

The Relationship between Perfectionism and Athlete Engagement Among Male Adolescent Athletes: The Moderating Role of Coach Autonomy Support

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Table of Contents

| | |
|--|----|
| Acknowledgements..... | 2 |
| Table of Contents | 3 |
| List of Tables | 5 |
| List of Figures | 6 |
| List of Appendices | 7 |
| Abstract..... | 8 |
| Athlete Engagement | 10 |
| Self-determination theory | 11 |
| Perfectionism | 12 |
| Relationships Between Athlete Engagement and Perfectionism..... | 15 |
| As evidenced by juxtapositions of healthy and unhealthy perfectionists..... | 15 |
| As evidenced by variable-oriented research..... | 17 |
| As evidenced by person-oriented research..... | 19 |
| Value of Person-oriented Approach | 23 |
| The Potential Moderating Role of Coach Autonomy Support | 24 |
| Purposes and Hypotheses..... | 26 |
| Method..... | 27 |
| Targeted Participants | 27 |
| Instruments..... | 28 |
| Demographics..... | 28 |
| Athlete Engagement..... | 28 |
| Perfectionism..... | 29 |
| Perceived Coach Autonomy Support..... | 33 |
| Procedure | 34 |
| Data Analysis | 37 |
| Preliminary analyses | 37 |
| Analysis for participant categorization by perfectionism profile. | 37 |
| Analysis for class differences in engagement and the moderating effect of perceived coach autonomy support. | 39 |
| Results | 40 |
| Recruiting and Participants | 40 |
| Preliminary Analysis | 41 |

| | |
|---|----|
| Data entry errors | 41 |
| Missing data, descriptive statistics, and internal consistency..... | 42 |
| Univariate and multivariate outliers | 43 |
| Test of sport differences..... | 44 |
| Bivariate correlations | 46 |
| Participant Categorization by Perfectionism Profile | 48 |
| Class Differences and Moderation Effects..... | 52 |
| Enthusiasm. | 56 |
| Confidence. | 56 |
| Vigour. | 57 |
| Dedication. | 59 |
| Discussion..... | 62 |
| Classification of Athletes Based on Perfectionism Profile | 62 |
| Differences Between the Perfectionism Classes on Athlete Engagement | 66 |
| The Moderating Role of Coach Autonomy Support..... | 70 |
| Practical Implications | 75 |
| Strengths, Limitations, and Future Directions..... | 76 |
| Conclusion | 77 |
| References..... | 79 |

List of Tables

| | |
|--|-----|
| Table 1: <i>Descriptive Statistics and Estimates of Internal Consistency for all Variables</i> | 43 |
| Table 2: <i>Sport Differences on Athlete Engagement, Perfectionism, and Coach Autonomy Support</i> | 46 |
| Table 3: <i>Bivariate Correlations between Perfectionism Proxies, Engagement Characteristics, and Coach Autonomy Support</i> | 47 |
| Table 4: <i>Values Across Fit Indices for Six Tested Models</i> | 49 |
| Table 5: <i>Practicality Proxies of Six Tested Models</i> | 49 |
| Table 6: <i>Class Differences on Perfectionism Proxies for 3-Class Model</i> | 50 |
| Table 7: <i>Indicator Coding System used to Represent Perfectionism Class</i> | 53 |
| Table 8: <i>Results of Three-step Hierarchical Multiple Regression Analyses for Engagement Characteristics</i> | 55 |
| Table 9: <i>Bivariate Correlations between Sport-MPS-2, MIPS, AEQ, and SCQ (r)</i> | 115 |

List of Figures

| | |
|--|-----|
| <i>Figure 1:</i> Levels across four engagement characteristics for each perfectionist class..... | 56 |
| <i>Figure 2:</i> Mean vigour scores for each perfectionism class across SCQ scores..... | 59 |
| <i>Figure 3:</i> Mean dedication scores for each perfectionism class across SCQ scores..... | 61 |
| <i>Figure 4:</i> Mean enthusiasm scores for each perfectionism class across SCQ scores..... | 117 |
| <i>Figure 5:</i> Mean confidence scores for each perfectionism class across SCQ scores..... | 118 |

List of Appendices

| | |
|--|-----|
| Appendix A: Demographic Questionnaire..... | 95 |
| Appendix B: Athlete Engagement Questionnaire..... | 98 |
| Appendix C: Athlete Sport Motivation Scale..... | 100 |
| Appendix D: Sport Climate Questionnaire..... | 104 |
| Appendix E: Governing Body Information Letter..... | 106 |
| Appendix F: Coach Information Letter..... | 108 |
| Appendix G: Athlete Information Letter..... | 110 |
| Appendix H: Participant Consent Form..... | 113 |
| Appendix I: Supplemental Tables..... | 114 |
| Appendix J: Supplemental Figures..... | 116 |

Abstract

Athlete engagement is a positive state of mind capturing athletes' feelings of enthusiasm, confidence, vigour, and dedication toward their sport and may result from basic psychological needs satisfaction (Hodge, Lonsdale, & Jackson, 2009; Lonsdale, Hodge, & Raedeke, 2007). As perfectionism is common in athletes, the present study examined whether athletes with different perfectionism profiles differed across these engagement characteristics and tested whether those differences were moderated by coach autonomy support. A sample of 191 male youth club basketball and football players ($M_{age} = 16.59$, $SD = 0.67$) completed measures of athlete engagement, sport perfectionism, and coach autonomy support. Latent profile analysis was used to categorize participants according to their standings across perfectionistic strivings and perfectionistic concerns. A 3-class model was adopted with groups representing *non-perfectionistic athletes*, *moderately perfectionistic athletes*, and *highly perfectionistic athletes*. Multiple regression was then used to test for class differences and moderation effects (see Hayes & Montoya, 2017). Across each characteristic, highly perfectionistic athletes reported higher engagement levels in comparison to moderately perfectionistic athletes regardless of levels of coach autonomy support. On vigour and dedication, though, class differences involving non-perfectionistic athletes were moderated by coach autonomy support. For both characteristics, non-perfectionistic athletes reported lower engagement levels than highly perfectionistic athletes when coach autonomy support was low. However, group differences on vigour and dedication between comparisons with the non-perfectionistic athletes were significantly moderated by coach autonomy support. The discussion compares the adopted 3-class model with those produced in past research and speculates as to why fostering autonomy support may have the greatest influence on engagement among athletes who are low, but not high, in perfectionism.

Effects of Perfectionism on Athlete Engagement: The Moderating Role of Coach Autonomy Support

With attention on injury, burnout, and eating disorders in athletes, past sport psychology research has focused largely on factors that contribute to a negative sporting experience, but has not made an emphasis on positive sporting experiences (Fraser-Thomas, Côté, & Deakin, 2005). There has been considerably less research conducted on what contributes to a positive sporting experience. The positive psychology movement recognizes this imbalance (Gould, 2002; Seligman & Csikszentmihalyi, 2000). Instead of focusing on weaknesses, ailments, deficiencies, and trying to fix what is wrong, the movement focuses more on strengths, optimal functioning, the presence of wellness, and building a superior quality of life (Seligman, 2002; Seligman & Csikszentmihalyi, 2000). In the sport domain, the positive psychology shift means the promotion of more positive, fulfilling, and enjoyable experiences in sport (Lonsdale, Hodge, & Raedeke, 2007).

Athlete engagement is a multidimensional construct that falls in line with the positive psychology movement as it reflects a persistent, positive, and pervasive state of mind that one experiences in a sporting domain (Lonsdale, Hodge, & Raedeke, 2007). Empirical findings support this claim: in general, higher levels of engagement have been found to be related to higher levels of positive affect (Damian, Stoeber, Negru-Subtirica, & Băban, 2017), higher levels of enjoyment (Hodge, Lonsdale, & Jackson, 2009), and greater likelihood of experiencing states of flow within sport (Lonsdale, Hodge, & Raedeke, 2007). Minimal research has been conducted that focuses on the personal and environmental predictors of athlete engagement (e.g., personality, communication style; Teixeira, Carraça, Markland, Silva, & Ryan, 2012), as athlete engagement research has primarily focused on the outcomes of being engaged in sport (see

Hodge et al., 2009; Jowett, Hill, Hall, & Curran, 2016). Engagement in sport is important to consider as it has been connected to positive physical, social, and mental health outcomes (Hodge et al., 2009) and “may allow researchers to better understand the complexities of human behaviour and experience in sport, and provide a framework for the promotion of more positive sport experiences” (Lonsdale, Hodge, & Raedeke, 2007, p. 453). In addition, the high prevalence of sport dropout of adolescent athletes highlights the need to foster athlete engagement in this population (Fraser-Thomas, Côté, & Deakin, 2008). Therefore, the general aim of the present study is to address this concern to examine factors that may contribute to athletes’ levels of engagement. Two constructs that may affect athlete engagement, and that are salient and meaningful within sport, are perfectionism and coach autonomy support (Maslach & Leiter, 1997; Wefald, Reichard, & Serrano, 2011). A more in-depth discussion regarding athlete engagement follows.

Athlete Engagement

Engagement has been studied in multiple achievement domains including sport, academics, and the workplace (Childs & Stoeber, 2010; Damian et al., 2017; Jowett et al., 2016). There is variation regarding the definition of engagement, but the core characteristics are similar. For example, within the domain of sport, engagement is conceptualized as a multidimensional, relatively stable, and positive state of mind that captures how athletes generally feel toward their sport (Lonsdale, Hodge, & Raedeke, 2007). More specifically, athlete engagement is considered to be an enduring, persistent, positive cognitive-affective sport experience that is characterized by enthusiasm, confidence, vigour, and dedication (Lonsdale, Hodge, & Jackson, 2007; Lonsdale, Hodge, & Raedeke, 2007). Enthusiasm reflects high enjoyment levels and feelings of excitement; confidence reflects belief in one’s ability to be successful and accomplish tasks

within sport; vigour refers to emotional, mental, or physical liveliness experienced while participating in sport; and dedication refers to the desire to devote time and effort towards the achievement of important goals.

Self-determination theory. Self-determination theory can be used to explain the development of athlete engagement (Stoeber, Childs, Hayward, & Feast, 2011). Developed by Deci and Ryan (1985, 2002), self-determination theory is a global theory of development and motivation that explains the quality of individuals' experiences through the degree to which three basic psychological needs are satisfied. Motivation can be defined generally as the desire to do something (Guay et al., 2010). According to the self-determination theory, there are three basic psychological needs: competence, relatedness, and autonomy (Deci & Ryan 1985, 2002). Competence reflects feeling effective and capable within an environment; relatedness reflects feeling meaningful connections to others; and autonomy reflects a sense of ownership over behaviours (Deci & Ryan, 1985, 2002). Within this theory, the quality of one's experience depends on the extent to which behaviours are undertaken voluntarily (i.e., choosing to do a behaviour) as opposed to being externally controlled (i.e., not feeling able to choose to do a behaviour; Deci & Ryan, 1985). The extent to which the behaviours are undertaken voluntarily or externally controlled is determined by basic need satisfaction: the more an experience satisfies individuals' basic psychological needs, the more they will voluntarily seek out that experience (Deci, 1971). Self-determination theory posits that the reciprocal is true as well: the more an experience thwarts individuals' basic psychological needs, the less they will voluntarily seek out that experience (Deci & Ryan, 1985, 2002). Hence, understanding basic need satisfaction is central to understanding human motivation. Within the self-determination theory, intrinsic motivation is of importance, which refers to the taking part in an activity volitionally, simply for

the inherent enjoyment of doing the activity and may present when the three basic psychological needs are satisfied (Deci, 1975). Both personal (e.g., personality) and environmental factors (e.g., communication, interpersonal styles of others) can foster basic psychological needs to varying degrees (Felton & Jowett, 2013; Teixeira et al., 2012).

According to self-determination theory, individuals are likely to associate positive psychological states with certain activities when participation in those activities contributes to the fulfillment of their basic psychological needs (Martínez-Alvarado, Guillén, & Feltz, 2016). Athlete engagement has been identified as one of these positive psychological states (Hodge et al., 2009). Research conducted within sport provides some support for this contention. For example, among youth club sport athletes, basic psychological need satisfaction was positively associated with athlete engagement (Curran, Hill, Hall, & Jowett, 2014; Jowett et al., 2016). This evidence suggests that the more athletes get their basic psychological needs fulfilled through participation in a certain sport, the more likely those athletes will feel engaged in that sport. Personal factors such as personality and skill level have shown relationships with basic psychological needs, as have environmental factors such as communication and the interpersonal styles of others (Felton & Jowett, 2013; Teixeira et al., 2012). From this, it stands to reason that personal and environmental factors that contribute to basic psychological need satisfaction through participation in sport may also play a meaningful role in the development of athlete engagement (Maslach & Leiter, 1997; Wefald et al., 2011). Perfectionism and coach autonomy support may be two such factors (Curran, Hill, & Niemiec, 2013; Damian et al., 2017).

Perfectionism

Perfectionism is defined as “a personality trait that broadly characterizes individuals’ commitment to extremely high standards of personal performance as well as their degree of self-

and socially-focused concern over the ramifications of failing to achieve those standards” (Gotwals & Spencer-Cavaliere, 2014, p. 271). Many world-class athletes are considered perfectionistic in their orientations (Hardy, Jones, & Gould, 1996). This prevalence may be due, in part, to the level of sport in which the athletes are competing. For example, in high performance sport, success is often dependent on one’s ability to produce near-perfect performances (Flett & Hewitt, 2005).

Multiple models have been developed to conceptualize perfectionism and explain the trait’s association with adaptive and maladaptive cognition, affect, and behaviour (see Flett, Hewitt, Blankstein, & Mosher, 1995; Gaudreau & Thompson, 2010; Stoeber & Otto, 2006). One model specifically, the tripartite model, has been supported in person-oriented research. As described later, the present study will adopt a person-oriented approach. As a result, perfectionism is described below in line with the tripartite model¹.

According to the model, there are two fundamental and overarching dimensions of perfectionism: perfectionistic strivings and perfectionistic concerns (Stoeber & Otto, 2006). Perfectionistic strivings are characterized by possessing high standards of performance for oneself, along with a strong desire and plan of how to achieve those standards (Gotwals, Stoeber, Dunn, & Stoll, 2012; Stoeber & Otto, 2006). Perfectionistic concerns, on the other hand, are characterized by worrying about mistakes, doubting actions, having negative reactions to imperfection, and fearing negative social evaluation (Gotwals et al., 2012; Stoeber & Otto, 2006). The tripartite model further posits that three distinct perfectionistic orientations (or types of perfectionists) can be identified by different profiles across these two dimensions: (1) healthy perfectionists are characterized by high perfectionistic strivings in combination with low

¹ However, it is recognized that other models may prove useful when interpreting and discussing results produced through the present study (see Hill, 2016)

perfectionistic concerns; (2) unhealthy perfectionists are characterized by high levels across both perfectionistic strivings and perfectionistic concerns; and (3) non-perfectionists are characterized by low levels of perfectionistic strivings and undifferentiated levels of perfectionistic concerns. Unhealthy perfectionists tend to be associated with more negative characteristics such as depression and negative affect compared to healthy perfectionists (Stoeber & Otto, 2006).

A more in-depth understanding of the distinct mindsets adopted by healthy and unhealthy perfectionists can be gained by examining anecdotal accounts that differentiate the two orientations – namely work by Hamachek (1978) and Lundh (2004) – and the first study to qualitatively explore healthy and unhealthy perfectionistic athletes' perspectives on achievement based on a study by Gotwals and Spencer-Cavaliere (2014). By considering these studies, a foundation for connecting perfectionism to engagement can be established. Healthy perfectionists, with their high perfectionistic strivings and low perfectionistic concerns, understand some mistakes are inevitable when striving to reach lofty goals (Hamachek, 1978). On the contrary, unhealthy perfectionists with their high perfectionistic strivings and high perfectionistic concerns view anything less than perfection as a complete failure (Gotwals & Spencer-Cavaliere, 2014; Hamachek, 1978). The sense of self-worth differs between healthy and unhealthy perfectionists as well. In healthy perfectionists, self-worth is maintained even when they do not perform perfectly. This allows healthy perfectionists to enjoy the effort it takes to strive for perfection (Hamachek, 1978; Lundh, 2004). In unhealthy perfectionists, self-worth is contingent on performance, as there is the perception that in order to be seen as worthy in the eyes of others, one has to be perfect (Gotwals & Spencer-Cavaliere, 2014; Hamachek, 1978; Lundh, 2004). The source of perfectionistic tendencies also differs between healthy and unhealthy perfectionists. In healthy perfectionists, the source of perfectionistic tendencies

originates from within themselves, whereas unhealthy perfectionists' tendencies originate from outside of themselves (e.g., from significant others in the environment; Gotwals & Spencer-Cavaliere, 2014). The difference in origin alludes to healthy perfectionists perhaps being more intrinsically motivated while unhealthy perfectionists may be more extrinsically motivated (Guiccardi, Mahoney, Jalleh, Donovan, & Parkes, 2012). In summary, healthy perfectionists are not overly concerned with committing mistakes, do not have contingent self-worth, and possess perfectionistic tendencies that are self-oriented; in contrast, unhealthy perfectionists are overly concerned with committing mistakes, have contingent self-worth, and have perfectionistic tendencies that are socially prescribed (Gotwals & Spencer-Cavaliere, 2014; Hamachek, 1978). In healthy perfectionists, compared to unhealthy perfectionists, these characteristics contribute to less fear of failure, less doubt, less concern over social evaluation, and more enjoyment which may permit healthy perfectionists to have more positive sporting experiences compared to unhealthy perfectionists.

Relationships Between Athlete Engagement and Perfectionism

As evidenced by juxtapositions of healthy and unhealthy perfectionists. The previous juxtaposition of healthy and unhealthy perfectionists helps to support the concept that perfectionism is a personality trait that could both foster and inhibit satisfaction of individuals' basic psychological needs (Costa, Coppolino, & Oliva, 2016). While healthy perfectionists appreciate their own efforts, feel good connections to significant others, and are free to commit some mistakes, unhealthy perfectionists are constantly dissatisfied with their own performance, feel inferior when they are not perfect in the eyes of others, and perceive that they always have to display flawless performances (Jowett et al., 2016). As such, it stands to reason that healthy perfectionists should generally experience higher levels of competence, autonomy, and

relatedness than unhealthy perfectionists. Given that engagement is borne out of basic psychological need satisfaction (Hodge et al., 2009), it can also be suggested that unhealthy perfectionistic athletes should show lower levels of engagement than healthy perfectionistic athletes, but this has not been examined in the literature. It has been suggested, however, that differences in engagement levels may be apparent between different types of perfectionists.

Support for the previous claim is provided by the fact that healthy and unhealthy perfectionists have been described as differing in several of the primary characteristics of athlete engagement. For example, regarding enthusiasm (i.e., high enjoyment and excitement), healthy perfectionists feel emotionally charged before a task, while unhealthy perfectionists feel emotionally drained (Hamachek, 1978). Regarding confidence (i.e., belief in one's ability to be successful), healthy perfectionists experience little doubt about actions and have minimal concern over mistakes, while unhealthy perfectionists experience uncertainty regarding their efforts and ruminate over mistakes (Hamachek, 1978; Gotwals & Spencer-Cavaliere, 2014). Regarding vigour (i.e., the experience of liveliness), healthy perfectionists feel relaxed and excited going into a task, whereas unhealthy perfectionists feel tired and confused (Gotwals & Spencer-Cavaliere, 2014). Regarding dedication (i.e., the devotion of time and effort toward one's goals), however, both healthy perfectionists and unhealthy perfectionists have been described as working hard toward achieving important goals. For instance, both healthy and unhealthy perfectionists value the hard work that it takes to reach goals (Gotwals & Spencer-Cavaliere, 2014). This characteristic of valuing hard work suggests that dedication may be the only characteristic of athlete engagement upon which the two types of perfectionists do not differ.

As evidenced by variable-oriented research. Past research has also produced empirical evidence of relationships between perfectionism and engagement (e.g., Damian et al., 2017; Jowett et al., 2016). This body of literature has generally adopted a variable-oriented approach. That is, these studies: (a) use variables of the over-arching dimensions of perfectionistic strivings and perfectionistic concerns as units of analysis; and (b) focus on the relationships that those variables individually show with regards to engagement (Dunn, Causgrove Dunn, Gamache, & Holt, 2014; Gotwals, 2011). Jowett et al. (2016) adopted a variable-oriented approach to conduct the only study to date that investigated the relationship between perfectionism and engagement among athletes. For the purposes of the present study, the most relevant findings from Jowett et al.'s study were those that evidenced the relationship between perfectionism and athlete engagement. A sample of male and female junior athletes ($N = 222$) from a variety of team and individual sports were recruited to examine the relationships between perfectionism, athlete engagement, and athlete burnout. It was found that perfectionistic strivings had a positive relationship with athlete engagement, but no significant associations were found between perfectionistic concerns and athlete engagement. This result could suggest that perfectionistic concerns may not have a direct influence on athlete engagement.

