THE INFLUENCE OF BIOLOGICAL SEX, ATHLETIC IDENTITY & PRESSURE ON COLLEGIATE ATHLETE'S ATTITUDES & BEHAVIORS TOWARD PLAYING THROUGH PAIN & INJURY

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ABSTRACT

THE INFLUENCE OF BIOLOGICAL SEX, ATHLETIC IDENTITY & PRESSURE ON COLLEGIATE ATHLETE'S ATTITUDES AND BEHAVIORS TOWARD PLAYING THROUGH PAIN AND INJURY

Margaret Anne Willis

Injuries are to be expected when participating in all levels of collegiate sports (e.g., recreation, elite, club, intermural). It is common among collegiate athletes to continue practicing or competing despite being in pain/injured. This willingness to play hurt can cause negative consequences for athlete's future health. The purpose of this study was to examine the influence of biological sex, athletic identity and pressure on collegiate athlete's attitudes and behaviors toward playing through pain and injury. Student-athletes involved in NCAA (National Collegiate Athletic Association) Division II sports completed two questionnaires and one measurement scale: demographic questionnaire, Risk, Pain and Injury Questionnaire and the Athletic Identity Measurement Scale. The results of this study indicated that student-athletes' perceived pressure from coaches, but not biological sex or athletic identity had a significant influence on collegiate athlete's attitudes and behaviors toward playing through pain and injury. Future research should also continue to examine the influence of gender on playing through pain and injury, as there is still conflicting evidence; as seen with our studies' results. By analyzing the 'why' to an athlete accepting the cost of playing through pain and injury improvements to the life of future student-athletes may be made.

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INTRODUCTION

Injuries are common when participating in all levels of collegiate sports (e.g., recreation, elite, club, intermural). In fact, Kerr et al., (2015) estimated a total of 1 million collegiate injuries occurred in the United States between 2009-2014. Injuries can be classified as acute (e.g., ankle sprain), chronic (e.g., shin splints) or season-ending (e.g., ACL tear) (Weinberg et at., 2013; Deroche et al., 2011; Madrigal et al., 2015). It is also common among collegiate athletes to continue to practice or compete despite being in pain or injured. Reasons for continued participation include hiding pain from medical staff, pressure from teammates or coaches, sport culture/stigma, and passion for the sport (Bone & Fry, 2006; Mayer et al., 2018; Nixon, 1993; Deroche et al., 2011; Newman & Weiss, 2018; S. et. al., 2019, Weinberg, 2013). This willingness to play hurt can lead to negative consequences for athlete's future health. Whether it leads to career ending injuries or chronic symptoms that can last a lifetime, understanding why athletes accept the risk and costs of playing through pain and injury could help coaches and medical staff minimize playing with injuries, and support healthier lifestyles after sports (Nixon, 1993; Nixon, 1994; Nixon, 1996).

Purpose/Hypothesis

The purpose of this study is to examine the influence of biological sex, athletic identity and pressure on NCAA Division II collegiate athlete's attitudes and behaviors toward playing through pain and injury. It was hypothesized that male student-athletes

would report higher levels of athletic identity and would exhibit more positive attitudes toward playing through pain and injury than female student-athletes. It was also hypothesized that student-athletes who report feeling pressured by coaches to play through pain and injury would have more positive attitudes toward playing through pain and injury.

Vocabulary Definition

It is important, when examining participants' attitudes and behavior towards playing through pain and injury, to define for the participants exactly what playing through injury means. Eccleston & Crombez (1999) definition of pain was, "that which is unpleasant, gets people's attention, alerts them to a threat of their own wellbeing and motivates them to escape." Based on this, the current study's definition of playing through injury was be defined as participating while still feeling pain so that the pain/injury requires some sort of mental attention during participation, the pain/injury involves change or loss in function affecting athletics performance, and a decision was necessary as to whether to continue participation while experiencing pain/injury. These definitions were given to all participants in the study to provide consistency across the board in understanding the term 'playing through injury'.

Specific Aims

1. Analyze the effects of student-athlete biological sex on attitudes and behaviors toward playing through pain and injury.

2. Analyze the effects of athletic identity on student-athlete's attitudes and behaviors toward playing through pain and injury through Athletic Identity Measurement Scale (AIM).
3. Analyze the effects of pressure on student-athlete's attitudes and behaviors toward playing through pain and injury.

Limitations & Assumptions

- It was assumed student-athletes will answer all questionnaires.
- It was assumed student-athletes will answer questionnaires honestly.
- It was assumed student-athletes who participate in the study have played while injured.
- Limitations of this study include the self-reporting questionnaires data collection, and there no limit on the amount of time between when a student-athlete has played injured during their college career and when they participate in the study.

Delimitations

- Only student-athletes who have played while injured during their college career will be included in the study, thus the results will not apply to student-athletes who have not played while injured.
- Only collegiate student-athletes will be participating in the study, thus generalization to other non-collegiate student-athlete populations will not apply.

