

PERSONALITY PROFILES AND INJURY OCCURRENCE IN A POPULATION OF
VARSITY ATHLETES

by

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Submitted in partial fulfilment of the requirements
for the degree of Master of Science

at

Dalhousie University
Halifax, Nova Scotia
November 2017

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ABSTRACT

Using the stress-injury model (Williams & Andersen, 1998), this retrospective study examined the relationship between perfectionism and injury occurrence among varsity and competitive club athletes. This study also sought to determine why perfectionism may lead to acute sport-related injury by investigating its relationship with other salient injury predictors.

Athletes were recruited in-person via team meetings, and online via email. Athletes were recruited from basketball, football, field hockey, hockey, soccer, and rugby. Consenting athletes completed a one-time (pen-and-paper or online) questionnaire consisting of measures of stress, anxiety, coping, perfectionism, and sport-related injury occurrence. Athletes were asked to respond to questionnaires based upon their thoughts and feelings during the most recent (2016-2017) academic season.

Study results showed that perfectionistic strivings, but not perfectionistic concerns, positively predicted acute sport-related injury occurrence. Findings and limitations are discussed, and suggestions are made for future research in the sport injury prediction and prevention domain.

Keywords: perfectionism, stress, anxiety, coping, acute injury, sport

LIST OF ABBREVIATIONS USED

<i>M</i>	Mean
<i>SD</i>	Standard deviation
Sport-MPS-2	Sport Multidimensional Perfectionism Scale-2
PSS	Perceived Stress Scale
SAS-2	Sport Anxiety Scale-2
CFQ	Coping Function Questionnaire
REB	Research Ethics Board
PI	Principal Investigator

ACKNOWLEDGEMENTS

I would like to extend my gratitude to Joshua Young for his unwavering patience, understanding, and support.

I would also like to acknowledge my supervisors, Dr. Melanie Keats and Dr. Lori Dithurbide, as well as my committee members, Dr. Janice Moreside and Dr. John Gotwals. Your guidance and support throughout this process was very much appreciated.

I also thank IRH, who wishes to remain anonymous.

CHAPTER 1 INTRODUCTION

Participation in sport exposes athletes to injury risk (Hootman, Dick, & Agel, 2007). High injury rates have been reported in a variety of team sports including football (Shankar, Fields, Collins, Dick, & Comstock, 2007), field hockey (Gardner, 2015) and soccer (Waldén, Hägglund, Werner, & Ekstrand, 2011). For example, a study of elite Finnish soccer players found that 92% of male athletes and 79% of female athletes sustained a minimum of one athletic injury per year (Ristolainen, Heinonen, Waller, Kujala, & Kettunen, 2009). Given these statistics, it is not surprising that sports injuries are recognized as one of the leading causes of premature termination from sport (Drawer & Fuller, 2002).

Sports injuries are not only common; they are also costly to both the individual and society. For the individual, there is the potential for psychological harm (Putukian, 2016) and reduced well-being (McGuine, Winterstein, Carr, Hetzel, & Scott, 2012; McLeod, Bay, Parsons, Sauers, & Snyder, 2009). Psychological responses to physical injury include disengagement, changes in appetite, lack of motivation, sleep disturbance, isolation, frustration, anger, irritation, and sadness (Herring et al., 2006). While it is important to acknowledge that emotional reactions to injury are normal, problematic emotional reactions are characterized by persistent, worsening, or excessive symptoms (Herring et al., 2006). Of note, sport-related injuries have been found to trigger serious mental health issues such as disordered eating (Busanich, McGannon, & Schinke, 2014), depression (Appaneal, Levine, Perna, & Roh, 2009), and substance abuse (Kontos, Elbin, Appaneal, Covassin, & Collins, 2013). For society, sports-related injuries are also costly in terms of medical care. In a study by Burt and Overpeck (2001) investigating sport-

related injury visits to the emergency department, it was revealed that basketball, football, and soccer were among the leading sports causing athletes to seek emergency medical care. Furthermore, athletic injuries were more likely to require diagnostic and therapeutic services, particularly orthopedic care (Burt & Overpeck, 2001).

Given the high physical, psychological, and financial cost of sports-related injuries, the roles of both intrinsic (person-related) and extrinsic (environment-related) factors have been investigated in attempt to mitigate injury risk (Bahr & Krosshaug, 2005). Furthermore, a number of theoretical models have been developed and tested to explore characteristics that may increase susceptibility to sport-related injury (Andersen & Williams, 1988; Appaneal & Perna, 2014; Bahr & Krosshaug, 2005; Wiese-Bjornstal, 2010). For example, the stress-injury model (Andersen & Williams, 1988) was pivotal in the acknowledgement of psychological factors in the prediction and prevention of injury. Following the emergence of the stress-injury model, subsequent theoretical models expanded on the premise of psychological factors to also include other intrinsic and extrinsic risk factors for injury (Appaneal & Perna, 2014; Bahr & Krosshaug, 2005; Wiese-Bjornstal, 2010). These models include the comprehensive model for injury causation (Bahr & Krosshaug, 2005), the biopsychosocial sport injury risk profile (Wiese-Bjornstal, 2010), and the biopsychosocial model of stress and athletic injury and health (Appaneal & Perna, 2014). However, despite the fact that limitations of the stress-injury model have been identified (Appaneal & Perna, 2014; Hackfort & Kleinert, 2007) and improved models have been introduced, the stress-injury model continues to be the most widely referenced in the sport injury prediction and prevention literature (Ivarsson et al., 2016).

The stress-injury model emphasizes the role of stressors, personality characteristics, and coping in the occurrence of acute sport-related injury (Williams & Andersen, 1998). Athletes having a history of stressors (e.g., life events stress, daily hassles, previous injury), personality characteristics that lead to an increase in anxiety, and/or ineffective coping resources (e.g., low social support, poor coping strategies) are considered to be at increased risk for acute sport-related injury. The aforementioned elements of the model may be involved independently or in combination to influence the occurrence of injury (Williams & Andersen, 1998). In support of the stress-injury model, there is empirical evidence to demonstrate the relationship between stress and injury (Ivarsson et al., 2016; Ivarsson, Johnson, Lindwall, Gustafsson, & Altemyr, 2014; Ivarsson, Johnson, & Podlog, 2013), anxiety and injury (Blackwell & McCullagh, 1990; Hanson, McCullagh, & Tonymon, 1992; Petrie, 1993b), and ineffective coping and injury (Ivarsson & Johnson, 2010; Johnson & Ivarsson, 2011).

Personality is acknowledged as being influential in how an individual perceives a potentially stressful event, with personality characteristics that produce increased anxiety considered to be precursors to injury as per the stress-injury model (Andersen & Williams, 1988). To date, personality characteristics that have been studied in relation to injury occurrence include locus of control (Kolt & Kirkby, 1996; Pargman & Lunt, 1989), competitive trait anxiety (Lavallée & Flint, 1996; Petrie, 1993a), mood states (Williams, Hogan, & Andersen, 1993), self-confidence/esteem (Kolt & Roberts, 1998), and perfectionism (Krasnow, Mainwaring, & Kerr, 1999). Recent advances in perfectionism research have led to the identification of two basic dimensions of perfectionism: perfectionistic strivings and perfectionistic concerns (Stoeber & Otto,

2006). Perfectionistic concerns are typically associated with a range of maladaptive behaviors, such as appraising potentially stressful events as threatening (Hewitt & Flett, 1993), experiencing higher levels of anxiety (Frost & Henderson, 1991), and employing avoidant coping strategies (e.g., denial, disengagement) (Dunkley, Blankstein, Halsall, Williams, & Winkworth, 2000). Conversely, perfectionistic strivings are frequently associated with a range of adaptive behaviors, such as appraising potentially stressful events as a challenge (Dunkley, Zuroff, & Blankstein, 2003), experiencing lower levels of anxiety (Frost & Henderson, 1991), and employing problem-focused coping strategies (e.g., actively attempting to solve the problem by means of seeking support, analyzing previous experiences, and expending more energy) (Flett, Russo, & Hewitt, 1994). Notwithstanding, perfectionistic strivings have also been linked to a variety of maladaptive features (Castro-Fornieles et al., 2007; Fry & Debats, 2009; Molnar, Flett, Sadava, & Colautti, 2012; Smith et al., 2017; Smith et al., 2016). Despite the potential impact of perfectionism on injury occurrence, to date only one study has examined this relationship (Krasnow et al., 1999). Although Krasnow et al. (1999) found preliminary evidence to support perfectionism as an antecedent to sport-related injury, further research is warranted to investigate this relation given advances in perfectionism (Stoeber & Otto, 2006) and recommendations for sport injury research (Johnson, 2007).

Accordingly, the purpose of this study is to investigate the role of perfectionism in acute sport-related injury occurrence among a population of varsity athletes.

Specifically, this study will examine the relationship between perfectionistic strivings and concerns and acute sport-related injury and whether this relationship may be mediated by stress, anxiety, and/or coping. It is hypothesized that perfectionistic concerns, but not

strivings, will demonstrate an association with acute sport-related injury. Furthermore, it is hypothesized that perfectionistic concerns will be mediated by high perceived stress, high trait anxiety, and/or avoidance coping.

CHAPTER 2 LITERATURE REVIEW

Due to the rising costs associated with injury (e.g., costs to health and well-being for the individual, and the economic costs for society), it is evident that a preventative approach may be preferable in the management of exercise- and sport-related injuries in comparison to a treatment approach (Taylor, 2006). Studies have examined a variety of factors that are considered to be influential in reducing the risk of exercise- and sport-related injury such as playing surface (McGhie & Ettema, 2013; Meyers, 2013; Steffen, Andersen, & Bahr, 2007) physical training (Emery & Meeuwisse, 2010; Mandelbaum et al., 2005; McGuine & Keene, 2006), protective equipment (Hagel, Pless, Goulet, Platt, & Robitaille, 2005), and rule changes (Collins, Fields, & Comstock, 2008; Macpherson, Rothman, & Howard, 2006).

Additionally, there is research to suggest that psychological factors also have the ability to increase or decrease susceptibility to injury (Kleinert, 2007), and various psychological attributes have been investigated in relation to sports injuries. However, competitive anxiety is recognized as the only psychological attribute that consistently demonstrates an association with injury occurrence in sport (Junge, 2000).

Further research is necessary to explore and differentiate other psychological attributes that may increase injury risk, so that preventative programs can be developed and initiated to reduce the frequency of injury in sport (Junge, 2000). Although perfectionism has been studied extensively in connection to factors such as burnout (Gotwals, 2011; Hill, Hall, & Appleton, 2010) and performance (Stoeber, 2011; Stoll, Lau, & Stoeber, 2008), the role of perfectionism as it relates to injury occurrence merits examination.

Stress-Injury Model

Developed by Andersen and Williams (1988), the stress-injury model posits the role of psychological and social factors in the prediction and prevention of stress-related acute athletic injuries. When an athlete is confronted by a sport-specific situation that has the potential to be appraised as stressful, the resulting stress response is influenced by the athlete's history of stressors (e.g., daily hassles, life events, previous injuries), their personality characteristics (e.g., locus of control, competitive trait anxiety), and/or coping resources (e.g., stress management, social support). While having a history of stressors has a direct impact on the stress response, personality characteristics and coping resources may also directly impact the stress response, or alternatively they may act through the history of stressors to moderate the effects of the stress response. Therefore, having favorable personality characteristics and/or coping resources may act to buffer athletes from stress (and injury) as they may be less likely to perceive a given sport-specific scenario as stressful. Additionally, it may reduce the likelihood that they will succumb to the effects of their history of stressors. Conversely, the lack of favorable personality characteristics and/or coping resources (or the presence of unfavorable personality characteristics, such as high trait anxiety) may lead to the appraisal of a given sport-specific situation as stressful, and may therefore result in increased injury risk.

The revised stress-injury model (Williams & Andersen, 1998) acknowledges the potential interplay between personality, history of stressors, and coping resources in contributing to the stress response. Specifically, the stress-injury model was modified to emphasize interactions between personality and coping resources, history of stressors and personality, and history of stressors and coping resources in affecting the stress response.

As per the stress-injury model (Andersen & Williams, 1988), the stress response is characterized by attentional disruptions (e.g., peripheral narrowing, increased distractibility, slower reaction time) and/or physiological activation (e.g., muscle tension, impaired motor coordination) in reaction to a perceived stressful event, and it is by means of these mechanisms that acute injury is presumed to occur. The stress-injury model (Andersen & Williams, 1988) hypothesizes that athletes at greatest risk for injury are those who are exposed to a high degree of stress in their lives, have personality traits that provoke a heightened stress response, and have fewer coping resources. In comparison to athletes with the opposite profile, it is expected that those athletes will be more likely to appraise a given event as threatening and exceeding their resources, experience increases in muscle tension and/or deficits in attention, and therefore be more likely to incur an acute sport-related injury (Andersen & Williams, 1988).

Studies have examined the role of attentional disruption by means of peripheral narrowing (Andersen & Williams, 1999; Rogers & Landers, 2005; Williams, Tonymon, & Andersen, 1990; Williams, Tonymon, & Andersen, 1991). Under stressful conditions, athletes reporting high life events stress experience greater peripheral narrowing than those with low life events stress (Williams et al., 1990; Williams et al., 1991). Furthermore, athletes declaring more negative life events stress (and conjointly lacking coping resources/strategies), in combination with greater peripheral narrowing during stress, are more likely to acquire an athletic injury than athletes with the opposing profile (Andersen & Williams, 1999; Rogers & Landers, 2005). Studies have also inspected the role of attentional disruption by means of slowed reaction time (Williams & Andersen, 1997), with athletes having high negative life events stress scores enduring slower

reaction times under stressful circumstances in comparison to athletes with low negative life events stress scores. Moreover, a significantly slowed reaction time has been found among athletes suffering from noncontact anterior cruciate ligament injuries when compared to non-injured controls (Swanik, Covassin, Stearne, & Schatz, 2007).

