injuries to the same ankle?

- Yes
- No

What were the knee injuries you suffered during your competitive career (i.e. pre-college, college, semi-pro, pro)?

*(Mark all that apply for each injury incident)*

Knee Injury 1	ACL	Meniscus	MCL	PCL	LCL	Patella	Other
Knee Injury 2	ACL	Meniscus	MCL	PCL	LCL	Patella	Other
Knee Injury 3	ACL	Meniscus	MCL	PCL	LCL	Patella	Other
Knee Injury 4	ACL	Meniscus	MCL	PCL	LCL	Patella	Other

When did your severe knee injuries occur during your competitive career (i.e. pre-college, college, semi-pro, pro)?

*(If you suffered fewer than 4 injuries just mark those that apply)*

Knee Injury 1	Before College	During College	After College
Knee Injury 2	Before College	During College	After College
Knee Injury 3	Before College	During College	After College
Knee Injury 4	Before College	During College	After College

During your playing career, did any of your severe knee injuries require surgery?

Yes

No

During your playing career, how many surgeries were required as a result of your severe knee injuries?

1

2

3

4+

This section asks for your view about your knee. Answer every question by checking the appropriate box. If you are unsure how to answer a question, please give the best answer you can.

The following question concerns the amount of joint stiffness you have experienced during the **last week** in your knee. Stiffness is a sensation of restriction or slowness in the ease with which you move your knee joint.

How severe is your knee stiffness after first waking in the morning?

None

Mild

Moderate

Severe

Extreme

What amount of knee pain have you experienced in the **last week** during the following activities?

Twisting/pivoting on your knee    None        Mild        Moderate        Severe        Extreme

Straightening knee fully        None        Mild        Moderate        Severe        Extreme

Going up or down stairs        None        Mild        Moderate        Severe        Extreme

Standing upright        None        Mild        Moderate        Severe        Extreme

The following questions concern your physical function. This means your ability to move around. For each of the following activities please indicate the degree of difficulty you have experienced in the **last week** due to your knee.

Rise from sitting    None            Mild            Moderate            Severe            Extreme

Bending to floor/pick up an object    None            Mild            Moderate            Severe            Extreme

How many severe head/concussion injuries did you suffer at any point during your competitive career (i.e. pre-college, college, semi-pro, pro)?

- 1
- 2
- 3
- 4+

When did your severe head/concussion injuries occur during your competitive career (i.e. pre-college, college, semi-pro, pro)?

*(If you suffered fewer than 4 injuries just mark those that apply)*

Head Injury 1	Before College	During College	After College
Head Injury 2	Before College	During College	After College
Head Injury 3	Before College	During College	After College
Head Injury 4	Before College	During College	After College

How many severe hip injuries did you suffer at any point during your competitive career (i.e. pre-college, college, semi-pro, pro)?

- 1
- 2
- 3
- 4+

Were any of your severe hip injuries to the same hip?

- Yes
- No

When did your severe hip injuries occur during your competitive career (i.e. pre-college, college, semi-pro, pro)?

*(If you suffered fewer than 4 injuries just mark those that apply)*

Hip Injury 1	Before College	During College	After College
Hip Injury 2	Before College	During College	After College
Hip Injury 3	Before College	During College	After College
Hip Injury 4	Before College	During College	After College

During your playing career, did any of your severe hip injuries require surgery?

Yes

No

During your playing career, how many surgeries were required as a result of your severe hip injuries?

1

2

3

4+

How many severe spine (back/neck) injuries did you suffer at any point during your competitive career (i.e. pre-college, college, semi-pro, pro)?

1

2

3

4+

When did your severe spine (back/neck) injuries occur during your competitive career (i.e. pre-college, college, semi-pro, pro)?

*(If you suffered fewer than 4 injuries just mark those that apply)*

Spine Injury 1	Before College	During College	After College
Spine Injury 2	Before College	During College	After College
Spine Injury 3	Before College	During College	After College
Spine Injury 4	Before College	During College	After College

During your playing career, did any of your severe spine (back/neck) injuries require surgery?