LITERATURE REVIEW

One of the most widely known reasons athletes push through pain or injury during training and games is sport ethic (Madrigal et al., 2015; Nixon, 1994). According to Hughes & Coakley (1991), sport ethic is the idea that injury during sports is an inherent risk that athletes should be willing to play through. Athletes commonly report being told they need to be willing to make sacrifices, that pain and injury are normal, and that they need to 'shake it off', and 'suck it up' in regard to feeling pain (Madrigal, 2015). In a content analysis of *Sports Illustrated* articles, Nixon (1996), found that respected sports figures, journalist, coaches, and commentators recurrently glorified athletes who endured pain, and continued playing despite injuries and marked athletes as courageous for returning after a serious injury. These types of messages spread by the media can incite athletes to use the excuse of sport ethic to rationalize playing hurt. Similarly, Malcom (2006) revealed that softball coaches and referees reinforced sport ethic when they ignored athletes' complaints of pain, made jokes about injuries, or believed that those who play through injury deserved the most respect. However, when athletes become devoted to sport ethic, they may not understand the distinction between pain of body soreness, and a serious pain that could signal the onset of an injury.

In addition to physiological factors, there are also social factors that impact an athlete's response to pain and injury. Social support is a common indicator that can influence an athlete's decision to play through pain and injury (Robbins, 2001; Yang et al., 2010). Social support can come from friends, family, coaches, teammates, partners, sport-

psychologists, athletic trainers and others. Within their social network, athletes are usually seeking guidance, understanding, reassurance, and direction to help them decide how to deal with pain or injuries. Nixon (1994) found that the willingness of an athlete to play hurt depended upon the sympathetic or caring attitudes coaches, teammates and athletic trainers had toward pain and injuries. Athletes were less likely to play through pain and injuries when coaches and teammates were more sympathetic than an athletic trainer. While athletes who felt that their coaches pressured them to play while hurt, and their athletic trainers were more supportive, were more likely to play through pain and injury. Yang et al., (2010) also investigated the role of social support for athletes before and after an injury and documented that athletes were more likely to play hurt if they received less support from coaches and athletic trainers before an injury and were less likely to play hurt if they received more support before an injury. A similar study focused on athlete's perception of social support from their athletic trainers and discovered that severity of injury also had an influence on willingness to play hurt (Bone & Fry, 2006). Athletes who perceived their injuries to be minor, and had less support from the athletic trainers, were more willing to play hurt, compared to athletes who perceive their injuries to be severe, and received more support from athletic trainers. When athletes disregard their injuries, whether minor or severe, and are unwilling to seek treatment or support from medical personnel, they are at a greater risk of developing serious injuries which increases the possibility of long-term disabilities (Nixon, 1994).

Coaches impact a variety of aspects of sport including the team's atmosphere, athlete's motivational level, attitudes and beliefs of injuries, and the athlete's overall

wellbeing (Nixon, 1994: Williams et al., 2017;). A study was conducted on a NCAA Division I women soccer team, examining the effect of positive and negative coach-athlete interactions on the athlete's wellbeing (Williams et al., 2017). Positive interactions led the athletes to feel valued, be confident in their skills, increased communication about injuries, and created a more supportive environment. However, athletes who had negative interactions with coaches felt they were not good enough, had to continue to play through injury, and became more stressed over the course of the season (Williams et al., 2017). Nixon (1994) investigated coaches' view of risk, pain and injury in sport and found mixed results. Fifty percent of coaches believed that athletes should push themselves to the limit while 50% believed that athletes could depend on them and medical personnel to care for and protect them when injured. However, while two-thirds of the coaches reported that they did not want an athlete to play hurt and knew the consequences if they did; they would also play an injured athlete when they felt it necessary (Nixon, 1994). Vergeer & Lyle (2009) explored coaches' level of experience and its relationship to their decision making. The results indicated that the more experience a coach had in a particular sport, the more likely they are to play an injured athlete. Coaches may be caring and want to protect their athletes; however, it is evident how much of an influence their expectations and encouragement has on athletes to take dangerous risks with their bodies (Nixon, 1994).

Biological sex of the athlete is another factor that can provide an understanding of differences in attitudes and experiences concerning pain and injury in sport. Nixon (1996) found some differences in the degree to which male and female athletes are willing to play hurt. Results revealed that female athletes exhibit lower levels of tolerance for playing

through pain compared to their male counterparts. Indicating that male athletes may have a greater desire to prove their physical ability to take risks in sports; 'marking their manhood'. Another difference found between male and female athlete' willingness to play hurt was the concern for their future health after sports. Malcom (2006) found that when women's softball players first enter the sport, they had no intention of playing through pain, however, throughout the season were observed athletes minimizing injuries, teasing those who demonstrated pain and continued to play despite being hurt. Granito (2002) surveyed NCAA Division 1 collegiate athletes about their experiences with athletic injuries, results showed that while 43% of female athlete took their future health into consideration when deciding to play hurt, only 0.6% of male athletes commented on the effect injuries could have on their future. While males tend to think about the here and now in many aspects of life (e.g. health), women generally look beyond and are aware of the consequences of their actions. However, other research suggests that female athletes are adopting similar values to that of male athletes when it comes to playing hurt (Madrigal, 2015; Malcom, 2006; Nixon 1996). This was demonstrated in Young's (1997) study who interviewed female athletes involved in wrestling, rugby and hockey and found that many of the women described the closing of the gap between male and female athletes in terms of culture around pain and injury. The female athletes were just as likely to mock teammates who showed pain, were willing to sacrifice their bodies and play hurt, and even encouraged others to embrace the risk of injury similar to that of most male athletes.

