University of Alberta

Perfectionism and Reactions to Mistakes in Competitive Curling

by

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Abstract

This study assessed the degree to which athletes (199 male, 144 female, *M* age = 30.78 years, *SD* = 7.93) with different profiles of perfectionism differed in terms of their emotional and cognitive responses to personal failure in low- and high-criticality situations in the sport of curling. Cluster analyses produced three clusters of athletes—labelled, healthy perfectionists, unhealthy perfectionists, and non-perfectionists—that closely resembled perfectionism profiles within Stoeber and Otto's (2006) tripartite model of perfectionism. Results of a repeated measures MANOVA indicated that, irrespective of situation criticality, healthy perfectionists had lower anger/dejection and higher self-confidence/optimism following mistakes than unhealthy perfectionists (*p*s < .005). Results also indicated that, irrespective of perfectionism, athletes reported lower anger/dejection and higher self-confidence/optimism following mistakes in low- as opposed to high-criticality situations (*p*s < .005). Results reinforce the importance of considering personality and situational characteristics when assessing athletes' emotional and cognitive reactions to mistakes in sport.

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Chapter 1

Introduction

Sir Winston Churchill, the British Prime Minister during the Second World War, once said, "success is stumbling from failure to failure with no loss of enthusiasm." Implicit within Churchill's quote is recognition of the fact that failure almost inevitably plays a role in the pursuit of success, and that success is highly predicated upon a person's ability to respond to failure in an adaptive or functional manner. These lessons are particularly applicable in the domain of competitive sport where failure (whether large or small, frequent or infrequent) is part of every athlete's journey towards the pursuit of competitive success (Sagar & Stoeber, 2009). Understanding personality and situational factors that may influence how athletes respond to failure is of particular interest to practitioners (e.g., coaches and sport psychologists) who work to help athletes achieve optimal performance in sport (Vallance, Dunn, & Causgrove Dunn, 2006). To this end, the general purpose of this study was to examine personality and situational factors that may influence the emotional and cognitive reactions of athletes to failure in competition. More specifically, the overarching purpose of this study was to determine if the personality trait of perfectionism and situation criticality factors during competition were associated with (or influenced) athletes' levels of anger, dejection, self-confidence, and optimism following failure in the sport of curling.

Perfectionism

Perfectionism is a multidimensional achievement personality disposition, at the core of which lies a person's desire to strive for the attainment of extremely

high performance standards (Frost, Marten, Lahart, & Rosenblate, 1990; Hamachek, 1978; Hewitt & Flett, 1991). At its most basic level, perfectionism can be defined as "the striving for flawlessness" (Flett & Hewitt, 2002, p. 5). Although a number of facets of perfectionism have been proposed in the literature to capture the latent structure of perfectionism (for a review see Enns & Cox, 2002), many contemporary perfectionism researchers classify these facets into two overarching (hierarchical) dimensions (see Stoeber, 2011). These hierarchical dimensions have been labelled *perfectionistic strivings* and *perfectionistic concerns* (Stoeber & Otto, 2006). Loosely defined, perfectionistic strivings reflect the degree to which people set and strive for the attainment of high performance standards. In contrast, perfectionistic concerns reflect the degree to which people evaluate themselves harshly, are overly concerned about failing to reach their high performance standards, and are concerned about the social pressures that exist in achievement settings surrounding personal performance (see Stoeber & Otto, 2006).

Facets (or subscales) from various multidimensional measures of perfectionism that capture core aspects of perfectionistic strivings include the *personal standards* subscale of Frost et al.'s (1990) Multidimensional Perfectionism Scale (Frost-MPS), the *self-oriented perfectionism* subscale of Hewitt and Flett's (1991) Multidimensional Perfectionism Scale (Hewitt-MPS), the *personal standards* and *organization* subscales of Gotwals and Dunn's (2009) Sport Multidimensional Perfectionism Scales-2 (Sport-MPS-2), and the *striving for perfection* subscale of Stöber, Otto, and Stoll's (2004) Multidimensional

Inventory of Perfectionism in Sport (MIPS). Facets (or subscales) that reflect core aspects of perfectionistic concerns include the *concern over mistakes* and *doubts about actions* subscales from the Frost-MPS and Sport-MPS-2, the *socially prescribed perfectionism* subscale from the Hewitt-MPS, and the *negative reactions to imperfection* subscale from the MIPS.

There is a growing body of research evidence indicating that perfectionistic strivings are often associated with healthy/adaptive/functional "characteristics, processes, and outcomes in athletes" (Sagar & Stoeber, 2009, p. 603), whereas perfectionistic concerns are generally associated with unhealthy/maladaptive/dysfunctional characteristics, processes, and outcomes (Gotwals, Stoeber, Dunn, & Stoll, 2012). For example, facets of perfectionistic strivings (e.g., personal standards, striving for perfection) have been positively associated with numerous adaptive correlates among athletes that include task-oriented motivational orientations (Dunn, Causgrove Dunn, & Syrotuik, 2002), self-esteem (McArdle & Duda, 2008), perceived ability (Hall, Kerr, & Matthews, 1998), internal attributions for success (Stoeber & Becker, 2008), and competitive success (Stoeber, Uphill, & Hotham, 2009) among athletes. In contrast, facets of perfectionistic concerns (e.g., concern over mistakes, negative reactions to imperfection) have been positively associated with a host of maladaptive correlates among athletes including anger following mistakes (Vallance et al., 2006), pre-competitive state anxiety (Hall et al., 1998), negative attitudinal body image (Dunn, Craft, Causgrove Dunn, & Gotwals, 2011), fear of failure (Sagar & Stoeber, 2009), and burnout (Gotwals, 2011).