Similar results have been produced by research conducted outside of the sport context (see Childs & Stoeber, 2010; Damian et al., 2017; Shih, 2011, 2012; Zhang, Gan, & Cham, 2007). For example, Damian et al. (2017) examined perfectionism and behavioural, emotional, and cognitive engagement among 486 students in grades six through twelve. Results indicated that perfectionistic strivings: (a) were positively related to behavioural, emotional, and cognitive engagement; and (b) predicted increases in cognitive engagement over three academic semesters. In contrast, perfectionistic concerns only showed a positive relationship with cognitive

engagement and did not predict changes in school engagement across time. Similarly, Zhang et al. (2007) examined perfectionism and academic engagement among an undergraduate student population ($N = 482$). It was found that facets of perfectionistic strivings were positively related to academic engagement, and perfectionistic concerns were negatively related to academic engagement. Finally, Childs and Stoeber (2010) examined perfectionism and work engagement in a sample of British employees ($N = 106$). Perfectionistic strivings showed significant positive correlations with multiple characteristics of engagement, whereas perfectionistic concerns only showed a significant negative correlation with one characteristic of engagement, namely vigour. Patterns have emerged in various contexts for the relationship between perfectionism dimensions and engagement considering the past research. Across the varying samples used in past perfectionism–engagement research, facets of perfectionistic strivings have consistently shown positive relationships with characteristics of engagement in youth sport, in academics, and in adult employees. Facets of perfectionistic concerns have shown either negative relationships or no relationships with characteristics of engagement.

Such variable-oriented findings are valuable in that they reveal the relationships that individual dimensions of perfectionism have with characteristics of engagement. There are limitations, however, to adopting the variable-oriented approach to study perfectionism as a predictor of athlete engagement. First, these studies use the dimensions of perfectionism as units of analysis. The problem with this approach is that dimensions (or variables) do not get engaged in sport; rather, athletes (or people) do (see Bergmann, Magnusson, & El Khouri, 2003), which may pose an issue when the aim of variable-oriented research is to generalize the findings to perfectionistic people (Dunn et al., 2014). A variable-oriented approach fails to take into consideration the interaction of the perfectionism dimensions that are present within individuals

(Bergmann & Trost, 2006). Second, these studies focus on relationships that individual dimensions of perfectionism have with engagement. The problem with this approach is that perfectionism is a multidimensional construct and that, to appropriately represent the construct, these multiple dimensions should be simultaneously considered—even when determining relationships with external constructs (see Dunn, Causgrove Dunn, et al., 2006; Gotwals, Dunn, & Wayment, 2003). As discussed in the next section, these limitations could be addressed by adopting a person-oriented approach.

As evidenced by person-oriented research. Person-oriented approaches to research are defined by two primary characteristics. That is, the person-oriented approach (a) posits that the interaction of the variables and the resulting profile across multiple variables can help to define people (Bergmann & Trost, 2006); and (b) allows for generalization of the findings to people, and more specifically, to athletes (Magnusson, 1988). Thus, the person-oriented approach is beneficial as it addresses the limitations that are present in the variable-oriented approach. First, the person-oriented approach allows for the recognition of athlete perfectionists, as opposed to perfectionism variables, to be engaged in sport. Second, regarding perfectionism specifically, differing levels of perfectionistic strivings and perfectionistic concerns produce different perfectionist types, accounting for the interaction between the two dimensions (Dunn et al., 2014). In recognition of the characteristics and benefits of using the person-oriented approach, and addressing a gap in the literature, a person-oriented approach was adopted in the present study by focusing on athletes, as defined by their unique profiles across multiple dimensions of perfectionism, and examining the differences that those athletes show in engagement toward sport.

To the best of my knowledge, no study to date has adopted a person-oriented approach to examine relationships between perfectionism and engagement. However, Gotwals (2011) used the approach to examine how groups of athletes, defined by their perfectionistic orientation, differed across indices of burnout towards sport and found that healthy perfectionists had lower levels of at least one subscale of burnout than the unhealthy perfectionists and non-perfectionists. Because burnout is deemed to be the conceptual opposite of engagement (Maslach & Leiter, 1997; Schaufeli, Salanova, González-Romá, & Bakker, 2002), a review of Gotwals (2011) work (below) may shed light on how perfectionism could relate to engagement among athletes. More specifically, perfectionism would be expected to relate to athlete engagement in a manner that is opposite to how it relates to athlete burnout.

Gotwals (2011) used cluster analysis to categorize 117 male and female Canadian intercollegiate varsity student-athletes according to their responses to the Sport Multidimensional Perfectionism Scale-2 (Sport MPS-2; Gotwals & Dunn, 2009)². A four-cluster solution that paralleled the tripartite model of perfectionism was adopted. One cluster was deemed to contain healthy perfectionists as it included athletes who showed relatively high levels of perfectionistic strivings in combination with relatively low levels of perfectionistic concerns. Two of the clusters were deemed to contain unhealthy perfectionists as they included athletes who showed relatively high levels of perfectionistic strivings in combination with relatively high levels of perfectionistic concerns: one of these clusters was labeled doubt-oriented unhealthy perfectionists as athletes in this cluster were doubtful and uncertain about their pre-performance

² Two other studies (Gustafsson, Hill, Steinberg, & Wagnsson, 2015; Lemyre, Hall, & Roberts, 2008) have used a person-oriented approach to examine perfectionism and burnout. However, perfectionism was not the sole determining factor used to group the athletes (i.e., a number of variables in addition to perfectionism were used to distinguish between groups). As a result of the plethora of variables in the group discriminations, these studies were deemed not applicable in regards to the current study, as it was difficult to determine whether the influence of perfectionism was important to athlete engagement since the groups were defined by many other variables as well.

training quality in comparison to the other clusters, and the other cluster was labeled parent-oriented unhealthy perfectionists as athletes in this cluster showed more sensitivity to their parents' criticism and expectations compared to the other clusters. The fourth cluster was considered to contain non-perfectionists as it was comprised of athletes with low levels of perfectionistic strivings. Gotwals (2011) then compared these clusters to their levels across the three core symptoms of burnout: namely emotional and physical exhaustion, sport devaluation, and reduced accomplishment. Results indicated that the healthy perfectionists reported lower levels across all three burnout symptoms in comparison to the non-perfectionists and the doubt-oriented unhealthy perfectionists, with the latter reporting lower scores on emotional and physical exhaustion symptom subscale compared to the parent-oriented unhealthy perfectionists and in comparison to the non-perfectionists.

The findings from Gotwals (2011) are generally supported in person-oriented research conducted with perfectionism and burnout outside of the sport domain. For example, Moate, Gnilka, West, and Burns (2016) used latent profile analysis to categorize a sample of 178 counselor educators according to their responses to the Almost Perfect Scale-Revised (APS-R; Slaney, Rice, Mobley, Trippi, & Ashby, 2001). Three classes were chosen in the final model, which fit with the tripartite model. The three classes reflected healthy perfectionists, unhealthy perfectionists, and non-perfectionists. Moate et al. (2016) then compared these clusters to the levels experienced across three types of burnout: namely personal, student-related, and work-related. Personal burnout reflected general exhaustion symptoms, student-related burnout reflected exhaustion symptoms specific to working with students, and work-related burnout reflected exhaustion symptoms specific to tasks related to work or being in the workplace. Results indicated that the unhealthy perfectionists had significantly higher personal, student-

related, and work-related burnout in comparison to the healthy perfectionists. The unhealthy perfectionists also had significantly higher personal and work-related burnout in comparison to the non-perfectionists. As burnout is considered to be the conceptual opposite of engagement, perhaps the opposite findings will be observed when engagement is the construct of interest (i.e., unhealthy perfectionists showing lower levels of engagement), providing support for the previous consideration.

Similarly, but among a different population, Li, Hou, Chi, Liu, and Hager (2014) cluster analyzed a sample of Chinese Information Technology employees ($N = 345$) according to their scores across the APS-R (Slaney et al., 2001). A four-cluster solution was chosen a priori because the study was founded on the 2×2 model of perfectionism (Gaudreau & Thompson, 2010) and that model identifies four distinct perfectionism subtypes: pure personal standards perfectionism, pure evaluative concerns perfectionism, mixed perfectionism, and non-perfectionism. Of these four types, the pure personal standards perfectionists represent healthy perfectionists as high levels of perfectionistic strivings components are present, and the mixed perfectionists represent unhealthy perfectionists as high levels of both perfectionistic strivings and perfectionistic concerns components are present. Subsequent cluster comparisons indicated that the pure personal standards perfectionists (i.e., the healthy perfectionists) reported significantly lower levels of burnout in comparison to the mixed perfectionists (i.e., the unhealthy perfectionists), reflecting similar trends as in the other contexts.

The review of literature that has utilized a person-oriented approach on perfectionism and burnout has revealed a similar pattern of findings (Gotwals, 2011; Li et al., 2014; Moate et al., 2016). Specifically, across all three studies, classes or clusters that represented unhealthy perfectionists had higher burnout scores compared to the groups that represented healthy

perfectionists. This trend was apparent despite the three different domains whereby the studies were contextualized, thus supporting the robustness of the trend. Given that engagement is considered to be the conceptual opposite of athlete burnout (Maslach & Leiter, 1997; Schaufeli et al., 2002), these findings suggest that unhealthy perfectionistic athletes may show lower levels of engagement toward their primary sport than healthy perfectionistic athletes or non-perfectionistic athletes, perhaps hindering their positive sport experience and the benefits of being engaged in sport. However, as noted below, further research is needed in the sport domain to confirm this assertion.

Value of Person-oriented Approach

According to the variable-oriented research on perfectionism and burnout and the person-oriented research on perfectionism and burnout (Gotwals, 2011; Jowett et al., 2016), there is reason to suspect that healthy and unhealthy perfectionistic athletes may show theoretically meaningful differences across various characteristics of engagement. There are several reasons it would be valuable to adopt a person-oriented approach to directly test for these relationships. First, there has only been one study that has simultaneously considered both perfectionism and engagement in sport (see Jowett et al., 2016), and it did so through a variable-oriented approach. As discussed, such an approach may not adequately represent perfectionism and faces challenges with the generalization of findings to athletes. Second, no study has used a person-oriented approach applied to the relationship between perfectionism and engagement. This approach would allow researchers to examine how *athletes* are engaged in sport instead of variables. Third, while some studies have used a person-oriented approach to examine relationships between perfectionism and burnout (Gotwals, 2011; Li et al., 2014; Moate et al., 2016), it would not be appropriate to assume that results from these studies provide direct evidence of the

relationship between perfectionism and engagement. This is because, although engagement and burnout are conceptual opposites, the constructs are considered to be distinct and independent (rather than opposing ends along the same continuum; Lonsdale, Hodge, & Jackson, 2007).

Given these limitations in the literature, a person-oriented approach examining the relationship between the personal factor of perfectionism and athlete engagement needs to be undertaken. To help explain this relationship, the environmental factor of coach autonomy support is considered as well.

The Potential Moderating Role of Coach Autonomy Support

Theorists and researchers suggest that environmental factors (e.g., lack of success, interpersonal styles, task difficulty) are influential in determining the relationships that perfectionism has with healthy and unhealthy outcomes in sport and the development of athlete engagement (Flett & Hewitt, 2005; Teixeira et al., 2012). Environmental factors may also serve to moderate the relationship between perfectionism and athlete engagement. In particular, given that engagement is considered to be a positive outcome of basic needs satisfaction, and perfectionism influences basic needs satisfaction, basic needs satisfaction may theoretically link perfectionism to engagement. Specific environmental factors that facilitate or inhibit perfectionistic athletes' need satisfaction may also enhance or suppress those perfectionists' degree of athlete engagement. Coach autonomy support may be such a factor (Appleton & Curran, 2016; Mageau & Vallerand, 2003).

Autonomy support is an interpersonal behaviour that can be used to identify, build, and nurture motivational resources within individuals (Deci & Ryan, 1985). Coaches are autonomy supportive when they provide their athletes with competency-related feedback, take their athletes' feelings into consideration, and give them the opportunity to make choices and take

initiative (Mageau & Vallerand, 2003). Empirical evidence suggests that coach autonomy support contributes to the satisfaction of athletes' basic psychological needs (Adie, Duda, & Ntoumanis, 2012; Almagro, Saenz, Lopez, & Moreno, 2010; Blanchard & Vallerand, 1996). For instance, Adie et al. (2012) examined how perceptions of coach autonomy support contributed to basic need satisfaction and well-being in 54 male adolescent soccer players. Over two soccer seasons, it was found that perceived coach autonomy support positively related to subjective vitality, and positively predicted levels of competence, relatedness, and autonomy. This ability to affect basic need satisfaction among athletes identifies coach autonomy support as an environmental factor that may influence the relationship that perfectionism shows with athlete engagement (Jowett et al., 2016). In other words, coach autonomy support may moderate (see Hayes, 2013) the perfectionism–engagement relationship.

Coach autonomy support may moderate the relationship between perfectionism and athlete engagement by specifically affecting the degree of engagement that unhealthy and healthy perfectionistic athletes experience. This point is grounded in Appleton and Curran's (2016) argument that undesirable tendencies associated with high levels of perfectionistic concerns—such as those demonstrated by unhealthy perfectionists—may be reduced when athletes have a coach who is autonomy supportive. Additionally, unhealthy perfectionists are more sensitive to significant others in the environment in comparison to healthy perfectionists (Gotwals & Spencer-Cavaliere, 2014). In combination, these findings suggest that the greatest differences between healthy perfectionists and unhealthy perfectionists on athlete engagement may be evident when coach autonomy support is low. In contrast, the smallest differences may be evident when coach autonomy support is high. This fluctuating relationship may be due not to changes in healthy perfectionists' level of engagement, but rather to increases in athlete

engagement that unhealthy perfectionists show under conditions of high coach autonomy support.

Autonomy support has been used as a moderator between variables within physical activity settings (see Halvari, Ulstad, Bagøien, & Skjesol, 2009; Trouilloud, Sarrazin, Bressoux, & Bois, 2006), and coach autonomy support was identified as a potential moderator of the perfectionism–athlete engagement relationship in a future research direction suggested by Jowett et al. (2016). Despite these past findings and suggestions, no study to date has examined whether coach autonomy support moderates the relationship between perfectionism and athlete engagement. Regarding positive psychology, having an autonomy supportive coach may help foster a positive and enjoyable sport experience for athletes. In addition, if autonomy support does act as a moderator, coaches may be able to promote and maintain their athletes' engagement in sport, and create a more positive sporting environment.

Purposes and Hypotheses

In light of the aforementioned gaps in the literature, the proposed study has two purposes. The first is to examine the degree to which distinct groups of adolescent athletes, defined by unique perfectionism profiles, differ across core characteristics of engagement towards sport. The second is to explore whether coach autonomy support moderates these potential group differences. Regarding the first purpose, it is hypothesized that unhealthy perfectionists will display lower levels of athlete engagement compared to healthy perfectionists, given past perfectionism–burnout research (i.e., Gotwals, 2011). Regarding the second purpose, it is hypothesized that when high levels of coach autonomy support are perceived, healthy perfectionists and unhealthy perfectionists will display similar levels of athlete engagement (Appleton & Curran, 2016). It is hypothesized that when low levels of coach autonomy support

are perceived, unhealthy perfectionists will display lower levels of athlete engagement compared to healthy perfectionists (Appleton & Curran, 2016).

Method

Targeted Participants

Approximately 200 adolescent athletes who were members of coach-led teams involved in competitive sport were targeted for the present study. These characteristics, and this sample size, were targeted for a number of reasons. Adolescent athletes were targeted because there is a 35% dropout rate from sport for adolescent athletes, highlighting the need to foster and maintain athlete engagement within this population (Fraser-Thomas et al., 2008). Maintained sport participation has been associated with reduced chronic disease risk, improved mood, and developing life skills (Chen, Snyder, & Magner, 2010). These benefits are not reaped if one drops out from sport. Athletes on coach-led teams were targeted because coach autonomy support was being investigated in the present study, and coaches have an opportunity to positively develop athletes (Vella, Oades, & Crowe, 2011). A competitive sport setting (e.g., competing against other teams; opportunity to advance in placing) was selected as perfectionism is fostered in a competitive sports context (Hewitt & Flett, 2005). Two-hundred participants were targeted because samples of that size are generally deemed appropriate for the primary analytical techniques used in this study (namely, latent profile analysis and hierarchical regression analysis; see Hayes, 2013; Wolf, Harrington, Clark, & Miller, 2013). To be included in the study, participants had to be at least 16 years old and an active member of a team where the coach had a voice in the teams' selection process, practices, and competitions. Parental or guardian permission was not needed as these were competitive athletes and deemed to have the capacity to decide for themselves if they wanted to participate in the study or not. Participants were excluded

if they had been injured and, as a result, were not taking part in team practices or competitions for the past two weeks.

Instruments

Demographics. A demographic questionnaire (see Appendix A) was used to capture participants' background information. The questionnaire was developed by the researcher based on past engagement research and past burnout research, and separated into two sections: one pertaining to the athlete, and one pertaining to the athletes' sport involvement. In the section about the athletes, questions regarding gender, age, and ethnicity were covered, and in the section about the athletes' sport involvement, questions regarding specifics about the age the athletes started playing the sport, the team they are currently on, the number of seasons they have been affiliated with the club and with the team, as well as questions regarding practices and competitions were covered.

Athlete Engagement. Athlete engagement was measured through use of the first and only self-report instrument designed to specifically capture the core characteristics of engagement among athletes: namely the Athlete Engagement Questionnaire (AEQ; Lonsdale, Hodge, & Jackson, 2007). As established by Lonsdale, Hodge, and Raedeke (2007), the AEQ is the only instrument developed to specifically capture the four core characteristics of athlete engagement.

The instrument (see Appendix B) is comprised of four subscales containing four items each that respectively capture the four characteristics of engagement: enthusiasm, confidence, vigour, and dedication. The enthusiasm subscale refers to the degree of excitement and enjoyment that the athlete feels while participating in sport (e.g., "I have fun in my sport"). The confidence subscale captures the degree to which athletes believe that they are able to be

successful or capable of accomplishing tasks in their sport (e.g., “I believe I am capable of accomplishing my goals in sport”). The vigour subscale refers to how mentally, physically, or emotionally energized or alive an athlete feels (e.g., “I feel energized when I participate in my sport”). The dedication subscale refers to the degree to which athletes feel devoted to their sport (e.g., “I want to work hard to achieve my goals in sport”). Respondents use a five-point Likert scale (1 = *almost never*; 5 = *almost always*) to respond to each item. Subscale scores are calculated for each characteristic of engagement, and a total score is calculated taking all characteristics into consideration (Hodge et al., 2009). A higher score reflects a higher level of that characteristic of engagement. The instructions and the items in the AEQ were originally designed to capture participants’ responses to the items when considering “sport” in general. In this study, items ($n = 16$) were edited to reflect the current, and primary sport the athlete is taking part in. For example, if the respondent was a member of a football club, then the original AEQ item that read, “I am devoted to my sport” was changed to “I am devoted to football.”

The AEQ has been used to assess engagement among adolescent athletes from a variety of sports (Hodge et al., 2009; Jowett et al., 2016; Podlog et al., 2015). Collectively, these studies have produced evidence of the reliability and validity of the instrument’s assessments. For instance, each subscale demonstrated acceptable levels of internal consistency (i.e., $\alpha \geq 0.70$), the instrument’s factor structure has been supported, and the AEQ subscales have been found to relate in theoretically meaningful ways to external constructs such as burnout (see Hodge et al., 2009; Jowett et al., 2016; Lonsdale, Hodge, & Jackson, 2007).