Much of recent research on pain and injuries in sport suggest that athlete's decision to play despite an injury is driven by the desire to maintain their sense of athletic identity

(Malcom, 2006; Nixon, 1993;). Athletes who demonstrate high levels of athletic identity express themselves in terms of their athletic status and place importance on their failure or success in the athletic domain (Weinberg et al., 2013). Madrigal et al., (2015) interviewed male and female rugby players in the USA Rugby National College tournament, to understand their mentality regarding playing through pain and injury. During interviews, athletes expressed that their overall love of the game, and the desire to be on the field prompted willingness to play regardless of their physical condition. A similar study conducted by Weinberg et al. (2013) examined the influence athletic identity on recreational basketball players preparedness to play through pain, noting a significant relationship between an athlete's attitudes and behaviors towards injury and athletic identity. Individuals who scored high on the Athletic Identity Measurement Scale (AIMS) exhibited more positive attitudes and desires towards playing through injury, compared to those who scored moderate or low. A more direct connection between athletic identity and injury was evident in the Malcom (2006) study, which reported that girls with a strong sense of ballplayer identity learned to accept the norm of pain and injuries with the sport, while those with weaker identities continued to resist this norm and persist in complaining of pain. The results of these studies imply continuing to play through pain and injury, is important to athletes and the consequences of not practicing or playing are not worth the risk.

The American Psychological Association dictionary (Vanden, 2015) defines peer pressure as, "the influence exerted by a peer group on its individual members to fit in with or conform to the group's norms and expectations." In the world of sport, peer pressure

can come from anyone involved in an athlete's sport-network (e.g. teammates, coaches, medical staff, parents, friends, etc.), and can have positive or negative impacts on the athlete's mental and physical health (Mayer, 2018). Nixon (1994) looked at the influence of social pressure for pain and injuries in college sports networks and found that 49% of athletes felt pressured by coaches to play hurt, 41% felt pressure from teammates and 17% felt pressure by medical staff. Additionally, athletes who felt this pressure to play hurt were more likely to hide their pain and injuries in the future with 60% of athletes were willing to hide their pain and injuries from coaches, 47% from medical staff, and 46% from teammates. Similarly, Mayer (2018) looked at the influence of sports played and the impact of pressure on athlete's willingness to compete hurt. The results indicated that overall, all sports had a similar presence of peer pressuring athletes to play hurt, however, ball game sports (e.g. soccer/lacrosse), aesthetic sports (e.g. gymnastics/swimming) and weight dependent sports (e.g. wrestling) scored higher on the willing to compete hurt scale compared to endurance sports (e.g. cross country/track and field) and power sports (e.g. weight lifting). Nixon (1996) later took a look at the social pressure of athletes playing hurt in terms of race, and sports status and found similar results. It was found that athletes who were lineup regulars and were supported by athletic scholarships, tended to feel more pressure to play hurt by coaches, teammates and fans. The results revealed that more White athletes were pressured from coaches, teammates and fans to play hurt, compared to non-White athletes; it is believed this was due to the sport industry being predominately White at that time, with White coaches, teammates and fans.

While injuries not only have an impact on athletes' physical but also mental health and well-being. Due to this, it is critical, to both coaches and sports medical professionals to understand an athlete's mentality when it comes to their decision and willingness to play hurt. Although literature has shown the influence of many factors on athlete's attitudes and behaviors towards playing through pain and injury, to the researcher's knowledge, there is little recent research that looks at this influence on collegiate athletes. By looking at the influence of biological sex, athletic identity and pressure on collegiate athletes, coaches and sports medical staff can work together to support athletes into a healthier lifestyle in the future.

METHODS

Participants

The target population of this study were current male and female (age: 18-25 years) student-athletes involved in NCAA Division II sports at Humboldt State University (HSU). All participants have practiced or played while injured at some point throughout their college career. All participants were informed of any risks /requirements involved with the study and were given written informed consent before participation in accordance with the HSU Institutional Review Board (IRB). Sampling population for the study was convenience, based on the available resources, and the number of sports that were willing to participate at HSU.

Questionnaires

To assess the outcome variables, two self-reported questionnaires and a measurement scale were completed by all participants. Demographic questionnaire included: participants' age, biological sex, gender identity, ethnicity, academic year, NCAA sport(s), number of years playing the sport, type of most recent injury, has your coach ever pressured you to play while injured or in pain, and has a teammate ever pressured you to play while injured or in pain.

The second questionnaire was the, Risk, Pain and Injury Questionnaire (RPIQ), which examined participants attitudes concerning the risk of sport (e.g., 'athletes who endure pain and play hurt deserve respect'). The RPIQ consisted of 13-items developed

by Walk & Wiersma (2005), which was modified from the original scale developed by Nixon (1993, 1994, 1996). Items were scored on a 4-point scale with responses ranging from 1 (strongly disagree) to 4 (strongly agree).

The measurement scale given was the Athletic Identity Measurement Scale (AIMS), to measure the degree to which study participants recognized their identity as an athlete (Brewer et at., 1993). The AIMS consisted of 10 items to measure the strength of a person's identity as an athlete (e.g., 'I would be depressed if I were injured and could not compete in sport'). The response format consisted of a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). Brewer et al., (1993) found that AIMs was a reliable, internally consistent instrument, with internal coefficients ranging from .81 to .93 and reliability was found to be .89.