Interestingly, it should be noted that facets of perfectionistic strivings have also been positively associated with maladaptive correlates among athletes including trait anger (Dunn, Gotwals, Causgrove Dunn, & Syrotuik, 2006), fear of failure (Sagar & Stoeber, 2009), and competitive trait anxiety (Stoeber, Otto, Pescheck, Becker, & Stoll, 2007). However, when the overlap with perfectionistic concerns is controlled (e.g., through the use of partial correlations), perfectionistic strivings are typically associated with adaptive characteristics "and less likely to be associated with maladaptive characteristics" (Gotwals et al., 2012, p.273)

Given that athletes can possess different patterns of perfectionistic strivings and perfectionistic concerns (Gotwals et al., 2012), two conceptual frameworks (or models) have been proposed in the literature that provide a means for researchers to differentiate (or classify) athletes' perfectionistic orientations: namely, the tripartite model of perfectionism (Stoeber & Otto, 2006) and the 2 × 2 model of dispositional perfectionism (Gaudreau & Thompson, 2010). Both models classify people according to the combination of their scores on the two hierarchical dimensions of perfectionism—perfectionistic strivings and perfectionist concerns—that are believed to subsume all facets of perfectionism.

In consideration of a person's perfectionistic strivings and perfectionistic concerns, the tripartite model (Stoeber & Otto, 2006) identifies three different profiles of perfectionism that are labelled healthy perfectionism, unhealthy perfectionism, and non-perfectionism (see Figure 1). Healthy perfectionists have high perfectionistic strivings combined with low perfectionistic concerns. Unhealthy perfectionists have high perfectionistic strivings combined with high

perfectionistic concerns. Non-perfectionists are those individuals who have low perfectionistic strivings (irrespective of the level of their perfectionistic concerns). Regarding the classification of non-perfectionists, Stoeber (2011) argued that "the strivings component of perfectionism is an integral part of the definition of perfectionism [and therefore] people who only show the concerns component of perfectionism but not the strivings component should [not] be referred to as 'perfectionists'" (p. 141).

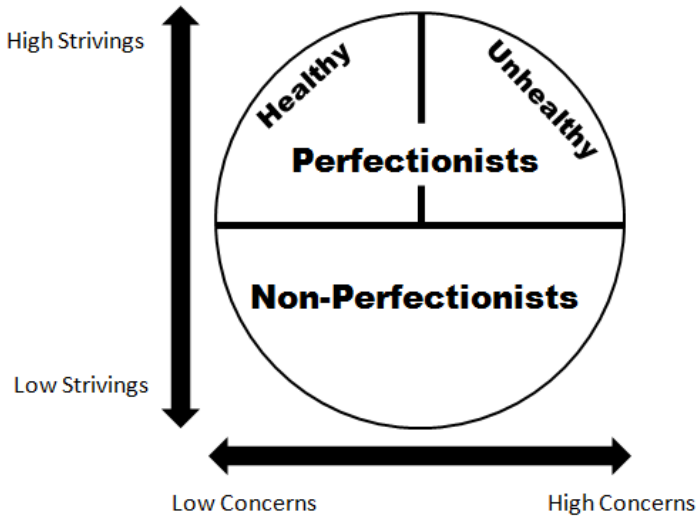

Figure 1. The tripartite model of perfectionism. Adapted from "Positive Conceptions of Perfectionism: Approaches, Evidence, Challenges," by J. Stoeber and K. Otto, 2006, *Personality and Social Psychology Review, 10,* p. 296.

According to theory, healthy perfectionists are thought to be well-adjusted, socially comfortable, and motivated to succeed (Hamachek, 1978; Parker, 1997). In contrast, unhealthy perfectionists are driven to achieve high standards but are highly self-critical, and motivated largely by the need to avoid failure or any

public displays of imperfection (see Blatt, 1995; Hamachek, 1978; Rice & Ashby, 2007).[1]

The 2 × 2 model (Gaudreau & Thompson, 2010) takes a different approach to classifying perfectionism profiles (see Figure 2). The 2 × 2 model classifies people who have high perfectionistic strivings combined with low perfectionistic concerns as having pure personal standards perfectionism (i.e., similar to healthy perfectionists in the tripartite model). The 2 × 2 model classifies people who have high perfectionistic strivings combined with high perfectionistic concerns as having mixed perfectionism (i.e., similar to unhealthy perfectionists in the tripartite model). However, the 2 × 2 model deviates from the tripartite model in its treatment and operationalization of people who have the combination of low perfectionistic strivings combined with high perfectionistic concerns. The 2 × 2 model labels this profile as pure evaluative concerns perfectionism—a combination of perfectionism scores that would be classified as non-perfectionism in the tripartite model. Lastly, the 2 × 2 model classifies people who have low perfectionistic strivings combined with low perfectionistic concerns as having non-perfectionism—these people would also be classified as non-perfectionists in the tripartite model.

[1] For the sake of brevity and conceptual consistency, the term "healthy perfectionism" will be used throughout the thesis to reflect other terms that have been used in the literature to describe conceptually similar profiles of perfectionism: namely, normal perfectionism (Hamachek, 1978), adaptive perfectionism (Parker, 1997), and positive perfectionism (Terry-Short, Owens, Slade, & Dewey, 1995). Similarly, the term "unhealthy perfectionism" will be used as a synonym for neurotic perfectionism (Hamachek, 1978), maladaptive perfectionism (Parker, 1997), and negative perfectionism (Terry-Short et al., 1995).

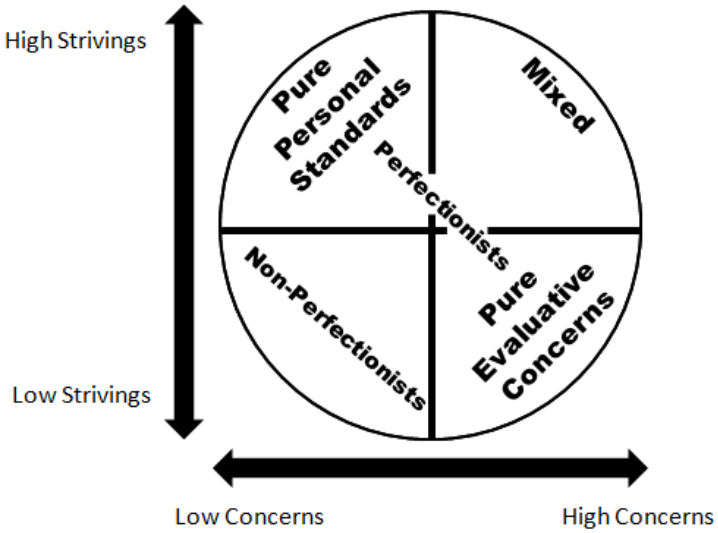

Figure 2. The 2 × 2 model of perfectionism. Adapted from "Testing a 2 × 2 Model of Dispositional Perfectionism," by P. Gaudreau and A. Thompson, 2010, *Personality and Individual Differences*, *48*, p. 533.