Perfectionism. Perfectionism is a domain-specific construct (Gotwals et al., 2003). That is, individuals may be more or less perfectionistic in different achievement domains. As a result, it is important to consider the specific domain that an individual is operating in to foster an

accurate measurement of that individual's perfectionistic tendencies (Dunn, Craft, Causgrove Dunn, & Gotwals, 2011). Also, Stoeber and Madigan (2014) suggested that perfectionism can be best represented by using multiple subscales from different instruments. Accordingly, the present study assessed perfectionism through use of the two most popular measures of sport-based perfectionism: namely, the Sport Multidimensional Perfectionism Scale-2 (Sport MPS-2; Gotwals & Dunn, 2009), and the Multidimensional Inventory of Perfectionism in Sport (MIPS; Stoeber, Otto, & Stoll, 2006).

The Sport MPS-2 (Gotwals & Dunn, 2009) consists of 42-items that are grouped into six subscales: Personal Standards, Organization, Concern Over Mistakes, Doubts About Actions, Perceived Parental Pressure, and Perceived Coach Pressure. The subscales of Personal Standards and Organization reflect aspects of perfectionistic strivings (Gotwals & Dunn, 2009; Dunn et al., 2016). The Personal Standards subscale contains seven items and captures athletes' tendencies to set high performance standards in sport (e.g., "I have extremely high goals for myself in my sport"); the Organization subscale is comprised of six items and captures the athletes' tendencies to establish routines or plans that direct behaviour before and during sport competition (e.g., "On the day of competition, I have a routine that I try to follow"). The subscales of Concern Over Mistakes, Doubts About Actions, Perceived Parental Pressure, and Perceived Coach Pressure reflect aspects of perfectionistic concerns. The Concern Over Mistakes subscale contains eight items and covers the degree to which athletes worry about committing a mistake during performance (e.g., "If I fail in competition, I feel like a failure as a person"); the Doubts About Actions subscale contains six items and captures the degree to which athletes are uncertain about the quality of their preparation for a sport competition (e.g., "Prior to competition, I rarely feel satisfied with my training"); the Perceived Parental Pressure subscale has nine items and reflects

athletes' tendencies to perceive their parents as sources of pressure or criticism (e.g., "My parents set very high standards for me in sport"); and the Perceived Coach Pressure subscale contains nine items that aim to represent athletes' tendencies to perceive their coach as a source of pressure (e.g., "I feel like my coach criticizes me for doing things less than perfectly in competition").

The MIPS (Stoeber et al., 2006) consists of ten items spanning two subscales: Striving for Perfection and Negative Reactions to Imperfection. The Striving for Perfection subscale reflects an aspect of perfectionistic strivings dimension, consists of five items and signifies the athletes' tendencies to strive for perfection in his/her sport (e.g., "During training, I strive to be as perfect as possible"). The Negative Reactions to Imperfection subscale, reflects an aspect of perfectionistic concerns dimension, contains five items, and reflects the degree to which athletes who do not feel that they met their sport goals, elicit a negative response to a performance (e.g., "During training, I feel extremely stressed if everything does not go perfectly"). The MIPS can be modified to refer specifically to training or competition. The present study used the version pertaining to training as the Sport MPS-2 focuses mainly on competition. It was hoped that addressing both contexts would help produce a more representative assessment of respondents' perfectionistic tendencies toward sport.

In the present study, the items from both the Sport MPS-2 and the MIPS were combined randomly and presented in a single instrument (Jowett et al., 2016) based on a suggestion by Stoeber and Madigan (2014). This instrument can be seen in Appendix C. Responses to each item were based on a five-point Likert-type scale (1 = *strongly disagree*; 5 = *strongly agree*). A score was produced for each subscale across the two instruments by summing and averaging responses to each item in that subscale. Higher subscale scores reflected higher levels of the

aspect of perfectionism at hand. The instructions and items in the Sport-MPS-2 and MIPS were originally intended to capture respondents' answers to items regarding their experience in their "sport" or "training" in general. In this study, these instructions and items were edited to emphasize the athletes' current, and primary sport. For example, if the respondent was a member of a soccer club, then the original perfectionism item that read, "I feel that other players generally accept lower standards for themselves in sport than I do" was changed to "I feel that other players generally accept lower standards for themselves in soccer than I do".

A considerable amount of reliability and validity evidence supports the use of the Sport MPS-2 and the MIPS. For instance, among samples of adolescent athletes, subscales across the two instruments have demonstrated adequate internal consistency (i.e., $\alpha \geq 0.70$), theoretically meaningful relationships with external constructs such as burnout, and the ability to be combined to represent higher-order dimensions of perfectionistic strivings and perfectionistic concerns (Larkin, O'Connor, & Williams, 2016; Rasquinha, Dunn, & Causgrove Dunn, 2014; Stoll, Lau, & Stoeber, 2008). In line with this last point, subscales from the Sport-MPS-2 and the MIPS were used to represent the two dimensions of perfectionism.

In line with Stoeber and Madigan's (2014) review of perfectionism assessment in sport, subscales from two different perfectionism questionnaires were used to measure perfectionism. Dunn et al.'s (2016) analysis of the higher-order factor structure of the two instruments, the subscales of Personal Standards, Organization, and Striving for Perfection were used for perfectionistic strivings, and the subscales of Concern Over Mistakes, Doubts About Actions, Perceived Parental Pressure, and Negative Reactions to Imperfection were used for perfectionistic concerns. The subscale of Perceived Coach Pressure was not included as an aspect of perfectionistic concerns in an effort to minimize potential multicollinearity with the variable

of coach autonomy support. The proxy scores were calculated by first standardizing (i.e., $M = 0$; $SD = 1.00$), and then combining the mean subscale scores included in each of the proxies.

Focusing on subscale mean scores, and the standardization of those scores, allowed for each variable to have the same distribution and weight prior to aggregation (see Stoeber & Madigan, 2014; Madigan, Stoeber, & Passfield, 2015).

Perceived Coach Autonomy Support. Past research has used two general approaches to measure coach autonomy support. The first approach focuses on coaches' actual behaviours (e.g., Webster et al., 2013); the second focuses on athletes' perceptions of the coaches' behaviours (see Sheldon & Watson, 2011; Solberg & Halvari, 2009). The present study adopted the second approach on the principal that how athletes perceive and interpret their coaches' behaviours is more important than the actual behaviours displayed by the coach (Shaver, 1975). To this end, the Sport Climate Questionnaire (SCQ; Deci & Ryan, 2006) was used to assess participants' perceptions of the degree to which their primary coach is autonomy supportive.

The SCQ (see Appendix D; Deci & Ryan, 2006) measures athletes' perceptions of their coach's autonomy supportive behaviours through a 15-item unidimensional questionnaire. Example items include "I feel that my coach has provided me choices and options about my physical activity and training" and "My coach listens to how I would like to do things." Respondents use a seven-point Likert-type scale (1 = *strongly disagree*; 7 = *strongly agree*) to respond to each item. Responses from each item are summed and averaged with higher average scores indicative of higher perceptions of coach autonomy support. Past research has produced evidence that supports the reliability and validity of the SCQ (Amorose & Anderson-Butcher, 2007; Jõesaar, Hein, & Hagger, 2012). The SCQ has demonstrated good internal consistency, as well as factorial validity (i.e., the extent of identifying the underlying structure of the scale;

Piedmont, 2014) when used in factor analyses with adolescent athletes (Balaguer, Castillo, Duda, & Ines, 2009; Jõesaar et al., 2009; Reinboth, Duda, & Ntoumanis, 2004).

Procedure

Procedures associated with the present study were reviewed by the Research Ethics Board at Lakehead University. Once ethical approval was granted, the researcher sought out Canadian tournaments that would attract athletes who fit the inclusion criteria. Tournaments were targeted because such events provide the opportunity to recruit a relatively large number of participants in a relatively short amount of time. Two tournaments emerged as useful contexts for participant recruitment, both in Winnipeg, Manitoba. One tournament was an adolescent club level basketball provincial championship. The basketball tournament was put on by Basketball Manitoba. A total of 90 club teams took part in the tournament which was used as a scouting opportunity for the provincial team coaches as teams vied for the championship. This tournament consisted of five age divisions, from Under 14 (U14) to Under 19 (U19). For the present study, the U17 and U19 divisions were targeted as the athletes in those divisions met the inclusion criteria of participants being at least 16 years of age. Within these divisions there were 16 male teams and 7 female teams with varying numbers of players on each team (i.e., ranging from 5 to 16 athletes).

The other tournament targeted for recruitment was a provincial level football showcase tournament. The tournament was put on by Football Manitoba. A total of six teams took part in the tournament, representing teams from two provinces. The tournament was used as a chance for the teams to strive for a chance to play in the national club football tournaments. This tournament consisted of two divisions: U16 and U18. The targeted age division was U18 as athletes in this division met the inclusion criteria of participants being at least 16 years of age.

This division contained a total of three teams comprised entirely of male athletes. These two tournaments took place on the same weekend, which allowed for efficient potential participant recruitment to occur. Because of the football team only having male athletes, it was decided to only recruit male athletes from the basketball tournament, especially as there were more male teams participating in the tournament. Doing so fostered chances of reaching the targeted number of participants and eliminated the risk of gender differences clouding the analyses.

To gain permission to recruit participants at these tournaments, the head coordinator of each tournament was contacted, provided with a verbal and written description of the study (see the information letter provided in Appendix E), and asked if the tournament could be used as a setting for data collection. Both head coordinators agreed to let the researcher collect data at the tournaments, and announced the approval of the study to the coaches of the teams participating in their respective tournament. Coaches were encouraged to allow their athletes to take part in the study. To foster the understanding of the study, information letters were distributed to the coaches via the head tournament coordinator approximately two weeks prior to the tournaments (see Appendix F). If coaches were interested in allowing their teams to participate, they were instructed to contact the primary researcher for more information.

For athletes taking part in the basketball tournament, participant recruitment and data collection took place during the tournament. This process started with the researcher introducing herself and the present study to head coaches of teams within the targeted divisions. This introduction occurred after one of their tournament games. More specifically, coaches were informed of the purposes of the study, what participation would entail for their athletes, and asked if they would allow their team to be recruited. If the coaches allowed recruitment of their team, a team meeting was scheduled that involved explanation of the present study and

collecting the data at a time convenient with both the coach and the athletes. These sessions were scheduled during the tournament either immediately before or after a game and took place in isolated hallways or in an open classroom at the tournament facility.

For athletes taking part in the football tournament, participant recruitment and data collection took place before the tournament. This process started with the researcher introducing herself to the managers of the teams, and the information about the present study was passed on to the coaches via the manager. If the manager agreed to let the teams participate, a time and place for participant recruitment and data collection was established by the team managers. For one of the teams, the session took place four days before the tournament and was conducted before practice on the bleachers at the field where the team was practicing. For the other two teams, the session took place one day before the tournament and was conducted inside the clubhouse at the field after the teams were finished practicing.

Actual procedures during recruitment and data collection sessions were the same for basketball and football teams. All participant recruitment and data collection sessions started with a brief introduction of the researcher to the potential participants. After this introduction, the head coaches, assistant coaches, trainers, managers, and parents left the area where the session was taking place as athletes were able to provide their own informed consent. The researcher then distributed information letters (see Appendix G) to the potential participants in attendance and verbally described the goals of the study. This description addressed the purposes of the study, what participation would entail, confidentiality, anonymity, and the right to drop out from the study. Athletes who were interested in participating were then asked to complete an informed consent form (see Appendix H). Consenting athletes were then asked to complete a questionnaire package containing the demographic questionnaire, the AEQ, the perfectionism questionnaire

(consisting of both the Sport MPS-2 and the MIPS), and the SCQ taking approximately 20 minutes to complete. The demographic questionnaire was always presented first, but the order of the other questionnaires was counterbalanced to control for order effects. Once participants finished responding to the questionnaire package, they were asked to return their completed package to the researcher. Upon completion of the session, the researcher thanked the participants as well as the coaches for their time and participation in the study. The entire session took approximately 15 to 20 minutes to complete.

Data Analysis

Preliminary analyses. Preliminary analyses included screening for and replacing missing data, identifying and evaluating potential outliers, testing the basketball players and football players for significant differences in athlete engagement, perfectionism, and perceived coach autonomy support, conducting a preliminary evaluation of multicollinearity, and evaluating the internal consistency of each subscale. Missing data were replaced using subscale mean replacement (Tabachnick & Fidell, 2013). Univariate outliers were identified by cases that had a standardized subscale z -score greater than ± 3.29 and multivariate outliers were identified by having a Mahalanobis D^2 probability less than 0.001 (Hair, Black, Babin, & Anderson, 2010; Tabachnick & Fidell, 2013). A one-way MANOVA in relation to each athlete engagement characteristic was used to test for group differences. A preliminary evaluation of multicollinearity was conducted through examination of bivariate correlations between perfectionism proxies and coach autonomy support. Cronbach's alpha was used to estimate internal consistency.

Analysis for participant categorization by perfectionism profile. Latent profile analysis was used to categorize participants according to their perfectionistic orientation. Latent

profile analysis is a model-based technique that is used “to identify clusters of observations that have similar values on cluster indicators” (Pastor, Barron, Miller, & Davis, 2007, p. 14). In the present study, participants were classified based on their scores across perfectionistic strivings and perfectionistic concerns. Models comprised of two to seven classes were tested using MPlus Version 8 (Muthén & Muthén, 1998-2017). In each analysis, the residuals for each proxy of perfectionism were not allowed to covary, modelling the assumption of local independence (Nyland, Asparouhov, & Muthén, 2007). Local independence is when items are independent of each other given one’s latent variable score (Vermunt & Magidson, 2004). Five thousand starts were used and 500 optimizations were used after 100 iterations (Berlin, Williams, & Parra, 2014).

The best fitting model was identified through the use of three criteria: fit indices, practicality, and interpretability (Berlin et al., 2014; Pastor et al., 2007). The fit indices that were used included the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), Sample Size Adjusted-Bayesian Information Criterion (SSA-BIC), and Bootstrap Likelihood Ratio Test (BLRT). For the AIC, BIC, and SSA-BIC, good fitting models are associated with lower values. For the BLRT, good fitting models are identified by having a non-significant value (i.e., $p > 0.05$), indicating that the model with one less class had a better fit (Gustafsson et al., 2015; Pastor et al., 2007). Practicality was determined by examining the proportion of the sample represented in each class within each model. Models with good practicality did not contain any small class sizes (i.e., classes containing less than 10% of the sample). Interpretability was assessed by considering how classes differ across perfectionistic strivings and perfectionistic concerns and by taking into account how well those inter-class differences were reflected in prominent models of perfectionism (i.e., tripartite model of perfectionism). A series of

MANOVAs were conducted to determine where differences occurred between the groups with regard to perfectionistic strivings and perfectionistic concerns. Models with good interpretability had classes that contained profiles across the perfectionism dimensions that were mirrored in popular models of perfectionism. Once identified, results from these tests were also used to determine labels for the classes in the best model.

Analysis for class differences in engagement and the moderating effect of perceived coach autonomy support. Hierarchical multiple regression analyses were used, in line with Hayes and Montoya's (2017) recommendations, to test for differences between the perfectionism classes on engagement and to examine if those differences were moderated by, or dependent on, coach autonomy support. Four multiple regression analyses were conducted, and all analyses were conducted through the HC (Hayes & Cai, 2007) and PROCESS (Hayes, 2013) macros for the Statistical Package for the Social Sciences (SPSS). Standard errors for all parameters were adjusted for violations of homoscedasticity (via HC3 standard error estimator; see Hayes & Cai, 2007).

A total of four analyses were conducted with each athlete engagement characteristic being a dependent variable. Each analysis was comprised of three steps. In the first step, perfectionism class was entered as the independent variable. Perfectionism class represented the classes in the best fitting model produced through latent profile analysis (see previous section) and, as such, was a multicategorical variable (i.e., having more than two groups). However, variables in multiple regression must be continuous and dichotomous. To make perfectionism class amenable to analyses through multiple regression, the variable was represented by dummy variables created through indicator coding (see Hayes & Montoya, 2017). With the use of these dummy variables, findings from the first step of the regression analyses determined if there were

significant class differences across the characteristics of engagement. In the second step, coach autonomy support was entered as an independent variable into the regression. In the third step, product terms between the dummy variables representing the perfectionism classes and coach autonomy support were entered into the regression. Findings from this third step determined if coach autonomy support moderated perfectionism class differences on athlete engagement.

Moderation was deemed to be present if the change in variance explained increased significantly from Step 2 to Step 3 (i.e., if the ΔR^2 between Step 2 and Step 3 had a p value $< .05$). If moderation was detected, the interaction was probed to determine where differences between the classes were attributed to coach autonomy support. To probe the interaction, a visual representation of the model was created. Then an omnibus test of the interaction was conducted via the Omnibus Groups Regions of Significance (OGRS; Montoya, 2016) macro for SPSS. This test determined, generally, the values of coach autonomy support at which differences between the perfectionism classes appeared. A pairwise test of the interaction was then conducted via the Johnson-Neyman technique using a procedure outlined by Hayes and Montoya (2017, pp. 16-17). This test identified the specific values of coach autonomy support at which differences between two predetermined classes' scores on a specific engagement characteristic changed from significant to non-significant (or vice-versa).

Results

Recruiting and Participants

Fourteen U17 and U19 teams from the basketball tournament took part in recruitment and data collection sessions. Two teams were not recruited due to conflicts between these two teams' game schedule and recruitment and data collection sessions for other teams. Of approximately 108 basketball athletes who were approached to participate in the study 97 enrolled. All three

teams from the football tournament in the U18 division took part in recruitment and data collection sessions. Of the approximate 98 football athletes who were given the opportunity to participate in the study 94 enrolled. This resulted in a total of 191 athletes who participated in the study.

The present sample had a mean age of 16.59 years ($SD = 0.67$). Ethnicities represented in the sample were African/African Canadian (9.9%), Caribbean (4.2%), Caucasian/Western European (49.2%), East Asian (4.7%), Indigenous/First Nations/Metis (9.4%), Mixed (6.8%), South Asian (5.2%), and other (5.8%). Participants reported starting to play their sport at an average age of 10.46 years old ($SD = 2.98$), while playing on their current team for an average of 2.93 seasons ($SD = 2.13$). The participants practiced with their current team an average of 2.78 times per week ($SD = 1.46$) and had already competed in an average of 3.28 tournaments ($SD = 6.11$). Of the 191 athletes, 69.1% had played on their current team before and 64.4% indicated that playing their sport is “very important” to them. Sixty-three percent of the athletes played at least one other sport in addition to their primary sport.

Preliminary Analysis

Data entry errors. Preliminary analyses began with a frequency analysis to check for any mistakes made during data entry (e.g., entered values that exceeded the range of possible responses; empty cells when there was a valid value to enter). Two errors were found; in one, a 6 was entered for an AEQ item (valid responses ranged from 1 – 5); in the other; the presentation order of a participant’s questionnaire package was not entered. These mistakes were corrected and the frequency analysis was run once again. This ensured that the identified mistakes had indeed been corrected and allowed for the identification of other data entry errors overlooked during the first frequency analysis. No additional errors were detected.

Missing data, descriptive statistics, and internal consistency. Ten participants had large amounts of missing data (e.g., did not provide responses to a complete questionnaire or to more than one page of a multi-page questionnaire). These participants were removed from the dataset, leaving a sample of 181 participants. Within this sample the total missing data for the sample was small (i.e., 337 cases of missing data points out of 15106 or 2.23%; less than 5% is considered a small amount of missing data, Tabachnick & Fidell, 2013). Leaving these missing data points as empty cells, or simply removing those cases with missing data, could have compromised subsequent analyses by reducing the statistical power and compromising generalizability (Kang, 2013). To avoid this, missing data points were replaced using subscale mean replacement, where the missing data point was replaced by the mean of the participant's responses to remaining items on that subscale (Tabachnick & Fidell, 2013).

Subscale mean item scores were then calculated for the AEQ, Sport-MPS-2, MIPS, and the SCQ. These means, along with their associated standard deviations, skewness, and kurtosis values are found in Table 1. As indicated in Table 1, mean scores for the AEQ subscales were very high and showed a strong negative skew. From a statistical perspective, this is not a concern because the mean scores were to be used with multiple regression analysis and multiple regression is strong against violations of normality (Hill & Lewicki, 2007). However, it does suggest that the variability of these variables may have been limited by a ceiling effect. Table 1 also presents estimates of internal consistency for each scale or subscale. Cronbach's alpha was used for these estimates. All alpha values were greater than .70, indicating acceptable levels of internal consistency (Nunnally & Bernstein, 1994).