Efforts to minimize the stress response (and the subsequent risk of acute sport-related injury), may be carried out in the form of various interventions aimed to reduce the severity of attentional and physiological reactions. As per the stress-injury model (Andersen & Williams, 1988) these interventions may include relaxation skills, meditation, imagery, cognitive restructuring, thought stoppage, and distraction desensitization. Specifically, studies have been carried out to investigate the role of cognitive behavioral stress management (Maddison & Prapavessis, 2005) and mental skills training (Johnson, Ekengren, & Andersen, 2005) in reducing injury occurrence. The study conducted by Maddison and Prapavessis (2005) sought to determine the effect of a cognitive-behavioral stress management program among a group of rugby players identified as having an at-risk psychological profile for injury (as based on the stress-injury model (Williams & Andersen, 1998)), compared to a matched control group. During a 4-week preseason period, athletes in the intervention group participated in six sessions that provided training on somatic-based (e.g., progressive muscle relaxation) and cognitive-based (e.g., imagery and cognitive restructuring) strategies to combat the stress response. Results of the study showed a significant difference in the amount of time missed due to injury, with participants in the intervention group reporting less time missed due to injury in comparison to their nonintervention counterparts. Furthermore, in terms of psychological variables, athletes who received the intervention reported an

overall increase in coping resources and a decrease in concentration disruption and worry (Maddison & Prapavessis, 2005). The study carried out by Johnson et al. (2005) also employed an intervention among athletes with at-risk psychological profiles as characterized by the stress-injury model (Williams & Andersen, 1998), randomizing at-risk soccer players to a treatment group or a control group. Soccer players in the treatment group received 6-8 sessions of mental skills training (e.g., somatic and cognitive relaxation, coping skills, goal-setting skills, self-confidence training) over a period of 19 weeks, which spanned the preseason and the first half of the competitive season. The study concluded that athletes who underwent mental skills training incurred significantly fewer injuries than those in the control group (Johnson et al., 2005).

Of note, the only personality characteristic assessed by both Johnson et al. (2005) and Maddison and Prapavessis (2005) was that of anxiety. In a review by Johnson, Traanaeus, and Ivarsson (2014), trait anxiety was found to be the most commonly researched personality variable in the sport injury prediction and prevention literature, and anxiety is the only personality characteristic reported to consistently demonstrate a relationship with injury occurrence (Junge, 2000). Identification of other personality characteristics that predispose an individual to high levels of anxiety will allow for the implementation of appropriate interventions to reduce stress among athletes possessing personality characteristics that place them at increased risk for injury.

Personality Characteristics

As emphasized in the stress-injury model (Williams & Andersen, 1998), certain personality characteristics have the potential to provoke a heightened stress response. Personality is defined as “psychological qualities that contribute to an individual’s

enduring and distinctive patterns of feeling, thinking and behaving” (Cervone & Pervin, 2010, p. 8). To date, a number of personality characteristics have been examined in sport with regards to their effects on injury occurrence. These include locus of control (Kolt & Kirkby, 1996; Pargman & Lunt, 1989), competitive trait anxiety (Lavallée & Flint, 1996; Petrie, 1993a), mood states (Williams et al., 1993), self-confidence/esteem (Kolt & Roberts, 1998), and perfectionism (Krasnow et al., 1999).

Perfectionism. As defined by Frost, Marten, Lahart, and Rosenblate (1990), “perfectionism involves high standards of performance which are accompanied by tendencies for overly critical evaluations of one’s own behavior” (p. 450). As such, perfectionism is described as a multidimensional personality trait (Frost et al., 1990; Hewitt & Flett, 1991) comprising two hierarchical dimensions: perfectionistic strivings and perfectionistic concerns (Stoeber & Otto, 2006). These two high-order dimensions have been studied extensively in both the general psychology literature (Mackinnon & Sherry, 2012; Smith, Saklofske, Yan, & Sherry, 2016; Stoeber & Janssen, 2011) and the sport psychology literature (Madigan, Stoeber, & Passfield, 2015; Rasquinha, Dunn, & Causgrove Dunn, 2014; Stoll et al., 2008).

The dimension of perfectionistic strivings is characterized by the setting of perfectionistic personal standards (i.e., personal standards; Frost et al., 1990) and demanding perfection of oneself (i.e., self-oriented perfectionism; Hewitt & Flett, 1991). The dimension of perfectionistic concerns is characterized by having highly negative reactions to perceived setbacks and failures (i.e., concerns over mistakes; Frost et al., 1990), having doubts about performance abilities (i.e., doubts about actions; Frost et al.,

1990), and the inclination to perceive others as demanding perfection (i.e., socially prescribed perfectionism; Hewitt & Flett, 1991)

Perfectionistic strivings have been found to correlate with a range of functional psychological, behavioral, and affective attributes, including positive affect (Chang, Watkins, Banks, & Watkins, 2004; Frost, Heimberg, Holt, Mattia, & Neubauer, 1993), conscientiousness (Parker & Stumpf, 1995; Stumpf & Parker, 2000), and satisfaction with life (Chang et al., 2004). Conversely, perfectionistic concerns have been found to correlate with a range of dysfunctional psychological, behavioral, and affective attributes, including negative affect (Chang et al., 2004; Frost et al., 1993), suicidal ideation (Chang et al., 2004), depression (Frost et al., 1993), neuroticism (Parker & Stumpf, 1995; Stumpf & Parker, 2000), reduced self-esteem (Stumpf & Parker, 2000), an external locus of control (Suddarth & Slaney, 2001), trait anxiety (Suddarth & Slaney, 2001), and perceived stress (Chang et al., 2004). Although perfectionistic strivings are generally considered to be adaptive and perfectionistic concerns are typically considered to be maladaptive, recent data has emerged to demonstrate that perfectionistic strivings also correlate with a range of dysfunctional psychological, behavioral, and affective attributes such as eating disorders (Castro-Fornieles et al., 2007), depression (Smith et al., 2016), suicidal ideation (Smith et al., 2017), poor health (Molnar et al., 2012), and early mortality (Fry & Debats, 2009).

Given the dysfunctional nature of perfectionistic concerns and potentially perfectionistic strivings, it is worth further exploring the impact of high perfectionistic concerns in sport. Perfectionism has been identified as a prevailing characteristic in

competitive athletes (Dunn, Gotwals, & Causgrove Dunn, 2005), and specifically among athletes competing at higher levels (Gould, Dieffenbach, & Moffett, 2002).

Perfectionism and injury. To date, only two studies have investigated the relationship between multidimensional perfectionism and athletic injury occurrence (Krasnow et al., 1999; Madigan, Stoeber, Forsdyke, Dayson, & Passfield, 2017). A retrospective study carried out among a population of adolescent dancers and gymnasts demonstrated initial support for perfectionism as a potential precursor to athletic injury (Krasnow et al., 1999). Krasnow et al. (1999) found that the number of injuries among modern dancers showed a significant correlation with the Parental Expectations subscale of the perfectionism measure used in the study, and injuries among artistic gymnasts showed a significant correlation with the Concern Over Mistakes subscale of the perfectionism measure. In summary, Krasnow et al. (1999) provided some evidence to support the relation between injury and the perfectionism dimension of perfectionistic concerns.

More recently, a prospective study conducted by Madigan et al. (2017) has offered further evidence for a relationship between perfectionistic concerns and sport-related injury. Specifically, 80 junior athletes were followed over a 10-month period of active training. Throughout the 10-month study period, 52 acute injuries and 12 overuse injuries were incurred among the 80 athletes. Athletic injuries were assessed and recorded by a trained physiotherapist. Although injury types were distinguished as acute or overuse as part of the injury assessment, the occurrence of athletic injury (i.e., yes/no) was used for the purpose of data analysis. The results of the study showed a positive, significant relationship between perfectionistic concerns and the occurrence of athletic

injury. Despite the fact that perfectionistic concerns demonstrated a statistically significant relationship with athletic injury, we cannot be certain whether the relationship may hold exclusively for acute injuries or for overuse injuries.

Stress

To determine whether a new or changing situation will be perceived as stressful, Lazarus and Folkman (1984) proposed that an individual undergoes a psychological appraisal process. The appraisal process consists of two components: primary appraisal and secondary appraisal. During primary appraisal, the individual seeks to understand the meaning of the event; that is, whether the event may be considered as positive, negative, or neutral (Lazarus & Folkman, 1984). Situations that are deemed to be negative are further evaluated for potential harm (i.e., damage that has already occurred as a result of the event), threat (i.e., the judgment of damage that may occur in the future), and challenge (i.e., assessment of one's ability to overcome, and perhaps even benefit, from the event). The secondary appraisal process involves determining if one's coping resources will be adequate to meet the challenge, threat, or harm associated with the event (Lazarus & Folkman, 1984). Therefore, stress may be described as a subjective experience resulting from the combination of primary and secondary appraisals (Taylor, 2006). Accordingly, one can expect to encounter high levels of stress when coping resources are low, and harm and threat are high. Conversely, stress levels may be minimized when coping resources are high (Taylor, 2006).

Perfectionism and stress. With regards to stressor appraisal, personality has been demonstrated to influence how an individual perceives a potentially stressful event (Komulainen et al., 2014; Noser, Zeigler-Hill, & Besser, 2014). In particular,

perfectionists have been found to appraise what may be otherwise regarded as ordinary events, as threatening stressors (Hewitt & Flett, 1993). It is assumed that perfectionists create stress for themselves by focusing on the negative aspects of events, and partaking in rigid and demanding self-evaluations (Hewitt & Flett, 1993). In the perfectionism literature, perfectionistic concerns are consistently related to higher levels of perceived stress (Albert, Rice, & Caffee, 2016; Chang & Sanna, 2012; Rice, Leever, Christopher, & Porter, 2006).

Perfectionism has also been investigated in relation to stress reactivity by means of measuring blood pressure (Albert et al., 2016). Specifically, college students were given a series of challenging mathematical tasks, with blood pressure assessed at baseline and following each individual task. The results of the study demonstrated that diastolic blood pressure remained stable among students high in perfectionistic concerns over the duration of the tasks. Furthermore, students reporting moderate to low perfectionistic concerns experienced a reduction in diastolic blood pressure over the duration of the mathematical tasks. Essentially, the findings of the study show that students high in perfectionistic concerns may be at increased risk for physiological issues associated with stress reactivity, particularly in the event of a sustained stressor.

Stress and injury. A number of studies have been carried out in the sport psychology literature to examine the relation between various types of stressors and injury occurrence (Ivarsson et al., 2016; Johnson, 2007; Johnson et al., 2014). Stressors that have been investigated in relation to injury outcome include daily hassles (Fawkner, McMurray, & Summers, 1999; Ivarsson & Johnson, 2010; Ivarsson et al., 2014, 2013), the occurrence of stressful events (Steffen, Pensgaard, & Bahr, 2009), negative life event

stress (Ivarsson et al., 2013; Johnson & Ivarsson, 2011; Sibold & Zizzi, 2012), positive life event stress (Petrie, 1993a; Sibold & Zizzi, 2012), and previous injuries (Devantier, 2011; Hanson et al., 1992; Steffen et al., 2009).

Daily hassles refers to the stress resulting from many minor daily irritations or problems (Williams & Andersen, 1998). In a study by Fawkner et al. (1999), athletes were followed prospectively across their competitive season. It was found that athletes who experienced a sport-related injury reported a significant increase in hassles during the week prior to injury, while there were no significant changes in the hassles reported by non-injured athletes.

In addition to the stress produced by daily hassles, athletic injury is also associated with experiencing a high level of stressful events (Steffen et al., 2009). In a prospective study conducted by Steffen et al. (2009), it was discovered that female football players who reported a high level of stressful events were at a significantly greater risk for incurring a new injury.

Although some studies have looked at overall life event stress (Steffen et al., 2009), other studies have investigated the distinct roles of negative life event stress (Ivarsson et al., 2013; Johnson & Ivarsson, 2011; Sibold & Zizzi, 2012) and positive life event stress (Petrie, 1993a; Sibold & Zizzi, 2012) in influencing injury occurrence. Both negative life event stress (Johnson & Ivarsson, 2011; Sibold & Zizzi, 2012) and positive life event stress (Sibold & Zizzi, 2012) have been identified as significant predictors of sport-related injury occurrence.

Anxiety

The anxiety response is considered to be multidimensional; consisting of cognitive and somatic components (Burton, 1998; Smith, Smoll, & Wiechman, 1998). Cognitive anxiety is defined as “the mental component of anxiety caused by negative expectations about success or by negative self-evaluation” (Martens, Vealey, & Burton, 1990, p. 6), whereas somatic anxiety “refers to the physiological and affective elements of the anxiety experience that develop directly from autonomic arousal” (Martens et al., 1990, p. 6).

With regards to the assessment of anxiety, cognitive and somatic components may be measured in response to a specific event (i.e., state anxiety; Martens, Burton, Vealey, Bump, & Smith, 1990) or as a stable characteristic of personality (i.e., trait anxiety; Smith, Smoll, Cumming, & Grossbard, 2006). State anxiety (i.e., a temporary state) refers to the changes in cognitive and somatic anxiety experienced in connection with a particular event (Spielberger, 1966). Comparatively, trait anxiety (i.e., a disposition or an enduring aspect of personality) is concerned with the tendency to appraise certain types of nondangerous events as threatening and respond accordingly with disproportionately high levels of state anxiety (Spielberger, 1966). A relation exists between state anxiety and trait anxiety, as individuals who score high on trait anxiety measures are more susceptible to report high state anxiety in evaluative/competitive situations (Weinberg & Gould, 2007).

Perfectionism and anxiety. To date, there are few studies that have examined the relation between anxiety and perfectionism in sport (Frost & Henderson, 1991; Hamidi & Besharat, 2010; Koivula, Hassmén, & Fallby, 2002). A preliminary study

investigating anxiety and perfectionism among athletes found that athletes with high scores on the Concern Over Mistakes subscale, one of the two subscales comprising perfectionistic concerns, also reported higher trait anxiety (Frost & Henderson, 1991). A later study carried out by Koivula et al. (2002) demonstrated a relation between perfectionistic concerns and high levels of cognitive state anxiety among a group of elite athletes. Furthermore, a study conducted by Hamidi and Besharat (2010) expanded upon previous study findings by presenting a negative association between perfectionistic strivings and cognitive anxiety, and perfectionistic strivings and somatic anxiety. Additionally, a positive association emerged between perfectionistic concerns and cognitive anxiety, and perfectionistic concerns and somatic anxiety.