1

2

3

4+

During your playing career, how many surgeries were required as a result of your severe spine (back/neck) injuries?

1

2

3

4+

How many severe soft tissue injuries (e.g. muscle strains/tears, compartment syndrome, etc.) did you suffer at any point during your competitive career (i.e. pre-college, college, semi-pro, pro)?

- 1
- 2
- 3
- 4+

When did your soft tissue injuries occur during your competitive career (i.e. pre-college, college, semi-pro, pro)?

*(If you suffered fewer than 4 injuries just mark those that apply)*

ST Injury 1	Before College	During College	After College
ST Injury 2	Before College	During College	After College
ST Injury 3	Before College	During College	After College
ST Injury 4	Before College	During College	After College

During your playing career, did any of your severe soft tissue injuries require surgery?

- Yes
- No

During your playing career, how many surgeries were required as a result of your severe soft tissue injuries?

- 1
- 2
- 3
- 4+

How many severe upper body injuries (e.g. hand, wrist, shoulder, etc.) did you suffer at any point during your competitive career (i.e. pre-college, college, semi-pro, pro)?

- 1
- 2
- 3
- 4+

When did your upper body injuries occur during your competitive career (i.e. pre-college, college, semi-pro, pro)?

*(If you suffered fewer than 4 injuries just mark those that apply)*

UB Injury 1	Before College	During College	After College
UB Injury 2	Before College	During College	After College
UB Injury 3	Before College	During College	After College
UB Injury 4	Before College	During College	After College

During your playing career, did any of your severe upper body injuries require surgery?

- Yes
- No

During your playing career, how many surgeries were required as a result of your severe upper body injuries?

- 1
- 2
- 3
- 4+

How many severe lower leg injuries (e.g. foot, tibia, fibula, etc.) did you suffer at any point during your competitive career (i.e. pre-college, college, semi-pro, pro)?

- 1
- 2
- 3
- 4+

When did your lower leg injuries (e.g. foot, tibia, fibula, etc.) occur during your competitive career (i.e. pre-college, college, semi-pro, pro)?

*(If you suffered fewer than 4 injuries just mark those that apply)*

LL Injury 1	Before College	During College	After College
LL Injury 2	Before College	During College	After College
LL Injury 3	Before College	During College	After College
LL Injury 4	Before College	During College	After College

During your playing career, did any of your severe lower leg injuries (e.g. foot, tibia, fibula, etc.) require surgery?

- Yes
- No

During your playing career, how many surgeries were required as a result of your severe lower leg injuries (e.g. foot, tibia, fibula, etc.)?

- 1
- 2
- 3
- 4+

During your playing career, did any of your other severe injuries require surgery?

- Yes
- No

During your playing career, how many surgeries were required as a result of your other severe injuries?

- 1
- 2
- 3
- 4+



Following your severe injury/injuries were you able to return to your pre-injury level of play?  
(Please explain if needed)

Yes

No

N/A (I didn't suffer any injuries)

Have you had any additional surgeries in the years following your soccer career that have been related to your soccer career or injuries suffered while playing?

Yes

No

Please describe/explain your additional surgeries

Did you ever suffer one or more severe injuries (kept you out 21 or more days) while participating in another sport other than soccer or due to an accident or due to any other reason or event? \_\_\_\_\_

The following questions will ask about your views of your health. Answer each question by checking the appropriate box. If you are unsure how to answer a question, please give the best answer you can.

In general, would you say your health is:

Excellent

Very good

Good

Fair

Poor

In general, would you say your quality of life is:

Excellent

Very good

Good

Fair

Poor

In general, how would you rate your physical health?

Excellent

Very good

Good

Fair

Poor

In general, how would you rate your mental health, including your mood and your ability to think?

- Excellent
- Very good
- Good
- Fair
- Poor

In general, how would you rate your satisfaction with your social activities and relationships?