Table 1

Descriptive Statistics and Estimates of Internal Consistency for all Variables

| Variables | <i>M</i> | <i>SD</i> | Skewness | Kurtosis | Internal Consistency (α) |
|--|----------|-----------|----------|----------|-----------------------------------|
| <i>AEQ^a</i> | | | | | |
| Enthusiasm | 4.62 | 0.56 | -1.64 | 2.23 | 0.87 |
| Confidence | 4.32 | 0.65 | -0.91 | 0.65 | 0.85 |
| Vigour | 4.44 | 0.61 | -1.14 | 0.87 | 0.84 |
| Dedication | 4.43 | 0.63 | -1.07 | 0.66 | 0.89 |
| <i>Sport-MPS-2^a</i> | | | | | |
| Personal Standards | 3.66 | 0.63 | -0.16 | -0.25 | 0.76 |
| Organization | 3.43 | 0.77 | -0.47 | 0.48 | 0.83 |
| Concern Over Mistakes | 3.06 | 0.84 | 0.03 | -0.40 | 0.86 |
| Doubts About Actions | 2.75 | 0.69 | 0.10 | 0.39 | 0.75 |
| Perceived Parental Pressure | 2.73 | 0.79 | 0.05 | -0.35 | 0.83 |
| Perceived Coach Pressure | 3.09 | 0.73 | -0.17 | 0.11 | 0.76 |
| <i>MIPS^a</i> | | | | | |
| Negative Reactions to Imperfection during Training | 2.95 | 0.77 | -0.10 | 0.10 | 0.74 |
| Striving for Perfection during Training | 3.70 | 0.78 | -0.15 | -0.61 | 0.83 |
| <i>SCQ^b</i> | | | | | |
| Coach Autonomy Support | 5.43 | 1.138 | -1.09 | 1.51 | 0.94 |

Note: Subscript indicates response formats differed across instruments: “a” had a range of scores from 1 to 5, “b” had a range of scores from 1 to 7.

Univariate and multivariate outliers. Screening for and dealing with univariate and multivariate outliers was conducted following guidelines by Hair et al. (2010) and Tabachnick and Fidell (2013). To screen for univariate outliers, participant’s mean scores on each subscale were converted to z-scores. Cases that had a z-score greater than ± 3.29 on any variable were considered to be an outlier on that variable. Five cases met this criterion. Within these five outliers, extreme cases were found on the AEQ subscales of enthusiasm, vigour, and dedication, the Sport-MPS-2 subscale of personal standards, and the SCQ. Instead of deleting such cases, Tabachnick and Fidell (2013) suggest transforming the variable upon which the case had an

extreme score. Variable transformation may “reduce the influence of the outlier” (Tabachnick & Fidell, 2013, p. 86) by allowing the extreme scores to be less extreme by improving the normality of the variables (see also Hair et al., 2010). In line with this suggestion, the variables of enthusiasm, vigour, dedication, personal standards, and coach autonomy support were first reflected (because each was negatively skewed; Tabachnick & Fidell, 2013) and then transformed by a base 10 logarithm (commonly known as “log 10”). After applying the reflection and transformation, the process of checking for univariate outliers was repeated. Based on their standardized scores on the transformed variables, the five cases in question no longer qualified as outliers and, thus, were retained in the dataset. These transformed variables were used in all subsequent analyses³.

To screen for multivariate outliers, two Mahalanobis D^2 values were calculated. One value was based on mean scores across the four AEQ subscales and one value was based on mean scores across the eight subscales across the Sport-MPS-2 and the MIPS. The probability of these values was then determined. In order for a case to be considered a multivariate outlier, the probability of any of their Mahalanobis D^2 scores had to be less than 0.001 (Hair et al., 2010; Tabachnick & Fidell, 2013). Based on this guideline, three multivariate outliers were detected. These outliers were removed from the dataset, leaving a final sample size of 178 participants. All following analyses were performed on data provided by this final sample.

Test of sport differences. The participants in this study were competing in similar contexts (i.e., provincial tournaments), but they were from two different sports, namely basketball and football. A one-way MANOVA was conducted to determine if it was appropriate

³ Throughout this thesis, scores from transformed variables are always reported in the original metric of the variables (Hair et al., 2010). Also, when the perfectionistic strivings proxy was created the personal standards subscale of the Sport-MPS-2 was re-reflected prior to being combined with the other subscales in the proxy.

to combine the responses from the basketball players and football players into a single dataset. In this analysis, sport served as the independent variable and scores across the AEQ subscales, the Sport-MPS-2 subscales, the MIPS subscales, and the SCQ served as dependent variables. The Box's M statistic produced from this analysis was non-significant ($p = 0.274$) indicating that the basketball players' and the football players' respective variance-covariance matrices did not significantly differ. As a result, it was deemed appropriate to combine all the responses from all participants into a single dataset.

The multivariate test statistic produced from the MANOVA (Wilks' $\Lambda = 0.81$, $F(7, 170) = 5.651$, $p < 0.001$, $\eta^2 = 0.189$) indicated that there were some differences between the basketball players and the football players. As indicated in Table 2, subsequent univariate F -tests specified that there were differences across all variables, except for enthusiasm and doubts about actions. Table 2 also presents mean scores for these variables for the basketball players and the football players. As indicated, the football players had higher mean scores across the AEQ, the Sport-MPS-2 and the MIPS than the basketball players. In contrast, the basketball players had higher mean scores across the SCQ than the football players. This suggests that despite having homogenous variance-covariance matrices, the football players were generally more engaged and more perfectionistic than the basketball players, but perceived less coach autonomy support.

Table 2
Sport Differences on Athlete Engagement, Perfectionism and Coach Autonomy Support

| Variable | Variable Scores | | | | Univariate Tests Statistics | | |
|------------|-----------------|-----------|----------|-----------|-----------------------------|----------------|------------------|
| | Basketball | | Football | | <i>F</i> (1, 176) | <i>p</i> value | Partial η^2 |
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | | |
| Enthusiasm | 4.66 | 0.49 | 4.73 | 0.64 | 0.913 | 0.34 | 0.01 |
| Confidence | 4.21 | 0.61 | 4.43 | 0.64 | 5.67 | 0.02 | 0.03 |
| Vigour | 4.42 | 0.56 | 4.61 | 0.67 | 5.52 | 0.02 | 0.03 |
| Dedication | 4.39 | 0.60 | 4.65 | 0.66 | 10.24 | 0.00 | 0.06 |
| PS | 3.7 | 0.60 | 4.10 | 0.60 | 16.04 | 0.00 | 0.08 |
| ORG | 3.32 | 0.79 | 3.56 | 0.74 | 4.60 | 0.03 | 0.03 |
| COM | 2.91 | 0.80 | 3.31 | 0.79 | 10.91 | 0.00 | 0.06 |
| DAA | 2.72 | 0.63 | 2.80 | 0.79 | 0.625 | 0.43 | 0.00 |
| PPP | 2.62 | 0.78 | 2.90 | 0.77 | 5.33 | 0.02 | 0.03 |
| PCP | 2.84 | 0.71 | 3.43 | 0.61 | 35.38 | 0.00 | 0.17 |
| NRI | 2.77 | 0.80 | 3.14 | 0.75 | 10.09 | 0.00 | 0.05 |
| SP | 3.45 | 0.79 | 3.88 | 0.73 | 14.3 | 0.00 | 0.07 |
| SCQ | 5.81 | 0.90 | 5.50 | 1.32 | 4.25 | 0.04 | 0.02 |

N = 178. Subscale abbreviations: PS = Personal Standards; ORG = Organization; COM = Concern Over Mistakes; DAA = Doubts About Actions; PPP = Perceived Parental Pressure; PCP = Perceived Coach Pressure; NRI = Negative Reactions to Imperfection; SP = Striving for Perfection; SCQ = Sport Climate Questionnaire. Mean scores for Enthusiasm, Vigour, Dedication, PS, and SCQ were re-transformed back into their original metric. However, *SD* values are from the original non-transformed variables.

Bivariate correlations. Table 3 presents the bivariate correlations between the engagement characteristics, perfectionistic strivings, perfectionistic concerns, and coach autonomy support⁴. There were two primary purposes of calculating these correlations. First, the correlations shed light on the relationships the predictor variable (i.e., perfectionism) and the moderator variable (i.e., coach autonomy support) respectively show with the outcome variable (i.e., athlete engagement). Regarding perfectionism, there were significant correlations between perfectionistic strivings and all four characteristics of athlete engagement. Each correlation

⁴ The created proxies of perfectionistic strivings and perfectionistic concerns (as opposed to individual Sport-MPS-2 and MIPS subscales) are used in all subsequent analyses. When interpreting the correlations presented in Table 4, take note that the variables of enthusiasm, vigour, dedication, and coach autonomy support have been reflected. As a result, high scores on those variables represent low levels of the constructs those variables reflect and low scores on those variables represent high levels of the constructs those variables reflect.

indicated that higher levels of perfectionistic strivings were associated with higher levels of athlete engagement. In contrast, perfectionistic concerns were not significantly correlated with any characteristics of athlete engagement. Regarding coach autonomy support, there were significant correlations between coach autonomy support and all four characteristics of athlete engagement. Each correlation indicated that higher levels of coach autonomy support were associated with higher levels of athlete engagement. These relationships were generally what was expected based on theory and past research (Hayes, 2013; Jowett et al., 2016).

Table 3
Bivariate Correlations between Perfectionism Proxies, Engagement Characteristics, and Coach Autonomy Support

| Subscale | <i>AEQ</i> | | | | <i>Proxies of Perfectionism</i> | |
|---------------------------------|------------|------------|--------|------------|---------------------------------|--------------------------|
| | Enthusiasm | Confidence | Vigour | Dedication | Perfectionistic Strivings | Perfectionistic Concerns |
| <i>AEQ</i> | | | | | | |
| Enthusiasm | | | | | | |
| Confidence | -.64** | | | | | |
| Vigour | .81** | -.70** | | | | |
| Dedication | .77** | -.72** | .79** | | | |
| <i>Proxies of Perfectionism</i> | | | | | | |
| Perfectionistic Strivings | -.34** | .32** | -.32** | -.42** | | |
| Perfectionistic Concerns | .11 | -.09 | .11 | .03 | .56** | |
| <i>SCQ</i> | | | | | | |
| Coach Autonomy Support | .18* | -.19* | .28** | .18* | -.09 | -.09 |

* $p < .05$

** $p < .01$

The second purpose of calculating the bivariate correlations was to conduct a preliminary investigation of the degree to which multicollinearity would be a concern in subsequent tests of moderation. Multicollinearity in multiple regression occurs when the predictors are correlated with one another (Hayes, 2013). In a regression analysis multicollinearity is undesirable as the results may become distorted or less generalizable when the predictors are highly correlated (Hayes, 2013). In the present study, the predictors were perfectionism and coach autonomy support. In Table 3, both perfectionistic strivings and perfectionistic concerns were not

significantly correlated with coach autonomy support. Such results provide preliminary evidence that multicollinearity would not adversely affect analyses when testing whether coach autonomy support moderated relationships between perfectionism and athlete engagement. To substantiate this conclusion, results of more formal tests of multicollinearity (i.e., using Variance Inflation Factor) are reported when documenting results pertaining specifically to this moderated relationship (see section entitled “Class Differences and Moderation Effects”).

Participant Categorization by Perfectionism Profile

As described in the data analysis sub-section, latent profile analysis was used to class the participants into distinct groups based on their profiles across perfectionistic strivings and perfectionistic concerns. Six models were tested; the models differed with regard to the number of classes represented (i.e., two to seven). The “best fitting” model was identified through the consideration of three criteria: fit indices, practicality, and interpretability. Table 4 presents the values across the fit indices for the six tested models. Values for the Akaike Information Criterion and the sample-size adjusted Bayesian information criterion decreased until the six-class model and then increased for the seven-class model. Values for the Bayesian Information Criterion increased from the three-class model to the seven-class model. Bootstrap Likelihood Ratio Test values were significant until the four-class model. Collectively, the trends across these fit indices suggest that the three- and six-class models fit the data better than the other models.

Each model’s practicality was assessed by determining the number of participants categorized within each class across each model. This information is presented in Table 5. As indicated, small classes started to emerge in every class after the three-class model. In particular, the six-class model had three classes that contained less than ten percent of the sample. Given that both the three-class model and the six-class model were supported by the fit indices, but that

only the three-class model proved to be practical, only the three-class model was carried forward for further evaluation.

Table 4
Values Across Fit Indices for Six Tested Models

| Classes | AIC | BIC | SSA-BIC | BLRT <i>p</i> value |
|---------|--------|--------|---------|---------------------|
| 2 | 842.24 | 864.52 | 842.34 | 0 |
| 3 | 832.60 | 864.42 | 832.75 | 0 |
| 4 | 831.28 | 872.66 | 831.48 | 0.11 |
| 5 | 830.45 | 881.36 | 830.69 | 0.38 |
| 6 | 828.03 | 888.48 | 828.31 | 0.29 |
| 7 | 830.18 | 900.18 | 830.51 | 1 |

AIC = Akaike information criterion; BIC = Bayesian information criterion; SSA-BIC = Sample-size adjusted Bayesian information criterion; BLRT = Bootstrap likelihood ratio test.

Table 5
Practicality Proxies of Six Tested Models

| Model | Class 1 | | Class 2 | | Class 3 | | Class 4 | | Class 5 | | Class 6 | | Class 7 | |
|-------|----------|------|----------|------|----------|------|----------|------|----------|------|----------|-----|----------|-----|
| | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % |
| 2 | 111 | 62.4 | 67 | 37.6 | – | – | – | – | – | – | – | – | – | – |
| 3 | 24 | 13.5 | 104 | 58.4 | 50 | 28.1 | – | – | – | – | – | – | – | – |
| 4 | 1 | 0.56 | 92 | 51.7 | 38 | 21.3 | 47 | 26.4 | – | – | – | – | – | – |
| 5 | 1 | 0.56 | 90 | 50.6 | 37 | 20.8 | 8 | 4.5 | 42 | 23.6 | – | – | – | – |
| 6 | 1 | 0.56 | 44 | 24.7 | 37 | 20.8 | 82 | 46.1 | 8 | 4.5 | 6 | 3.4 | – | – |
| 7 | 1 | 0.56 | 82 | 46.1 | 21 | 11.8 | 15 | 8.4 | 45 | 25.3 | 6 | 3.4 | 8 | 4.5 |

A MANOVA protocol was used to evaluate the theoretical relevance of the three-class model by testing for class differences across perfectionistic strivings and perfectionistic concerns. The MANOVA produced a significant multivariate test statistic (Wilks $\Lambda = 0.198$, $F(4, 348) = 108.355$, $p < 0.01$, partial $\eta^2 = 0.55$). As presented in Table 6, follow up univariate *F*-tests indicated significant class differences across both perfectionistic strivings and perfectionistic concerns. Similar trends were observed across both dimensions of perfectionism when the classes were compared. Class 3 had higher perfectionistic strivings and perfectionistic concerns

than Classes 1 and 2 and Class 2 had higher perfectionistic strivings and perfectionistic concerns than Class 1. Similar trends were observed across both dimensions of perfectionism.

Table 6

Class Differences on Perfectionism Proxies for 3-Class Model

| Perfectionism Proxy | Class 1 (<i>n</i> = 24) | | Class 2 (<i>n</i> = 104) | | Class 3 (<i>n</i> = 50) | | Univariate Test Statistics | |
|---------------------------|-----------------------------|-----------|------------------------------|-----------|-----------------------------|-----------|----------------------------|------------------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>F</i> (2, 175) | Partial η^2 |
| Perfectionistic Strivings | -1.22 _c | 0.49 | -0.23 _b | 0.42 | 1.02 _a | 0.41 | 255.354 | 0.745 |
| Perfectionistic Concerns | -1.08 _c | 0.52 | -0.10 _b | 0.57 | 0.75 _a | 0.72 | 76.056 | 0.465 |

Levels across proxies of perfectionism for the three perfectionist classes. Within each row, subscale means with subscript “a” are significantly higher than means with the subscripts “b” and “c”, subscale means with “b” subscript are significantly higher than means with subscript “c” (determined through estimated marginal means with Bonferroni corrections). Univariate test statistics significant at the $p < .05$ level.

If the tripartite model was apparent in the classes each class would have a different profile across perfectionistic strivings and perfectionistic concerns. One class would have high levels of perfectionistic strivings in combination with high levels of perfectionistic concerns, another class would have high levels of perfectionistic strivings in combination with low levels of perfectionistic concerns, and one class would have low levels of perfectionistic strivings in combination with undifferentiated levels of perfectionistic concerns. In the present study, only one class was reflective of a profile in the tripartite model; Class 3 exhibited a profile with high levels of perfectionistic strivings in combination with high levels of perfectionistic concerns. Classes 1 and 2 did not reflect profiles included in the tripartite model of perfectionism. Given that two of the classes in the 3-class model are not represented in the tripartite model, the 3-class model was deemed not to adequately reflect the tripartite model.

The present pattern of class differences, though, does fit well with a dimensional conceptualization of perfectionism (Gotwals, 2016). Dimensional conceptualizations of

perfectionism assume that there are not different types of perfectionists, but rather different degrees of perfectionism. That is, dimensional conceptualizations of perfectionism assume that individuals do not differ in terms of the type of perfectionism they endorse; instead, such conceptualizations assume that perfectionism falls along a continuum and individuals differ in terms of where they fall on this continuum. Such a conceptualization is supported in the three-class model as increasing levels of perfectionistic strivings and perfectionistic concerns were present in each class. That is, Class 1 displayed low levels of perfectionistic strivings and low levels of perfectionistic concerns, Class 2 displayed moderate levels of perfectionistic strivings and moderate levels of perfectionistic concerns, and Class 3 displayed high levels of perfectionistic strivings and high levels of perfectionistic concerns. Some perfectionism researchers consider the dimensional models as the best way to represent perfectionism (e.g., Flett & Hewitt, 2002). Additionally, person-oriented studies that categorized athletes according to their perfectionism profile have produced three class or cluster solutions that are dimensional in nature (see Gustafsson et al., 2015; Nordin-Bates, Cumming, Aways, & Sharp, 2011; Vallance, Dunn, & Causgrove Dunn 2006). As a result, the 3-class model provided the best fit to the data and reflected the dimensional conceptualization of perfectionism.

In summary, the three-class model was supported by two of four fit indices, showed strong practicality, and paralleled a prominent conceptualization of perfectionism. Furthermore, the entropy value for the model was 0.69 indicating classification utility (Celeux & Soromenho, 1996; Pastor et al. 2007). Given this collective evidence, the three-class model was chosen as the best way to categorize participants based on their perfectionism profile. Accordingly, this model was carried forward for all subsequent analyses. In line with results from the MANOVA that tested for class differences and labels used in past research (e.g., Gustafsson et al., 2015; Nordin-

Bates et al., 2011; Vallance et al., 2006) Class 1 was labelled as *non-perfectionistic athletes*, Class 2 labelled as *moderately perfectionistic athletes*, and Class 3 labelled as *highly perfectionistic athletes*.

Class Differences and Moderation Effects

As indicated in the data analysis sub-section, hierarchical multiple regression was used to test whether coach autonomy support moderated differences the perfectionism classes showed on athlete engagement. In multiple regression, variables must be continuous and dichotomous. However, perfectionism class (as represented by the final model chosen through latent profile analysis) is a multicategorical variable comprised of three groups. To make the multicategorical perfectionism class variable amenable to analyses through multiple regression, indicator coding was used to represent the variable across two sets of dichotomous variables (i.e., D_1 & D_2 ; D_3 & D_4). Table 7 represents the specific indicator coding system that was adopted. In the first set of dummy variables (i.e., D_1 & D_2), the highly perfectionistic athletes served as the reference group (i.e., coded $D_1 = 0$ and $D_2 = 0$). This allowed for comparisons between the highly perfectionistic athletes and moderately perfectionistic athletes (who were coded $D_1 = 1$ and $D_2 = 0$) and between the highly perfectionistic athletes and non-perfectionistic athletes (i.e., coded $D_1 = 0$; $D_2 = 1$). However, this first set of dummy variables does not allow for comparisons to be made between the non-perfectionistic athletes and the moderately perfectionistic athletes. The second set of dummy variables (i.e., D_3 & D_4) was designed to address this. In the second set of variables the non-perfectionistic athletes served as the reference group (i.e., coded $D_3 = 0$ and $D_4 = 0$). This allowed for comparisons between the non-perfectionistic athletes and moderately perfectionistic athletes (who were coded $D_3 = 1$ and $D_4 = 0$) and between the non-perfectionistic athletes and highly perfectionistic athletes (i.e., coded $D_3 = 0$; $D_4 = 1$). The multiple regression protocol was

then run twice: once using D_1 and D_2 to represent perfectionism class and once using D_3 and D_4 . As can be seen in Table 7, D_3 offers a novel comparison between the non-perfectionistic athletes and the moderately perfectionistic athletes. However, D_4 offers a comparison that was already represented by D_2 in the first set of analyses (specifically, a comparison between the non-perfectionistic athletes and the moderately perfectionistic athletes). As a result, only results pertaining to D_1 , D_2 , and D_3 are presented when describing findings from the multiple regression analyses.