Anxiety and injury. With regards to the impact of anxiety on injury occurrence in sport, the roles of both state anxiety (Alizadeh, Pashabadi, Hosseini, & Shahbazi, 2012) and trait anxiety (Ivarsson & Johnson, 2010; Johnson & Ivarsson, 2011) have been investigated. With regards to state anxiety, a study by Alizadeh et al. (2012) examined self-reported previous injuries and state anxiety among a population of male junior football players. Athletes were asked to report all injuries incurred within the prior 12 months, with relevant injuries being defined as those that caused at least one day of missed training, or requiring medical attention. The results of the study demonstrated a statistically significant relationship between cognitive state anxiety and injury occurrence, as well as somatic state anxiety and injury occurrence. Studies exploring the relationship between trait anxiety and injury occurrence have also found statistically significant relationships between cognitive trait anxiety and injury (Ivarsson & Johnson,

2010) and somatic trait anxiety and injury (Ivarsson & Johnson, 2010; Johnson & Ivarsson, 2011; Sibold, Howard, & Zizzi, 2011).

Coping

Coping is defined in the literature as the effort put forth by an individual in attempt to mitigate external (e.g., training environment/conditions) and/or internal (e.g., self-presentational concerns, self-doubt) sources of psychological stress (Lazarus & Folkman, 1984). Attempts to minimize the effects of a stressor may be cognitive and/or behavioral, with coping strategies typically falling into the following high-order dimensions: problem-focused coping, emotion-focused coping, and avoidance coping. Problem-focused coping involves behavioral and cognitive attempts to identify and alter the situation (Lazarus & Folkman, 1984), and may include developing a plan of action, increasing effort, or consulting a sport psychologist (Giacobbi & Weinberg, 2000). Emotion-focused coping refers to efforts made to reduce emotional distress (Lazarus & Folkman, 1984), and may include denial, humor, or wishful thinking (Giacobbi & Weinberg, 2000). Avoidance coping pertains to behavioral (e.g., physically removing oneself from the stressful situation) and/or cognitive (e.g., blocking) efforts to avoid a stressor (Anshel, 2001). Athletes in various studies have reported avoidance coping as a means to deal with stress (Anshel, Jamieson, & Raviv, 2001; Giacobbi, Foore, & Weinberg, 2004; Gould, Finch, & Jackson, 1993; Thelwell, Weston, & Greenlees, 2007), citing strategies such as ignoring the situation, using distractions, alcohol/tobacco use, and making excuses. Avoidance coping occurs when a perceived stressful event is appraised as threatening, and is prevalent among athletes who simultaneously demonstrate high levels of cognitive and somatic anxiety (Dias, Cruz, & Fonseca, 2012).

Of the three aforementioned types of coping, the literature has classified problem-focused coping as an adaptive form of coping, and emotion-focused and avoidance coping as maladaptive forms of coping (Dunkley & Blankstein, 2000). Employing maladaptive coping strategies in response to stressors has been linked to depression (Holahan, Moos, Holahan, Brennan, & Schutte, 2005), anxiety (Endler & Parker, 1990), eating disorders (MacNeil, Esposito-Smythers, Mehlenbeck, & Weismore, 2012), and suicidal ideation (Abdollahi & Carlbring, 2016). Within a sporting context, the inability to effectively cope with stressors may lead to reduced performance (Lazarus, 2000), burnout (Hill et al., 2010; Madigan et al., 2015), sport-related injury (Ivarsson & Johnson, 2010; Johnson & Ivarsson, 2011), and withdrawal from sport (Klint & Weiss, 1986; Smith, 1986).

Perfectionism and coping. There is research to support the influential role of personality traits in selecting coping behaviors in the face of stress (Allen, Frings, & Hunter, 2012; Allen, Greenlees, & Jones, 2011; Kaiseler, Polman, & Nicholls, 2013). With regards to perfectionism, relationships have been found with both adaptive and maladaptive forms of coping (Dunkley, Mandel, & Ma, 2014; Gaudreau & Antl, 2008; Hill et al., 2010). Specifically, there is empirical evidence that demonstrates the use of problem-focused coping among those high in perfectionistic strivings (Dunkley & Blankstein, 2000; Dunkley et al., 2014; Gaudreau & Antl, 2008; Hill et al., 2010), and emotion-focused coping and avoidance coping use among those high in perfectionistic concerns (Dunkley et al., 2014; Gaudreau & Antl, 2008; Hewitt, Flett, & Endler, 1995; Hill et al., 2010).

In particular, a recent study by Dunkley et al. (2014) studied 223 community-dwelling adults and found that perfectionistic strivings was positively and significantly associated with problem-focused coping. The study also showed a positive and significant association between perfectionistic concerns and avoidant coping.

Within the sport literature, Gaudreau and Antl (2008) investigated coping behaviors among Canadian athletes and similarly found a positive relation between perfectionistic strivings and problem-focused coping, and an association between perfectionistic concerns and avoidance coping. These findings were further supported by (Hill et al., 2010), who examined perfectionism and coping among junior elite athletes and demonstrated a connection between high levels of perfectionistic strivings and problem-focused coping, and high levels of perfectionistic concerns and avoidance coping.

Although emotion-focused coping has not been as thoroughly investigated as problem-focused coping and avoidance coping in the perfectionism literature, Hewitt et al. (1995) provide support for this maladaptive form of coping among those high in perfectionistic concerns.

Coping and injury. As stated above, the inability to effectively cope with stressful situations in competitive sport has the potential to result in sport-related injury (Ivarsson & Johnson, 2010; Johnson & Ivarsson, 2011). Specifically, in a study carried out by Ivarsson and Johnson (2010) among competitive male soccer players, it was discovered that athletes who became injured during the prospective 12-week study period reported using ineffective coping skills more frequently than the non-injured athletes. The ineffective coping skills used by the injured athletes were those of self-blame and

behavioral disengagement, and have been recognized as maladaptive coping skills in previous research (Anshel & Sutarso, 2007). Further research by Johnson and Ivarsson (2011) also provides support for a relationship between ineffective coping and sport-related injury. In a prospective study of male and female soccer players, it was again found that ineffective coping was a predictor for sport-related injury. Ineffective coping was characterized by freedom from worry and coachability, as measured by the Athletic Coping Skills Inventory-28 (Smith, Schutz, Smoll, & Ptacek, 1995).

Gaps in the Literature

As previously stated, the relationship between perfectionism and injury occurrence has only been investigated in two empirical studies (Krasnow et al., 1999; Madigan et al., 2017). However, it is worth acknowledging some limitations of those studies. Foremost, Krasnow et al. (1999) did not identify the use of a theoretical model as a basis for the study. In addition, although it was recognized that dancers are more susceptible to overuse injuries and gymnasts are more susceptible to traumatic injuries, it was not indicated whether acute or overuse injury data was collected and reported in the analysis (as the study did not provide a definition for what constituted an injury). Furthermore, the perfectionism scale used to measure perfectionism among the population of adolescent athletes was not a sport-specific measure of perfectionism. Previous research demonstrates that athletic injury is more effectively predicted by sport-based questionnaires in comparison to general questionnaires (Lavallée & Flint, 1996). Additionally, there is research to support the domain-specificity of perfectionism (as opposed to regarding perfectionism as a global personality construct) (Dunn, Craft, Causgrove Dunn, & Gotwals, 2011; Dunn et al., 2005), and it is therefore recommended

for any perfectionism measure employed in research to be validated among the population (and within the domain) in which it is examining. As such, a sport-specific perfectionism measure should be used when assessing perfectionism in athletes.

Although the study of perfectionism has been largely ignored with respect to its relation to injury, it seems as though perfectionism is relevant within the stress-injury model given its relationships with stress (Hewitt & Flett, 1993), anxiety (Frost & Henderson, 1991), and coping (Dunkley et al., 2000). Given that there is some preliminary evidence to support perfectionism and injury occurrence (Madigan et al., 2017), it is worth exploring the potential mediating role of the factors included in the stress-injury model (i.e., stress, anxiety, and coping) to determine the mechanism(s) for why perfectionists experience acute sport-related injuries. To this end, the current study builds upon that of Madigan et al. (2017).

Research Question

This study sought to explore the role of perfectionistic strivings and perfectionistic concerns in relation to acute sport-related injury occurrence among a population of varsity and competitive club athletes. Specifically, it was investigated whether the relationship(s) between perfectionism and acute sport-related injury may be mediated by stress, anxiety, and/or coping.

Hypotheses

It was hypothesized that there would be a negative, nonsignificant relationship between perfectionistic strivings and acute sport-related injury, and that there would be a positive, significant relationship between perfectionistic concerns and acute sport-related injury. Furthermore, it was hypothesized that the positive, significant relationship

between perfectionistic concerns and acute sport-related injury would be mediated by perceived stress, trait anxiety, and/or avoidance coping.

CHAPTER 3 METHODS

Study Design

The current study used a retrospective, cross-sectional design to explore athletic injury occurrence and its relationship to personality. Consenting athletes were asked to complete a one-time, online or pen-and-paper questionnaire that was not anticipated to exceed 45 minutes of their time. The study package contained questionnaires to assess perfectionism, stress, anxiety, coping, and all acute injuries resulting from participation in varsity or competitive club sport during the 2016-2017 season.

Participants

Varsity and competitive club athletes who represented their academic institution during the 2016-2017 academic year were recruited for participation in the study. Athletes were recruited from Dalhousie University, Saint Mary's University, Acadia University, St. Francis Xavier University, Cape Breton University, the University of New Brunswick, Mount Allison University, and St. Thomas University. Specifically, male and female athletes from the following team sports were eligible to participate: basketball, football, field hockey, hockey, soccer, and rugby. Athletes were eligible to take part in the study regardless of whether they experienced an acute sport-related injury within the most recent season (i.e., they were eligible to participate if they did experience an acute sport-related injury during the most recent season, and they were also eligible to participate if they did not experience an acute sport-related injury during the most recent season).

Participants consisted of 23 males (19.8%) and 93 females (80.2%), ranging in age from 18 to 30 years ($M = 20.10$, $SD = 1.68$). Of the 116 athletes, a total of 38 were

involved in basketball (32.8%), 10 in field hockey (8.6%), 6 in hockey (5.2%), 42 in rugby (36.2%), and 20 in soccer (17.2%). The majority of the athletes participated in a varsity sport (70.7%), and ranged from first year to fifth year of eligibility ($M = 2.32$, $SD = 1.16$). Of the 116 participants, 53 athletes (45.7%) reported not having incurred an acute sport-related injury during the most recent season, while 63 athletes (54.3%) reported that they did incur an acute sport-related injury during the most recent season. Of the 63 participants who experienced an acute injury, 35 athletes (30.2%) reported only one injury for the duration of the season, 19 athletes (16.4%) reported two injuries, 8 athletes (6.9%) reported three injuries, and 1 athlete (.9%) reported four injuries. The maximum number of acute injuries during the most recent season did not exceed four injuries.

Measures

Demographics. Demographic information was collected by self-report and included biological sex, age, whether the participant was a varsity athlete or a competitive club athlete, and current year of eligibility in their varsity sport (if applicable).

Acute injury history and severity. For the purpose of this study, an acute injury was defined as an injury with a sudden onset, and (often) having a known cause (e.g., sprained ankle). The definition of acute injury employed in the current study is consistent with that used in prior research (Steffen et al., 2009). Athletes were asked whether or not they experienced an acute injury resulting from participation in their varsity or competitive club sport during the most recent (2016-2017) season. If yes, they were asked to report the number of injuries incurred within the most recent season.

Previous research has demonstrated that athletes are able to reliably recall the occurrence (i.e., yes/no) of an injury within the past 12 months (Gabbe, Finch, Bennell, & Wajswelner, 2003).

Perfectionism. The Sport Multidimensional Perfectionism Scale 2 (Sport-MPS-2; Gotwals & Dunn, 2009) was used to assess perfectionism. The scale is established as a valid and reliable measurement tool among athletic populations (Gotwals, 2011; Gotwals & Spencer-Cavaliere, 2014; Hill, 2013). It is a 42-item questionnaire and uses a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale consists of six subscales that are inclusive to: personal standards (e.g., “If I do not set the highest standards for myself in my sport, I am likely to end up a second-rate player”), concern over mistakes (e.g., “Even if I fail slightly in competition, for me, it is as bad as being a complete failure”), perceived parental pressure (e.g., “My parents set very high standards for me in my sport”), perceived coach pressure (e.g., “I feel like my coach criticizes me for doing things less than perfectly in competition”), doubts about actions (e.g., “I usually feel uncertain as to whether or not my training effectively prepares me for competition”), and organization (e.g., “On the day of competition I have a routine that I try to follow”). Athletes were asked to respond to the questionnaire based on their thoughts and feelings from the most recent season. The Sport-MPS-2 was used to assess the two higher-order dimensions of perfectionism; perfectionistic strivings and perfectionistic concerns (Stoeber & Otto, 2006). Perfectionistic strivings are characterized by the personal standards and organization subscales, whereas perfectionistic concerns are comprised of the concern over mistakes, doubts about actions, perceived parental pressure, and perceived coach pressure subscales (Gotwals, Dunn, Causgrove Dunn, & Gamache,

2010). Although researchers have argued against the inclusion of the organization subscale in the calculation of multidimensional perfectionism scores (Frost et al., 1990), numerous studies in the sport science literature provide support for the incorporation of the organization subscale when using the Sport-MPS-2 to measure perfectionistic strivings in sport (Dunn et al., 2016; Dunn, Causgrove Dunn, Gamache, & Holt, 2014; Gotwals & Spencer-Cavaliere, 2014). Specifically, in a sample of hockey players, the organization subscale of the Sport-MPS-2 demonstrated a positive association with the personal standards subscale of the Frost Multidimensional Perfectionism Scale (Gotwals et al., 2010). Also, recent qualitative research has confirmed that the perspectives described by perfectionistic athletes are consistent with the content of the organization subscale items from the Sport-MPS-2 (Gotwals & Spencer-Cavaliere, 2014; Hill, Witcher, Gotwals, & Leyland, 2015). Following the above, Dunn et al. (2016) conclude that all six subscales of the Sport-MPS-2 contribute to the understanding and assessment of perfectionistic strivings and perfectionistic concerns in sport, and therefore provide support for the inclusion of all six subscales within statistical analyses. The validation study for the Sport-MPS-2 produced internal consistency coefficients for the subscales that ranged from .77 to .87 (Gotwals et al., 2010). Within the current study, the Cronbach alpha coefficients were acceptable and ranged from 0.73 to 0.90 for each of the subscales.