- Excellent
- Very good
- Good
- Fair
- Poor

In general, please rate how well you carry out your usual social activities and roles. (This includes activities at home, at work and in your community, and responsibilities as a parent, spouse, employee, friend, etc)

- Excellent
- Very good
- Good
- Fair
- Poor

To what extent are you able to carry out your everyday physical activities such as walking, climbing stairs, carrying groceries, or moving a chair?

- Completely
- Mostly
- Moderately
- A little
- Not at all

In the past 7 days . . .

How often have you been bothered by emotional problems such as feeling anxious, depressed or irritable?

- Never
- Rarely
- Sometimes
- Often
- Always

How would you rate your fatigue on average?

- None
- Mild
- Moderate
- Severe
- Very Severe

How would you rate your pain on average?

1-10

During the **typical week** (7 days) how many times on the average do you do the following kinds of exercise for **more than 15 minutes** during your free time?

STRENUOUS EXERCISE (HEART BEATS RAPIDLY) e.g. running, soccer, basketball, cross country skiing, vigorous biking, vigorous swimming \_\_\_\_\_

MODERATE EXERCISE (NOT EXHAUSTING) e.g. fast walking, tennis, easy biking, easy swimming, volleyball, badminton \_\_\_\_\_

MILD EXERCISE (MINIMAL EFFORT) e.g. yoga, archery, bowling, golf, easy walking, horseshoes \_\_\_\_\_

Please list the types of physical activities you participate in regularly. \_\_\_\_\_

During a **typical week** (7 days), in your leisure time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)?

Often

Sometimes

Never/Rarely

Are you currently suffering any illness or injuries that limit your ability to participate in physical activity?

Yes

No

Please explain your current limitations.

How often does your previous injuries suffered while participating in soccer **hinder or prevent** you from participating in any recreational activities, sports or physical activity?

Almost Always

Often

Rarely

Never

N/A (I didn't suffer any injuries)

Please choose the statement that most closely describes your problem(s) within the past 24 hours.

Do I have **pain**?

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Do I have **impaired motion**?

Ex: Decreased range/ease of motion, flexibility, and/or increased stiffness

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Do I have impaired **muscle function**?

Ex: Decreased strength, power, endurance, and/or fatigue

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Do I have impaired **stability**?

Ex: The injured area feels loose, gives out, or gives way

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Do I have difficulty with **changing directions** in activity?

Ex: Twisting, turning, starting/stopping, cutting, pivoting

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Do I have difficulty with **daily actions** that I would normally do?

Ex: walking, squatting, getting up, lifting, carrying, bending over, reaching, and going up/down stairs

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Do I have difficulty **maintaining the same position** for a long period of time?

Ex: standing, sitting, keeping arm overhead, or sleeping

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Do I have difficulties with **performing skills** that are required for physical activity?

Ex: running, jumping, precision & balance.

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Do I have difficulties with **performing skills** that are required for physical activity?

Ex: coordination, agility, precision & balance

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Do I have difficulty maintaining my **fitness** level?

Ex: conditioning, weight-lifting & cardiovascular endurance

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Do I have difficulty with **participating in activities**?

Ex: Participation in leisure activities, hobbies & games

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Do I have difficulty with **participating in activities**?

Ex: participating in my sport(s) of preference

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Increased uncertainty, stress, pressure, and/or anxiety?

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Altered relationships with team, friends, and/or colleagues?

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Decreased overall energy

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Changes in my mood and/or increased frustration?

No Problem

I have the problem(s), but it **does not affect** me

The problem(s) **slightly affects** me

The problem(s) **moderately affects** me

The problem(s) **severely affects** me

Do you have any concerns regarding the following bodily systems? (Choose all that apply)

Cardiovascular Health

Joint Health

Mental Health

Skin Health

Other \_\_\_\_\_

N/A- No Concerns

Have you ever been diagnosed with osteoarthritis (OA) by a healthcare provider?

Yes

No

Where were you diagnosed with osteoarthritis (OA)?

*Choose all that apply.*

Ankle

Knee

Hip

Spine (Back/Neck)

Other \_\_\_\_\_

How much do you feel your injury experience affects your current health and quality of life?