Table 7
Indicator Coding System used to Represent Perfectionism Class

| Class | D_1 | D_2 | Class | D_3 | D_4 |
|-------------------------------------|-------|-------|-------------------------------------|-------|-------|
| Highly Perfectionistic Athletes | 0 | 0 | Non-perfectionistic Athletes | 0 | 0 |
| Moderately Perfectionistic Athletes | 1 | 0 | Moderately Perfectionistic Athletes | 1 | 0 |
| Non-perfectionistic Athletes | 0 | 1 | Highly Perfectionistic Athletes | 0 | 1 |

Within each set of comparisons, four analyses were conducted with a different engagement characteristic serving as the dependent variable within each analysis. Each analysis was comprised of three steps. In Step 1, D_1 and D_2 (or D_3 and D_4) were entered as the independent variables. In Step 2, coach autonomy support (i.e., SCQ) was entered as the independent variable. In Step 3, the product terms between the indicator coded variables and coach autonomy support (i.e., $D_1 \times \text{SCQ}$ and $D_2 \times \text{SCQ}$ or $D_3 \times \text{SCQ}$ and $D_4 \times \text{SCQ}$) were entered as the independent variables. Variance Inflation Factor (VIF) values were consulted to determine whether problematic multicollinearity was present between any of the subscales involved in the multiple regression analyses. A VIF value greater than 10 suggests problematic multicollinearity (Hair et al., 2010). The VIF values produced for the present analyses did not exceed 1.46 indicating that multicollinearity was not a concern.

Table 8 presents the results from the three-step hierarchical multiple regression analyses for each athlete engagement characteristic. When interpreting the path coefficients in this table, take note enthusiasm, vigour, and dedication were reflected variables. As such, when one of these three variables served as the dependent variable, positive coefficients indicate that the comparison class had a lower mean score on that specific engagement characteristic than the reference class (and vice versa for negative coefficients). To aid the interpretation of the findings presented in Table 8, Figure 1 illustrates class scores across each engagement characteristic in the characteristic's original metric. The following sections describe results of the multiple regression analyses pertaining to each engagement characteristic.

Table 8
Results of Three-step Hierarchical Multiple Regression Analyses for Engagement Characteristics

| Athlete Engagement Characteristics | | | | | | | | | | | | |
|------------------------------------|------------|------|----------|------------|------|----------|----------|------|----------|------------|------|----------|
| | Enthusiasm | | | Confidence | | | Vigour | | | Dedication | | |
| | <i>B</i> | SE | <i>t</i> | <i>B</i> | SE | <i>t</i> | <i>B</i> | SE | <i>t</i> | <i>B</i> | SE | <i>t</i> |
| Step 1 | | | | | | | | | | | | |
| <i>D</i> ₁ | 0.06 | 0.02 | 4.08** | -0.31 | 0.10 | -2.97** | 0.09 | 0.03 | 3.68** | 0.09 | 0.02 | 3.46** |
| <i>D</i> ₂ | 0.07 | 0.04 | 1.85 | -0.33 | 0.16 | -2.10* | 0.07 | 0.04 | 1.84 | 0.13 | 0.04 | 3.39** |
| <i>D</i> ₃ | -0.01 | 0.04 | -0.26 | 0.02 | 0.15 | 0.13 | 0.02 | 0.04 | 0.55 | -0.04 | 0.04 | -1.08 |
| Step 2 | | | | | | | | | | | | |
| <i>D</i> ₁ | 0.06 | 0.02 | 2.67** | -0.31 | 0.10 | -2.99** | 0.09 | 0.02 | 3.74** | 0.09 | 0.03 | 3.44** |
| <i>D</i> ₂ | 0.08 | 0.04 | 2.06* | -0.35 | 0.15 | -2.34* | 0.08 | 0.03 | 2.26* | 0.13 | 0.04 | 3.78** |
| <i>D</i> ₃ | -0.02 | 0.03 | -0.42 | 0.04 | 0.14 | 0.30 | 0.01 | 0.03 | 0.37 | -0.05 | 0.03 | -1.33 |
| SCQ | 0.15 | 0.06 | 2.33* | -0.65 | 0.24 | -2.76** | 0.23 | 0.06 | 3.90** | 0.16 | 0.06 | 2.54* |
| Step 3 | | | | | | | | | | | | |
| <i>D</i> ₁ | 0.06 | 0.05 | 1.23 | -0.43 | 0.18 | -2.39* | 0.11 | 0.05 | 2.20* | 0.07 | 0.05 | 1.39 |
| <i>D</i> ₂ | -0.09 | 0.07 | -1.31 | -0.03 | 0.31 | -0.09 | -0.06 | 0.06 | -1.03 | -0.03 | 0.07 | -0.42 |
| <i>D</i> ₃ | 0.15 | 0.07 | 2.20 | -0.40 | 0.30 | -1.33 | 0.17 | 0.06 | 3.08** | 0.10 | 0.07 | 1.58 |
| SCQ | 0.09 | 0.09 | 0.96 | -0.78 | 0.42 | -1.87 | 0.22 | 0.11 | 2.09* | 0.09 | 0.10 | 0.92 |
| <i>D</i> ₁ × SCQ | 0.01 | 0.12 | 0.09 | 0.33 | 0.51 | 0.65 | -0.05 | 0.13 | -0.39 | 0.03 | 0.13 | 0.25 |
| <i>D</i> ₂ × SCQ | 0.48 | 0.25 | 1.96 | -0.96 | 1.03 | -0.93 | 0.41 | 0.18 | 2.35* | 0.47 | 0.19 | 2.49* |
| <i>D</i> ₃ × SCQ | -0.47 | 0.24 | -1.95 | 1.30 | 0.99 | 1.31 | -0.46 | 0.16 | -2.90** | -0.43 | 0.18 | -2.43* |
| <i>R</i> ² total | 0.11** | | | 0.10** | | | 0.17** | | | 0.13** | | |

**p* < 0.05

***p* < 0.01

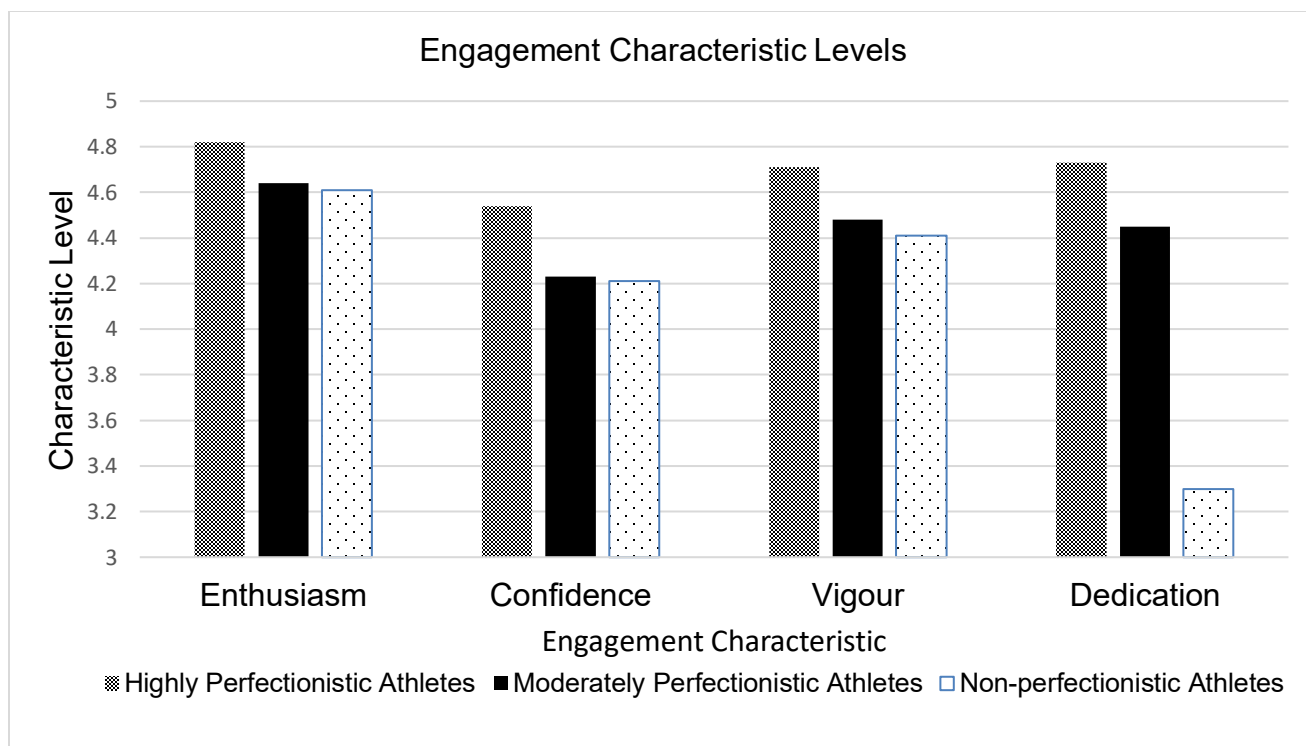


Figure 1: Levels across four engagement characteristics for each perfectionist class.

Enthusiasm. The multiple regression analyses explained a significant amount of variance when enthusiasm served as the dependent variable ($R^2 = 0.11$, $F(5, 172) = 3.42$, $p < 0.01$). In Step 1 of the analyses, the coefficient for D_1 was significant and positive ($\beta = 0.06$, $p = 0.01$). This indicated that there were significant differences on enthusiasm levels between the perfectionist classes, specifically between the highly perfectionistic athletes ($M = 4.82$) and the moderately perfectionistic athletes ($M = 4.64$). In Step 3 of the analyses, the addition of the product terms between perfectionism class and coach autonomy support did not explain a significant amount of variance beyond that explained in Step 2 ($\Delta R^2 = 0.03$, $p > 0.05$). This indicates that the differences that were seen on enthusiasm between the perfectionist classes were not dependent on coach autonomy support.

Confidence. The multiple regression analyses explained a significant amount of variance when confidence served as the dependent variable ($R^2 = 0.10$, $F(5, 172) = 4.72$, $p < 0.01$). In

Step 1 of these analyses, the coefficient for D_1 was significant and negative ($\beta = -0.31, p = 0.003$) as well as the coefficient for D_2 ($\beta = -0.33, p = 0.04$). Since confidence was not a reflected variable, the negative coefficient indicates that the comparison class had a higher mean score than the reference class. This indicated that there were significant differences in mean confidence levels between the highly perfectionistic athletes ($M = 4.54$) and the moderately perfectionistic athletes ($M = 4.23$), as well as between the highly perfectionistic athletes and the non-perfectionistic athletes ($M = 4.21$). In Step 3 of the analyses, the addition of the product terms between perfectionism and coach autonomy support did not explain a significant amount of variance beyond that explained in Step 2 ($\Delta R^2 = 0.01, p > 0.05$). This indicated that the differences that were seen between the perfectionist classes on confidence were not dependent on coach autonomy support.

Vigour. The multiple regression analyses explained a significant amount of variance when vigour served as the dependent variable ($R^2 = 0.17, F(5, 172) = 9.39, p < 0.01$). In Step 1 of these analyses, the coefficient for D_1 was significant and positive ($\beta = 0.09, p < 0.001$). This indicated that there were significant differences in vigour levels between the highly perfectionistic athletes ($M = 4.71$) and the moderately perfectionistic athletes ($M = 4.41$). In Step 3 of the analyses, the addition of the product terms between perfectionism class and coach autonomy support explained a significant amount of variance beyond that explained in Step 2 ($\Delta R^2 = 0.03, p < 0.05$). Furthermore, the coefficients for the product terms involving D_2 and D_3 were both significant (0.41 and -0.46, respectively, both $ps < 0.05$). This indicates that coach autonomy support significantly moderated group differences on vigour between the non-perfectionistic athletes and the highly perfectionistic athletes and between the non-perfectionistic athletes and the moderately perfectionistic athletes.

These interaction effects are illustrated in Figure 2. The omnibus test of the interaction indicated that there were generally differences between the perfectionism classes on vigour across the full range of coach autonomy support. This general finding was specified by pairwise tests of the interaction. The pairwise test involving D_2 revealed that the highly perfectionistic athletes had higher levels of vigour than the non-perfectionistic athletes up to a SCQ score of 6.02 where non-significant differences between the classes started to emerge. Above SCQ scores of 6.02, the highly perfectionistic athletes and the non-perfectionistic athletes experienced similar levels of vigour. Given that the SCQ scores had a potential range of 1.00 to 7.00, this suggests that when coach autonomy support was low-to-moderate significant differences were observed between the classes on vigour, but when coach autonomy support was high there were no significant differences observed between the classes.

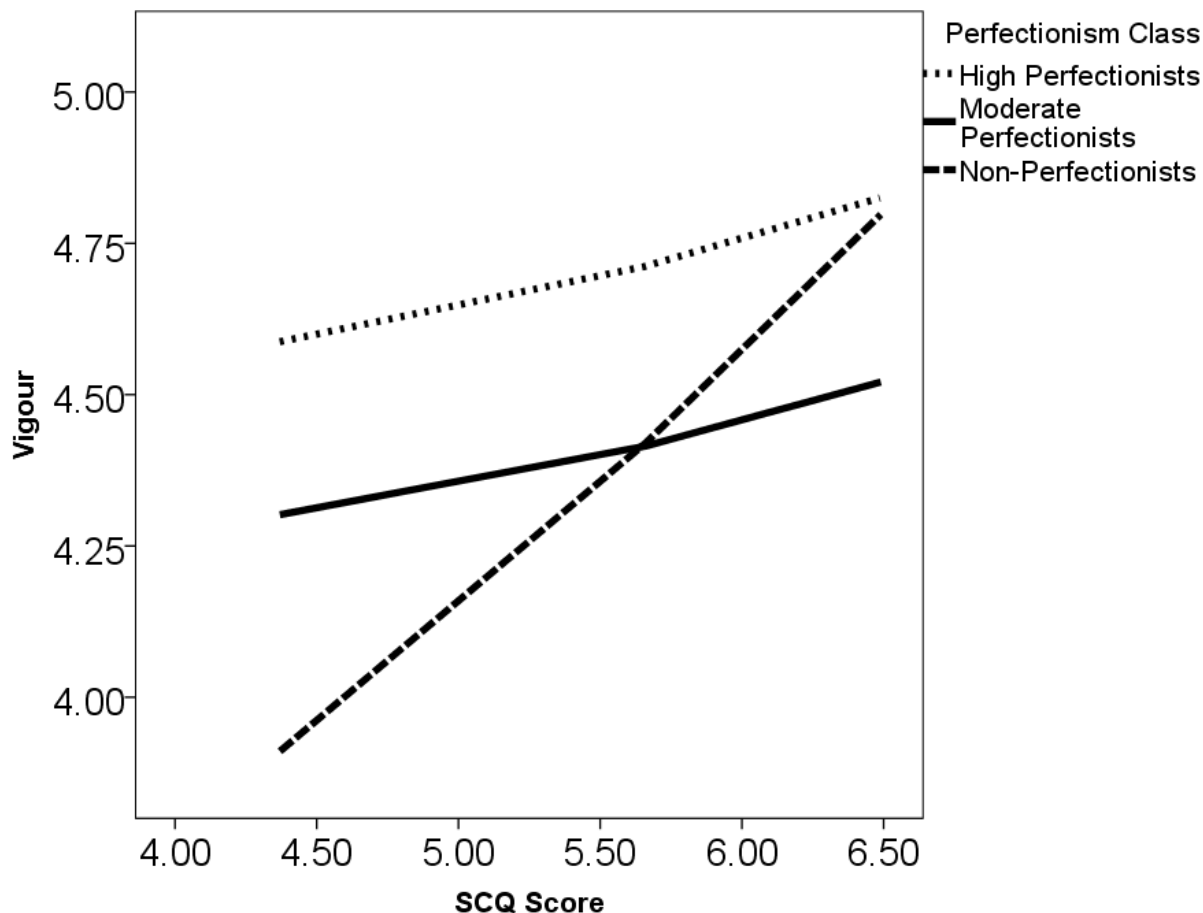


Figure 2: Mean vigour scores for each perfectionism class across SCQ scores.

The pairwise test involving D_3 revealed that the moderately perfectionistic athletes and the non-perfectionistic athletes had similar levels of vigour between SCQ scores of 3.73 and 6.26. Below SCQ scores of 3.73 the moderately perfectionistic athletes had higher levels of vigour than the non-perfectionistic athletes. Above scores of 6.26 the non-perfectionistic athletes had higher levels of vigour than the moderately perfectionistic athletes. Given the range of potential SCQ scores, this suggests that when coach autonomy support was low or high, differences were observed between these two classes on vigour, but when coach autonomy support was moderate there were no significant differences observed between the classes.

Dedication. The multiple regression analyses explained a significant amount of variance when dedication served as the dependent variable ($R = 0.37$, $R^2 = 0.13$, $F(5, 172) = 6.54$, $p <$

0.01). In Step 1 of the analyses, the coefficients for D_1 and D_2 were significant and positive ($\beta = 0.09$ and $\beta = 0.13$, respectively, both $ps < 0.01$). This indicated that there were significant differences in dedication levels between the highly perfectionistic athletes ($M = 4.73$) and the moderately perfectionistic athletes ($M = 4.45$), and also between the highly perfectionistic athletes and the non-perfectionistic athletes ($M = 3.30$). In Step 3 of the analyses, the addition of the product terms between D_2 and coach autonomy support and between D_3 and coach autonomy support explained a significant amount of variance beyond that explained in Step 2 (0.47 and -0.43, respectively, both $ps < 0.05$). This indicates that coach autonomy support was a significant moderator of the comparison between the non-perfectionistic athletes and the highly perfectionistic athletes on dedication, as well as the comparison between the non-perfectionistic athletes and the moderately perfectionistic athletes on dedication.

The interaction effects are illustrated in Figure 3. The omnibus test of the interaction indicated that there were generally differences between the perfectionism classes on dedication that began to appear at a SCQ score of 6.31. The pairwise test involving D_2 revealed that the highly perfectionistic athletes had higher levels of dedication than the non-perfectionistic athletes up to a SCQ score of 6.35 where non-significant differences between the classes began to emerge. Above SCQ scores of 6.35 the highly perfectionistic athletes and the non-perfectionistic athletes experienced similar levels of dedication. Given the potential range of SCQ scores, this suggests that when coach autonomy support was low-to-moderate significant differences were observed between the classes on dedication, but when coach autonomy support was high there were no significant differences observed between these two classes.