Stress. The Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) was used to measure participants' perceived stress during the most recent season. The PSS is a 14-item questionnaire that employs a 5-point Likert scale ranging from 0 (never) to 4 (very often). It is a global measure of stress, and was validated among two separate samples of college age students (Cohen et al., 1983). Internal consistency

coefficients for the validation studies were .84 and .85 for each sample, respectively (Cohen et al., 1983). The internal consistency coefficient for the current sample was .83. Although life event scales have frequently been used to measure stress in previous studies investigating the relationship between stress and athletic injuries (Ivarsson & Johnson, 2010; Ivarsson et al., 2013; Sibold & Zizzi, 2012), subjective ratings from the PSS have been found to better predict health-related outcomes in comparison to objective ratings from life event scales (Cohen et al., 1983).

Anxiety. The Sport Anxiety Scale-2 (SAS-2; Smith, Smoll, Cumming, & Grossbard, 2006) was selected for inclusion in the study as it is established as a valid and reliable measurement tool among athletic populations (Kavussanu, Dewar, & Boardley, 2014; Wolf, Eys, & Kleinert, 2015). It is a 15-item questionnaire and uses a 4-point Likert scale ranging from 1 (not at all) to 4 (very much). The SAS-2 will be used to measure anxiety by asking the athletes to recall thoughts and feelings experienced during the most recent season. The scale consists of three subscales that are inclusive to: somatic anxiety (e.g., “My muscles feel shaky”), worry (e.g., “I worry that I will not play well”), and concentration disruption (e.g., “It is hard for me to focus on what I am supposed to do”). The validation study for the SAS-2 produced internal consistency coefficients for the subscales which were .89, .91, and .84 for somatic anxiety, worry, and concentration disruption, respectively (Smith et al., 2006). The internal consistency coefficients within the current study were .85, .93, and .83 for somatic anxiety, worry, and concentration disruption, respectively.

Coping. The Coping Function Questionnaire (CFQ; Kowalski & Crocker, 2001) was administered to assess how athletes coped with stressful situations in their sport

during the most recent varsity season. The CFQ is an 18-item questionnaire and uses a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). Although the CFQ was validated in a population of adolescent athletes, Hanton, Neil, Mellalieu, and Fletcher (2008) support the inclusion of the scale in studies with university athletes. The scale contains three subscales: problem-focused coping (e.g., “I try to find a way to change the situation”), emotion-focused coping (e.g., “I stay in the situation and try to control my emotions to better deal with the situation”), and avoidance coping (e.g., “I try to get out of the situation as soon as I can to reduce the stress”). Validation of the measure produced a Cronbach alpha greater than .80 for each subscale, indicating adequate internal consistency of the scale (Kowalski & Crocker, 2001). The internal consistency coefficients within the current study sample were .85, .84, and .90 for problem-focused coping, emotion-focused coping, and avoidance coping, respectively. Previous research has demonstrated the disposition of an athlete as being influential in determining whether an event is perceived to be a challenge or a threat, in addition to whether or not they possess the resources to cope with the anticipated demands of the event (Jones, Meijen, McCarthy, & Sheffield, 2009). Therefore, the CFQ was deemed appropriate for inclusion within the study, as it has been employed in studies investigating personality and coping in sport (Allen et al., 2012, 2011).

Procedure

Varsity and competitive club athletes were recruited by means of email and face-to-face meetings. Athletes were recruited from Dalhousie University, Saint Mary’s University, Acadia University, St. Francis Xavier University, Cape Breton University, the University of New Brunswick, Mount Allison University, and St. Thomas University.

Research Ethics Board (REB) approval was obtained from each university prior to commencing recruitment at that respective institution. Recruitment started in March 2017 and ended in June 2017.

Using publically available email addresses, an email was sent to the varsity and competitive club coaches of eligible team sports at Dalhousie University, Saint Mary's University, Acadia University, and St. Francis Xavier University (Appendix A). Coaches were asked if he/she would grant permission to the Principal Investigator (PI) to speak to his/her athletes about the study during a team meeting. For athletes recruited by means of face-to-face meetings, interested athletes were invited to take a copy of the questionnaire package (Appendix C – Appendix I) to complete at a time and location of their choosing. Athletes who opted to take a copy of the questionnaire package were asked to sign a follow-up email consent form (Appendix K), signifying that they consented to receive two follow-up reminder emails (Appendices L and M) pertaining to the study. Athletes at Dalhousie University and Acadia University were instructed to return their completed study package directly to the PI (by sending an email to the PI to set up a meeting time and place on the athlete's respective campus), and athletes at Saint Mary's University and St. Francis Xavier University were instructed to return their completed study package to the Head Athletic Therapist at their respective academic institution. If coaches were not willing to permit the PI to meet face-to-face with the athletes (or if the point in the academic year was not favorable for arranging a team meeting), they were asked if they would forward a web link to the online version of the questionnaire to their athletes (Appendix O). Using publically available email addresses, an email was sent to the varsity and competitive club coaches of eligible team sports at Cape Breton University,

the University of New Brunswick, Mount Allison University, and St. Thomas University. Coaches were asked if they would be willing to forward the link to the online version of the questionnaire to their athletes, and the PI provided the web address to those coaches who indicated their willingness to do so.

Statistical Analyses

Descriptive analyses utilized frequencies, means, and standard deviations to describe participant demographics, varsity sport participation, years of participation, and details pertaining to self-reported acute sport-related injuries (including injury frequency). Internal consistency coefficients (i.e., Cronbach alpha) were generated for all subscales from the Sport-MPS-2, PSS, SAS-2 and CFQ questionnaires to confirm reliability of scores within the given sample.

While the primary focus was on testing mediation, logistic and multiple regression analyses were also conducted to examine whether any of the nine variables in the present study (e.g., perfectionistic strivings, perfectionistic concerns, perceived stress, somatic anxiety, worry, concentration disruption, problem-focused coping, emotion-focused coping, and avoidance coping) were unique predictors of the occurrence of athletic injury.

Logistic regression was used to investigate the relationship between nine psychological predictors (e.g., perfectionistic strivings, perfectionistic concerns, perceived stress, somatic anxiety, worry, concentration disruption, problem-focused coping, emotion-focused coping, and avoidance coping) and the occurrence of acute sport-related injury. Multiple regression was carried out to investigate the relationship between the nine psychological predictors and the frequency (i.e., number of injuries) of

acute sport-related injuries incurred during the most recent athletic season. Logistic and multiple regression were conducted in this manner so as to allow an examination of unique effects. These analyses would, for example, allow an understanding of perfectionistic concerns while simultaneously taking into account the influence of all other psychological variables.

To gain an understanding of how perfectionistic strivings and/or perfectionistic concerns may lead to acute injury occurrence (e.g., through stress, anxiety, and/or coping), mediation analyses were conducted. Although early research in mediation analyses posited that there must be a statistically significant relationship between the predictor variable and the outcome variable for mediation to occur (Baron & Kenny, 1986), recent research acknowledges that mediation may also occur in the absence of an association between the predictor variable and the outcome variable (Cerin & MacKinnon, 2009; Hayes, 2009)

Based on recommendations put forth by Preacher and Hayes (2004), an SPSS macro was used to examine whether perfectionistic strivings and/or perfectionistic concerns may have an indirect effect on injury occurrence through stress, anxiety, and/or coping. This was carried out using a bootstrapping procedure to calculate a confidence interval with regards to the indirect effect.

CHAPTER 4 RESULTS

A total of 74 varsity and competitive club coaches from eight Nova Scotian and New Brunswick universities were contacted about the study. Of the 74 coaches contacted, 41 replied to express their willingness to allow the PI to speak to his/her athletes at an organized team meeting, or expressed his/her willingness to forward the online web link to their athletes (55% coach response rate). Of the 41 inclined coaches, 27 coaches were those of a women's team. Coaches replied from all sports eligible to participate in the research study (i.e., basketball, football, field hockey, hockey, soccer, and rugby).

A total of 119 varsity and competitive club athletes completed the study questionnaires. Of the 119 athletes, 12 athletes filled out the pen-and-paper package and 107 athletes filled out the online survey. Three athletes classified their injuries as "tendonitis", a type of overuse injury (Cuff, Loud, & O'Riordan, 2010), and were therefore excluded from the final data analysis. Data from the remaining 116 participants were analyzed and included within the final study results.

Psychological Factors and Acute Sport-Related Injury

Means, standard deviations, and coefficients alpha are presented in Table 1. Several meaningful relationships were found. A large (.82) and significant correlation between acute injury and number of injuries ($p < .001$) was found. A significant, moderate correlation between perfectionistic strivings and acute injury (.22; $p < .05$) as well as perfectionistic strivings and perfectionistic concerns (.31; $p < .01$) was also noted. Perfectionistic strivings was unrelated to all other study variables (i.e., number of injuries, perceived stress, somatic anxiety, worry, concentration disruption, problem-

focused coping, emotion-focused coping, and avoidance coping). There was a moderate and significant correlation between perfectionistic concerns and somatic anxiety (.34; $p < .001$), as well as perfectionistic concerns and concentration disruption (.39; $p < .001$). A large and significant correlation between perfectionistic concerns and perceived stress (.49; $p < .001$), and perfectionistic concerns and worry (.50; $p < .001$) was found. Furthermore, there was a moderate and significant correlation between perfectionistic concerns and problem-focused coping (-.23; $p < .05$). Perfectionistic concerns were unrelated to all other study variables (i.e., acute injury occurrence, number of injuries, emotion-focused coping, and avoidance coping).

Acute Athletic Injury Occurrence

Logistic regression analysis was carried out to examine how nine psychosocial variables (e.g., perfectionistic strivings) predicted the likelihood of acute sport-related injury occurrence during the most recent varsity season. All nine variables were entered into the regression equation simultaneously (Table 2). Among these nine predictors, only perceived stress was associated with injury occurrence. There was a positive, significant, and small association observed between perceived stress and injury occurrence ($p = .02$). No other significant associations were observed. Furthermore, the analysis indicated that the likelihood (odds ratio) of incurring an injury was increased by 1.10 for each 1 *SD* increase in perceived stress. Results demonstrated that the model as a whole explained between 15% (Cox and Snell R^2) and 20% (Nagelkerke R^2) of the variance in injury.

Table 1

Relationship Between Psychological Factors and Acute Sport-Related Injury

Measure	<i>M(SD)</i>	α	1	2	3	4	5	6	7	8	9	10	11
1. Acute Injury	-----	-----	-----										
2. No. Injuries	0.87(0.98)	-----	.82***	-----									
3. PS	3.64(0.54)	.83	.22*	.15	-----								
4. PC	2.77(0.50)	.89	.10	.08	.31**	-----							
5. PSS	1.87(0.48)	.83	.14	.08	.16	.49***	-----						
6. SA	1.94(0.66)	.85	-.13	-.11	.09	.34***	.42***	-----					
7. Worry	2.60(0.84)	.93	-.11	-.11	.01	.50***	.47***	.65***	-----				
8. CD	1.52(0.53)	.83	-.17	-.11	.02	.39***	.45***	.55***	.57***	-----			
9. PFC	3.24(0.70)	.85	.09	.00	.11	-.23*	-.30**	-.15	-.16	-.25**	-----		
10. EFC	3.49(0.69)	.84	-.01	-.05	.11	-.14	-.30**	-.05	-.12	-.16	.62***	-----	
11. AC	2.68(0.92)	.90	.02	-.11	.05	.17	.16	.01	.14	.10	.19*	.06	-----

Note. Correlations were interpreted with respect to the effect size guidelines from Cohen (1992; small = .10; moderate = .30; large = .50). No. Injuries = Number of injuries; PS = Perfectionistic strivings; PC = Perfectionistic concerns; PSS = Perceived Stress Scale; SA = Somatic anxiety; CD = Concentration disruption; PFC = Problem-focused coping; EFC = Emotion-focused coping; AC = Avoidance coping.

* $p < .05$. ** $p < .01$. *** $p < .001$

Table 2

Psychological Factors Predicting the Occurrence of Acute Athletic Injury

Predictor	Injury (yes/no)				
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>OR</i>	<i>95% CI</i>
PS	0.05	0.03	.18	1.05	[0.99, 1.12]
PC	0.02	0.02	.33	1.02	[0.98, 1.06]
PSS	0.09*	0.04	.02	1.10	[1.01, 1.19]
SA	-0.08	0.09	.37	0.93	[0.78, 1.10]
Worry	-0.05	0.07	.49	0.95	[0.82, 1.10]
CD	-0.18	0.11	.11	0.84	[0.67, 1.04]
PFC	0.50	0.41	.22	1.65	[0.74, 3.70]
EFC	-0.24	0.38	.54	0.79	[0.38, 1.67]
AC	-0.11	0.24	.63	0.89	[0.56, 1.41]

Note. Injury coded as 1 = yes, 0 = no. OR: odds ratio; CI: confidence interval. PS = Perfectionistic strivings; PC = Perfectionistic concerns; PSS = Perceived Stress Scale; SA = Somatic anxiety; CD = Concentration disruption; PFC = Problem-focused coping; EFC = Emotion-focused coping; AC = Avoidance coping.

* $p < .05$.