A great deal

A lot

A moderate amount

A little

Not at all

N/A (I didn't suffer any injuries)

If you look back, is there anything you wish had been done differently in dealing with your soccer injury/injuries? (If applicable) \_\_\_\_\_

How has your experience playing collegiate soccer positively impacted your physical activity and health? Please explain. \_\_\_\_\_

How has your experience playing collegiate soccer negatively impacted your physical activity and health? Please explain. \_\_\_\_\_

Please provide any other thoughts you'd like to share on your experiences playing competitive soccer. \_\_\_\_\_

APPENDIX B

OUTCOME MEASURES BY INJURY LOCATION

Outcome Measure Scores by Injury Location							
	MVPA <i>M (SD)</i>	PROMIS- PS <sub>Raw Score</sub> <i>M (SD)</i>	PROMIS- MS <sub>Raw Score</sub> <i>M (SD)</i>	PROMIS- PS <sub>T-Score</sub> <i>M (SD)</i>	PROMIS- MS <sub>T-Score</sub> <i>M (SD)</i>	DPA- PS <i>M (SD)</i>	DPA- MS <i>M (SD)</i>
Knee	36.97 (21.98)	16.23 (1.98)	16.07 (2.67)	52.04 (6.23)	54.12 (7.37)	15.20 (12.06)	2.89 (3.47)
Ankle	39.47 (22.74)	16.31 (2.09)	16.03 (2.49)	52.40 (6.78)	53.99 (6.96)	15.14 (11.54)	2.96 (3.21)
Hip	40.12 (19.14)	16.05 (2.66)	15.74 (2.68)	51.89 (8.49)	53.02 (6.96)	18.05 (13.89)	2.83 (2.92)
Head	39.66 (21.86)	15.77 (2.47)	15.18 (2.76)	50.86 (7.79)	51.68 (7.38)	17.84 (12.09)	3.72 (3.97)
Spine	32.14 (22.01)	15.05 (2.77)	15.59 (3.80)	48.76 (8.61)	53.41 (10.52)	20.27 (13.95)	4.18 (4.17)
LL	34.82 (22.03)	16.74 (1.98)	15.38 (2.88)	53.86 (6.70)	53.49 (7.76)	14.30 (12.39)	3.64 (3.56)
UB	38.29 (21.76)	16.37 (1.85)	16.07 (2.63)	52.53 (6.31)	54.16 (7.37)	13.17 (11.62)	3.14 (3.38)
ST	37.17 (21.03)	16.07 (2.07)	15.59 (2.86)	51.53 (6.49)	52.74 (7.54)	16.29 (11.50)	3.23 (3.23)
Severe Injury				52.91 (6.54)	54.17 (7.35)		
No Injury				54.82 (6.37)	54.69 (7.89)		

Note: PROMIS Scores are in both Raw Score and T-Score format  
 LL = Lower Leg. UB = Upper Body. ST = Soft Tissue. MVPA = Moderate-to-vigorous physical activity. PS = Physical Score. MS = Mental Score.



APPENDIX C

CURRENT HEALTH CONCERNS

Current Health Concerns	Joint Health	Skin Health	Mental Health	CV Health	Other	No Concerns
% with concerns	39%	13.9%	18.1%	6.8%	6.8%	39.5%

Note: CV = cardiovascular. Other included anxiety, headaches, cancer, hormone disorders, gastrointestinal disorders.

## APPENDIX D

### WEBSITE

The screenshot shows the top portion of a website. At the top, there is a navigation menu with links: HOME, D1 STUDY, D2 STUDY, TAKE AWAYS/RECOMMENDATIONS, RESOURCES, and ABOUT RESEARCHER. Below the navigation is a large heading: **FORMER WOMEN'S SOCCER PLAYER STUDY**. Underneath the heading is a paragraph of text: "In 2019, former NCAA women's soccer players were contacted in an effort to determine their current health and the role previous injury played in their current health. The results of that study are compiled here." Below this paragraph is a smaller line of text: "(Scroll Down for more information)". At the bottom left of the main content area, there is a blue box with the text "POWERED BY weebly". The background of the main content area features a sunset over a soccer field.