Recent cluster-analytic research with athletes has provided direct empirical support for perfectionism profiles that fit within the conceptual frameworks provided by the tripartite model (see Gucciardi, Mahoney, Jalleh, Donovan, & Parkes, 2012; Sapieja, Dunn, & Holt, 2011) and the 2 × 2 model (see Cumming & Duda, 2012). For example, Sapieja et al. (2011) obtained three perfectionism clusters among a sample of 194 male youth soccer players (*M* age = 13.64 years) that directly reflected profiles of healthy-, unhealthy-, and non-perfectionism as defined within the tripartite model. Healthy perfectionists had high perfectionistic strivings (i.e., high personal standards and organization—as measured by the Sport-MPS-2 [Gotwals & Dunn, 2009]) combined with low perfectionistic concerns (i.e., low concern over mistakes, perceived parental pressure, perceived coach pressure, and doubts about actions). Unhealthy perfectionists had high perfectionistic strivings (i.e., high personal standards and moderate organization) combined with high perfectionistic concerns (i.e., high concern over mistakes,

perceived parental pressure, perceived coach pressure, and doubts about actions). Sapieja et al. reported that the cluster of healthy perfectionists had significantly higher perceptions of exposure to both maternal and paternal authoritative parenting—a parenting style that is generally associated with best-practice child-rearing behaviours (see Baumrind, 1971)—than the cluster of unhealthy perfectionists.

Gucciardi et al. (2012) examined profiles of perfectionism among a sample of 423 elite athletes (*M* age = 25.64 years) who completed the Sport-MPS (i.e., the predecessor to the Sport-MPS-2—see Dunn, Causgrove Dunn, Gotwals, Vallance, Craft, & Syrotuik, 2006). A series of cluster analyses produced three clusters that were highly interpretable from the perspective of Stoeber and Otto's (2006) tripartite model. One cluster was comprised of athletes who had high perfectionistic strivings combined with low perfectionistic concerns (i.e., healthy/adaptive perfectionists). Another cluster was comprised of athletes who had high perfectionistic strivings combined with high perfectionistic concerns (i.e., unhealthy/maladaptive perfectionists). The third cluster was comprised of athletes who had low perfectionistic strivings (i.e., non-perfectionists). Gucciardi et al. reported that the cluster of adaptive perfectionists had significantly higher scores on adaptive/functional motivational constructs (e.g., mastery-approach goals) and significantly lower scores on less adaptive/functional motivational constructs (e.g., mastery-avoidance goals, performance-avoidance goals, and fear of failure) than the cluster of maladaptive perfectionists.

In contrast to the three-cluster solutions obtained by Sapieja et al. (2011) and Gucciardi et al. (2012) that were interpretable from the perspective of the tripartite model, Cumming and Duda (2012) recently obtained a 4-cluster solution that was interpretable from the perspective of the 2 × 2 model. Cumming and Duda asked a sample of 194 vocational dancers (*M* age = 16.73 years) to complete three subscales contained within the Frost-MPS (i.e., personal standards, concern over mistakes, and doubts about actions). The first cluster contained athletes who had high perfectionistic strivings (i.e., high personal standards) combined with low perfectionistic concerns (i.e., moderate concern over mistakes and low doubts about actions). This cluster was equated with pure personal standards perfectionism within the 2 × 2 model. The second cluster contained athletes who had low perfectionistic strivings (i.e., low personal standards) combined with low perfectionistic concerns (i.e., low concern over mistakes and low doubts about actions). This cluster was equated with non-perfectionism within the 2 × 2 model. The third cluster contained athletes who had low perfectionistic strivings (i.e., low personal standards) combined with high perfectionistic concerns (i.e., moderate concern over mistakes and high doubts about actions). This cluster was equated with pure evaluative concerns perfectionism within the 2 × 2 model. The fourth cluster contained athletes who had high perfectionistic strivings (i.e., high personal standards) combined with high perfectionistic concerns (i.e., high concern over mistakes and high doubts about actions). This cluster was equated with mixed perfectionism within the 2 × 2 model. The highest levels of psychological health (i.e., positive affect) were reported among athletes in the

pure personal standards perfectionism cluster (although positive affect levels within the pure-personal-standards-perfectionism cluster were not significantly different than those reported by dancers within the mixed-perfectionism cluster), while the highest levels of psychological distress (i.e., social physique anxiety, negative affect, physical symptoms [e.g., headaches, sore muscles], and emotional/physical exhaustion) were reported in the mixed-perfectionism and pure-evaluative-concerns-perfectionism clusters.

Given that support appears to exist in the literature for the tripartite model and the 2 × 2 model in sport, more research is required to examine the feasibility (and usefulness) of using these conceptual frameworks for structuring profiles of perfectionism among athletes. Moreover, Gucciardi et al. (2012) have argued that, relative to variable-oriented approaches, there continues to be a paucity of research in the sport-perfectionism literature that employs group/person-oriented approaches (see Bergman, Magnusson, & El-Khouri, 2003) to studying the healthy/adaptive versus unhealthy/maladaptive aspects of perfectionism in sport. To this end, the current study adopted a person-oriented approach to assess the degree to which different profiles of perfectionism influenced athletes' emotional and cognitive reactions to mistakes in low- and high-criticality situations in competition. The tripartite model of perfectionism (Stoeber & Otto, 2006) and the 2 × 2 model of perfectionism (Gaudreau & Thompson, 2010) served as the primary conceptual frameworks that were used to assess and interpret the profiles (clusters) of perfectionism that emerged from the data

Reactions to Mistakes in Sport

The ability of athletes to "bounce back from performance set-backs" is often viewed as a defining characteristic of mental toughness that leads to success in sport (Jones, Hanton, & Connaughton, 2002, p. 210). In other words, the manner in which athletes react to set-backs and disappointments that occur following failure during competition can have a powerful influence upon athletes' performances during the remainder of the competition (Zinsser, Bunker, & Williams, 2006). This is particularly true in the sport of curling where it has long been recognized that "a few missed shots are enough to shatter [the curling athlete's] confidence" (Jones, 2007, p. 56) and can lead the competitor to become angry, upset, and "so unnerved that he [or she] fail[s] to make a good [shot] thereafter" (Watson, 1950, p. 156).