Acute Athletic Injury Frequency

Multiple regression analysis was conducted to investigate how nine psychosocial variables (e.g., perfectionistic strivings) predicted the likelihood of acute sport-related injury frequency during the most recent varsity season. All nine variables were entered into the regression equation simultaneously (refer to Table 3), and no significant associations were noted between the nine predictor variables and the number of acute athletic injuries ($F(9, 106) = 1.16, p = .332$). These nine predictor variables explained 8.9% of the variance between the predictors and injury frequency.

Table 3

Psychological Factors Predicting the Frequency of Acute Athletic Injuries

Predictor	Injury Frequency				
	<i>B</i>	<i>95% CI</i>	β	<i>t</i>	<i>p</i>
PS	0.19	[-0.02, 0.04]	.09	0.90	.37
PC	0.01	[-0.01, 0.03]	.14	1.14	.26
PSS	0.01	[-0.01, 0.06]	.16	1.28	.20
SA	-0.03	[-0.10, 0.05]	-.08	-0.65	.52
Worry	-0.03	[-0.09, 0.04]	-.12	-0.86	.39
CD	-0.04	[-0.13, 0.06]	-.10	-0.78	.44
PFC	0.12	[-0.23, 0.48]	.09	0.70	.48
EFC	-0.11	[-0.45, 0.23]	-.08	-0.64	.52
AC	-0.15	[-0.36, 0.06]	-.14	-1.44	.15

Note. The number of acute athletic injuries reported during the most recent (2016-2017) season ranged from 0 to 4. PS = Perfectionistic strivings; PC = Perfectionistic concerns; PSS = Perceived Stress Scale; SA = Somatic anxiety; CD = Concentration disruption; PFC = Problem-focused coping; EFC = Emotion-focused coping; AC = Avoidance coping.

Direct and Indirect Effect of Perfectionism on Acute Injury Occurrence

Mediational analyses were carried out to investigate the potential indirect effect of perfectionistic strivings and perfectionistic concerns on acute injury occurrence. A significant, direct effect was observed between perfectionistic strivings and the seven other predictor variables (i.e., perceived stress, somatic anxiety, worry, concentration disruption, problem-focused coping, emotion-focused coping, and avoidance coping) (Table 4). All direct effects between perfectionistic strivings and the predictor variables were significant at $p < .05$. No significant direct effects were observed between perfectionistic concerns and the seven other predictor variables. Analyses of the indirect

effect of perfectionistic strivings and perfectionistic concerns on acute injury occurrence did not reveal any statistically significant findings.

Table 4

Direct and Indirect Effects of Perfectionistic Strivings and Perfectionistic Concerns on Acute Injury Occurrence

Effect	Direct Path Estimate		Indirect Effect Estimate	
	<i>B</i>	95% <i>CI</i>	<i>B</i>	95% <i>CI</i>
PS → PSS	0.06*	[0.01, 0.12]	0.01	[-0.03, 0.02]
PC → PSS	0.01	[-0.02, 0.04]	0.01	[-0.01, 0.02]
PS → SA	0.07*	[0.02, 0.13]	0.00	[-0.03, 0.01]
PC → SA	0.02	[0.00, 0.05]	-0.01	[-0.03, 0.00]
PS → Worry	0.07*	[0.01, 0.12]	0.00	[-0.01, 0.01]
PC → Worry	0.03	[0.00, 0.06]	-0.02	[-0.03, 0.00]
PS → CD	0.07*	[0.01, 0.13]	0.00	[-0.02, 0.01]
PC → CD	0.03	[0.00, 0.06]	-0.01	[-0.03, 0.00]
PS → PFC	0.06*	[0.01, 0.12]	0.00	[0.00, 0.02]
PC → PFC	0.02	[-0.01, 0.04]	0.00	[-0.01, 0.00]
PS → EFC	0.07*	[0.01, 0.13]	0.00	[-0.02, 0.00]
PC → EFC	0.01	[-0.01, 0.04]	0.00	[-0.01, 0.01]
PS → AC	0.07*	[0.01, 0.12]	0.00	[-0.01, 0.01]
PC → AC	0.01	[-0.01, 0.04]	0.00	[-0.01, 0.01]

Note. PS = Perfectionistic strivings; PC = Perfectionistic concerns; PSS = Perceived Stress Scale; SA = Somatic anxiety; CD = Concentration disruption; PFC = Problem-focused coping; EFC = Emotion-focused coping; AC = Avoidance coping.

* $p < .05$

CHAPTER 5 DISCUSSION

The primary purpose of this study was to explore the role of perfectionistic strivings and perfectionistic concerns in relation to acute sport-related injury occurrence. It was hypothesized that there would be a non-significant, negative relationship between perfectionistic strivings and acute sport-related injury occurrence. The findings did not support this hypothesis, as a positive and significant relationship was observed between perfectionistic strivings and the occurrence of acute sport-related injury. Furthermore, it was hypothesized that there would be a significant and positive relationship between perfectionistic concerns and acute sport-related injury occurrence. This hypothesis was similarly not supported by the study findings, as a significant relationship was not observed between perfectionistic concerns and the occurrence of acute sport-related injury. That said, there was a small and positive, albeit, nonsignificant association between perfectionistic concerns and acute sport-related injury.

Additionally, it was hypothesized that the significant and positive relationship between perfectionistic concerns and acute sport-related injury would be mediated by perceived stress (i.e., threat appraisal), trait anxiety, and/or avoidance coping. Although perfectionistic concerns were related to perceived stress and trait anxiety, the mediation model did not hold as perfectionistic concerns were not related to injury occurrence. Furthermore, perceived stress, trait anxiety, and avoidance coping did not demonstrate a significant association with injury occurrence.

Injury Occurrence and Frequency of Injury Occurrence

In the present study, a significant and positive relationship was observed between whether or not an acute injury was reported and the frequency of injury. This finding

suggests that athletes who suffer one injury may be more susceptible to the occurrence of multiple injuries.

Perfectionism and Injury Occurrence

The current study demonstrated a significant and positive relationship between perfectionistic strivings and injury, and a nonsignificant and positive relationship between perfectionistic concerns and injury. These findings are in opposition of the stated study hypotheses. Specifically, it was hypothesized that there would be a nonsignificant, negative relationship between perfectionistic strivings and injury occurrence. This was anticipated due to the plethora of research findings relating perfectionistic strivings to an array of adaptive outcomes (Chang et al., 2004; Frost et al., 1993; Stumpf & Parker, 2000). Furthermore, it was hypothesized that there would be a significant, positive relationship between perfectionistic concerns and injury occurrence. This was expected as a result of numerous studies reporting an association between perfectionistic concerns and maladaptive outcomes (Chang et al., 2004; Frost et al., 1993; Stumpf & Parker, 2000; Suddarth & Slaney, 2001).

Despite existing data which suggests an association between perfectionistic strivings and adaptive outcomes and perfectionistic concerns and maladaptive outcomes, there is some research to suggest that the relentless striving and hyper-competitiveness that is characteristic of perfectionistic strivings may also place individuals at risk for maladaptive outcomes such as negative affect (Besser, Flett, & Hewitt, 2004), obsessive passion (Curran, Hill, Jowett, & Mallinson, 2014), increased blood pressure (Besser, Flett, Hewitt, & Guez, 2008), and obligatory exercise (Hall, Kerr, Kozub, & Finnie, 2007). The present study builds upon this area of literature by demonstrating that

perfectionistic strivings may also be associated with acute sport-related injury occurrence among competitive varsity athletes. Having discussed the association between perfectionism and injury occurrence, factors are now considered (i.e., stress, anxiety, coping) which may mediate the perfectionism-injury occurrence relationship.

Perfectionism, Stress, and Injury Occurrence

As expected, perceived stress was positively and significantly correlated with perfectionistic concerns. No significant relationship was found between perceived stress and perfectionistic strivings. This is consistent with a wider literature showing that perfectionistic strivings has an inconsistent relationship with stress, including positive, negative, and null findings. However, the nonsignificant relationship between perceived stress and acute injury occurrence was unexpected. The cross-sectional nature of the present study may have obscured a relationship between perceived stress and injury occurrence. For example, perceived stress may be more prominent after an injury, but our cross-sectional design was unable to capture such temporal processes.

Perfectionism and stress. This study is consistent with past literature in that the sample within the present study was comprised of undergraduate students, who are known to possess perfectionistic personality traits (Richardson, Rice, & Devine, 2014). Of note, individuals exhibiting perfectionistic concerns have also been found to report high levels of perceived stress (Albert et al., 2016; Chang & Sanna, 2012; Rice et al., 2006). The current study supports the above, as a positive and significant relationship was noted between perfectionistic concerns and perceived stress in the present sample of undergraduate student-athletes.

Stress and injury occurrence. There is empirical evidence linking stress to athletic injury occurrence, but the findings have been mixed (Ivarsson & Johnson, 2010; Rogers & Landers, 2005). This may be due to the various methods used to assess stress among the studies, including daily hassles (Fawkner et al., 1999; Ivarsson & Johnson, 2010), life event stress (Ivarsson et al., 2013; Johnson & Ivarsson, 2011; Sibold & Zizzi, 2012), and previous injuries (Devantier, 2011; Hanson et al., 1992; Steffen et al., 2009). Among studies investigating the relationship between life event stress and athletic injury occurrence, some studies have focused on either negative life event stress (Ivarsson et al., 2013; Maddison & Prapavessis, 2005; Rogers & Landers, 2005; Sibold & Zizzi, 2012) and/or positive life event stress (Sibold & Zizzi, 2012), while others have encompassed total life event stress (Johnson et al., 2005). Furthermore, assessments of stress vary between measuring the presence of a stressful event (e.g., checklists) (Passer & Seese, 1983), versus those that measure stress subjectively (i.e., how the individual perceives and responds to a potentially stressful event) (Cohen et al., 1983). Given the varied methods utilized to assess stress, it is perhaps not surprising to note the discrepant findings pertaining to stress and injury occurrence.

Perfectionism, Anxiety, and Injury Occurrence

As expected, cognitive and somatic trait anxiety were positively and significantly correlated with perfectionistic concerns. Also as anticipated, cognitive and somatic trait anxiety did not demonstrate a relationship with perfectionistic strivings. However, the negative and nonsignificant relationship between (cognitive and somatic) trait anxiety and acute injury occurrence was unexpected.

Perfectionism and anxiety. As anticipated, both cognitive (i.e., worry and concentration disruption) and somatic anxiety were not significantly correlated with perfectionistic strivings, but they were significantly correlated with perfectionistic concerns. Surprisingly, although non-significant, both cognitive and somatic anxiety demonstrated a negative relationship with acute injury occurrence.

The majority of the research investigating perfectionism and anxiety is found within the general psychology literature (Burgess & DiBartolo, 2016). A limitation of the anxiety measures used within the general psychology literature is the absence of subscales to distinguish between cognitive anxiety and somatic anxiety, and instead conceptualizing anxiety as unidimensional (Dunkley et al., 2000; Klibert et al., 2014). The current study contributes to the existing literature on perfectionism and anxiety by using a multidimensional measure of anxiety to differentiate between the varying components of the anxiety experience (e.g., cognitive anxiety (worry and concentration disruption) and somatic anxiety).

Anxiety and injury occurrence. As previously stated, both cognitive and somatic anxiety showed a negative and nonsignificant relationship with acute injury occurrence. This is largely inconsistent with previous literature exploring the connection between anxiety and sport-related injury, as both cognitive (Ivarsson & Johnson, 2010) and somatic (Ivarsson & Johnson, 2010; Johnson & Ivarsson, 2011) anxiety have been associated with injury occurrence.

Perfectionism, Coping, and Injury Occurrence

In the current study, a significant, negative correlation was found between perfectionistic concerns and problem-focused coping. Surprisingly, no significant

relationships were found between perfectionistic strivings and coping strategies.

Furthermore, no significant relationships were discovered between injury occurrence and coping strategies.

Perfectionism and coping. It was hypothesized that athletes scoring high on perfectionistic concerns would be more likely to employ methods of avoidance coping, and would be less likely to engage in problem-focused coping strategies. Although the results of this study confirm that those high in perfectionistic concerns were less likely to use problem-focused coping in the face of a stressor (as indicated by a negative, significant relationship between perfectionistic concerns and problem-focused coping), no relationship was found between perfectionistic concerns and avoidance coping.

Coping and injury occurrence. As stated above, the present study did not find a relationship between the occurrence of acute sport-related injury and the presence of maladaptive coping strategies (or the absence of adaptive coping strategies). It was expected that the current findings would be consistent with other literature in the sport psychology domain; that is, it was anticipated that there would be a relationship between maladaptive coping strategies and the occurrence of sport-related injury as found by Ivarsson and Johnson (2010), and Johnson and Ivarsson (2011).

Limitations and Future Directions

Stress-injury model. The theoretical framework used in the current study focuses predominantly on cognitive stress responses (Williams & Andersen, 1998). Previous literature has identified the narrow focus of the stress-injury model to be a major limitation within sport injury prediction and prevention research (Appaneal & Perna, 2014), and it is suggested that behavioral mechanisms associated with the stress response

(e.g., poor sleep quality, impaired self-care) should also be considered along with the psychological, physiological, and attentional mechanisms (Appaneal & Perna, 2014). In addition, other psychological variables not encompassed as part of the stress-injury model have been associated with increased risk of sport-related injury. These include poor visual and verbal memory (Swanik et al., 2007), high levels of psychophysiological fatigue (Liederbach & Compagno, 2001), and the ignorance of stressors and/or neglecting recovery (Richardson, Andersen, & Morris, 2008). Future research should aim to investigate behavioral mechanisms and other psychological variables in combination with the stress-injury model. This will allow for a greater understanding of how the variables included within the stress-injury model may interact with other behavioral mechanisms or psychological variables to influence acute sport-related injury.