Procedure

Following approval from the IRB, participant recruitment began by contacting the Office of Institutional Effectiveness at HSU to obtain all current student-athlete names. Student-athletes were then contacted via email, to introduce the study. An electronic version of the surveys was then be sent out to each student-athlete during the Fall 2020 Semester of the academic year. A hard copy of each of the surveys was also made available to student-athletes to accommodate the preferences of each individual. Student-athletes who choose not to participate, and those who had never played while injured were automatically disqualify from the study. An approved informed consent form were first administered to all participants before the two questionnaires and measurement scale

were completed; at the end of the study, participants were then be thanked for their participation.

Statistical Analysis

All analyses were performed using SPSS statistics. Descriptive statistics were calculated and inspected for linearity and normality. Three, two-way ANOVAs were used to examine, the differences in athletic identity by biological sex, athletic identity by academic year, athletic identity by coaches' pressure and the intersection of biological sex, academic year and coaches' pressure. Two multiple-regression were conducted to determine the relationship between student-athlete's attitudes towards playing injured (RPIQ), athletic identity (AIMS), biological sex, and other demographic factors.

RESULTS

Descriptive Statistics

A total of 244 surveys were distributed to Humboldt State University student-athletes at the beginning of the study. Out of the 244 student-athletes, 77 surveys were fully completed and returned, with no missing data. Of the 77 participants, 62% were female student-athletes, and 38% were male. The study's student-athletes were members of the following teams: Men's Soccer (23%), Women's Soccer (7%), Men's Basketball (5%), Women's Basketball (5%), Softball (14%), Volleyball (9%), Crew (10%), Men's Track/Field (3%), Women's Track/Field (9%), Men's Cross Country (7%), and Women's Cross Country (7%). Other demographic characteristics of the participants and their view of pressure from college coaches and teammates are provided below (Table 1 & Table 2 respectively).

Table 1. Descriptive Statistics

Variable	*n*	Percentage
Age		
18 yrs.	10	13%
19 yrs.	21	27%
20 yrs.	16	21%
21 yrs.	22	29%
22 yrs.	6	8%
23 yrs.	2	2%
Academic Year		
First-year	11	14%
Second-year	19	25%
Third-year	20	26%
Fourth-year	27	35%
Race		
American Indian/Alaska Native	2	3%
Asian	6	9%
Black/African American	5	7%
Native Hawaiian/Other Pacific Islander	3	4%
White/Non-Hispanic	54	44%
Severity of Most Recent Injury		
Mild	44	57%
Moderate	17	22%
Severe	9	11%
Critical	7	10%

Note. Mild – missed 1-2 weeks or less of practices and/or games; Moderate – missed 3-5 weeks of practices and/or games; Severe – missed more than 6 practices and/or games; Critical – missed more than 8 weeks of practices and/or games or was hospitalized

Table 2. Coaches Pressure Statistics

Variable	*n*	Percentage
College Coach Pressure		
Never Pressure	44	57%
Sometimes Pressure	27	35%
Usually Pressure	5	7%
Regularly Pressure	0	0
Always Pressure	1	1%
College Teammate Pressure		
Never Pressure	54	70%
Sometimes Pressure	19	25%
Usually Pressure	3	4%
Regularly Pressure	1	1%
Always Pressure	0	0

Athletic Identity Measurement Scale

Means, standard deviations, and range scores for the AIMS variables were calculated and are presented in Table 3. As the data shows, the mean scores for the AIMS total scale, as well as for the biological sex and academic year were slightly above the midpoint (4.0 on a 7-point scale). When examining the standard deviation, the scores did show the data was spread across the entire possible score range. All data shown in Table 3 were inspected for normality. Results indicated that data was normally distributed (skewness scores did not exceed ± 1.00).

Table 3. Athletic Identity Measurement Scale - Descriptive Statistics

Variable	Mean (SD)	Possible Score Range	Obtained Score Range
AIMS Total Score	5.22 (0.92)	1 – 7	3.0 – 7.0
AIMS: Males	5.47 (0.79)	1 – 7	4.1 – 7.0
AIMS: Females	5.08 (0.92)	1 – 7	3.0 – 7.0
AIMS: First-year	5.53 (0.94)	1 – 7	3.7 – 6.7
AIMS: Second-year	5.28 (0.77)	1 – 7	4.1 – 6.8
AIMS: Third-year	5.42 (1.03)	1 – 7	3.5 – 7.0
AIMS: Forth-year	5.02 (0.82)	1 – 7	3.0 – 7.0

Risk, Pain and Injury Questionnaire

Means, standard deviations, and range scores for the RPIQ variables were calculated and are presented in Table 4. As the data shows, the mean scores for the RPIQ total scale, RPIQ by biological sex, and RPIQ by academic year were all around the midpoint (2.0 on a 4-point scale). When examining the standard deviation, the range scores did show the data was mostly clumped together around the middle of the score range. All data shown in Table 3 were inspected for normality. Results indicated that data was normally distributed (skewness scores did not exceed ± 1.00).