The emotional responses to failure examined in this study were anger and dejection. These variables were selected because increased levels of anger and dejection are often associated with reduced performance and/or reduced psychological well-being (Jones, Lane, Bray, Uphill, & Catlin, 2005; Spielberger, 1991). The cognitive responses to failure examined in this study were self-confidence and optimism. These variables were selected because high levels of self-confidence and optimism are generally associated with enhanced performance and/or heightened psychological well being (Gould, Dieffenbach, & Moffett, 2002; Kluemper, Little, & Degroot, 2009; Zinsser et al., 2006).

Emotions. Emotions are affective states that are relatively short in duration and that are triggered by specific events and antecedents (Lane & Terry, 2000; 2011). Lazarus (2000) referred to these triggers as core-relational themes and argued that every emotion has its own unique core-relational theme that must be present in a given situation for the emotion to be experienced. Understanding emotions and the antecedent factors that contribute to emotional responses in sport is important because emotional responses of athletes prior to and during athletic competition (e.g., anxiety, anger) can have a substantial impact upon performance in sport (see Hanin, 2000; Lane, 2007; Lazarus, 2000).

Anger. State anger is defined as a "psychobiological emotional state or condition marked by subjective feelings that vary in intensity from mild irritation or annoyance to intense fury and rage" (Spielberger, 1999, p. 1). According to Lazarus (2000), anger is elicited when an event has occurred that is judged by an individual to be a "demeaning offence against me and mine" (p. 234). Stated differently, anger occurs when an individual perceives some form of injustice or when an individual feels that something has happened that 'should not' have happened (Vallance et al., 2006). Anger can also occur in response to the blockage of highly meaningful goals (Averill, 1982).

State anger reflects the "intensity of angry feelings and the extent to which a person feels like expressing anger at a particular time" (Spielberger, 1999, p. 2). Although anger has the potential to facilitate performance if controlled and expressed in an appropriate manner (Lane & Terry, 2000; Lazarus, 2000), it also has the potential to impede performance by hindering task-relevant cognitions

that are essential to skilled athletic performance (Botterill & Brown, 2002; Nideffer, 1989). Most notably, state anger is "generally accompanied by [increases in] muscular tension and by arousal of the neuroendocrine and autonomic nervous system" (Spielberger, 1999, p. 1). In sports that require fine motor control and high levels of precision/accuracy in specific movements (e.g., the curling delivery: see Lukowich, Hackner, & Lang, 1986), these marked increases in muscular tension and physiological arousal are generally viewed as impediments to performance (Hanin, 2000).

Dunn, Gotwals, et al. (2006) provided empirical support for the links between unhealthy/maladaptive perfectionism and anger in sport among a sample of 138 male teenage high-performance Canadian Football players (*M* age = 18.27 years). Canonical correlation analysis revealed that perfectionism variates characterized by a combination of high perfectionistic strivings with high perfectionistic concerns (i.e., unhealthy perfectionism) were positively correlated with trait anger and reactions-to-mistakes anger (where 'reactions-to-mistakes anger' was measured by asking athletes to indicate how they would likely react or feel if they were playing poorly). Vallance et al. (2006) conducted a similar study with male youth ice hockey players (*M* age = 14.15 years), but instead of using the variable-oriented approach employed by Dunn, Gotwals, et al. (2006), Vallance et al. used a person-oriented approach by creating clusters of athletes and comparing anger responses across the clusters. Although Vallance et al. did not find any evidence of a healthy/adaptive perfectionism cluster—as defined by Stoeber and Otto's (2006) tripartite model of perfectionism—the authors did

report that athletes with the most unhealthy/maladaptive profile of perfectionism (i.e., high perfectionistic strivings combined with high perfectionistic concerns) had significantly higher self-reported anger levels following mistakes in competition than clusters of athletes who had combinations of lower perfectionistic strivings and lower perfectionistic concerns.

Given that unhealthy perfectionists view mistakes and failure as an unacceptable part of the performance process (Hamachek, 1978) that should not happen (Burns, 1980; Frost et al., 1990), and that anger can occur when personally meaningful goals (e.g., flawless performances) are blocked (Averill, 1982; Lazarus, 1991), Vallance et al. (2006) proposed that athletes who have high perfectionistic strivings combined with high perfectionistic concerns (i.e., unhealthy perfectionists) will be particularly vulnerable to experiencing heightened anger following personal mistakes in competition.

Dejection. Dejection is defined as "a low intensity negative emotion characterized by feelings of deficiency and sadness" (Jones et al., 2005, p. 411). Based on Carver and Scheier's (1990) control-process model of emotion, Frijda (1994) proposed that dejection-related feelings of deficiency and sadness result from the perceived (or actual) deficiency in one's progress towards the achievement of a personally meaningful goal. Although direct links between dejection and performance have not been explored among athletes, dejection is a relevant and important emotion to examine in the context of competitive sport because research has shown that it is strongly correlated (in a positive direction) with other debilitative mood states (including confusion, anger, tension, and

anxiety) and negatively correlated with athletes' ability to maintain emotional control in competition (see Jones et al., 2005).