Measure of injury. The present study relied on straightforward measures of injury occurrence (i.e., yes/no) and injury frequency (i.e., number of injuries during season). This is consistent with a range of research within the realm of sport injury (Ivarsson et al., 2014, 2013; Johnson et al., 2005; Madigan et al., 2017). Although the measure of injury frequency is consistent across studies (e.g., number of injuries during study period), the definition of injury varies widely. For example, some studies use a time-loss definition for injury (Ivarsson & Johnson, 2010; Ivarsson et al., 2014, 2013; Sibold & Zizzi, 2012), implying that a certain amount of time must be lost from participation in sport for it to be considered a valid injury for the study (Clarsen & Bahr, 2014; Coddington & Troxell, 1980). Among those that use a time-loss definition for injury, some studies have characterized an injury as those requiring an athlete to miss at least one practice or competition due to injury (Ivarsson & Johnson, 2010; Ivarsson et al.,

2013; Sibold & Zizzi, 2012) whereas others require an athlete to miss at least three days of practice or games to be considered a valid injury for inclusion within the study (Ivarsson et al., 2014). Using this approach to measure injury, Ivarsson and Johnson (2010) found a statistically significant relationship between injury and (somatic and cognitive) trait anxiety. In addition, it was noted that injured athletes in the study were more likely to employ maladaptive coping strategies (e.g., behavioral disengagement and self-blame) than non-injured athletes. Alternatively, some studies use a medical attention definition for injury (Alizadeh et al., 2012; Deroche, Stephan, Brewer, & Le Scanff, 2007; Fawkner et al., 1999; Madigan et al., 2017), implying that medical attention must be sought from a practicing clinician for it to be considered a valid injury for the study (Blackwell & McCullagh, 1990; Clarsen & Bahr, 2014). When measuring injuries in this manner, Alizadeh et al. (2012) discovered a statistically significant relationship between injury and (somatic and cognitive) state anxiety. Furthermore, Fawkner et al. (1999) found that athletes who became injured reported a significant increase in minor life events in the week leading up to injury. Some studies combine a time-loss and medical attention definition for injury, specifying that the athlete must require medical attention *or* must miss at least one day of training (Alizadeh et al., 2012; Deroche et al., 2007), or specifying that the athlete must require medical attention *and* miss at least one day of training (Fawkner et al., 1999; Madigan et al., 2017). Other studies operationalize an injury as requiring the athlete to miss a practice or competition *or* causing sport participation to be substantially modified for at least one day (Johnson et al., 2005). A much less specific operationalized definition of injury that has been used in the literature is “all types of injuries that occur in connection with sport participation” (Johnson &

Ivarsson, 2011, p. 131). Of note, none of the above definitions specify whether the injury data collected was that of an acute nature or an overuse nature. Given variations in injury definitions, it can prove difficult to reliably compare outcomes among multiple studies. Previous efforts have been made to standardize injury surveillance methodology (Fuller et al., 2006, 2007; Orchard et al., 2005), however, Clarsen and Bahr (2014) assert that injury should be defined in consideration with the population, context, and resources available for the particular study.

While defensible, the measures of injury occurrence and injury frequency described above do not provide a richer nuanced assessment of the injury experience. In future research, more nuanced multidimensional measures of the injury experience might be used or developed. For example, the psychological variables in the present study may impact aspects of the injury experience not measured in the present study (e.g., severity of pain). It may also be possible that a semi-structured interview (e.g., with prompts and follow-up questions) would allow for a more detailed characterization of the injury experience. Given challenges in the measurement of injury in the present study, it would be premature to conclude that perfectionistic concerns and the occurrence of acute sport-related injuries are unrelated.

Study design. The current study employed a retrospective, cross-sectional study design. In future research, a longitudinal design should be used to shed light on issues of temporal precedence and directionality (e.g., does stress precede injuries, or do injuries trigger stress?) (Euser, Zoccali, Jager, & Dekker, 2009). Retrospective studies investigating stress and injury provide a unique challenge, as the injury itself may serve as a stressor and bias the results of participant stress (Petrie & Falkstein, 1998). In

addition, the present study involved a relatively small sample size. Future studies should recruit larger samples, which may allow detection of smaller effect sizes (Cohen, 1992).

Self-report. The present study relied entirely on participant self-report. Participants were not trained in the observation of their injuries, and therefore their observations may be in some ways biased (e.g., under or over-reporting injury). Previous research has also made use of self-report in the recording of sport-related injuries (Alizadeh et al., 2012; Kolt, Hume, Smith, & Williams, 2004). Additionally, coaches (Johansson et al., 2015), physiotherapists (Madigan et al., 2017; Steffen et al., 2009), and athletic therapists (Johnson & Ivarsson, 2011) have also been responsible for recording sport-related injuries. In future research, it will be important to corroborate or extend participant self-report by making use of relevant experts (e.g., physiotherapists, athletic therapists) to verify the occurrence of sport-related injury. Self-reports are also subject to biases that may affect the present study, such as recall bias (Petrie & Falkstein, 1998). In the current study, data was collected from athletes at the end of their most recent season, which may have affected the accuracy of their responses. Recall bias has been investigated in the stress and coping literature, with findings indicating that individuals are more likely to overestimate the degree to which they engaged in favorable coping strategies when asked in retrospect (Smith, Leffingwell, & Ptacek, 1999). In future research, a study design could be used where participants report their injuries closer to their real-time occurrence.

Response rate. The response rate in the present study is ultimately unknown. That is, while it is known that 74 coaches were contacted via email and 41 replies were received, the final participation rate is unknown. This raises questions about the

representativeness and generalizability of the sample. For example, as the majority of participants in the current study were female, we cannot determine if that may be due to the fact that many of the coaches who were willing to forward the study email were those of women's teams, or if women are more likely than men to participate in psychological research studies (Graham et al., 2010; Mackinnon, Battista, Sherry, & Stewart, 2014; Sherry, Stoeber, & Ramasubbu, 2016; Smith, Sherry, Saklofske, & Mushqaush, 2017).

Furthermore, sex differences have been identified in the coping literature (Hoar, Kowalski, Gaudreau, & Crocker, 2006; Nicholls & Polman, 2007), and although both males and females use a variety of problem-focused and emotion-focused coping strategies, females have been found to be more likely to employ emotion-focused coping strategies when confronted with a similar stressor (Crocker & Graham, 1995; Kolt, Kirkby, & Lindner, 1995). Future studies should examine sex differences within the stress-injury model. This may be achieved by recruiting and comparing a large (sex-balanced) sample of male and female athletes.

Moderation. Although mediation analysis did not produce any statistically significant results in the present study, the potential moderating effect of stress, anxiety, and coping should be considered and examined in future research. A general perfectionism vulnerability model has been supported in the literature, demonstrating that individuals with high perfectionistic concerns who encounter high levels of stress have subsequently higher levels of distress symptoms (Enns, Cox, & Clara, 1995; Flett, Hewitt, Blankstein, & Mosher, 1995). Furthermore, research supports the notion that individuals with perfectionistic standards are more likely to experience maladjustment

when high levels of avoidance coping are employed in response to a stressor (O'Connor & O'Connor, 2003).

Implications

The current study has implications for various practitioners. For example, practitioners may be advised that athletes who are perfectionists are more likely to be stressed and to be anxious, and to cope in a less problem-focused manner. Put differently, an injured perfectionist may perceive their injury experience as being more complicated. Moreover, an injured perfectionist may also require additional psychological supports to recover from their injury in a timely manner.

Many practitioners may hold a favorable view of perfectionism or perfectionists in sport. However, the association between perfectionistic strivings and injury occurrence in the present study suggests perfectionism may in some ways place athletes at risk for the occurrence of injury. At a minimum, this finding seems to run contrary to the notion that perfectionism may have adaptive benefits to athletes.

Coaches working with athletes may want to view perfectionism as a double-edged sword; that is, a trait that is associated with both favorable and unfavorable characteristics and consequences. To this end, it may be desirable for coaches to have an empirically informed view of the pros and cons of perfectionism. Some indicators of perfectionism displayed by athletes may include verbally expressed self-criticism, exaggerated reactions to perceived or actual mistakes, and/or doubts about their performance abilities. Athletes may also be preoccupied with their presentation of self, as characterized by exaggerated concerns of public display of perfection or imperfection. Coaches and parents should also consider that they may be contributing to the problem by imposing high expectations

or demands on the athlete. A coach or parent could support a perfectionistic athlete by referring the athlete to counselling or to a sport psychologist, or by providing him/her with self-help tools (e.g., websites, books, etc.). It may be decided that an athlete is in need of additional support when impairment is noted. Impairment may be in the form of reduced performance in sport, interpersonal conflict (with teammates), reduced performance in school, and/or reduced performance at a part-time job (if applicable).

Pending future research that more robustly implicates perfectionism in the injury experience, practitioners may wish to incorporate measures of perfectionism into the assessment and understanding of their athletes. In other words, an initial assessment of athletes' perfectionism may help to identify those perfectionists who are at risk for a more complicated injury experience. Given that self-report measures of perfectionism are widely available in the public domain, such assessments could readily be carried out by coaches or clinicians.

Conclusion

The present study confirms, extends, and challenges existing research. Specifically, this study confirmed our understanding that perfectionistic concerns is associated with anxiety, stress, and some forms of ineffective coping. This study also builds on existing research in several ways. Going beyond many of the studies typically occurring in perfectionism research, which focus on unselective samples of undergraduates, the present study provided one of only a small number of empirical demonstrations that competitive athletes also struggle with perfectionism in ways that are associated with stress, anxiety, ineffective coping, and injury. The present study also raised questions about the pros and cons of perfectionistic strivings within the athletic

domain by suggesting that perfectionistic strivings may be associated with injury occurrence.

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APPENDIX A Email to varsity coaches about face-to-face recruitment

Dear Mr./Ms. (coach's name):

My name is Krystal Soucy and I am a Masters student in Kinesiology at Dalhousie University. I am conducting a study to fulfill my Master's thesis requirement, and it involves the recruitment of varsity athletes to complete a pen-and-paper questionnaire.

The purpose of my study is to explore if certain personality characteristics can increase the likelihood of athletic injury. To accomplish this, athletes will be asked to complete questionnaires that will assess personality, stress, anxiety, and coping. They will also be asked to report details pertaining to any acute sport-related injuries they incurred in varsity sport during the most recent varsity season (if applicable). Athletes from the following sports are invited to take part in the study: basketball, field hockey, football, hockey, soccer, and rugby. All athletes from the above sports are invited to take part, regardless of whether or not they experienced an acute sport-related injury during the most recent varsity season (i.e., they may participate if they have incurred an acute sport-related injury during the most recent varsity season, and they may also participate if they have not incurred an acute sport-related injury during the most recent varsity season).

I am seeking your support by asking if I may come to an organized team meeting to speak to your athletes about the study. I will have questionnaire packages available that I can distribute to interested athletes, and athletes may read the consent form and decide whether or not they wish to participate in the research study. Athletes will be given the opportunity to take the questionnaire package home with them, to complete at a time and location of their choice. It should take no more than 15 minutes to introduce the study and provide study packages to those interested.

It is acknowledged that you may no longer be holding team meetings at this point in the academic year. If that is the case, would you be willing to forward a link to the online survey to your athletes?

This study has been granted ethical approval by the Dalhousie University Research Ethics Board. Should you have any questions about the study, please do not hesitate to contact myself: Krystal Soucy, Masters Student, Kinesiology, Dalhousie University, email: soucyk@dal.ca, or my supervisors: Dr. Melanie Keats, Associate Professor, Kinesiology, Dalhousie University, email: melanie.keats@dal.ca, phone: (902) 494-7173 and Dr. Lori Dithurbide, Assistant Professor, Kinesiology, Dalhousie University, email: lori.dithurbide@dal.ca, phone: (902) 494-2477.

Thank you in advance,
Krystal Soucy

APPENDIX B Consent form (electronic copy)



Consent Form

Project Title

Personality Profiles and Injury Occurrence in a Population of Varsity Athletes

Principal Investigator

Krystal Soucy, Masters Student, Kinesiology, Dalhousie University, email: soucyk@dal.ca

Supervisors

Dr. Melanie Keats, Associate Professor, Kinesiology, Dalhousie University, email: melanie.keats@dal.ca, phone: (902) 494-7173

Dr. Lori Dithurbide, Assistant Professor, Kinesiology, Dalhousie University, email: lori.dithurbide@dal.ca, phone: (902) 494-2477

Introduction

You are invited to take part in a research study being conducted by Krystal Soucy, who is a Masters student in Kinesiology at Dalhousie University. Your participation in this study is voluntary and you may withdraw from the study at any time *prior to submitting the completed questionnaire*. Your choice to participate or not participate will not affect your standing on your varsity team in any way. The study is described below, and tells you about the potential risks, inconvenience, or discomfort that you might experience. Although participating in the study will not be of direct benefit to you, we hope to use the information to further understand the relation between personality and potential injury risk at the varsity level. You should discuss any questions you may have pertaining to this study with Krystal Soucy. She may be contacted at soucyk@dal.ca.

Purpose of the Study

The purpose of this research study is to observe if athletes with certain personality characteristics are more likely to experience an acute sport-related injury in varsity sport. You are being asked to participate in this study as you are a current varsity athlete and are attending a Canadian university.

Who Can Participate?

You are eligible to take part in this study if you are a male or female varsity athlete currently studying at a Canadian university, and currently participating in one of the following varsity sports: field hockey, basketball, football, hockey, soccer, or rugby. You must be able to read in the English language, as the questionnaire is in English.

What You Will Be Asked To Do

If you agree to take part in this study, you will be asked to complete a one-time online survey that should take no more than 45 minutes of your time. Although you may complete the survey at any location of your choice, you are encouraged to find a location with minimal distractions. You will be asked to provide some demographic information, and you will also be asked questions pertaining to your personality, your anxiety levels, and the ways that you cope with stressful events. Additionally, you will be asked questions pertaining to *each acute sport-related injury* you experienced as a result of participating in your varsity sport during the most recent varsity season (if applicable). An acute sport-related injury is defined as an injury with a sudden onset, and (often) has a known cause such as a sprained ankle. Questions will include: number of injuries, date of injuries, whether the injuries occurred in practice or competition, the point in the season during which the injuries occurred, how the injuries occurred, whether they are new or recurrent injuries, location of the injuries, types of injuries, any modifications made to accommodate your participation in sport, amount of time missed from your sport, and any immediate or long-term medical attention that was required.