Table 4. Risk, Pain & Injury Questionnaire - Descriptive Statistics

Variable	Mean (SD)	Possible Score Range	Obtained Score Range
RPIQ Total Score	2.38 (0.54)	1 – 4	1.23 – 4.00
RPIQ: Males	2.51 (0.54)	1 – 4	1.31 – 3.46
RPIQ: Females	2.32 (0.53)	1 – 4	1.23 – 4.00
RPIQ: First-year	2.05 (0.59)	1 – 4	1.23 – 2.92
RPIQ: Second-year	2.41 (0.48)	1 – 4	1.62 – 3.46
RPIQ: Third-year	2.42 (0.50)	1 – 4	1.62 – 3.38
RPIQ: Forth-year	2.44 (0.58)	1 – 4	1.23 – 4.00

Group Comparison Analysis

ANOVA Analysis

Three 2-way ANOVA's were conducted to examine, the differences in athletic identity by biological sex, athletic identity by academic year and athletic identity by coaches' pressure. The dependent variable for all ANOVAs included the student-athlete's score from the RPIQ. The first independent variable that was also used for all ANOVAs was student-athletes' level of athletic identity (low, moderate, high). To obtain the three athlete identity groups, student-athletes' scores on the AIMS were used to divide them into three group based on percentile scores. Those in the low athletic identity group were those whose total AIMS score was below the 25th percentile for the sample of student-athletes (a score of 4.74 or below on the 7-point AIMS). Those in the moderate group were those whose AIMS score was between 25th and the 75th percentiles (a score between 4.75 and 5.99 on the 7-point AIMS). Those classified in the high group were the athletes whose AIMs score put them into the 75th percentile or above (a score of 6.0 or above on the 7-point AIMS). This procedure is consistent with that used by previous researchers in identifying or classifying individuals into contrasting groups using a continuously based score (Nixon, 1994; Weinberg, 2013; William, 2012). The other independent variables were athlete's biological sex (male/female), academic year (1st, 2nd, 3rd, 4th), and coaches' pressure on student-athletes (Never Pressure, Sometimes Pressure, Usually Pressure, Regularly Pressure, Always Pressure).

The results of the first 2-way ANOVA (Biological Sex X Athletic Identity Group) revealed a nonsignificant biological sex by athletic identity interaction effect (p = .23), a nonsignificant main effect for student-athlete biological sex (p = .35), as well as a nonsignificant main effect for athletic identity (p = .21).

The results of the second 2-way ANOVA (Academic Year X Athletic Identity Group) showed a nonsignificant athletic identity main effect (p = .09), and a nonsignificant interaction effect between academic year and athletic identity group (p= 0.7). However, a significant main effect for academic year was found, $F(3,65) = 2.93$, p = .04, $\omega^2 = .073$. Post hoc comparison test revealed that the four groups differed from each other on the dependent variable (Table 5). That is, student-athletes who were a 4th year indicated significantly higher or more positive attitudes towards playing through pain and injury, than student-athletes in either the 1st year, 2nd year or 3rd year groups.

Table 5. Results for Significant Academic Year Main Effect

Dependent Variable	Group 1: First-Year *(n = 11)*	Group 2: Second-Year *(n = 19)*	Group 3: Third-Year *(n = 20)*	Group 4: Fourth-year *(n = 27)*	F-Value F (3,65)	ω^2	Post hoc Means Comparison Results
Avg. RPIQ Score	2.05	2.41	2.42	2.44	2.93	.073	4 > 3 > 2 > 1*

Note: * p <.05

The results of the last 2-way ANOVA (Coaches Pressure X Athletic Identity Group) presented a nonsignificant main effect for athletic identity (p = .39) and nonsignificant interaction effect between athletic identity groups and coaches' pressure on student-athlete (p= .34). Conversely, there was a significant main effect for coaches' pressure on student-athletes, $F(3,67) = 3.86$, p = .013, $\omega^2 = .198$. Post hoc indicated the

five groups differed from each other on the dependent variable (Table 6). Showing, student-athletes who perceived their coaches always, regularly, and/or usually pressured them to play through pain and injury indicated significantly higher, or more positive attitudes towards playing through pain and injury, compared to student-athletes who perceived their coaches never, and/or sometimes pressured them to play through pain and injury.

Table 6. Results for Significant Pressure from Coaches Main Effect

Dependent Variable	Group 1: Never Pressure *(n = 11)*	Group 2: Sometime Pressure *(n = 19)*	Group 3: Usually Pressure *(n = 20)*	Group 4: Regularly Pressure *(n = 27)*	Group 5: Always Pressure *(n = 27)*	F-Value F (3,67)	ω^2	Post hoc Means Comparison Results
Avg. RPIQ Score	2.31	2.32	2.86	2.76	2.7	3.86	.198	3> 4 > 5 > 2 > 1*

Note: * p <.05

Regression

To take a closer look at the relationships between athletic identity (AIMS), student-athlete's attitudes towards playing injured (RPIQ), biological sex and other demographic factors (i.e., coaches' pressure on student athletes and academic year); two multiple regressions were conducted. The results of these regressions are summarized in Table 7.