Why should dejection be related to an athlete's perfectionistic orientations? Both healthy and unhealthy perfectionists set and strive for the accomplishment of very high performance standards (Stoeber & Otto, 2006). However, unhealthy perfectionistic athletes tend to rely on the accomplishment of their high performance standards to validate their self-concept or self-esteem, whereas the self-worth of healthy perfectionists is believed to be less contingent upon the accomplishment of these same high performance standards (see Gotwals, Dunn, & Wayment, 2003; Koivula, Hassmén, & Fallby, 2002). Consequently, when personal mistakes occur in competition, the performance-contingent self-worth of unhealthy perfectionistic athletes is threatened to a much greater degree than that of healthy perfectionistic athletes (who view mistakes as a natural [though unwanted] part of the performance process: Hamachek, 1978). Given that dejection occurs when an individual feels a strong sense of deficiency (or even helplessness) towards achieving a personally meaningful goal (Frijda, 1994), it seems likely that unhealthy perfectionistic athletes will experience a greater sense of dejection following a personal mistake (or failure) in competition than healthy perfectionistic athletes.

Cognitions. Although emotions can influence performance in sport, an athlete's emotional state immediately following a personal mistake in competition does not necessarily have a lasting impact on the valence and content of the athlete's thoughts regarding future outcome expectancies. Consequently, to gain a

more complete understanding of how athletes (with different profiles of perfectionism) respond to failure in competition, it is necessary to assess their cognitions (or beliefs) regarding their abilities to succeed in the remainder of the competition. The term *cognition* refers to a wide array of mental processes (Robinson-Riegler & Robinson-Riegler, 2008) and will be used in this study to describe thoughts relating to self-confidence and optimism. These constructs respectively capture athletes' future-oriented cognitions regarding assessments of their own personal ability to successfully execute upcoming tasks (i.e., self-confidence), and athletes' views towards the likelihood of a positive outcome occurring in the remainder of the game/competition (i.e., optimism).

Self-confidence. Self-confidence "involves cognitions that one is [mentally and physically] up to the task and able to give one's best possible performance" (Vealey, Hayashi, Garner-Holman, & Giacobbi, 1998, p. 960). Self-confidence levels can fluctuate before and/or during competition—even among Olympic-level athletes (see Gould, Guinan, Greenleaf, Medbery, & Peterson, 1999)—and these fluctuations can often occur as a direct consequence of the success and failure athletes' experience during competition (Hays, Maynard, Thomas, & Bawden, 2007). Vealey et al. noted that "self-confidence is widely acclaimed by theorists, researchers, and practitioners as [being] the most critical psychological characteristic influencing sport performance" (p. 54).

Studies conducted with international-caliber athletes appear to support the commonly held view among sport psychology researchers that self-confidence is a highly desirable (adaptive) cognitive state that can facilitate athletic

performance (see Zinsser et al., 2006). For example, Gould et al. (2002) reported that U.S. Olympic gold medalists (N = 10) were characterized by having high levels of self-confidence around their athletic events. In contrast, a study conducted by Orlick and Partington (1988) with 235 Canadian Olympic athletes found that athletes who performed below their expectations in international competition often cited a lack of confidence as a reason for their failure.

A number of studies have shown links between various facets of perfectionism and self-confidence in sport. For example, in a study of 40 intercollegiate female varsity athletes, Frost and Henderson (1991) found significant negative correlations (ps < .05) between two facets of perfectionistic concerns (i.e., concern over mistakes and doubts about actions) and trait self-confidence. In other words, as athletes' perfectionistic concerns increased, there was a corresponding tendency for athletes' levels of trait self-confidence in sport to decrease.

Stoeber et al. (2007) also examined links between perfectionistic orientations and trait self-confidence among four independent samples of competitive athletes (aged 15 – 43 years). Stoeber et al. found significant negative correlations between the negative reactions to imperfection (NRI) subscale of the MIPS (Stöber et al., 2004)—a key indicator of perfectionistic concerns in sport—and a trait-modified version of the self-confidence subscale of the Competitive State Anxiety Inventory-2 (CSAI-2: Martens, Burton, Vealey, Bump, & Smith, 1990). Interestingly, when bivariate correlations were considered, the striving for perfection (SP) subscale of the MIPS—a key indicator of perfectionistic strivings

in sport—was not correlated with trait self-confidence in any of the four samples; however, when the overlap with negative reactions to imperfection was controlled (using partial correlations), striving for perfection had significant positive correlations with trait self-confidence in three of the four samples.

In a more recent study of 642 male and female competitive athletes (aged 13 – 25 years), Martinent, Ferrand, Guillet, and Gauthier (2010) found a small significant positive correlation between the personal standards of the Sport-MPS-2 and pre-competitive state self-confidence (r = .20). In another recent study, Machida, Marie Ward, and Vealey (2012) employed path analysis to examine links between perfectionism and sources of self-confidence within a sample of competitive athletes (N = 206, M age = 19.62 years). A composite variable resembling perfectionistic strivings (comprised of personal standards and organization) was positively related to both controllable (i.e., internal) and uncontrollable (i.e., external) sources of confidence, whereas a composite variable resembling perfectionistic concerns (comprised of concern over mistakes, perceived parental pressure, perceived coach pressure, and doubts about actions) was positively related to external sources of confidence. On the basis of these results, Machida et al. speculated that practitioners (e.g., sport psychologists and coaches) may wish to consider nurturing "athletes' adaptive perfectionistic characteristics [e.g., being organized, having high personal standards] to encourage selection of controllable sources of their confidence" (p. 183).

Despite the number of studies that have investigated links between perfectionistic orientations and self-confidence in sport (also see Hall et al., 1998;

Koivula et al., 2002), no studies have attempted to determine if athletes' perfectionistic orientations are associated with (or influence) the extent to which athletes' self-confidence levels change following failure. Given that (a) unhealthy perfectionists view failure as an entirely unacceptable aspect of performance and that the self-worth and self-esteem of unhealthy perfectionists is largely contingent upon flawless performance (see Hamachek, 1978), and (b) healthy perfectionists accept failure as a natural (though unwanted) part of the performance process and are not driven by the fear of failure (Hamachek, 1978), it seems reasonable to speculate that athletes with unhealthy perfectionistic orientations may experience lower levels of self-confidence immediately following failure in competition than healthy perfectionists.