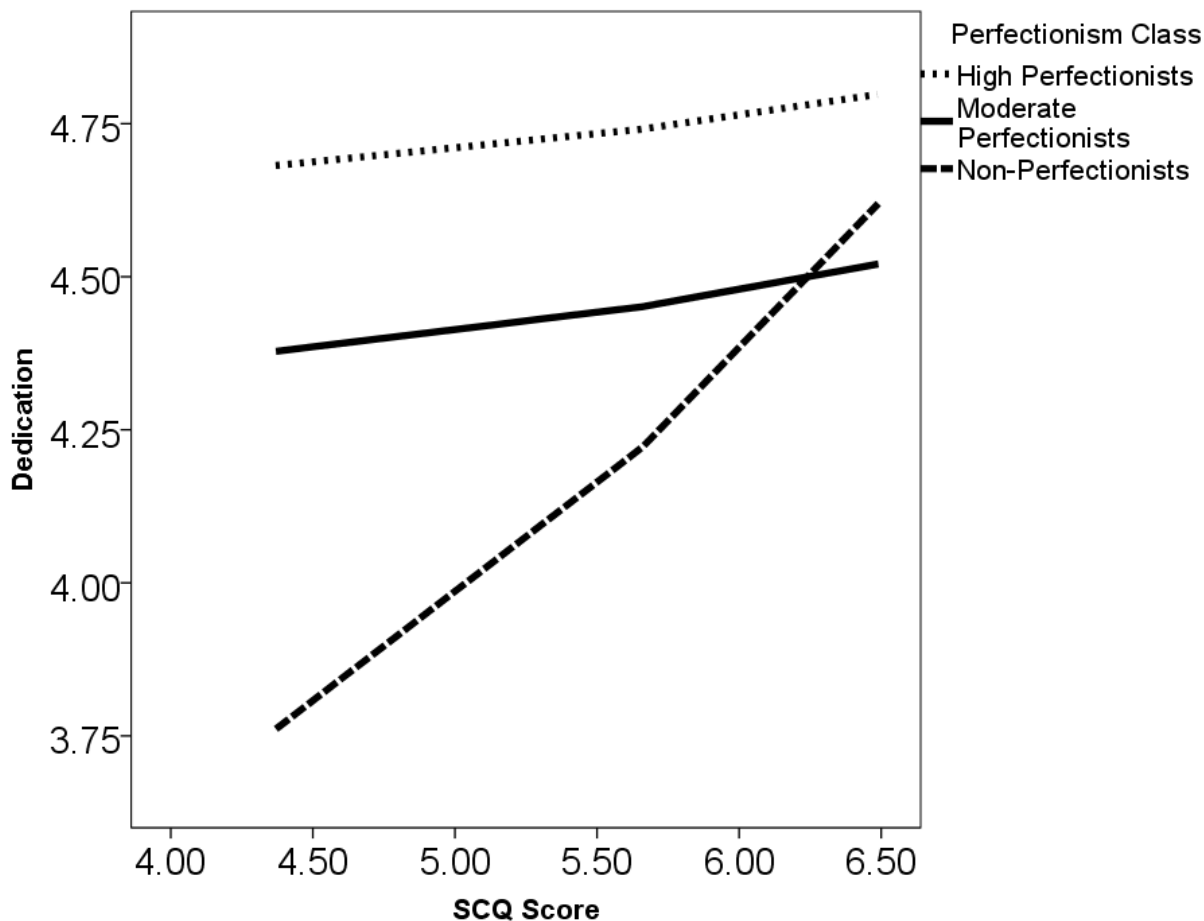


Figure 3: Mean dedication scores for each perfectionism class across SCQ scores.

The pairwise test involving D_3 revealed that the moderately perfectionistic athletes had higher levels of dedication than the non-perfectionistic athletes up to a SCQ score of 5.53 where non-significant differences between the classes began to emerge. Above SCQ scores of 5.53 the moderately perfectionistic athletes and the non-perfectionistic athletes experienced similar levels of dedication. Given the range of potential SCQ scores, this suggests that when coach autonomy support was low-to-moderate significant differences were observed between these two classes on dedication, but when coach autonomy support was moderate-to-high there were no significant differences observed between the classes.

Discussion

The purposes of this study were twofold: 1) to examine the degree to which distinct groups of athletes, defined by unique perfectionism profiles, differed across core characteristics of engagement and 2) to explore whether perceived coach autonomy support moderated the differences between the groups. The participants in the study were male adolescent basketball and football athletes from club teams competing at the provincial level. Latent profile analysis was used to categorize the athletes into groups based on their profiles across perfectionistic strivings and perfectionistic concerns. Hierarchical multiple regression was used to determine class differences on engagement and moderation effects. Results indicated that the highly perfectionistic athletes exhibited the highest levels of athlete engagement, and moderation effects were present regarding comparisons with the non-perfectionistic athletes on the characteristics of vigour and dedication. As this study was the first of its kind, this section theorizes as to why a dimensional solution of perfectionism was revealed, why the highly perfectionistic athletes had the highest levels of athlete engagement, and why coach autonomy support had the most influence on the non-perfectionistic athletes. The section concludes with practical implications of the findings, limitations of the present study, and future directions for research in this area.

Classification of Athletes Based on Perfectionism Profile

The purposes and original hypotheses of the present study used the tripartite model of perfectionism as a reference. It was assumed that the results of the latent profile analysis would reflect the three orientations in the tripartite model of perfectionism (Stoeber & Otto, 2006) as the latent profile analysis of scores across perfectionistic strivings and perfectionistic concerns indicated that the athletes could be classified into three distinct classes. The tripartite model would have revealed one class containing unhealthy perfectionists (i.e., having high levels of

perfectionistic strivings in combination with high levels of perfectionistic concerns), one class containing healthy perfectionists (i.e., having high levels of perfectionistic strivings in combination with low levels of perfectionistic concerns), and one class containing non-perfectionists (i.e., having low levels of perfectionistic strivings in combination with undifferentiated levels of perfectionistic concerns). However, that was not the case for the present sample. The 3-class model that provided the best fit to the present data, but not the classes in the tripartite model. The classes were deemed to be comprised of highly perfectionistic athletes (i.e., having high levels of both perfectionistic strivings and perfectionistic concerns), moderately perfectionistic athletes (i.e., having moderate levels of both perfectionistic strivings and perfectionistic concerns or having levels in between highly and non-perfectionistic athletes), and non-perfectionistic athletes (i.e., having low levels of both perfectionistic strivings and perfectionistic concerns).

When comparisons were made between what the latent profile analysis was expected to produce versus the solution that was actually produced, similarities and differences were observed. When the tripartite model that was expected was compared to the solution produced in the present study, there was only one class that displayed the same profile between the models. The unhealthy perfectionists' profile in the tripartite model mirrored the highly perfectionistic athletes' profile in the present solution. There was no profile that mirrored the healthy perfectionists' profile from the tripartite model in the present latent classes that were produced. Profiles between the non-perfectionists in the expected latent classes compared to the present solution were similar in the sense that in the same labels were used, but different as no undifferentiated levels of perfectionistic concerns were observed. Because of these differences, the solution that was produced did not reflect the tripartite model of perfectionism.

Dimensional conceptualizations assume that individuals differ in degree, rather than type, of perfectionism (Gotwals, 2016). That is, perfectionism is assumed to fall along a continuum and individuals are assumed to differ in terms of how they are rank-order along this continuum. This conceptualization fits well with the classes that were produced in the present study as each of the classes was ranked higher on perfectionistic strivings and perfectionistic concerns than the previous class. Of the three classes that were produced, the present solution had a class that was ranked high on levels of both perfectionistic strivings and perfectionistic concerns (i.e., highly perfectionistic athletes), a class that was ranked lower as moderate levels of both perfectionistic strivings and perfectionistic concerns were observed (i.e., moderately perfectionistic athletes), and a class that had was ranked the lowest as low levels of both perfectionistic strivings and perfectionistic concerns were observed. (i.e., non-perfectionistic athletes). Therefore, the classes did reflect a dimensional conceptualization of perfectionism.

The discrepancy between the solution that was expected and the solution that was observed speaks to the variability in solutions produced across past person-oriented perfectionism research. While there has been research that has displayed solutions similar to the tripartite model of perfectionism (see Gotwals, 2011; Smith, Saklofske, Yan, & Sherry, 2016), other research has displayed a dimensional solution to perfectionism similar to what the present study found (see also Gustafsson et al., 2015; Nordin-Bates et al., 2011; Vallance et al., 2006). This variability lends itself to a discussion of factors that may influence the nature of solutions produced in person-oriented perfectionism research.

One such factor may be the analytical approach to participant classification. Latent profile analysis and cluster analysis are the two statistical tools used in person-oriented research. Latent profile analysis has been used in person-oriented perfectionism research by Gustafsson et

al. (2015) and Smith et al. (2016). The former study found a dimensional solution of perfectionism, while the latter study found a solution similar to the tripartite model of perfectionism. Cluster analysis has been used by Gotwals (2011), Nordin-Bates et al. (2011) and Vallance et al. (2006). The former study found a solution similar to the tripartite model, while the two latter studies found dimensional solutions to perfectionism. The use of proxies versus subscales of perfectionism as the classification criteria may also influence the nature of solutions produced. Smith et al. used proxies of perfectionism as the classification criteria and found a solution similar to the tripartite model, while Gotwals and Nordin-Bates et al. used perfectionism subscales as the classification criteria. Gotwals found a tripartite solution and Nordin-Bates et al. found a dimensional solution. Based on review of this literature, no clear trends emerge regarding why some person-oriented research found a dimensional solution and others found a tripartite solution; both solutions were found regardless of the statistical tools or the classification criteria utilized.

Another factor may be the characteristics of the sample used; specifically, age and gender. The present study sampled older adolescent male athletes ($M = 16.59$ years old) and produced a dimensional solution of perfectionism. Compared to studies that have used similarly aged participants (i.e., Gustafsson et al., 2015; Vallance et al., 2006), dimensional solutions were also produced. However, when the sample used older participants ($M = 21.28$ years old, Gotwals, 2011; $M = 18.77$ years old, Smith et al., 2016), tripartite solutions were produced. The primary difference between a dimensional solution and the tripartite model is the absence of a healthy perfectionism profile in dimensional solutions. This may be suggestive of the idea that healthy profiles of perfectionism may not become apparent until individuals develop emotional self-control or learn how to deal with their perfectionistic tendencies (Flett & Hewitt, 2005; Hardy,

Jones, & Gould, 1996). This may be important for coaches to consider when working with adolescent athletes of varying levels of maturity. Considering gender, the present study used male athletes and produced a dimensional solution. Past research also using male athletes (i.e., Vallance et al., 2006) similarly produced a dimensional solution. To the best of my knowledge, there has not been any person-oriented perfectionism research done that solely considers female athletes. Research has indicated that females differ in levels of perfectionism (i.e., be less perfectionistic) compared to males and may differ in orientation as well (Macsinga & Dobrița, 2010). The lack of research in this area sampling females, makes exploration of trends difficult. As a result, future person-oriented perfectionism research should consider using female athletes as participants.

The present study used the gold standard regarding the measurement and classification of perfectionism in athletes using a person-oriented research approach (Hayes & Montoya, 2017; Stoeber & Madigan, 2014), but finding research that follows this same approach is rare. Therefore, future research is needed using the approaches adopted in the present study to gain a better understanding of the potential factors influencing the perfectionism solution in person-oriented research.

Differences Between the Perfectionism Classes on Athlete Engagement

It was originally hypothesized that unhealthy perfectionistic athletes would show lower levels of athlete engagement than healthy perfectionistic athletes. As indicated earlier, the profile that defines unhealthy perfectionistic athletes parallels the profile that defined the class of highly perfectionistic athletes that was produced in the present study. As a result, the original hypothesis could be translated to read that highly perfectionistic athletes were expected to have lower levels of athlete engagement than athletes characterized by other perfectionistic orientations. The

present findings did not support this translated hypothesis. In fact, the opposite results were found. As indicated by the results from Step 1 of the hierarchical regressions, the highly perfectionistic athletes displayed the highest levels of confidence and dedication compared to both the moderately perfectionistic and non-perfectionistic athletes and higher levels of enthusiasm and vigour compared to the moderately perfectionistic athletes.

Past anecdotal and qualitative research supports the concept that the highly perfectionistic athletes should not have experienced the highest levels of athlete engagement. The high dedication levels might have been warranted as highly perfectionistic athletes may perform any behaviour it takes to attain a desired result including putting effort and focus into achieving goals (Burns, 1980; Gotwals & Spencer-Cavaliere, 2014). But according to past anecdotal perfectionism research, enthusiasm, confidence, and vigour should not have been as high as they were in the highly perfectionistic athletes. Highly perfectionistic athletes feel emotionally drained before a task, have low self-esteem, and have deep seated fears of failure, alluding to reduced levels of enthusiasm, confidence, and vigour, respectively (Burns, 1980; Gotwals and Spencer-Cavaliere, 2014; Hamachek, 1978).

The present results do not offer any explanations as to why increased levels of perfectionism were associated with increased engagement among this sample of athletes. Speculatively, though, there may be several reasons. For example, motivation may be one reason for the increased engagement levels observed with highly perfectionistic athletes. Six types of motivation (i.e., amotivation, external regulation, introjected regulation, identified regulation, integrated regulation, intrinsic motivation) can be represented along a continuum from least self-determined to most self-determined (Ryan & Deci, 2000). Guiccardi et al. (2012) investigated perfectionism and motivation among elite athletes and found that the highly perfectionistic

athletes were more externally regulated and intrinsically motivated than the non-perfectionistic athletes. External regulation reflects doing something because of the contingencies of being rewarded or punished for doing or not doing a task within the activity (Deci & Ryan, 2008). Intrinsic motivation reflects doing something for the inherent enjoyment of the activity (Ryan & Deci, 2000). Along the motivation continuum, both types of motivation fit with highly perfectionistic individuals' inclinations to avoid failing and feeling proud of putting effort into working hard to achieve goals, respectively (Gotwals & Spencer-Cavaliere, 2014; Hamachek, 1978). Similarly, Martin, Ginns, and Papworth (2017) found positive correlations between motivation and academic engagement; perhaps Martin et al.'s (2017) findings are echoed in a sport domain. This speculation suggests that highly perfectionistic athletes in the present study may have shown elevated levels of engagement in sport because they had motivation that was more self-determined and externally driven than those with other perfectionistic orientations.

Another explanation could be perceived competence in sport skills. Perhaps as perfectionism towards sport increases, so does the perceived competence of the athlete in sport. Dunn, Causgrove Dunn, and McDonald (2012) found negative correlations between perceived competence and perfectionism, suggesting that perceived competence in a certain domain may buffer the development of perfectionistic tendencies. Perhaps the opposite is true as well; perhaps the more perfectionistic individuals are within a certain domain, then the more likely they are to develop perceived competence in that domain. Hill, Witcher, Gotwals, and Leyland (2015) found that self-identified perfectionists believed that they could accomplish the tasks they set out to do, which may suggest perfectionists having elevated levels of perceived competence. Competence may be an important factor to consider with engagement as it is one of the basic psychological needs, and basic needs satisfaction has been linked to engagement (Curran et al.,

2014; Jowett et al., 2016). This suggests that the highly perfectionistic athletes in this study may have shown high engagement levels because of high perceived competence in sport.

Preliminary evidence may help to support this speculation. The football players showed a greater predisposition towards higher levels of perfectionism than the basketball players. When each class is considered, the percentage of basketball and football players within each class changes. The percentage of football players in each class increases (non-perfectionistic athletes = 21%; moderately perfectionistic athletes = 45%; highly perfectionistic athletes = 64%), while the percentage of basketball players decreases (non-perfectionistic athletes = 79%; moderately perfectionistic athletes = 55%; highly perfectionistic athletes = 36%). When the basketball and football players were compared on the age they started playing their primary sport, it was found that the football players started playing football an average of just over one year earlier than when the basketball players started playing basketball (9.88 years old versus 10.99 years old, respectively). Since the football players had one more year of playing experience compared to the basketball players, the football players may feel more competent in their sport. In addition, the football teams appeared to have a more rigorous tryout and selection process to secure a spot on the team compared to the basketball teams. Since the football players made up the majority of the class of highly perfectionistic athletes, have been playing their sport for longer, and had to undergo a demanding tryout process compared to the basketball players, this may be indicative of higher perceived competence levels within that class.

Another speculation could be perceived importance of the athletes' primary sport. Perhaps as perfectionism towards sport increases, so does perceived importance of the sport. Dunn et al. (2012) suggest a connection between perfectionism and importance, while Frost and Marten (1990) indicate that being more perfectionistic makes tasks more important. Highly

perfectionistic athletes may think of sport as more important than athletes characterized by other perfectionistic orientations since they equate their sense of self-worth with the quality of their performance and are overly concerned with significant others' performance expectations and criticisms. Perceived importance has shown positive and significant correlations with engagement (Gao, 2009). This suggests that the present class of highly perfectionistic athletes may have shown relatively higher engagement levels because sport was more important to them.

To further support this speculation, preliminary evidence from a question in the demographic questionnaire was consulted. Athletes were asked to rate how important their primary sport was to them on a response scale from 1 (*not at all important*) to 5 (*very important*). It was established that highly perfectionistic athletes had a higher mean score on perceived sport importance ($M = 4.59$) than the non-perfectionistic athletes ($M = 4.50$), but these differences were not significant ($p > .05$). This preliminary evidence does not support the contention that as perfectionism increases so does perceived importance, but more in-depth investigation is needed.

The previous sections identify motivation, perceived competence, and perceived importance as factors that may help to explain highly perfectionistic athletes' high engagement levels. In other words, motivation, perceived competence, and perceived importance could be potential mediators between perfectionism and engagement. Mediation is an important avenue for perfectionism research as the focus should be not be on *if* perfectionism is adaptive or maladaptive, but *when* perfectionism is adaptive or maladaptive (Hill, 2016). This research is especially valuable as the findings in the present study were the opposite of what was expected.

The Moderating Role of Coach Autonomy Support

Regarding moderation, it was hypothesized that coach autonomy support would moderate the relationship between perfectionism and athlete engagement. More specifically it was

expected that the unhealthy perfectionistic athletes would display similar levels of athlete engagement as the healthy perfectionistic athletes when coach autonomy support was high, but display lower levels of athlete engagement compared to the healthy perfectionistic athletes when coach autonomy support was low. Recall that the highly perfectionistic athletes in the present study have the same profile as unhealthy perfectionists in the tripartite model. Translated to fit the present class solution, the hypothesis read that the highly perfectionistic athletes would display similar levels of athlete engagement as athletes with other perfectionistic orientations when coach autonomy support was high, but display lower levels of athlete engagement compared to athletes with other perfectionistic orientations when coach autonomy support was low. The present findings partially supported the hypotheses. As indicated by the results from Step 3 of the hierarchical regressions, coach autonomy support did moderate the perfectionism–athlete engagement relationship. However, it was not the expected highly perfectionistic athletes who were the most susceptible to the varying levels of coach autonomy support, but the non-perfectionistic athletes. It was also expected that moderation would be detected across all four characteristics of athlete engagement, but moderation was only detected on vigour and dedication. These findings are discussed in the following sections.

The effect of the influence of coach autonomy support on the non-perfectionistic athletes' engagement levels can be seen in Figures 2 and 3. Notice that for vigour levels, the non-perfectionistic athletes had a steeper slope (0.63) than the moderately perfectionistic athletes (0.17) and the highly perfectionistic athletes (0.22). A similar observation was made for dedication levels; the non-perfectionistic athletes had a steeper slope (0.56) than the moderately perfectionistic athletes (0.13) and the highly perfectionistic athletes (0.09). This indicates that, as coach autonomy support increased, the non-perfectionistic athletes' engagement scores increased

at a greater rate in comparison to both the moderately perfectionistic athletes and the highly perfectionistic athletes. Speculatively, there may be some factors to consider when attempting to explain why this finding was observed.

Motivation, competence, and perceived importance were proposed as factors that may potentially contribute to the class differences that were observed in the present study as they speculatively explained the mechanism behind the group differences. Coach autonomy support may inhibit how the groups differ on these constructs and may result in similar levels of engagement. Non-perfectionistic athletes may have lower levels of motivation, perceived competence, and perceived importance than the highly perfectionistic athletes. In other words, this particular group has further to go so improvements will be more obvious. Coach autonomy support may enhance motivation in non-perfectionistic athletes as they possess low levels of both perfectionistic strivings and perfectionistic concerns contributing to potentially less drive to achieve originating from themselves or perceived to be coming from significant others in the environment (Stoeber & Otto, 2006). Coach autonomy support may improve motivation as the coach uses autonomy supportive behaviours to satisfy the basic psychological needs of the athlete, which may allow for the development of more self-determined intrinsic motivation (Amorose & Anderson-Butcher, 2015). Perceived competence in the non-perfectionistic athletes may also be enhanced by coach autonomy support as these athletes may benefit from the competence feedback provided by an autonomy supportive coach (Mageau & Vallerand, 2003). Coach autonomy support may also enhance the non-perfectionistic athletes' perceived importance of sport if coaches give their athletes more responsibilities and choices within their sport, making them feel like they have something to contribute (Amorose & Anderson-Butcher, 2015). Since the non-perfectionistic athletes may have been relatively low across each factor in

the first place, they may have been well-positioned to reap these beneficial effects of coach autonomy support to positively influence their engagement.