Table 7. Multiple Regression: Prediction of RPIQ & AIMS

Dependent Variable	Predictor	ß	R^2	F-Value *F (1,75)*	Sig. *(p < .05)*
AIMS	Biological Sex	-.27	.03	2.39	.13
	Coaches' Pressure	-.08	.01	.461	.51
	Academic Year	-.08	.03	.972	.32
	RPIQ	.32	.06	4.34	.11
RPIQ	Biological Sex	-.22	.04	2.94	.09
	Coaches' Pressure	.21	.08	6.47	.01
	Academic Year	.11	.05	3.58	.03
	AIMS	.32	.06	4.34	.11

Examination of the results for predictive effects of AIMS scale revealed that biological sex, coaches' pressure on student-athletes, academic year and RPIQ were all nonsignificant predictors ($p > 0.05$). While predictive effects of RPIQ showed that biological sex and AIMS were the only non-significant predictor ($p > 0.05$). Whereas coaches' pressure, $F(1,75) = 6.48$, $p = 0.01$, and academic year $F(1,75) = 3.59$, $p = 0.03$, were all significant predictors of RPIQ. However, only 8% of the variance in RPIQ scale could be predicted by coaches' pressure, and 8% by academic year.

DISCUSSION

This study was conducted to examine the influence of biological sex, athletic identity and pressure on NCAA Division II collegiate athlete's attitudes and behaviors toward playing through pain and injury. While the results provided support for coaches' pressure on student-athletes as a factor that would explain variability in the attitudes towards playing through pain and injury, they however, showed no support for biologixal sex and athletic identity.

Coaches' Pressure

The results from two-way ANOVA, indicated there was a significant main effect with coaches' pressure on student-athletes to play through pain and injury. It revealed that student-athletes who perceived their coaches had always, regularly, or usually pressured them, exhibited significantly higher, or more positive attitudes towards playing through pain and injury, than their peers who perceived their coaches had never, or sometimes pressured them.

These ANOVA results were not only replicated but also strengthened in the results obtained from the multiple regression analysis. In particular, the multiple regression analysis examined the degree to which the coaches' pressure could predict student-athlete's attitudes and behaviors toward pain and injury and identifying oneself as an athlete. While coaches' pressure as a predictor for AIMS was nonsignificant, it was a found to be a significant predictor of the RPIQ scale.

In general, these results indicated that coaches' pressure is significantly related to student-athletes injury attitudes and behaviors, are consistent with previous literature that examined sport culture. That literature suggests that coaches' pressure on athletes to play through pain/injury is because injury is perceived to be a risk that athletes must take and accept in order to succeed in sport (Deroche et. al., 2011; Nixon, 1996; Whatman et. al, 2018.)

Biological Sex

This study was also designed to assess the possibility that NCAA Division II athletes' attitudes and behaviors toward playing through pain and injury would differ as a function of their biological sex; however, the results from the ANOVA revealed a nonsignificant biological sex main effect. Furthermore, the results from the multiple regression analyses indicated that biological sex was not a significant predictor of the AIMS scale or of the RPIQ. Previous research (Malcom, 2006; Young, 1997; Nixon, 1994) has suggested that females are socialized into their sports in ways that are similar to male athletes. Thus, it may not be surprising that females who participate in competitive sports end up with similar attitudes to their male counterparts regarding the notion of playing through pain and injury.

The lack of significant biological sex differences in this study provided support for similarities Madrigal et al. (2015) found when looking at male and female collegiate Rugby players. The results indicated that both males and female athletes had related

reasoning behind playing through pain and injury, exhibiting alike psychological aspects of competitive sports.

Athletic Identity

The results of the ANOVA that were conducted to compared individual's athletic identity, who were classified as high (75th percentile and above), moderate (between 25th and 75th percentile), or low (below 25th percentile), revealed a nonsignificant athletic identity main effect. Similarly, these results were confirmed in the results obtained from the subsequently conducted multiple regression analysis. These results were interesting, as they suggest that simply identifying oneself as an athlete does not affect or predict injury attitudes and behaviors. Implicating that individuals who scored in the high athletic identity percentile were just as likely to exhibit positive attitudes and behaviors toward playing through pain and injury as individuals in the moderate or low athletic identity percentile.

However, these results indicated that athletic identity is insignificant to athlete's injury attitudes and behaviors, which is inconsistent with previous literature. Nixon (1993; 1994) and Weinberg (2013), found that athletes who embody the sport culture of normalizing injuries, had a high athletic identity, while those who did not play through pain tended to not identify as an athlete. Athletes with higher athletic identity, are willing to put practice and competition above all else, even if it means playing while injuried or in pain (Hughes & Coakley, 1991; Nixon, 1996; Schneider, 2019).

Limitations & Future Research

One limitation of this study was the lack of variability in athletes across different competitive levels. Our study focused specifically on student-athletes involved in NCAA Division II sports, due to simplicity and convenance of the subject population, while there were two other levels of competitive student-athletes on HSU campus: club sports and intermural sports. As research has suggested in the past, many athletes on any competitive level, feel pressure from teammates, coaches and significant others (i.e., friends/family) to play through pain and injury (Malcom, 2006; Mayer et al., 2018; Weinberg et al., 2013). Future studies investigating athletes' attitudes and behaviors towards playing through pain and injury at different levels of competition would be quite intuitive rather than simply classifying everyone who is a varsity athlete in one group, and those who are not a varsity athlete into the recreational group. Future research should also continue to examine the influence of biological sex on playing through pain and injury, as there is still conflicting evidence; as seen with our studies' results (Madrigal, 2015; Malcom, 2006; Nixon 1996, Young, 1997; Weinberg et al., 2013). With the quickly changing roles of women in sport, and the expectations that go along with their increased participation and levels of competitiveness, perhaps there will be more similarities than differences between biological sex regarding attitudes toward playing through pain and injury.