Optimism. Unlike self-confidence—which reflects cognitions about one's own abilities to perform or accomplish a task, or to succeed in a particular achievement setting—optimism reflects a more general expectancy or anticipation that good things will happen (Scheier & Carver, 1985, 1987). As noted by Seligman (1998), optimism "can make the difference between getting the job done well or poorly or [not] at all" (p. 255). A large body of research suggests that people who have positive expectations about the future (i.e., people who are optimistic) have more adaptive or functional responses to adversity in comparison to those individuals who have negative expectations about the possibility of good things happening in the future (Carver, Scheier, & Segerstrom, 2010).

Carver and Scheier (2002) argued that, "optimists are likely to assume that (. . .) adversity can be handled successfully, in one fashion or another" (p. 232).

Optimists generally demonstrate high levels of persistence towards goals (Carver, et al., 2010) because heightened optimism "fosters a positive mindset to undertake challenges with the confidence that one can succeed" (Sweeny, Carroll, & Shepperd, 2006, p. 302). As such, optimism in sport would be considered a highly adaptive/functional motivational state that can drive desirable behaviours towards the accomplishment of athletic goals in the face of adversity during competition (Zinsser et al., 2006).

To date, only one study has examined the link between perfectionism and optimism in sport (i.e., Brannan, Petrie, Greenleaf, Reel, & Carter, 2009). Brannan et al. examined relationships between a number of subscales from the Frost-MPS (Frost et al., 1990) and trait optimism (as measured by the Life Orientation Test-Revised [LOT-R]: Scheier, Carver, & Bridges, 1994) among a sample of 204 female intercollegiate athletes (*M* age = 20.16 years). The researchers found that facets of perfectionistic concerns (i.e., concern over mistakes, parental expectations, and parental criticism) were negatively correlated with trait optimism (*r*s= -.31, -.16, and -.42 respectively; all *p*s < .05), indicating that higher perfectionistic concerns were associated with a decreased tendency to be optimistic about future events.

Although optimism has traditionally been conceptualised and measured as a stable and enduring personality trait (e.g., Scheier & Carver, 1985, 1987; Scheier et al., 1994), a number of researchers have recognized that optimism can vary on a moment-to-moment basis (e.g., Carver et al., 2010; Kluemper et al., 2009; Luthans, Lebsack, & Lebsack, 2008; Shifren, 1996). As such, optimism can

be conceptualised and measured as a state-like construct. Indeed, Sweeny et al. (2006) posited that people are generally optimistic, but that optimism can be shifted downwards or 'shelved' by the anticipation of a negative or undesirable outcome or as a response to the possibility that something might not turn out as well as one had anticipated (e.g., losing a competitive event in sport).

To date, no research has examined changes in state optimism levels that occur as a result of failure within competition. Moreover, no research has attempted to determine if athletes with different perfectionistic orientations differ in their state optimism responses following failure during competition. Building upon the findings of Brannan et al. (2009), it seems reasonable to speculate that unhealthy perfectionistic athletes may respond with lower levels of state optimism following failure during competition than healthy perfectionists. Unhealthy perfectionists often have an "all or nothing" view of performance (i.e., even a small failure/mistake is viewed as a complete failure). Therefore, a personal mistake in competition may be interpreted as an indication that their desired level of (flawless) performance is no longer achievable (Tangney, 2002). The tendency of unhealthy perfectionists to engage in overly-critical self-evaluations (Frost et al., 1990) may also result in a drop in state optimism levels following momentary failure in competition because such individuals believe that a personal mistake (or momentary failure) during competition inhibits their (perceived) opportunity to accomplish their desired performance goals. In contrast, healthy perfectionistic athletes do not view their performances with the same "all or nothing" mentality, and they generally accept mistakes as a natural part of the performance process

(see Hamachek, 1978), which may make them less susceptible to experiencing drops in state optimism following performance errors in competition.

Situation Criticality

Situation criticality in sport is defined as the "perceived importance an athlete assigns to a competitive situation" (Vallance et al., 2006, p. 386). Different stages/phases within competitions often take on different levels of perceived importance for athletes as a function of both the time remaining and the score that exists in the competition at any given moment (see Dunn & Nielsen, 1996). Situations that occur early in competitions or late in competitions when score differentials are large are generally perceived as being less important or less critical compared to the same situations that might occur late in competition when the score is close (see Krane, Joyce, & Rafeld, 1994).

Previous research has shown that athletes' emotional reactions differ as a function of perceived situation criticality in sport. For example, Vallance et al. (2006) found that anger responses of male youth ice hockey players were more intense following a personal mistake (i.e., missed scoring opportunity) late in a tied game (i.e., high-criticality situation) compared to the same mistake happening early in a tied game (i.e., low-criticality situation). Similarly, Krane et al. (1994) found that female intercollegiate softball players reported higher levels of state anxiety when waiting to bat in the late innings of a close game (i.e., high-criticality situation) compared to when they were waiting to bat in the early innings of the same game (i.e., low-criticality situation).

Manipulating the degree of situation criticality that is perceived by athletes can enable researchers to examine differences in the intensity of athletes' emotional and cognitive responses to failure at different stages of competition. This study sought to expand upon the work of Vallance et al. (2006)—who only studied anger responses to mistakes in competition—by determining if athletes' emotional and cognitive responses following personal failure would differ as a function of situation criticality during competition. Obtaining evidence that variations in situation criticality within competition can influence the emotional and cognitive responses of athletes (following failure during competition) may assist sport psychologists and coaches in their efforts to educate athletes about the importance of recognizing periods of competition when athletes may be more emotionally and/or cognitively vulnerable to failure. This enhanced self-awareness can then be used by athletes to prepare for moments in competition when they may be required to direct more of their attention towards controlling their emotional and cognitive responses (see Bull, Shambrook, James, & Brooks, 2005) to maintain or enhance performance. Lukowich et al. (1986) aptly summarized the benefits of this awareness and control in the sport of curling when they stated:

> The person [i.e., curling competitor] who is able to control his [or her] mind in a confident manner is the one who can assess the situation clearly, block out the negative thoughts, and replace them with positive thoughts that bring positive action and far better chances of success. (p. 64)

Purpose and Hypotheses

The purpose of this study was to determine if athletes with different profiles of perfectionism differ in terms of their emotional (i.e., anger and dejection) and cognitive (i.e., self-confidence and optimism) responses to failure (i.e., personal mistakes) in low- versus high-criticality situations in the sport of curling (cf. Vallance et al., 2006). It was hypothesised that athletes who exhibited a healthy/adaptive profile of perfectionism (i.e., high perfectionistic strivings combined with low perfectionistic concerns) would experience lower levels of anger and dejection and higher levels of self-confidence and optimism following failure during competition in comparison to athletes who exhibited an unhealthy/maladaptive profile of perfectionism (i.e., high perfectionistic strivings combined with high perfectionistic concerns). It was also hypothesised that athletes, irrespective of their perfectionistic tendencies, would experience lower levels of anger and dejection and higher levels of self-confidence and optimism following failure in a low-criticality situation in comparison to a high-criticality situation (i.e., situation main effect).