Potential Risks and Discomforts

There is a minimal possibility that you may feel uncomfortable about some of the questions you are being asked (i.e., there is a very small chance that you may experience emotional or psychological distress as a result of recalling a previous injury). Your participation in the study is completely voluntary, and you may take a break or skip questions that make you feel uncomfortable. You may leave the study at any point (i.e., you may stop answering questions), but understand that the responses that you have submitted up until the point that you choose to withdraw will be retained and may be included in the final data analyses. While there are no direct personal benefits to you from taking part in this study, your participation may help us to learn more about perfectionistic tendencies in relation to injury occurrence and prevention in a population of varsity-level athletes.

Confidentiality and Anonymity

Your email address will be stored within the survey site, which is hosted on Dalhousie University's secure Opinio web server, but will not be linked with your survey responses in any way (as your survey responses will be linked with a randomly assigned identification number). At the end of the study, the responses from the online questionnaire will be exported to a data analysis program. This new document containing the survey responses will be encrypted, and will be accessed only by the investigative team. At the end of the study, results will be reported in a collective format (i.e., individual results will not be identified). The research team will continue to have access to the anonymously coded data for a minimum of 5 years post-publication, after which the data will be destroyed.

Prize Draw

At the end of the survey, you may provide your contact information (e.g., name and email) to be entered into a draw for a \$100 Sport Chek gift card. The chance of winning will depend upon the number of entries received. Please note that your participation in

the study will no longer be anonymous should you choose to include your contact information for the purpose of the prize draw. However, your contact information will be stored separately from your survey responses (i.e., your contact information will not be associated in any way with your completed questionnaire).

Contact Information

If you have any questions about the study, you can contact Krystal Soucy at soucyk@dal.ca. If you wish to receive a written summary of the results via email at the end of the study, you may send your request to Krystal at the email address stated above. Again, please note that the study results will only be available in a group format; individual results will not be provided.

If you have any questions or concerns about the ethical conduct of this study, you may contact Research Ethics, Dalhousie University at (902) 494-1462, or email ethics@dal.ca (and reference REB file # 2016-3769).

By clicking “Agree”, you are signaling that you have been informed of the potential risks and benefits of the study, and that you agree to take part in this research study. By clicking “Agree”, you will be directed to the questionnaire.

APPENDIX C Consent form (paper copy)



Consent Form

Project Title

Personality Profiles and Injury Occurrence in a Population of Varsity Athletes

Principal Investigator

Krystal Soucy, Masters Student, Kinesiology, Dalhousie University, email: soucyk@dal.ca

Supervisors

Dr. Melanie Keats, Associate Professor, Kinesiology, Dalhousie University, email: melanie.keats@dal.ca, phone: (902) 494-7173

Dr. Lori Dithurbide, Assistant Professor, Kinesiology, Dalhousie University, email: lori.dithurbide@dal.ca, phone: (902) 494-2477

Introduction

You are invited to take part in a research study being conducted by Krystal Soucy, who is a Masters student in Kinesiology at Dalhousie University. Your participation in this study is voluntary and you may withdraw from the study at any time *prior to submitting the completed questionnaire*. Your choice to participate or not participate will not affect your standing on your varsity team in any way. The study is described below, and tells you about the potential risks, inconvenience, or discomfort that you might experience. Although participating in the study will not be of direct benefit to you, we hope to use the information to further understand the relation between personality and potential injury risk at the varsity level. You should discuss any questions you may have pertaining to this study with Krystal Soucy. She may be contacted at soucyk@dal.ca.

Purpose of the Study

The purpose of this research study is to observe if athletes with certain personality characteristics are more likely to experience an acute sport-related injury in varsity sport. You are being asked to participate in this study as you are a current varsity athlete and are attending a Canadian university.

Who Can Participate?

You are eligible to take part in this study if you are a male or female varsity athlete currently studying at a Canadian university, and currently participating in one of the following varsity sports: field hockey, basketball, football, hockey, soccer, or rugby. You must be able to read in the English language, as the questionnaire is in English.

What You Will Be Asked To Do

If you agree to take part in this study, you will be asked to complete a one-time pen-and-paper survey that should take no more than 45 minutes of your time. Although you may complete the survey at any location of your choice, you are encouraged to find a location with minimal distractions. You will be asked to provide some demographic information, and you will also be asked questions pertaining to your personality, your anxiety levels, and the ways that you cope with stressful events. Additionally, you will be asked questions pertaining to *each acute sport-related injury* you experienced as a result of participating in your varsity sport during the most recent varsity season (if applicable). An acute sport-related injury is defined as an injury with a sudden onset, and (often) has a known cause such as a sprained ankle. Questions will include: number of injuries, date of injuries, whether the injuries occurred in practice or competition, the point in the season during which the injuries occurred, how the injuries occurred, whether they are new or recurrent injuries, location of the injuries, types of injuries, any modifications made to accommodate your participation in sport, amount of time missed from your sport, and any immediate or long-term medical attention that was required.

Potential Risks and Discomforts

There is a minimal possibility that you may feel uncomfortable about some of the questions you are being asked (i.e., there is a very small chance that you may experience emotional or psychological distress as a result of recalling a previous injury). Your participation in the study is completely voluntary, and you may take a break or skip questions that make you feel uncomfortable. You may stop answering questions at any point, but understand that any completed questions that you submit in your sealed envelope will be retained and may be included in the final data analyses. While there are no direct personal benefits to you from taking part in this study, your participation may help us to learn more about personality in relation to injury occurrence and prevention in a population of varsity-level athletes.

Confidentiality and Anonymity

Survey responses will remain confidential, as your completed pen-and-paper survey will be stored in a locked filing cabinet in a secure office on Dalhousie University campus. Your participation in the study will not be anonymous, as the individual who receives your sealed questionnaire package will be aware that you participated in the research study. If you chose to provide your contact information (e.g., name and email) for inclusion in the prize draw, then your participation in the study will be known to the investigative team. However, given that your contact information and survey responses will be collected in separate envelopes, your identifying information will never be associated with your survey responses. Your responses will be uploaded into a data analysis program, and this document containing the survey responses will be encrypted and accessed only by the investigative team. At the end of the study, results will be reported in a collective format (i.e., individual results will not be identified). The research team will continue to have access to the anonymously coded data for a maximum of 5 years post-publication, after which the data will be destroyed (i.e., paper data will be shredded, and electronic data will be deleted).

Prize Draw

At the end of the survey, you may provide your contact information (e.g., name and email) to be entered into a draw for a \$100 Sport Chek gift card. The chance of winning will depend upon the number of entries received. Please note that your participation in the study will no longer be anonymous should you choose to include your contact information for the purpose of the prize draw. However, given that your survey responses and contact information will be contained in two separate envelopes, there will be no way of linking your identifying information to your responses. Identifying information (for the purpose of the prize draw) and survey responses will be stored separately in a secure laboratory on Dalhousie University campus.

Contact Information

If you have any questions about the study, you can contact Krystal Soucy at soucyk@dal.ca. If you wish to receive a written summary of the results via email at the end of the study, you may send your request to Krystal at the email address stated above. Again, please note that the study results will only be available in a group format; individual results will not be provided.

If you have any questions or concerns about the ethical conduct of this study, you may contact Research Ethics, Dalhousie University at (902) 494-1462, or email ethics@dal.ca (and reference REB file # 2016-3769).

By completing and returning this questionnaire in the sealed envelope, you are signaling that you understand any potential risks and benefits of taking part in this study. By submitting this questionnaire, you are considered to have implied your consent to take part in this research study.

APPENDIX D Demographic questionnaire

Instructions: Please complete the following demographic information.

Sex:

Male

Female

Age: _____

Indicate whether you are a varsity or a club athlete:

Varsity

Club

If you are a varsity athlete, what is your current year of eligibility (2016-2017 academic year) for varsity athletics:

1

2

3

4

5

Varsity sport:

Basketball

Field Hockey

Football

Hockey

Rugby

Soccer

APPENDIX E Acute Injury History Questionnaire

When completing this survey, please note that an *acute sport-related injury* is defined as an injury with a sudden onset, and (often) has a known cause (e.g., sprained ankle). In completing this questionnaire, think back to all acute injuries you experienced while participating in your *varsity sport during the most recent varsity season*.

Given the above definition, have you experienced one or more acute sport-related injury/injuries during the most recent varsity season?

Yes

No

** If No, the remaining questions are not applicable to you. If Yes, please complete the following questions.

If yes, how many acute sport-related injuries did you experience in varsity sport during the most recent varsity season?

1

2

3

4

5

More than 5 (*specify*): _____

If you have had more than one acute sport-related injury as a result of participating in your varsity sport during the current varsity season, please provide the following information as it pertains to **each acute sport-related injury**.

INJURY 1

Date of injury: _____ (MM/YYYY)

When did the injury occur?

Practice Game/competition

If the injury occurred during a game/competitive event, at what point in the season did the injury occur?

Regular season

Tournament

Playoffs

Exhibition

How did the injury occur?

- Sudden onset and contact with another player or equipment
- Sudden onset and NO contact with another player or equipment
- Unknown
- Other (*specify*): _____

Injury status:

- New injury
- Recurrent injury from current season
- Recurrent injury from previous season

Indicate the location of injury (and circle the affected side where applicable):

- | | |
|---|--|
| <input type="checkbox"/> Head | <input type="checkbox"/> Back |
| <input type="checkbox"/> Face | <input type="checkbox"/> Side (L/R) |
| <input type="checkbox"/> Ears (L/R) | <input type="checkbox"/> Ribs (L/R) |
| <input type="checkbox"/> Eye (L/R) | <input type="checkbox"/> Chest |
| <input type="checkbox"/> Nose | <input type="checkbox"/> Abdomen |
| <input type="checkbox"/> Teeth | <input type="checkbox"/> Pelvis |
| <input type="checkbox"/> Neck | <input type="checkbox"/> Hip (L/R) |
| <input type="checkbox"/> Throat | <input type="checkbox"/> Groin (L/R) |
| <input type="checkbox"/> Shoulder (L/R) | <input type="checkbox"/> Genitals |
| <input type="checkbox"/> Collarbone (L/R) | <input type="checkbox"/> Upper leg (L/R) |
| <input type="checkbox"/> Upper arm (L/R) | <input type="checkbox"/> Knee (L/R) |
| <input type="checkbox"/> Elbow (L/R) | <input type="checkbox"/> Lower leg (L/R) |
| <input type="checkbox"/> Forearm (L/R) | <input type="checkbox"/> Ankle (L/R) |
| <input type="checkbox"/> Wrist (L/R) | <input type="checkbox"/> Foot (L/R) |
| <input type="checkbox"/> Hand (L/R) | <input type="checkbox"/> Toes (L/R) |
| <input type="checkbox"/> Finger (L/R) | <input type="checkbox"/> Other (<i>specify</i>): _____ |

Indicate the type of injury:

- | | |
|--|--|
| <input type="checkbox"/> Bruise | <input type="checkbox"/> Joint/ligament sprain |
| <input type="checkbox"/> Burn | <input type="checkbox"/> Dislocation |
| <input type="checkbox"/> Bleeding | <input type="checkbox"/> Broken bone |
| <input type="checkbox"/> Abrasion/scrape | <input type="checkbox"/> Muscle strain |
| <input type="checkbox"/> Cut | <input type="checkbox"/> Tendonitis |
| <input type="checkbox"/> Blister | <input type="checkbox"/> Knocked out |
| <input type="checkbox"/> Joint swelling | <input type="checkbox"/> Concussion |
| <input type="checkbox"/> Other (<i>specify</i>): _____ | |

Choose the following option that best corresponds to the amount of modification that was made to accommodate your participation in varsity sport:

- No modification of activity
- Assistive device(s) (e.g., brace, splint, taping) AND no modification of activity
- Some modification of activity (e.g., modification of intensity, duration, or type)
- Assistive device(s) AND some modification of activity
- Some period of non-participation

Indicate the amount of time missed from participating in your varsity sport as a result of this injury:

- 0 days of missed practice and/or competition
- 1 to 7 days of missed practice and/or competition
- 8 to 21 days of missed practice and/or competition
- More than 21 days of missed practice and/or competition
- Unknown (i.e., still undergoing treatment)

If still undergoing treatment, consecutive days missed to date: _____

Did you see any health care practitioners for assessment and/or treatment of this injury?

- Yes
- No

If **yes**, please indicate all practitioners you visited for assessment and/or treatment of this injury:

- Chiropractor
- Dentist
- Massage therapist
- Physician (ER)
- Physician (Family/GP)
- Physician (Sport medicine)
- Physiotherapist
- Radiologist (X-ray Technician)
- Surgeon
- Other (*specify*): _____

Who provided you with clearance to return to play?

- Self
- Coach
- Athletic Therapist
- Physiotherapist
- Physician
- Other (*specify*): _____

APPENDIX F Competitive Orientations Scale (Sport-MPS-2)

INSTRUCTIONS: The purpose of this questionnaire is to identify how players view certain aspects of their competitive experiences in sport. Please help us to more fully understand how players view a variety of their competitive experiences by indicating the extent to which you **agree or disagree** with the following statements, based on your thoughts and feelings **during the most recent varsity season**. (Select one response option to the right of each statement). Some of the questions relate to your sport experiences in general, while others relate specifically to experiences on the team that you have most recently played with. **There are no right or wrong answers** so please don't spend too much time on any one statement; simply choose the answer that best describes how you view each statement. If any of the questions on this questionnaire make you feel upset or uncomfortable, you may take a break and/or skip the question(s).