CONCLUSION

The results of this study indicated that student-athletes' perceived pressure from coaches, had a significant influence on collegiate athlete's attitudes and behaviors toward playing through pain and injury, while biological sex and athletic identity had no influence. Individuals who perceived their coaches to always, regularly, or usually pressure them to play while injured and/or in pain, exhibited higher positive attitude towards playing through pain and injury, than those who were sometimes or never pressured.

The risks and pain of sport injuries are widely accepted among collegiate athletes. By analyzing the 'why' to an athlete accepting the cost of playing through pain and injury could help coaches and medical staff indicate which athletes are likely to be more willing to play hurt than their peers, assist in evaluation for fitness tests or return-to-play decision, and work together to support athletes into a healthier lifestyle after sports (Mayer, 2015; Nixon, 1993).

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APPENDIX

Participant Consent Form

The Influence of Biological Sex, Athletic Identity & Pressure on Collegiate Athlete's Attitude & Behavior Toward Playing Through Pain & Injury

Principal Investigator: Margaret Willis, ATC
(Approval Date: 5/11/2020)

My name is Margaret Willis, and I am a graduate student and an assistant athletic trainer at the Humboldt State University in the Kinesiology Department. I am conducting this research study to examine the influence of biological sex, athletic identity and pressure on collegiate athletes' attitudes and behavior towards playing through injury. If you volunteer to participate, you will be asked to complete three surveys: a demographic questionnaire, the Athletic Identity Measurement Scale and the Risk, Pain and Playing through Injury Scale. Completion of the surveys will take between 10-15 minutes and will be online powered by Google Form.

Your participation in this study is voluntary. You have the right not to participate at all, or to leave the study at any time without penalty or loss of benefits to which you are otherwise entitled. There are no possible risks involved for participants. The benefits to this research include: (a) better understand why athletes accept the risk of playing through injury, (b) help coaches and medical staff minimize playing with injuries, (c) support healthier lifestyles after sports

You have the right to withdraw your consent or stop participating at any time. You have the right to refuse to answer any question(s) or participate in any procedure for any reason. You will not be paid or compensated for participation in this research study.

It is anticipated that study results will be shared with the public through presentations/posters or publication. Information collected for this study will be completely anonymous and cannot be linked back to you. The anonymous data will be maintained in a safe, locked location in Dr. Jill Pawlowski office, and may be used for future research studies or distributed to another investigator for future research studies without additional informed consent from you. Raw data will be destroyed after a period of 5 years after study completion.

We will make every effort to keep your answers confidential. However, because HSU employees are required to report information regarding discrimination, harassment, or

retaliation involving the CSU, information you share about discrimination, harassment, or retaliation may be reportable under CSU Executive Order 1096. HSU employees are also encouraged to contact Human Resources regarding information from third parties not affiliated with the CSU regarding discrimination, harassment, or retaliation.

If you have any questions or concerns, about this research, you can contact the researcher, Margaret Willis, at maw179@humboldt.edu or (909) 680-0076, or the faculty supervisor, Dr. Jill Pawlowski, at jill.pawlowski@humboldt.edu or (707) 826-4541. If you have any concerns with this study or questions about your rights as a participant, contact the Institutional Review Board for the Protection of Human Subjects at irb@humboldt.edu or (707) 826-5165.

Authorization: Your participation in this study indicates that you are at least 18 years old and have read and understand the information provided above, that you willingly agree to participate, and that you may withdraw your consent at any time and discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

** Please print this informed consent form now and retain it for your future reference. If you agree to voluntarily participate in this research as described, please check the box below to begin the online survey. Thank you for your participation in this research*

☐ I have read and understood this consent information and agree to participate in this study.

☐ I DO NOT want to participate, please remove me from the mailing list

Student-Athlete Questionnaires

Demographic Questionnaire

1.) Age: _____

2.) Biological Sex:

- Male
- Female
- Prefer to self-describe:_____

3.) Gender Identity:

- Man
- Women
- Agender
- Androgyne
- Demigende
- Genderqueer or gender fluid
- Transgender
- Questioning or unsure
- Prefer to self-describe:_____

4.) Academic Year:

- 1st Year
- 2nd Year
- 3rd Year
- 4th Year
- 5th Year

5.) Ethnicity:

- Hispanic or Latino
- Not Hispanic or Latino

6.) Race:

- American Indian/Alaska Native
- Asian
- Black/African American
- Native Hawaiian/Other Pacific Islander
- White/Non-Hispanic

7.) NCAA sport(s) played at HSU:_____

8.) Number of years playing the sport(s) (including outside of college career):_____

9.) Severity of most recent injury (within the past year – 12 months):

- Mild (i.e. missed one to two weeks or less of practices/games, due to injury)
- Moderate (i.e. missed three to five weeks of practices and/or games, due to injury)
- Severe (i.e. missed more than five weeks of practices and/or games, due to injury)
- Critical (i.e. missed more than two months of practices and/or games, was hospitalized due to injury)

10.) Type of most recent injury (within the past year):

- Sprain (i.e. ankle sprain)
- Strain (i.e. pulled muscle)
- Fracture/Broken Bone
- Dislocation
- Rupture (i.e. tendons, ligaments)
- Concussion
- Additional type of injury, please specific: _____

11.) How many injuries have you experienced in the past year (12 months)?_____

Please read each statement carefully and circle the number associated with your response that best represents your attitudes as a collegiate athlete at HSU:

12.) Has your college coach ever pressured you to play while injured or in pain?