Chapter 2

Method

Participants

The initial sample contained 356 athletes (206 male, 150 female) who competed in the sport of curling. All participants competed in at least one Canadian Team Ranking System (CTRS) registered event in Canada.[2] Thirteen participants were removed because they provided large portions of missing data (to be discussed in the Results section), therefore, the final sample that was used for data analytic purposes contained 343 participants (199 males, 144 females) who ranged in age from 18 to 54 years (*M* age = 30.78 years, *SD* = 7.93; *M* competitive curling experience = 17.03 years, *SD* = 7.34). On average, participants indicated that they practiced 2.99 times per week during their competitive season (*SD* = 1.69).

Of the four throwing/playing positions that athletes can fulfill on a curling team, 84 participants threw lead (i.e., throw the first two shots), 88 threw second (i.e., throw the second two shots), 83 threw third (i.e., throw the third two shots), and 86 threw fourth (i.e., throw the last two shots of an end); two participants did not report their throwing position. Where positional responsibilities were concerned, 173 played front-end (i.e., primary brushers), 79 played vice-skip (i.e.,

[2] The CTRS is a system that uses points to rank both men's and women's curling teams in Canada. The points are earned in selected curling events held in Canada throughout each season and are used as part of the Olympic qualification process (see Canadian Curling Association, 2013) for detailed explanation). The events from which participants were recruited in this study were cash tournaments that required entry fees and provided prize money to successful (i.e., "playoff") teams. The level of competition at these events is amongst the highest in Canada (second only to "Grand Slam" events and the National Championships).

brusher and secondary line caller), 90 played skip (i.e., primary line caller); one participant did not indicate his/her positional responsibility.[3]

Measures

Participants completed four self-report instruments to measure demographic characteristics (see Appendix A), perfectionism in sport (see Appendix B), and reactions to mistakes in competition (in low- and high-criticality situations; see Appendix C).

Perfectionism. Perfectionism was measured using an abbreviated version of the Sport-Multidimensional Perfectionism Scale-2 (Sport-MPS-2; Gotwals & Dunn, 2009). The Sport-MPS-2 is an updated version of the Sport-MPS (Dunn et al., 2002) which was modelled around the subscales contained within Frost et al.'s (1990) Multidimensional Perfectionism Scale (Frost-MPS). The Sport-MPS-2 contains 42 items that measure six facets of perfectionism in sport: *Personal Standards* (PS: 7 items, e.g., "I have extremely high goals for myself in sport"), *Organization* (ORG: 6 items, e.g., "I have and follow a pre-competitive routine"), *Perceived Parental Pressure* (PPP: 9 items, e.g., "My parents expect excellence from me in my sport"), *Perceived Coach Pressure* (PCP: 6 items, e.g., "I feel like I can never quite live up to my coach's standards"), *Concern Over Mistakes* (COM: 8 items, e.g., "I should be upset if I make a mistake in competition"), and

[3] In curling, the goal is to "throw" (slide) a granite rock down a "sheet" of ice and score more points than the other team over the duration of 8-10 "ends" (similar to innings in baseball). During a given shot, one player is throwing the rock, two are "sweeping" the rock, and another is providing a target and "calling line" for the shot.

Doubts About Actions (DAA: 6 items, e.g., "I usually feel uncertain as to whether or not my training effectively prepares me for competition").

Respondents are asked to rate the degree to which items reflect their views and experiences in sport using a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*). Higher composite scores reflect higher levels of perfectionism across each subscale. Extensive validity and reliability evidence supporting the use of Sport-MPS-2 subscales as measures of perfectionism in sport has been documented in the literature (see Dunn et al. 2002; Dunn, Causgrove Dunn, et al., 2006; Gotwals & Dunn, 2009; Gotwals, Dunn, Causgrove Dunn, & Gamache, 2010).

One set of modifications was made to the version of the Sport-MPS-2 that was used in this study. Specifically, five (of the original nine) items that measure PPP were removed. This decision was taken solely for the purpose of reducing the amount of time that respondents would require to complete the test package. Four studies (with six independent samples) that had previously assessed the factor structure of the PPP subscale were examined to select the four PPP items that were retained (i.e., Dunn et al., 2002; Dunn, Causgrove Dunn, et al., 2006; Gotwals & Dunn, 2009; Gotwals et al., 2010). The retained items (i.e., items 7, 11, 15, and 29 from the original Sport-MPS-2) consistently had moderate to high factor loadings on the PPP factor (ranging from .45 to .75) across the six factor analytic solutions that were examined. The mean pattern coefficients for these four PPP items—across the six samples reported in the four studies—were .66, .64, .64, and .64 respectively. All four items demonstrated excellent simple structure (see Thurstone, 1947) across all six factor-analytic solutions with the

sole exception of Item 29 ("My parents expect excellence from me in my sport."), which had a small cross-loading on a second factor in one of the six solutions (see Dunn et al., 2006).[4] These four items were therefore considered to be good marker items of the PPP construct (see Gorsuch, 1983). Consequently, the version of the Sport-MPS-2 that was employed in this study contained 37 items that measured six facets of perfectionism in sport.

Reactions to mistakes. The Sport Emotion and Cognition Questionnaire (SECQ) is a newly-constructed instrument that was designed to measure respondents' levels of anger, dejection, self-confidence, and optimism following a personal mistake in competition. All of the SECQ items were selected from subscales contained within existing psychological inventories. Participants responded to items using a 5-point scale ranging from 1 (*not at all*) to 5 (*very much so*), such that higher composite subscale scores reflected higher anger, dejection, self-confidence, and optimism following a mistake in competition.