	To what extent do you agree or disagree with the following statements?	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1.	If I did not set the highest standards for myself in my sport, I was likely to end up a second-rate player.	1	2	3	4	5
2.	Even if I failed slightly in competition, for me, it was as bad as being a complete failure.	1	2	3	4	5
3.	I usually felt uncertain as to whether or not my training effectively prepared me for competition.	1	2	3	4	5
4.	My parents set very high standards for me in my sport.	1	2	3	4	5
5.	On the day of competition I had a routine that I tried to follow.	1	2	3	4	5
6.	I felt like my coach criticized me for doing things less than perfectly in competition.	1	2	3	4	5

	To what extent do you agree or disagree with the following statements?	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
7.	In competition, I never felt like I could quite meet my parents' expectations.	1	2	3	4	5
8.	I hated being less than the best at things in my sport.	1	2	3	4	5
9.	I had and followed a pre-competitive routine.	1	2	3	4	5
10.	If I failed in competition, I felt like a failure as a person.	1	2	3	4	5
11.	Only outstanding performance during competition was good enough in my family.	1	2	3	4	5
12.	I usually felt unsure about the adequacy of my pre-competition practices.	1	2	3	4	5
13.	Only outstanding performance in competition was good enough for my coach.	1	2	3	4	5
14.	I rarely felt that my training fully prepared me for competition.	1	2	3	4	5
15.	My parents have always had higher expectations for my future in sport than I have.	1	2	3	4	5
16.	The fewer mistakes I made in competition, the more people would like me.	1	2	3	4	5

	To what extent do you agree or disagree with the following statements?	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
17.	It was important to me that I be thoroughly competent in everything I did in my sport.	1	2	3	4	5
18.	I followed pre-planned steps to prepare myself for competition.	1	2	3	4	5
19.	I felt like I was criticized by my parents for doing things less than perfectly in competition.	1	2	3	4	5
20.	Prior to competition, I rarely felt satisfied with my training.	1	2	3	4	5
21.	I think I expected higher performance and greater results in my daily sport-training than most players.	1	2	3	4	5
22.	I felt like I could never quite live up to my coach's standards.	1	2	3	4	5
23.	I felt that other players generally accepted lower standards for themselves in sport than I did.	1	2	3	4	5
24.	I should have been upset if I made a mistake in competition.	1	2	3	4	5
25.	In competition, I never felt like I could quite live up to my parents' standards.	1	2	3	4	5

	To what extent do you agree or disagree with the following statements?	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
26.	My coach set very high standards for me in competition.	1	2	3	4	5
27.	I followed a routine to get myself into a good mindset going into competition.	1	2	3	4	5
28.	If a team-mate or opponent (who played a similar position to me) played better than me during competition, then I felt like I failed to some degree.	1	2	3	4	5
29.	My parents expected excellence from me in my sport.	1	2	3	4	5
30.	My coach expected excellence from me at all times: both in training and competition.	1	2	3	4	5
31.	I rarely felt that I had trained enough in preparation for a competition.	1	2	3	4	5
32.	If I did not do well all the time in competition, I felt that people would not respect me as an athlete.	1	2	3	4	5
33.	I had extremely high goals for myself in my sport.	1	2	3	4	5
34.	I developed plans that dictated how I wanted to perform during competition.	1	2	3	4	5

	To what extent do you agree or disagree with the following statements?	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
35.	I felt like my coach never tried to fully understand the mistakes I sometimes made.	1	2	3	4	5
36.	I set higher achievement goals than most athletes who play my sport.	1	2	3	4	5
37.	I usually had trouble deciding when I had practiced enough heading into a competition.	1	2	3	4	5
38.	I felt like my parents never tried to fully understand the mistakes I made in competition.	1	2	3	4	5
39.	People would probably think less of me if I made mistakes in competition.	1	2	3	4	5
40.	My parents wanted me to be better than all other players who play my sport.	1	2	3	4	5
41.	I set plans that highlighted the strategies I wanted to use when I competed.	1	2	3	4	5
42.	If I played well but only made one obvious mistake in the entire game, I still felt disappointed with my performance.	1	2	3	4	5

Scoring Key

Personal Standards (PS): 1, 8, 17, 21, 23, 33, 36

Concern Over Mistakes (COM): 2, 10, 16, 24, 28, 32, 39, 42

Perceived Parental Pressure (PPP): 4, 7, 11, 15, 19, 25, 29, 38, 40

Perceived Coach Pressure (PCP): 6, 13, 22, 26, 30, 35

Doubts About Actions (DAA): 3, 12, 14, 20, 31, 37

Organization (Org): 5, 9, 18, 27, 34, 41

APPENDIX G A Global Measure of Perceived Stress (PSS)

Directions: The following questions ask you about your feelings and thoughts *during the most recent varsity season*. In each case, you will be asked to indicate *how often* you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate.

		Never	Almost Never	Sometimes	Fairly Often	Very Often
1.	In the most recent varsity season, how often were you upset because of something that happened unexpectedly?	0	1	2	3	4
2.	In the most recent varsity season, how often did you feel that you were unable to control the important things in your life?	0	1	2	3	4
3.	In the most recent varsity season, how often did you feel nervous and "stressed"?	0	1	2	3	4
4.	In the most recent varsity season, how often did you deal successfully with irritating life hassles?	0	1	2	3	4
5.	In the most recent varsity season, how often did you feel that you were effectively coping with important changes that were occurring in your life?	0	1	2	3	4
6.	In the most recent varsity season, how often did you feel confident about your ability to handle your personal problems?	0	1	2	3	4
7.	In the most recent varsity season, how often did you feel that things were going your way?	0	1	2	3	4
8.	In the most recent varsity season, how often did you find that you could not cope with all the things that you had to do?	0	1	2	3	4
9.	In the most recent varsity season, how often were you able to control irritations in your life?	0	1	2	3	4
10.	In the most recent varsity season, how often did you feel that you were on top of things?	0	1	2	3	4
11.	In the most recent varsity season, how often were you angered because of things that happened that were outside of your control?	0	1	2	3	4

		Never	Almost Never	Sometimes	Fairly Often	Very Often
12.	In the most recent varsity season, how often did you find yourself thinking about things that you have to accomplish?	0	1	2	3	4
13.	In the most recent varsity season, how often were you able to control the way you spend your time?	0	1	2	3	4
14.	In the most recent varsity season, how often did you feel difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

APPENDIX H Sport Anxiety Scale-2 (SAS-2)

DIRECTIONS: Many athletes get tense or nervous before or during games, meets, or matches. Please read each question. Then, circle the number that represents how you have USUALLY felt before or while competing in your sport(s) *during the most recent varsity season*. There are no right or wrong answers. Please be as truthful as you can. Do not spend too much time on any one statement. If any of the questions on this questionnaire make you feel upset or uncomfortable, you may take a break and/or skip the question(s).

	Before or while I competed in my sport:	Not At All	A Little Bit	Pretty Much	Very Much
1.	It was hard to concentrate on the game.	1	2	3	4
2.	My body felt tense.	1	2	3	4
3.	I worried that I would not play well.	1	2	3	4
4.	It was hard for me to focus on what I was supposed to do.	1	2	3	4
5.	I worried that I would let others down.	1	2	3	4
6.	I felt tense in my stomach.	1	2	3	4
7.	I lost focus on the game.	1	2	3	4
8.	I worried that I would not play my best.	1	2	3	4
9.	I worried that I would play badly.	1	2	3	4
10.	My muscles felt shaky.	1	2	3	4
11.	I worried that I would mess up during the game.	1	2	3	4
12.	My stomach felt upset.	1	2	3	4
13.	I could not think clearly during the game.	1	2	3	4
14.	My muscles felt tight because I was nervous.	1	2	3	4
15.	I had a hard time focusing on what my coach told me to do.	1	2	3	4

Scoring Key

Somatic anxiety: 2, 6, 10, 12, 14

Worry: 3, 5, 8, 9, 11

Concentration Disruption: 1, 4, 7, 13, 15

APPENDIX I Coping Function Questionnaire (CFQ)

Directions: The following questions ask about how you have *typically* coped with stressful events in your sport *during the most recent varsity season*. Please choose the number that corresponds to how much you agree with the statement. There are no right or wrong answers. Do not spend too much time on any one statement. If any of the questions on this questionnaire make you feel upset or uncomfortable, you may take a break and/or skip the question(s).

		Not at all	A little	Somewhat	Quite a bit	Very much
1.	I tried to find a way to change the situation.	1	2	3	4	5
2.	I stayed in the situation and tried to control my emotions to better deal with the situation.	1	2	3	4	5
3.	I worked hard to try to change the situation.	1	2	3	4	5
4.	I tried to change how I thought about the situation so it didn't seem so stressful.	1	2	3	4	5
5.	I tried to get out of the situation as soon as I could to reduce the stress.	1	2	3	4	5
6.	I used strategies to change the situation in order to deal with the stress.	1	2	3	4	5
7.	I tried to view the situation in a way that made it seem less stressful.	1	2	3	4	5
8.	I tried to leave or avoid the situation to get away from the problem or reduce the stress.	1	2	3	4	5
9.	I did my best to change the situation.	1	2	3	4	5
10.	I tried to use different strategies that would help me control my emotions.	1	2	3	4	5
11.	I looked for ways to solve the problem or change the situation.	1	2	3	4	5
12.	I tried to get out of the situation to get away from the stress.	1	2	3	4	5
13.	I stayed in the situation and tried to change it.	1	2	3	4	5
14.	I worked through my emotions in order to feel better.	1	2	3	4	5
15.	I tried to get away from the situation to reduce the stress.	1	2	3	4	5
16.	I tried to find ways to control my emotions.	1	2	3	4	5
17.	I tried to relax so that I could keep my emotions under control.	1	2	3	4	5
18.	In order to reduce the stress, I tried to get myself out of the situation.	1	2	3	4	5

Scoring Key

Problem-focused coping: 1, 3, 6, 9, 11, 13

Emotion-focused coping: 2, 4, 7, 10, 14, 16, 17

Avoidance coping: 5, 8, 12, 15, 18

APPENDIX J Oral recruitment script

My name is Krystal and I am a Master's student in Kinesiology at Dalhousie University. I am here today to invite you to participate in a research study I am currently conducting. My study is looking at personality and injury occurrence. Participation in the study is voluntary.

If you are interested in the study, I can provide you with a copy of the questionnaire package that contains a copy of the consent form and the study materials. You may read the consent form and decide if you would like to participate. You can take the questionnaire package home with you to complete at a time and location of your choice (if you so choose). If you decide to take a copy of the study package, I would like to ask your permission to send you two reminder emails pertaining to the study. You can provide your consent to receive the emails reminders by filling out the email reminder consent form that is attached to the study package, and handing it back to me before you leave the room here today.

If you decide to take part in the study, you will be asked to complete questionnaires about aspects of your personality, as well as any acute injuries you incurred as a result from participating in your varsity sport in your most recent varsity season. Completion of the survey should take no more than 45 minutes of your time. For this study, an acute injury is defined as an injury with a sudden onset and (often) having a known cause.

If you decide to take part, you will have the option to enter into a prize draw for a \$100 gift card from SportChek. The prize draw entry form is located in the small, white envelope attached to the study package, therefore your identifying information will remain separate from your survey responses. To return your study package, please make sure that both envelopes are sealed, and give them to (insert name of individual here). Your questionnaires will be stored in a secure, locked cabinet. While we can assure confidentiality of your survey responses (as they will be in a sealed envelope, in a locked cabinet), we cannot assure anonymity as the individual to whom you return your survey package will be aware that you took part in the study.

APPENDIX K Email consent

Project Title

Personality Profiles and Injury Occurrence in a Population of Varsity Athletes

I acknowledge that I have expressed interest in the research study by voluntarily choosing to take a copy of the study package. By providing my email address below, I consent to receive two email reminders pertaining to the research study.

(email address)

APPENDIX L First email reminder

You are receiving this email because you expressed interest in our research study on personality and athletic injuries by choosing to take a copy of our study package. If you have already returned your questionnaire package, thank you for choosing to take part! If you have not yet returned the questionnaire package, and you have further questions pertaining to the study, please reply to this email and we will address any questions or concerns you may have about your participation.

Sincerely,
Krystal Soucy (Principal Investigator)

APPENDIX M Second email reminder

You are receiving this email because you expressed interest in our research study on personality and athletic injuries by choosing to take a copy of our study package. If you have already returned your questionnaire package, thank you for choosing to take part! If you have not yet returned the questionnaire package, and you have further questions pertaining to the study, please reply to this email and we will address any questions or concerns you may have about your participation.

If you have not yet returned the questionnaire package, and you still wish to take part in the study, please note that questionnaire packages must be submitted to (insert individual's name) by (insert date here).

Sincerely,
Krystal Soucy (Principal Investigator)

APPENDIX N Prize draw entry form

Project Title

Personality Profiles and Injury Occurrence in a Population of Varsity Athletes

Yes, I would like to be entered in the prize draw

Name: _____

Email: _____

No, I do not want to be entered in the prize draw

APPENDIX O Email recruitment script to varsity coaches for online recruitment

Dear Mr./Ms. (coach's name):

My name is Krystal Soucy and I am a Master's student in Kinesiology at Dalhousie University. I am conducting a study to fulfill my Master's thesis requirement, and it involves the recruitment of varsity athletes to complete a one-time questionnaire.

The purpose of my study is to explore if certain personality characteristics can increase the likelihood of athletic injury. To accomplish this, athletes will be asked to complete questionnaires that will assess personality, stress, anxiety, and coping. They will also be asked to report details pertaining to any acute sport-related injuries they incurred in varsity sport during the most recent varsity or club season (if applicable). Athletes from the following sports are invited to take part in the study: basketball, field hockey, football, hockey, soccer, and rugby. All athletes from the above sports are invited to take part, regardless of whether or not they experienced an acute sport-related injury during the most recent season (i.e., they may participate if they have incurred an acute sport-related injury during the most recent season, and they may also participate if they have not incurred an acute sport-related injury during the most recent season).

I am seeking your support by asking if you would you be willing to forward a link to the web-based survey to your athletes?

This study has been granted ethical approval by the Dalhousie University Research Ethics Board and the (insert name of university at which recruitment email is being sent) Research Ethics Board. Should you have any questions about the study, please do not hesitate to contact myself: Krystal Soucy, Masters Student, Kinesiology, Dalhousie University, email: soucyk@dal.ca, or my supervisors: Dr. Melanie Keats, Associate Professor, Kinesiology, Dalhousie University, email: melanie.keats@dal.ca, phone: (902) 494-7173 and Dr. Lori Dithurbide, Assistant Professor, Kinesiology, Dalhousie University, email: lori.dithurbide@dal.ca, phone: (902) 494-2477.

Thank you in advance,
Krystal Soucy