### Purpose of the Study

Previous research has shown that former collegiate athletes are suffering from a decline in health outcomes following their competitive athletic careers. These outcomes include a decrease in physical activity (PA) participation, decreased Health Related Quality of Life (HRQOL), and increased disablement. Prior sports related injury has been identified as a potential factor in these declining health outcomes.

Women's soccer is one of the most popular sports in the US for females, and also has some of the highest injury rates. However, most previous research on former athletes has been on diverse cohorts of athletes and most soccer specific research has been on the professional male population.

The purpose of this study was to assess the current perceived health of former Division I collegiate women's soccer players, and specifically to examine the role prior sports injury plays in the health and physical activity behaviors of these former athletes.

*(The results from a pilot study with former Division 2 players are also included).*

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## Health Outcome Measures

### Health Related Quality of Life (HRQoL)

Health related quality of life (HRQoL) is a uniquely personal measure of health that accounts for physical, mental and social components.

### DISABLEMENT

Disablement is characterized by the inability to perform physical activities or social responsibilities that are of importance to the individual due to a health or physical problem. The disablement process describes the interrelated factors that result in disability, including how the functioning of the body systems are affected and the resulting physical and mental consequences.

### PHYSICAL ACTIVITY (PA)

Physical activity (PA) is an important component to physical and mental health. Additionally, HRQoL has been found to be highly connected to PA, as HRQoL is enhanced by PA.

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### Division 1 Study Results

## INJURY DATA

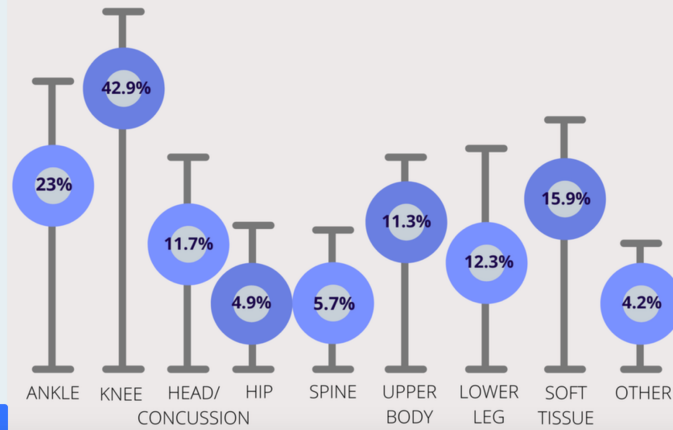
### FREQUENCY OF REPORTED SEVERE INJURY

- Knee and Ankle injuries were the most common reported injuries among the former women's soccer players
  - 42.9% of the sample had at least 1 severe knee injury
  - 23% of the sample had at least 1 severe ankle injury
- Most of the knee injuries (78%) resulted in surgery

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### Frequency of Severe Injury by Location

### Frequency of Severe Injury by Location



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### FREQUENCY OF REPEATED INJURY

- Many of the former players reported suffering repeated injuries to the same body part over the course of their careers
- Notably:
  - 35 former players suffered 4 or more ankle injuries (39.8% of all that reported ankle injuries)
  - 21 former players suffered 4 or more knee injuries (12.8% of all that reported knee injuries)
  - 14 former players suffered 4 or more head/concussion injuries (31.1% of all that reported head injuries)
  - The majority of those that suffered 2+ joint injuries (ankle, knee, hip) involved the same side limb
    - 75% of Ankle
    - 71% of Knee
    - 80% of Hip

# of injuries over career	Ankle n = 88	Knee n = 164	Hip n = 19	Head n = 45	Spine n = 22	Upper Body n = 44	Lower Leg n = 44	Soft Tissue n = 61
1	18	87	14	9	14	27	20	23
2	22	39	4	9	7	8	14	15
3	13	17	---	13	1	4	3	7
4	35	21	1	14	---	5	1	16