1	2	3	4	5
Never Pressured	Sometimes Pressured	Usually Pressured	Regularly Pressured	Always Pressured

13.) Has a fellow teammate ever pressured you to play while injured or in pain?

1	2	3	4	5
Never Pressured	Sometimes Pressured	Usually Pressured	Regularly Pressured	Always Pressured

Athletic Identity Measurement Scale

Directions: Please read each statement carefully and circle the number associated with your response that best represents your attitudes as a collegiate athlete at HSU

1.) I consider myself an athlete.

1	2	3	4	5	6	7
Strongly Agree			Neither Agree nor disagree			Strongly Disagree

2.) I have many goals related to sport.

1	2	3	4	5	6	7
Strongly Agree			Neither Agree nor disagree			Strongly Disagree

3.) Most of my friends are athletes.

1	2	3	4	5	6	7
Strongly Agree			Neither Agree nor disagree			Strongly Disagree

4.) Sport is the most important part of my life.

1	2	3	4	5	6	7
Strongly Agree			Neither Agree nor disagree			Strongly Disagree

5.) I spend more time thinking about sport than anything else.

1	2	3	4	5	6	7
Strongly Agree			Neither Agree nor disagree			Strongly Disagree

6.) I need to participate in sport to feel good about myself.

1	2	3	4	5	6	7
Strongly			Neither Agree			Strongly

Agree			nor disagree			Disagree

7.) Other people see me mainly as an athlete.

1	2	3	4	5	6	7
Strongly Agree			Neither Agree nor disagree			Strongly Disagree

8.) I feel bad about myself when I do poorly in sport.

1	2	3	4	5	6	7
Strongly Agree			Neither Agree nor disagree			Strongly Disagree

9.) Sport is the only important thing in my life.

1	2	3	4	5	6	7
Strongly Agree			Neither Agree nor disagree			Strongly Disagree

10.) I would be very depressed if I were injured and could not compete in sport.

1	2	3	4	5	6	7
Strongly Agree			Neither Agree nor disagree			Strongly Disagree

Risk, Pain and Injury Questionnaire

Directions: Please read each statement carefully and circle the number associated with your response that best represents your attitudes as a collegiate athlete at HSU

1. No Pain, No Gain	**1** *Strongly Disagree*	**2** *Disagree with reservations*	**3** *Agree with reservation*	**4** *Strongly agree*
2. Athletes who endure pain and play hurt deserve respect	**1** *Strongly Disagree*	**2** *Disagree with reservations*	**3** *Agree with reservation*	**4** *Strongly agree*
3. Teammates make athletes feel guilty if they don't want to play hurt or with pain	**1** *Strongly Disagree*	**2** *Disagree with reservations*	**3** *Agree with reservation*	**4** *Strongly agree*
4. Athletes who care about their team will try to play with injuries and pain	**1** *Strongly Disagree*	**2** *Disagree with reservations*	**3** *Agree with reservation*	**4** *Strongly agree*
5. Athletes should "tough it out" with an injury or pain today and not worry about the effect's tomorrow	**1** *Strongly Disagree*	**2** *Disagree with reservations*	**3** *Agree with reservation*	**4** *Strongly agree*
6. Teammates only care about players who are healthy and able to play	**1** *Strongly Disagree*	**2** *Disagree with reservations*	**3** *Agree with reservation*	**4** *Strongly agree*
7. Every athlete should expect to have to play with an injury or pain sometime	**1** *Strongly Disagree*	**2** *Disagree with reservations*	**3** *Agree with reservation*	**4** *Strongly agree*
8. Teammates say they don't want athlete to play with serious injuries, but they actually push them to play if they are needed	**1** *Strongly Disagree*	**2** *Disagree with reservations*	**3** *Agree with reservation*	**4** *Strongly agree*
9. Athletes should ignore the pain	**1** *Strongly Disagree*	**2** *Disagree with reservations*	**3** *Agree with reservation*	**4** *Strongly agree*
10. Teammates are impressed with those who play with injuries and pain	**1** *Strongly Disagree*	**2** *Disagree with reservations*	**3** *Agree with reservation*	**4** *Strongly agree*
11. Only athletes understand what it is like to play with injuries and pain	**1** *Strongly Disagree*	**2** *Disagree with reservations*	**3** *Agree with reservation*	**4** *Strongly agree*
12. Playing with injuries and pain demonstrates character and courage	**1** *Strongly Disagree*	**2** *Disagree with reservations*	**3** *Agree with reservation*	**4** *Strongly agree*