The non-perfectionistic athletes may also have been especially influenced by coach autonomy support because they have enhanced awareness of autonomy supportive behaviours. Vansteenkiste et al. (2010) suggested that as perfectionism increases, the perception of autonomy support decreases. Those individuals high in perfectionism are more likely to perceive criticism or control from others. Vansteenkiste et al.'s suggestion is further supported by Zuroff, Sadikaj, Kelly, and Leybman (2016) who found negative correlations between perceived support from others and aspects of perfectionistic concerns. Based on Vansteenkiste et al.'s suggestion and Zuroff et al.'s finding, perhaps the non-perfectionistic athletes were more aware or better able to perceive autonomy support from their coach compared to the highly perfectionistic athletes and that was why they were influenced the most.

In summary, the non-perfectionistic athletes' levels of engagement may have been especially susceptible to the effects of coach autonomy support because they may have had low initial levels of motivation, perceived competence, and perceived importance, but were aware of and open to autonomy supportive behaviours of the coach. In contrast, the highly perfectionistic athletes may have had higher levels of motivation, perceived competence, and perceived importance, but were less aware of and receptive to the coach's autonomy supportive behaviours. Future research should consider measuring these factors in order to get a comprehensive understanding of the moderating effect of coach autonomy support on perfectionistic athletes' engagement levels.

It is also important to note that moderation was detected for the athlete engagement characteristics of vigour and dedication, but not for enthusiasm and confidence. It is difficult to

come up with an explanation of this that is based in theory. However, perhaps such an explanation is not necessary. Consider the graphs of each of the engagement characteristic scores for the perfectionism classes across varying levels of coach autonomy support. Appendix J displays graphs for enthusiasm and confidence where moderation was not detected. The slope of the lines for each perfectionism class suggests that a similar effect was taking place across each characteristic. More specifically, across each engagement characteristic it appears that as levels of coach autonomy support increase, the non-perfectionistic athletes' engagement levels increased at a rate faster than the moderately perfectionistic and highly perfectionistic athletes. The change in variance statistic (i.e., ΔR^2) was used to determine if moderation had taken place. The magnitude of this statistic for vigour and dedication were similar to enthusiasm and dedication, but the value was significant for the first two characteristics and not the latter two characteristics (e.g., all ΔR^2 ranged from 0.01–0.03). There may have been a moderation effect for all four engagement characteristics, but it just was not detected (McClelland & Judd, 1993). Why was this the case? Perhaps the present study did not have enough statistical power to detect all of these effects. Perhaps this was exacerbated by the fact that all four engagement characteristics showed a limited range and a strong negative skew (see Table 1). As such, there was a limited amount of variance in athlete engagement for the regression analyses to explain in the first place. Future studies should be cognisant of the large sample sizes (~200 participants) needed to detect moderation effects involving coach autonomy support on athlete engagement and to seek out sports contexts where there may be enhanced diversity in athletes' engagement scores.

Practical Implications

The present study found that the highly perfectionistic athletes reported having the highest levels of athlete engagement, and that the non-perfectionistic athletes' engagement levels were the most affected by coach autonomy support. Both of these findings are important for coaches of male adolescent athletes to consider. Based on the former finding, coaches may be inclined to enhance or encourage perfectionism in their athletes in an effort to try to foster engagement. This should not be encouraged. Coaches should not encourage high levels of perfectionism in athletes as it has been well documented that high levels of perfectionism are maladaptive (see Flett & Hewitt, 2005; 2014). Past person-oriented perfectionism research has indicated that having high levels of both perfectionistic strivings and perfectionistic concerns has been positively associated with negative outcomes, such as athlete burnout (see Gotwals, 2011).

Perhaps coaches could try to enhance athlete engagement through encouraging specific aspects of perfectionism. For example, coaches could try to foster aspects of perfectionistic strivings (i.e., personal performance standards), while discouraging aspects of perfectionistic concerns (i.e., concerns about mistakes). This recommendation is supported by the bivariate correlations produced in this study (see Table 3). While perfectionistic strivings was found to be positively and significantly correlated with each athlete engagement characteristic, perfectionistic concerns was not significantly correlated with any athlete engagement characteristic. Past research has also found similar trends where perfectionistic strivings have been generally associated with positive characteristics, while perfectionistic concerns have been consistently associated with negative characteristics (Gotwals et al., 2012). As a result, in an effort to enhance athlete engagement it would be safer for coaches to target perfectionistic strivings, but not perfectionistic concerns.

In addition, coaches should be aware that it was the non-perfectionistic athletes who were the most influenced by autonomy support, whereas athletes with higher levels of perfectionism appeared to be minimally influenced by coach autonomy support. This suggests that coaches may get the most benefit out of focusing autonomy supportive efforts on non-perfectionistic athletes. In contrast, it may not be an efficient use of time or effort on the part of the coach to focus autonomy supportive efforts on the moderately or highly perfectionistic athletes. Those athletes already appear to be engaged in sport and may not be perceptive of autonomy supportive efforts. Since coaches have to be proficient in time management and use of resources (Macquet, 2010), the present suggestions are emphasized.

Strengths, Limitations, and Future Directions

The present study was the first to consider athlete engagement, coach autonomy support, and the simultaneous consideration of perfectionistic strivings and perfectionistic concerns all from a person-oriented approach. As a result, replication is important. Given that the present study sampled older male adolescent athletes competing in basketball and football, future researchers should consider replicating the study within samples of female athletes, athletes of different ages, and/or athletes involved in sports other than basketball or football. The present study was limited by the use of a cross-sectional design. This is a limitation as cross-sectional designs cannot be used to establish the direction of influence between variables (Trochim, 2005). This study was based on the assumption that perfectionism influenced athlete engagement, but perhaps athlete engagement influenced perfectionism. The use of prospective or longitudinal research designs would be useful in attempts to alleviate this limitation. A third limitation of the present study was that perceived coach autonomy support was measured instead of actual autonomy supportive behaviours of the coach. That is, researchers would actually observe and

measure the autonomy supportive behaviours that the coach exhibits with athletes. By using athletes' perception of the autonomy supportive behaviours of the coach, it may have helped to explain the athletes' behaviour. However, measuring the actual autonomy supportive behaviours of the coach may have been more instructional and practical for the coaches as they could become more aware of using those behaviours with athletes.

Conclusion

The objective of the present study was to examine the degree to which distinct groups of male adolescent athletes, defined by unique perfectionism profiles, differed across core characteristics of engagement and to explore whether perceived coach autonomy support moderated the differences between the groups. Findings indicated that: (a) highly perfectionistic athletes had the highest levels of athlete engagement; and (b) at low-to-moderate levels of coach autonomy support moderation was detected for class differences on vigour and dedication. The factors of motivation, perceived competence, and perceived importance may help to explain the relationships between perfectionism, athlete engagement, and coach autonomy support. Coaches of male adolescent athletes should focus autonomy supportive behaviours on non-perfectionistic athletes and consider enhancing aspects of perfectionistic strivings in an effort to increase engagement levels. Based on the present findings, a better understanding of male adolescent perfectionistic athletes' experiences in sport as well as an understanding of more positive sporting experiences for those athletes has been gained, especially those who are low or high in perfectionistic tendencies. However, the present findings contradict evidence that being overly perfectionistic is maladaptive (Flett & Hewitt, 2005; 2014). Thus, more in-depth and focused research is needed to help explain why the findings in the present study were produced and what

the outcomes of being a highly perfectionistic male adolescent athlete with high engagement levels are.

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Appendix A:
Demographic Questionnaire

Appendix A: Demographic Questionnaire

ID: _____

Please tell us a bit about yourself.

| | | | |
|---|-------------|-----------|------------|
| 1. Please indicate the gender that you identify with. | Female ____ | Male ____ | Other ____ |
| 2. How old are you? | _____ years | | |
| 3. Please indicate your ethnicity: | | | |
| African, African American, or African Canadian | _____ | | |
| Caribbean | _____ | | |
| Caucasian or Western European | _____ | | |
| East Asian | _____ | | |
| Hispanic or Latino | _____ | | |
| Indigenous, Native American, First Nations, Métis, or Inuit | _____ | | |
| Middle Eastern | _____ | | |
| Mixed | _____ | | |
| South Asian | _____ | | |
| Other (please specify) | _____ | | |

Please tell us a bit about your involvement in basketball.

| | | |
|-----|--|-----------------------|
| 4. | How old were you when you started playing basketball competitively? | _____ years old |
| 5. | What team do you currently play for? | _____ |
| 6. | Your current team is part of a bigger basketball club. How old were you when you started playing for teams managed by this club? | _____ years old |
| 7. | Prior to this season, have you played for your current team before? | ___ Yes ___ No |
| | If "yes", how many other seasons have you played for this team? | _____ seasons |
| 8. | When did your current team start practicing? | _____ month |
| 9. | In general, how often did your current team practice over the season? | _____ times per week |
| 10. | Including this tournament, how many tournaments have you played in as a member of your current team? | _____ |
| 11. | How important is playing basketball to you? | |
| | <i>Not at all important</i> | <i>Very important</i> |
| | 1 2 3 4 5 | |

Order # _____

Please tell us about your involvement in other sports.

| | | | | |
|---|---|---------------------|----------|---------------------|
| 12. | Do you take part in organized competition for other sports ? Examples include playing in other sport leagues, competing at tournaments for other sports, and being members of high school, regional, or provincial teams for other sports. | | | _____ yes _____ no |
| If so, list the sports and indicate the highest level at which you compete. | | | | |
| | Sport | Level | Sport | Level |
| | 1. _____ | _____ City | 2. _____ | _____ City |
| | | _____ Regional | | _____ Regional |
| | | _____ Provincial | | _____ Provincial |
| | | _____ National | | _____ National |
| | | _____ International | | _____ International |
| | 3. _____ | _____ City | 4. _____ | _____ City |
| | | _____ Regional | | _____ Regional |
| | | _____ Provincial | | _____ Provincial |
| | | _____ National | | _____ National |
| | | _____ International | | _____ International |

General Instructions (Please Read Carefully)

- ★ You will now be asked to complete four questionnaires relating to your feelings, attitudes, and expectations toward your sport and your coaches.
- ★ Please read all instructions carefully before completing the questionnaire.
- ★ There are ***no right or wrong answers***, so do not spend too much time on any one question, and answer as honestly as you can.
- ★ Some of the questions may appear to be very similar. Please ignore this and respond to each item accurately.
- ★ ***The individual information you provide here will be kept private. No one, other than the research team, will ever see your individual responses to these questionnaires.***

Appendix B:
Athlete Engagement Questionnaire

Appendix B: Athlete Engagement Questionnaire

INSTRUCTIONS Below are some statements people have made about their experiences in sport. Using the scale provided, please indicate **how often** you have felt this way about your participation in your main sport ***this season***. This includes experiences during training and competition.

| | | Almost Never | Rarely | Sometimes | Frequently | Almost Always |
|-----|---|-----------------|--------|-----------|------------|------------------|
| 1. | I believe I am capable of accomplishing my goals in sport. | 1 | 2 | 3 | 4 | 5 |
| 2. | I feel energized when I participate in my sport. | 1 | 2 | 3 | 4 | 5 |
| 3. | I am dedicated to achieving my goals in sport. | 1 | 2 | 3 | 4 | 5 |
| 4. | I feel excited about my sport. | 1 | 2 | 3 | 4 | 5 |
| 5. | I feel capable of success in my sport. | 1 | 2 | 3 | 4 | 5 |
| 6. | I feel energetic when I participate in my sport. | 1 | 2 | 3 | 4 | 5 |
| 7. | I am determined to achieve my goals in my sport. | 1 | 2 | 3 | 4 | 5 |
| 8. | I am enthusiastic about my sport. | 1 | 2 | 3 | 4 | 5 |
| 9. | I believe I have the skills/technique to be successful in my sport. | 1 | 2 | 3 | 4 | 5 |
| 10. | I feel really alive when I participate in my sport. | 1 | 2 | 3 | 4 | 5 |
| 11. | I am devoted to my sport. | 1 | 2 | 3 | 4 | 5 |
| 12. | I enjoy my sport. | 1 | 2 | 3 | 4 | 5 |
| 13. | I am confident in my abilities. | 1 | 2 | 3 | 4 | 5 |
| 14. | I feel mentally alert when I participate in my sport. | 1 | 2 | 3 | 4 | 5 |
| 15. | I want to work hard to achieve my goals in sport. | 1 | 2 | 3 | 4 | 5 |
| 16. | I have fun in my sport. | 1 | 2 | 3 | 4 | 5 |

Appendix C:
Perfectionism Questionnaire

Appendix C: Athlete Sport Motivation Scale

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 your experiences by indicating the extent to which you **agree or disagree** with the following statements. (Circle 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 your experiences with your current team.

| | 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 do not set the highest standards for myself in sport, I am likely to end up a second-rate player. | 1 | 2 | 3 | 4 | 5 |
| 2. | Even if I fail slightly in competition, for me, it is as bad as being a complete failure. | 1 | 2 | 3 | 4 | 5 |
| 3. | I usually feel uncertain as to whether or not my training effectively prepares me for competition. | 1 | 2 | 3 | 4 | 5 |
| 4. | My parents set very high standards for me in sport. | 1 | 2 | 3 | 4 | 5 |
| 5. | During training I feel depressed if I have not been perfect. | 1 | 2 | 3 | 4 | 5 |
| 6. | On the day of competition I have a routine that I try to follow. | 1 | 2 | 3 | 4 | 5 |
| 7. | I feel like my coach criticizes me for doing things less than perfectly in competition. | 1 | 2 | 3 | 4 | 5 |
| 8. | In competition, I never feel like I can quite meet my parents' expectations. | 1 | 2 | 3 | 4 | 5 |
| 9. | During training I feel extremely stressed if everything does not go perfectly. | 1 | 2 | 3 | 4 | 5 |
| 10. | I hate being less than the best at things in sport. | 1 | 2 | 3 | 4 | 5 |
| 11. | I have and follow a pre-competitive routine. | 1 | 2 | 3 | 4 | 5 |
| 12. | If I fail in competition, I feel like a failure as a person. | 1 | 2 | 3 | 4 | 5 |
| 13. | Only outstanding performance during competition is good enough in my family. | 1 | 2 | 3 | 4 | 5 |
| 14. | I usually feel unsure about the adequacy of my pre-competition practices. | 1 | 2 | 3 | 4 | 5 |
| 15. | During training I have the wish to do everything perfectly. | 1 | 2 | 3 | 4 | 5 |

Please complete the remaining items in this questionnaire on the next page. ☞

| | To what extent do you agree or disagree with the following statements? | Strongly Disagree | Disagree | Neither Agree Nor Disagree | Agree | Strongly Agree |
|-----|--|--------------------------|-----------------|-----------------------------------|--------------|-----------------------|
| 16. | Only outstanding performances in competition is good enough for my coach. | 1 | 2 | 3 | 4 | 5 |
| 17. | I rarely feel that my training fully prepares me for competition. | 1 | 2 | 3 | 4 | 5 |
| 18. | My parents have always had higher expectations for my future in sport than I have. | 1 | 2 | 3 | 4 | 5 |
| 19. | The fewer mistakes I make in competition, the more people will like me. | 1 | 2 | 3 | 4 | 5 |
| 20. | It is important to me that I be thoroughly competent in everything I do in sport. | 1 | 2 | 3 | 4 | 5 |
| 21. | I follow pre-planned steps to prepare myself for competition. | 1 | 2 | 3 | 4 | 5 |
| 22. | I feel like I am criticized by my parents for doing things less than perfectly in competition. | 1 | 2 | 3 | 4 | 5 |
| 23. | During training it is important to me to be perfect in everything I attempt. | 1 | 2 | 3 | 4 | 5 |
| 24. | Prior to competition, I rarely feel satisfied with my training. | 1 | 2 | 3 | 4 | 5 |
| 25. | I think I expect higher performance and greater results in my daily sport-training than most players. | 1 | 2 | 3 | 4 | 5 |
| 26. | I feel like I can never quite live up to my coach's standards. | 1 | 2 | 3 | 4 | 5 |
| 27. | I feel that other players generally accept lower standards for themselves in sport than I do. | 1 | 2 | 3 | 4 | 5 |
| 28. | During training I feel the need to be perfect. | 1 | 2 | 3 | 4 | 5 |
| 29. | I should be upset if I make a mistake in competition. | 1 | 2 | 3 | 4 | 5 |
| 30. | In competition, I never feel like I can quite live up to my parents' standards. | 1 | 2 | 3 | 4 | 5 |
| 31. | My coach sets very high standards for me in competition. | 1 | 2 | 3 | 4 | 5 |
| 32. | I follow a routine to get myself into a good mindset going into competition. | 1 | 2 | 3 | 4 | 5 |
| 33. | During training I strive to be as perfect as possible. | 1 | 2 | 3 | 4 | 5 |
| 34. | If a team-mate or opponent (who plays a similar position to me) plays better than me during competition, then I feel like I failed to some degree. | 1 | 2 | 3 | 4 | 5 |

Please complete the remaining items in this questionnaire on the next page. ☞

| | To what extent do you agree or disagree with the following statements? | Strongly Disagree | Disagree | Neither Agree Nor Disagree | Agree | Strongly Agree |
|-----|---|--------------------------|-----------------|-----------------------------------|--------------|-----------------------|
| 35. | My parents expect excellence from me in sport. | 1 | 2 | 3 | 4 | 5 |
| 36. | My coach expects excellence from me at all times: both in training and competition. | 1 | 2 | 3 | 4 | 5 |
| 37. | I rarely feel that I have trained enough in preparation for a competition. | 1 | 2 | 3 | 4 | 5 |
| 38. | If I do not do well all the time in competition, I feel that people will not respect me as an athlete. | 1 | 2 | 3 | 4 | 5 |
| 39. | I have extremely high goals for myself in sport. | 1 | 2 | 3 | 4 | 5 |
| 40. | I develop plans that dictate how I want to perform during competition. | 1 | 2 | 3 | 4 | 5 |
| 41. | I feel like my coach never tries to fully understand the mistakes I sometimes make. | 1 | 2 | 3 | 4 | 5 |
| 42. | I set higher achievement goals than most athletes who play sport. | 1 | 2 | 3 | 4 | 5 |
| 43. | During training I am a perfectionist as far as my targets are concerned. | 1 | 2 | 3 | 4 | 5 |
| 44. | During training I get frustrated if I do not fulfill my high expectations. | 1 | 2 | 3 | 4 | 5 |
| 45. | I usually have trouble deciding when I have practiced enough heading into a competition. | 1 | 2 | 3 | 4 | 5 |
| 46. | I feel like my parents never try to fully understand the mistakes I make in competition. | 1 | 2 | 3 | 4 | 5 |
| 47. | People will probably think less of me if I make mistakes in competition. | 1 | 2 | 3 | 4 | 5 |
| 48. | My parents want me to be better than all other players who play sport. | 1 | 2 | 3 | 4 | 5 |
| 49. | During training I get completely furious if I make a mistake. | 1 | 2 | 3 | 4 | 5 |
| 50. | I set plans that highlight the strategies I want to use when I compete. | 1 | 2 | 3 | 4 | 5 |
| 51. | During training if something does not go perfectly, I am dissatisfied. | 1 | 2 | 3 | 4 | 5 |
| 52. | If I play well but only make one obvious mistake in the entire game, I still feel disappointed with my performance. | 1 | 2 | 3 | 4 | 5 |

Appendix D:
Sport Climate Questionnaire

Appendix D: Sport Climate Questionnaire

Part 1. Think of the coach on your current team that has ***the most influence*** on your experiences in practice and competition across this season. Once you have this person in mind, respond to the following questions.

| | | |
|----|---|--------------------------------------|
| 1. | Is this person your head coach or an assistant coach? | Head coach ____ Assistant coach ____ |
| 2. | For how many seasons has this person been your coach? | ____ seasons |

Part 2: The following questions focus on your experiences with the coach you identified in Part 1. Coaches have different styles in dealing with athletes, and we would like to know more about how you have felt about your encounters with your coach. Please respond to the following questions ***based on your experiences with the coach you identified.*** Your responses are confidential—*no one outside of the research team will see your answers.* Please be honest.

| | To what extent do you agree or disagree with the following statements? | Strongly Disagree | | Neutral | | | Strongly Agree | |
|-----|--|-------------------|---|---------|---|---|----------------|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. | I feel that my coach provides me choices and options. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. | I feel understood by my coach. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. | I am able to be open with my coach while engaged in basketball. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. | My coach conveyed confidence in my ability to do well at basketball. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5. | I feel that my coach accepts me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6. | My coach made sure I really understood the goals of my basketball involvement and what I need to do. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7. | My coach encouraged me to ask questions. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8. | I feel a lot of trust in my coach. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9. | My coach answers my questions fully and carefully. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 10. | My coach listens to how I would like to do things. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 11. | My coach handles people's emotions very well. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 12. | I feel that my coach cares about me as a person. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 13. | I don't feel very good about the way my coach talks to me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 14. | My coach tries to understand how I see things before suggesting a new way to do things. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15. | I feel able to share my feelings with my coach. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Appendix E:
Governing Body Information Letter

Appendix E: Governing Body Information Letter

Dear [Governing Body],

My name is Ms. Kailey Trodd. I am currently a graduate student in Kinesiology at Lakehead University working under the supervision of Dr. John Gotwals. For my thesis, I am conducting a study titled "*Relationship between Perfectionism and Athlete Engagement: The Mediating Role of Need Satisfaction and the Moderating Role of Coach Autonomy Support.*" With your permission, we would like to invite U18 athletes from the Football Manitoba Blue and Gold Weekend to participate in the study. Please allow me to describe the study in more detail.