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## HEALTH OUTCOMES

The perceived health of the former women's soccer players was determined through 3 main outcome measures:

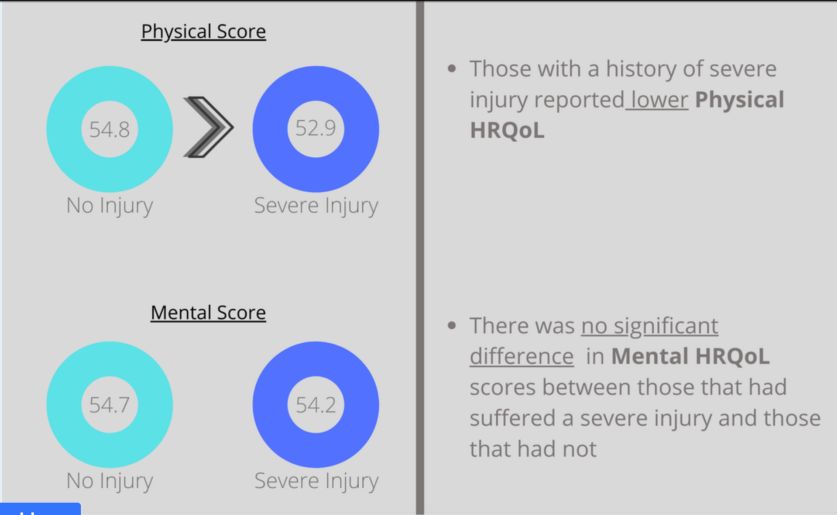
- Health Related Quality of Life (HRQoL)
- Disablement
- Physical Activity (PA)

### HRQoL: Health Related Quality of Life

Health related quality of life (HRQOL) is a uniquely personal measure of health that accounts for physical, mental and social components.

- Mental HRQoL includes: mood, emotions, ability/desire to engage socially
- Physical HRQoL includes: pain, fatigue, ability to perform daily physical activities

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Note: Higher HRQoL scores equate to higher levels of perceived health and lower HRQoL scores equate to lower levels of perceived health.

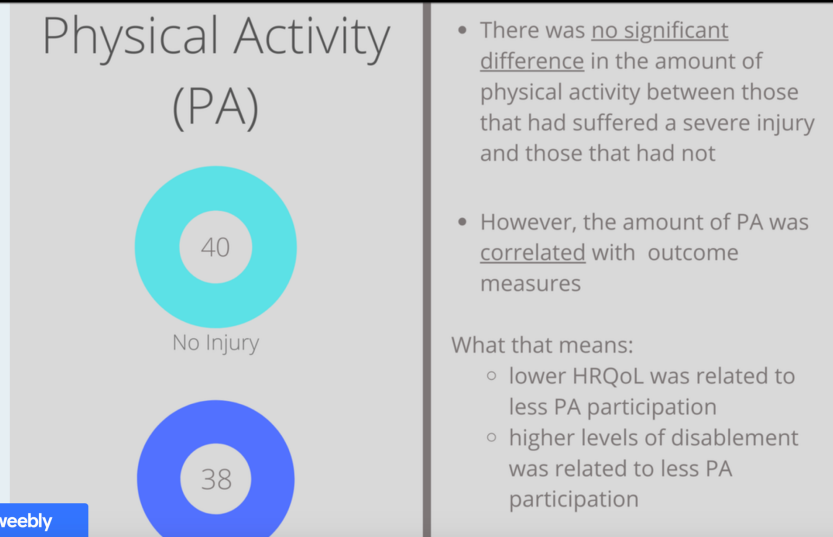
\*\* 50 is the general population norm score, so while the severe injured group was lower than non-injured for physical HRQoL scores they were still above the general population. Both groups were above the general population in mental HRQoL scores.

Disablement is characterized by the inability to perform physical activities or social responsibilities that are of importance to the individual due to a health or physical problem.



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Note: Lower levels of disablement equate to higher levels of functioning and higher levels of disablement to lower level of functioning.



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Note: Physical activity (PA) was presented in MET units which was a calculation made off of the participants reported weekly frequency of moderate-to-vigorous PA (MVPA) (e.g. running, biking, vigorous walking). The higher the number the better, but greater than 24 units of PA have been identified as what is necessary for health benefits.

Example 1: Light Biking is equal to about 5 METs, therefore biking 4 times a week for 15 minutes or more would equal 20 MET units of MVPA for that week.  
 Example 2: Running is about 9 METs, therefore running 3 times a week for 15 minutes or more would equal 27 MET units of MVPA for that week.

\*\* In this study, the non-injured did report slightly more weekly PA (40 MET units) than the severe injury group (38 MET units), it was just not found to be statistically significantly different which is why it was reported as no difference between groups.

## Division 1 Study Results

# HEAR FROM THE FORMER ATHLETES

Participants were asked **4 open-ended questions** to get a better idea of their personal experience playing college soccer and their injury experience if applicable.

The responses were grouped into common answers and reported as frequencies. The responses to the 4 questions can be found below.



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## Looking Back what would you change?

Participants were asked:

*If you look back, is there anything you wish had been done differently in dealing with your soccer injury/injuries? (if applicable)*

Here's what they said:

- Taken more time to heal/recover/ not be rushed back (26.2%)
- Rehabilitation Related (e.g. done more, better treatment, taken more seriously) (25%)
- Looked at different treatment options (17.1%)
- Done more Prehab/Strength Training (10.4%)
- Taken injury more seriously/Acted sooner (9.8%)
- Participated in less of an activity (e.g. heading, running) (6.1%)
- Be more proactive medically/Advocate for self (6.1%)
- Be more proactive in preparation & recovery (e.g. stretching, ice baths) (6.1%)
- Received mental/emotional support for injury (3.7%)
- Rehabilitation Related (e.g. ate better, received nutritional guidance) (3.7%)

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## What were the Positives?

Participants were asked:

*How has your experience playing collegiate soccer positively impacted your physical activity and health?*

Here's what they said:

- Desire to be Active/Stay Active (34.8%)
- Taught Healthy Habits/Desire to be Healthy (25.8%)
- Taught Competitiveness/Ability to Push Self (16.8%)
- Taught how to Exercise/Coach (12.6%)
- Instilled Work Ethic/Discipline/Dedication (10.3%)
- Developed Toughness (Mental & Physical) (10.3%)
- Relationships/Teamwork (9.4%)
- Other (Life Lessons, Professional Impact, Manage Physical Recovery) (9.0%)
- Realized PA Benefits Mental Health (5.8%)
- Body Awareness (4.5%)

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## What were the Negatives?

Participants were asked:

*How has your experience playing collegiate soccer negatively impacted your physical activity and health?*

Here's what they said:

- Physical Impairments (Pain, Stiffness, Worn Down) (39.8%)
- Limited in Physical Activity (PA) or Forced to Make Adjustments to PA (24.7%)
- Negative Mental Health Impact (9.3%)
- Fear of Health Issues in Future (6.5%)
- Issues with Physical Activity (4.3%)
- Struggled to Adjust to Life/PA After College (2.9%)
- Regrets from College (1.8%)
- Fear of Injury/Pain (2.2%)
- Body Image/Food Issues (2.2%)
- Consequences to Concussion/Headaches (1.8%)

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## Any Other Thoughts?

Participants were asked:

*Please provide any other thoughts you'd like to share on your experiences playing competitive soccer.*

Here's what they said:

- **No Regrets/Loved it/Wouldn't change for the world (62.8%)**
  - 'Wouldn't change a thing'
  - 'I wouldn't trade it for the world. I had a great time and met THE best people!'
  - 'I wish it could have lasted longer!'
- **Great Experience, but . . . (20.9%)**
  - 'It was an amazing experience but I wish I could do more with my kids and not be in pain everyday.'
  - 'It was a great experience with amazing friendships, though tough on my body physically.'
- **General Advice (0.06%)**
  - 'We need more women involved in coaching and who value the importance of balance on a college athlete'
  - 'Emotional part of the game is just as impactful as the physical. Coaching staff can also have an incredible impact on a player's experience (positive or negative).'
- **Warning or specific concerns (0.05%)**
  - 'Demanding on the body and mind.'