The purpose of the thesis is to examine factors that influence high performance athletes' engagement in sport. Engagement reflects the degree to which athletes show confidence, enthusiasm, vigour, and dedication toward their sport. These characteristics are positively connected to well-being and develop when athletes' feel competent, connected to others, and in control of their involvement in sport. The thesis examines how athlete engagement can be predicted by both environmental and personal factors. The environmental factor examined is coach autonomy support. This reflects the degree to which coaches provide their athletes with appropriate feedback, take their feelings into consideration, and give them the opportunity to take initiative. The personal factor examined is perfectionism. This trait is prevalent among high performance athletes. It reflects the degree to which people strive for extremely high standards of performance and are overly critical of their efforts. The study is valuable in that it will enhance understanding of how coaches can modify their behaviour, based on the perfectionistic tendencies of their athletes, to promote engagement among those athletes.

Athletes who participate in the study will be asked to complete five questionnaires during a single team meeting. The meeting will be scheduled with the assistance of the coach and will take place at a location and time that is convenient for the athletes. The meeting will be approximately 30 to 45 minutes in length. Copies of the questionnaires are attached should you wish to review them.

To recruit athletes for the study, we would like to first contact coaches of the U18 teams participating in the Football Manitoba Blue and Gold Weekend to inform them about the study and ask if they would allow us to recruit their team members as potential participants. If they agree, then we will also ask them to schedule a team meeting where we can (a) explain the details of the study to the athletes, (b) obtain consent from athletes who want to participate, and (c) ask consenting athletes to complete the questionnaires. Participation is completely voluntary, and athletes may refuse to participate in any part of the study, and are allowed to withdraw from the study at any time. All of the study's procedures have been approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak with someone outside of the research team please contact Sue Wright at the Research Ethics Board at 807-343-8283 or research@lakeheadu.ca.

If you are willing to allow the U18 teams at the Football Manitoba Blue and Gold Weekend to participate in this study, we only ask that you foster our ability to distribute information about the study to your coaches. In return, we would be glad to provide a report of the study's findings to you. This report will be available by September 2017. Please **respond to katrodd@lakeheadu.ca indicating your intent to allow your organization's teams to participate.** Your assistance and participation will be a valuable component of the project.

Thank you for your consideration and I will be following up with you in the next few days.

Yours truly,

Ms. Kailey Trodd
M Sc. Kinesiology Candidate
Graduate Student Researcher
(807) 620 7847
katrodd@lakeheadu.ca

Dr. John Gotwals
Associate Professor
Faculty Supervisor
(807) 346-7952
john.gotwals@lakeheadu.ca

Appendix F:
Coach Information Letter

Appendix F: Coach Information Letter

Dear Coach,

My name is Kailey Trodd. I am a student in the Master of Science in Kinesiology program at Lakehead University. I am conducting a research study titled, "*Relationship between Perfectionism and Athlete Engagement: The Mediating Role of Need Satisfaction and the Moderating Role of Coach Autonomy Support*", under the supervision of Dr. John Gotwals. The purpose of this letter is to describe this project, outline your potential role in the project, and ask if I could meet with the athletes on your club team to see if they would be willing to participate in the study. The Lakehead University Research Ethics Board has approved this study.

The purpose of the thesis is to examine factors that influence high performance athletes' engagement in sport. Engagement reflects the degree to which athletes show confidence, enthusiasm, vigour, and dedication toward their sport. These characteristics are positively connected to well-being and develop when athletes' feel competent, connected to others, and in control of their involvement in sport. The thesis examines how athlete engagement can be predicted by both environmental and personal factors. The environmental factor examined is coach autonomy support. This reflects the degree to which coaches provide their athletes with appropriate feedback, take their feelings into consideration, and give them the opportunity to take initiative. The personal factor examined is perfectionism. This trait is prevalent among high performance athletes. It reflects the degree to which people strive for extremely high standards of performance and are overly critical of their efforts. The study is valuable in that it will enhance understanding of how coaches can modify their behaviour, based on the perfectionistic tendencies of their athletes, to promote engagement among those athletes.

If you allow us to recruit your club team members as potential participants, then we will also ask for your assistance in arranging a meeting with your athletes. The location, date, and time of the meeting would be set based on the needs of your team. At this meeting I will inform your athletes about the study and ask them if they would consider taking part in the project. Doing so would involve the completion of five questionnaires and take approximately 30 to 45 minutes of their time. Take note that coaches (and any other team personnel) will not be allowed to be in the meeting room while the athletes are informed about the study and complete the questionnaires. However, we would gladly provide you with a summary of the general results of the study, discuss those results with you, and work with you to develop coaching strategies designed to foster engagement among your athletes.

We will be contacting you soon to clarify any questions you may have about our study. Please feel free to contact us as well. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team please contact Sue Wright at the Research Ethics Board at 807-343-8283 or research@lakeheadu.ca

We hope that you find this study interesting and will help us to recruit your team members as potential participants. Please **respond to katrodd@lakeheadu.ca indicating your willingness to do so.**

Thank you for your consideration and I will be following up with you in the next few days.

Yours truly,

Ms. Kailey Trodd
MSc. Kinesiology Candidate
Graduate Student Researcher
(807) 620 7847
katrodd@lakeheadu.ca

Dr. John Gotwals
Associate Professor
Faculty Supervisor
(807) 346-7952
john.gotwals@lakeheadu.ca

Appendix G:
Participant Information Letter

Appendix G: Athlete Information Letter

Dear Potential Participant,

We gladly invite you to participate in a research study titled, *“Relationship between Perfectionism and Athlete Engagement: The Mediating Role of Need Satisfaction and the Moderating Role of Coach Autonomy Support”*, to be carried out by Ms. Kailey Trodd, a student in the Master of Science in Kinesiology program at Lakehead University. Your participation is being requested, as you are a club athlete over the age of 16 and a member of a coached high performance club sport team. The purpose of this letter is to describe the study so you can make an informed decision about whether to participate.

Your Role in the Project

Your participation in this project would involve the completion of five questionnaires. Below is a summary of the procedure:

- (1) You would complete a brief packet of surveys. The first survey asks for basic background information about yourself and your involvement in sport. A second survey asks you about how engaged you are in your sport. A third survey asks about your goals in sport and your perspectives on performance. A fourth survey asks about the degree to which playing your sport fosters feelings of competence, meaningful connections to others, and personal control. A fifth survey asks about the degree to which your coach contributes to these feelings.
- (2) The questionnaire packet will take about 30 to 45 minutes for you to complete.

Ethical Issues Regarding Your Participation

- (1) Your decision to take part in the study is entirely voluntary and will have no impact upon your playing status.
- (2) We are taking steps to support the confidentiality and anonymity of your responses. Coaches will be asked to leave the room immediately following a brief introduction, before the study is explained to potential participants and before completion of the questionnaire package. If you decide to participate, a unique id number will be assigned to you and that id number (as opposed to your name) will be associated with your responses in all analyses.
- (3) There are no direct personal benefits to taking part in this study; nor are there any mental or physical risks associated with doing so.
- (4) You may decline to take part or drop out from any stage of the study for any reason with no consequences. You may also choose to not answer or skip any question on any of the questionnaires.
- (5) This project has been approved by the Research Ethics Board at Lakehead University.

Data Access and Presentation

- (1) Hard copies of your completed questionnaires will be stored in a locked office at Lakehead University. Electronic files compiling your responses will be password protected and stored on research team members' computers. Only the research team will have access to these hard copies and electronic files.
- (2) After the completion of the study, all data will be kept in a locked file cabinet in the office of Dr. John Gotwals in the School of Kinesiology for a minimum period of five years.

- (3) You can choose to receive a report of the study's findings. You can indicate how you would choose to receive this report (i.e., phone, email) on the consent form. This report will be available by September 2017.
- (4) The study's findings will be presented in Ms. Trodd's thesis document. These findings may also be published in a professional journal and/or presented at an academic conference. Regardless of the format, participants' anonymity and confidentiality will always be maintained.

If you have any questions or concerns at any point during this investigation, please do not hesitate to contact either the graduate student researcher or her faculty advisor. The study has been approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team please contact Sue Wright at the Research Ethics Board at (807) 343-8283 or research@lakeheadu.ca

Thank you for your consideration,

Yours truly,

Ms. Kailey Trodd
M Sc. Kinesiology Candidate
Graduate Student Researcher
(807) 620 7847
katrodd@lakeheadu.ca

Dr. John Gotwals
Associate Professor
Faculty Supervisor
(807) 346-7952
john.gotwals@lakeheadu.ca

Appendix H:
Participant Consent Form

Appendix H: Participant Consent Form

Principal Investigator: ***Dr. John Gotwals, Lakehead University***Student-Investigator: ***Ms. Kailey Trodd, Lakehead University*****To be completed by the research participant (i.e., the athlete):**

I have read the associated information letter and understand that:

- I have been asked to take part in the research study as outlined in the Participant Information Letter;
- There is no direct benefit to taking part in the study; nor any mental or physical risks to doing so;
- I may contact the student researcher or her supervisor at any time throughout the study to ask questions regarding my participation;
- My participation is voluntary and I have the right to stop participation at any time, without consequence and that my information will be removed from the study at my request;
- The research team has taken steps to foster the anonymity and confidentiality of my data;
- Any information presented in the academic community will maintain my anonymity and confidentiality;
- Information I provide will be securely stored for a minimum of 5 years in the School of Kinesiology at Lakehead University; and
- If I choose, I may provide my contact information, or I may contact the researcher by phone or e-mail, to obtain a summary of the findings from this study.

I agree to take part in this study:

Signature

Date

Printed Name

 I would like to receive a summary of the results when completed.

Email

Phone Number

Appendix I
Supplemental Tables

Table 9
Bivariate Correlations between Sport-MPS-2, MIPS, AEQ, and SCQ (r)

| Variable | AEQ | | | | Sport-MPS-2 | | | | | | MIPS | | SCQ |
|--------------------|------------|------------|---------|------------|-------------|--------|-------|-------|-------|-------|-------|-------|-----|
| | Enthusiasm | Confidence | Vigour | Dedication | PS | ORG | COM | DAA | PPP | PCP | NRI | SP | SCQ |
| <i>AEQ</i> | | | | | | | | | | | | | |
| Enthusiasm | | | | | | | | | | | | | |
| Confidence | -0.64* | | | | | | | | | | | | |
| Vigour | 0.81* | -0.70* | | | | | | | | | | | |
| Dedication | 0.77* | -0.72* | 0.79* | | | | | | | | | | |
| <i>Sport-MPS-2</i> | | | | | | | | | | | | | |
| PS | 0.31* | -0.34* | 0.33* | 0.44* | | | | | | | | | |
| ORG | -0.30* | 0.25* | -0.24* | -0.33* | -0.56* | | | | | | | | |
| COM | 0.01 | 0.02 | 0.01 | -0.09 | -0.55* | 0.47* | | | | | | | |
| DAA | 0.18** | -0.23* | 0.21* | 0.17** | -0.26* | 0.17** | 0.54* | | | | | | |
| PPP | 0.15 | -0.02 | 0.12 | 0.02 | -0.31* | 0.40** | 0.55* | 0.60* | | | | | |
| PCP | -0.14 | 0.17* | -0.18** | -0.22* | -0.49* | 0.45* | 0.57* | 0.39* | 0.55* | | | | |
| <i>MIPS</i> | | | | | | | | | | | | | |
| NRI | 0.04 | -0.10 | 0.05 | -0.01 | -0.50* | 0.45* | 0.76* | 0.59* | 0.61* | 0.51* | | | |
| SP | -0.25* | 0.21* | -0.24* | -0.30* | -0.64* | 0.52* | 0.58* | 0.20* | 0.36* | 0.52* | 0.52* | | |
| <i>SCQ</i> | | | | | | | | | | | | | |
| SCQ | | | | | 0.05 | -0.13 | 0.09 | 0.18* | 0.04 | 0.15 | 0.01 | -0.05 | |

* $p > .05$

** $p > .01$

Appendix J
Supplemental Figures

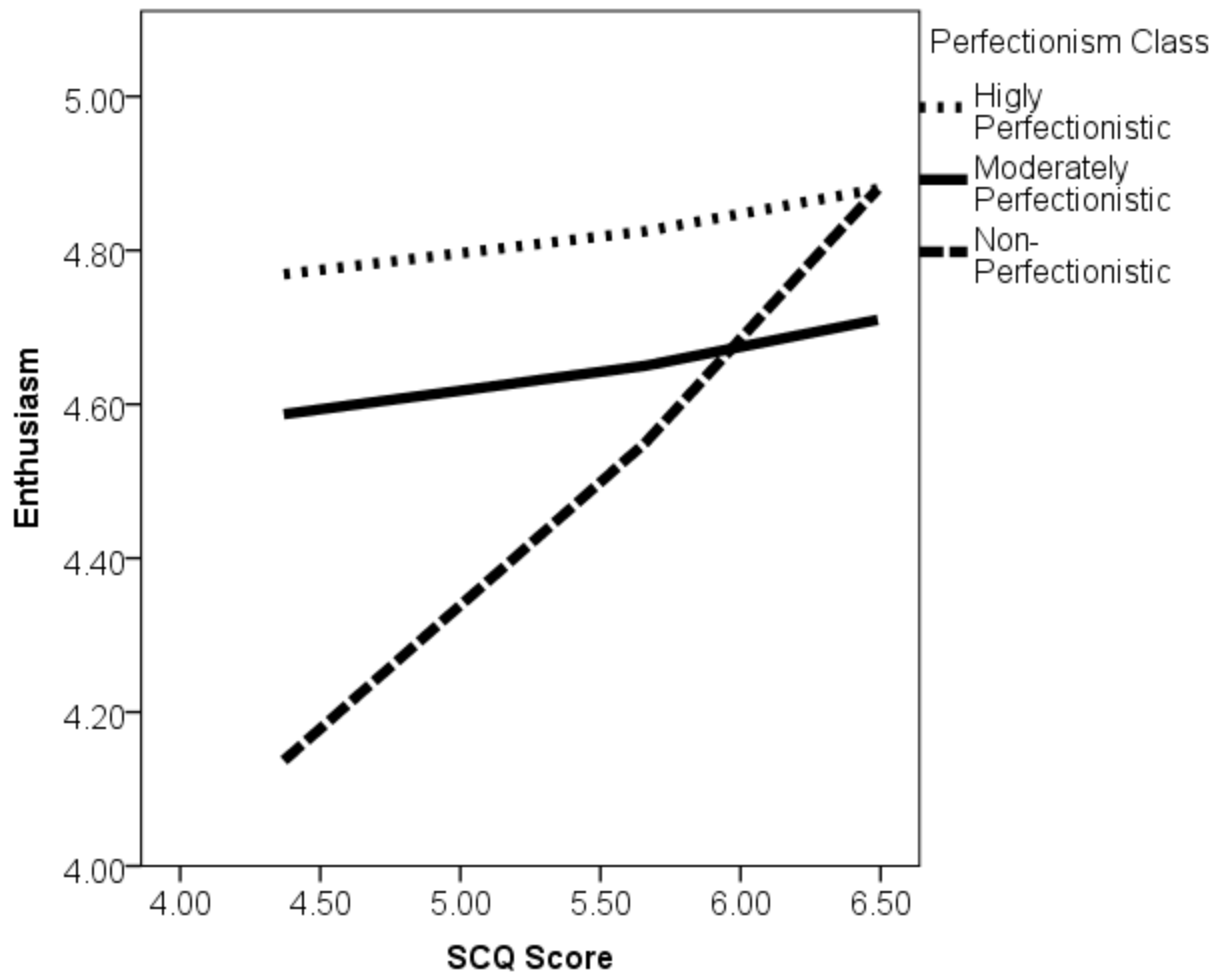


Figure 4: Mean enthusiasm scores for each perfectionism class across SCQ scores.

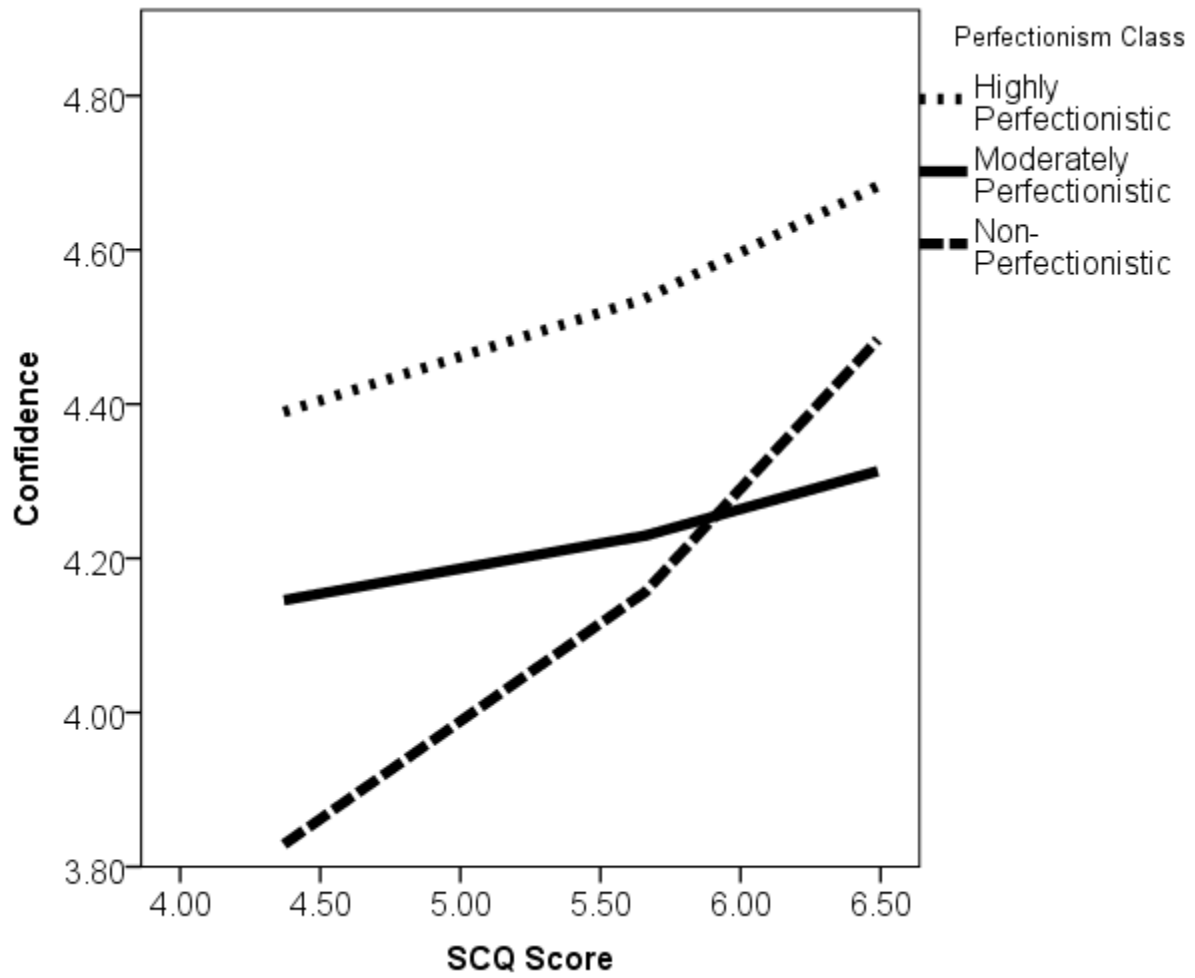


Figure 5: Mean confidence scores for each perfectionism class across SCQ scores.