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## Key Take Aways/Recommendations

### TAKE-AWAYS

- Women's soccer players do suffer high rates of injury
  - Knee and Ankle injuries are the most prevalent
  - Spinal injuries (while occurring at much lower rates) might be the most debilitating
- Those with a history of injury reported higher disablement & lower health related quality of life
- Those with higher disablement reported lower amounts of physical activity
- Lower physical activity is associated with lower health related quality of life
- While those that suffered prior sport injury DID SHOW DEFICITS in perceived health outcomes:
  - the sample was still on average ABOVE the general population in health related quality of life
  - AND still reported enough physical activity considered for health benefits
- There might be a connection between concussions and lower mental health related quality of life
- Joint Health and Mental Health are the systems most former players have concerns about
- Without being explicitly asked: 83.7% of respondents stated they loved their experience and/or have no regrets regarding their collegiate soccer experience and would do it again

## RECOMMENDATIONS

- **What can we do to prevent injuries?**
  - Avoid overtraining and specialization
  - Proper strength training and prehab programs should be emphasized
  - Injury prevention programs (IPP) should be implemented at all levels
    - IPPs work! Rates of injuries decline when a IPP is implemented and maintained
    - Players, parents, coaches should be educated on potential long-term consequences of injury
- **When injuries do occur:**
  - Emphasis should be placed on a high quality rehabilitation program (under the supervision of a sports medicine professional)
  - Take proper time to recover and rehabilitate
- Don't be afraid to seek a second opinion
- Take head injuries seriously
- Don't be afraid to seek out support for the psychological impact of injury
- **When deciding when to return to play:**
  - Players, parents & coaches need to be educated on the potential long-term consequences of returning too early
  - Decisions should include insight from athlete and sports medicine professionals on readiness both physically and mentally
  - Players should not feel rushed to return
- **When planning for a lifetime after soccer:**
  - Stay active - it will benefit you mentally and physically
  - You may need to modify activity in order to maintain activity level
  - Understand if you suffered an injury it may impact you long-term. Seek out a physical therapist and/or other sports medicine professional that can assist you

# Helpful Resources

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## INJURY PREVENTION PROGRAMS

FIFA 11+

[https://www.kort.com/uploadedFiles/KORT/Content/Services/Sports\\_Medicine/Concussion\\_Management/FIFA-the-11-Booklet.pdf](https://www.kort.com/uploadedFiles/KORT/Content/Services/Sports_Medicine/Concussion_Management/FIFA-the-11-Booklet.pdf)

Santa Monica Orthopaedic and Sports Medicine Research Foundation

<https://www.aclstudygroup.com/pdf/pep-program.pdf>

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## INJURY RESOURCES

Helping Students Report Injuries - National Federation of State High School Associations (NFHS)

<https://www.nfhs.org/articles/helping-students-report-injuries-without-fear-of-looking-weak/>

Concussion Safety Protocol Resources - NCAA

<http://www.ncaa.org/sport-science-institute/concussion-educational-resources>

At Your Own Risk - National Athletic Trainers Association (NATA)

*The mission of At Your Own Risk is to educate, provide resources and equip the public to act and advocate for safety in work, life and sport.*

<https://www.atyourownrisk.org>

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## SPORTS SCIENCE RESOURCES

NCAA Sports Science Institute

<http://www.ncaa.org/sport-science-institute>

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## LIFETIME PHYSICALLY ACTIVE RESOURCES

Moving On! - The Moving On! program is designed to help student-athletes make healthy transitions to life after college sports.

<https://athletesmovingon.org>

Choose PT- Physical Therapy Resources from the American Physical Therapy Association

<https://www.choosept.com/Default.aspx>

Physical Activity Basics - CDC

<https://www.cdc.gov/physicalactivity/basics/index.htm>

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