Anger and dejection were measured using all items contained within the *Anger* (4 items) and *Dejection* (5 items) subscales of the Sport Emotion Questionnaire (SEQ: Jones et al., 2005). Items in the SEQ are written as single-word descriptors (e.g., furious, dejected). A detailed overview of the factorial-, convergent-, and divergent-validity evidence supporting the use of the selected SEQ subscales as measures of anger and dejection in sport is provided by Jones et al. The internal consistency of the anger and dejection subscales has been

[4] Item 29 had a pattern coefficient of .45 on the PPP factor and a cross-loading of .39 onto the PS factor in a factor analytic solution for a sample of 229 male youth ice hockey players (see Dunn, Causgrove Dunn, et al., 2006).

acceptable (αs $\geq$ .76) in a number of studies that have previously used the SEQ to measure emotional reactions in sport (e.g., Allen, Jones, & Sheffield, 2009; Dewar & Kavussanu, 2011; Jones et al., 2005).

Self-confidence was measured by all five items contained within the *Self-Confidence* (SC) subscale of the Revised Competitive State Anxiety Iventory-2 (CSAI-2R: Cox, Martens, & Russell, 2003; Martens et al., 1990). Exemplar items include, "I feel self-confident" and "I feel confident of coming through under pressure." The SC subscale of the CSAI-2R has shown acceptable levels of internal consistency (αs $\geq$ .76) among samples of both elite and non-elite athletes (see Cox et al., 2003; Martinent et al., 2010). One of the original CSAI-2R self-confidence items was deleted in this study (i.e., "I'm confident because I mentally picture myself reaching my goal") and was replaced with a newly constructed item (i.e., "I feel less confident about my ability to perform" [reverse scored]). This change was implemented because the original item contains an explanation of why self-confidence might be influenced, whereas all the other SC items provide a statement about the respondent's level of self-confidence.

Optimism was measured by four items that were taken from a state-modified version of the Life Orientation Test-Revised (LOT-R: Scheier et al., 1994).[5] The LOT-R and its predecessor (i.e., the Life Orientation Test [LOT]:

[5] The LOT-R actually contains six items that measure optimism. However, due to an item-construction error that was committed by the investigator during the scale construction process of this thesis, slightly different versions of two items from the LOT-R (items 7 and 9) were inadvertently created in each version of the SECQ (items 12 and 16). This error meant that participants responded to slightly different versions of items 12 and 16 in the low- and high-criticality versions of the SECQ. This error was not discovered until all data had been collected. Therefore, only four optimism items had data that could be used in subsequent data analyses.

Scheier & Carver, 1985) were originally designed to measure trait optimism. However, in line with previous research (see Kluemper et al., 2009; Luthans et al., 2008; Shifren, 1996; Shifren & Hooker, 1995) items were reworded such that they provided measures of state optimism in the context of competitive sport (e.g., "I would expect the best for the rest of this game"). Acceptable levels of internal consistency ($\alpha s \geq .70$) have been reported in a number of studies that have used state-modified versions of the LOT and LOT-R (e.g., Kluemper et al., 2009; Luthans et al., 2008; Shifren, 1996; Shifren & Hooker, 1995). A detailed overview of the validity evidence surrounding the use of the LOT-R as a measure of optimism is provided by Scheier et al. (1994).

In total, the SECQ contained 18 scored-items that were intended to measure anger (n = 4), dejection (n = 5), self-confidence (n = 5), and optimism (n = 4) following mistakes in competition. Two versions of the SECQ were constructed. One version asked respondents to consider how they would likely feel or react immediately following a personal error in competition that occurred early in a close game (i.e., low-criticality situation). The other version of the SECQ asked respondents how they would likely feel or react immediately following the same error late in a close game (i.e., high-criticality situation). Each error resulted in the opposing team "stealing" one point and the opposing team taking a two-point lead in the game.[6]

[6] In an end of curling, the typical goal of the team with last-shot advantage ("hammer") is to score one or more points. It is generally considered to be a substantial failure for the team with the last-shot advantage if the team without the last-shot advantage "steals" one point or more because of a miss by the team with the last-shot advantage (especially in a close game).

All items were preceded with the phrase "I would feel. . ." or "I would expect. . ." (e.g., "I would feel angry," "I would feel dejected," "I would feel self-confident," "I would expect the best for the rest of this game"). This "self-estimation" approach to assessing emotional reactions to mistakes in low- and high-criticality situations has been successfully employed in previous research with athletes (see Vallance et al., 2006) and is designed to overcome the pragmatic difficulties associated with attempting to assess athletes' emotional and cognitive reactions to personal mistakes during competition.

Procedure

Phase 1: SECQ scenario development. The game situation that was included in each version of the SECQ was developed by the researcher (Mick Lizmore)—a member of a Canadian Interuniversity Sport (CIS) national-championship winning varsity curling team—in conjunction with two curling experts; namely, the Director of High Performance for the Canadian Curling Association and the Head Coach at the Canadian National Training Centre. The same scenario (i.e., performance error) was developed for inclusion in each version of the SECQ, with the only difference reflecting the stage of the game during which the error occurred (see Vallance et al., 2006).

Despite the high levels of curling expertise that the scenario-developers possessed, it was still deemed necessary to have an independent assessment of the relevance of the scenarios (i.e., low- and high-criticality game situations) prior to their inclusion in the SECQ (see Dunn, Bouffard, & Rogers, 1999; Messick, 1989). In other words, from a construct-validation perspective, it was important to

establish that the game scenarios were deemed to be both relevant and understandable to CTRS-level competitors and that these competitors would likely recognize (or perceive) differences in the situation criticality of the two scenarios (i.e., when the same mistake occurs in the second- or eighth-end of a close 10-end game).

Five male and four female judges were asked to evaluate the scenarios. These judges were considered to have expert knowledge because they had either coached and/or competed in curling at the international level and were very familiar with the CTRS system. Each judge had 10 or more years of high-level playing experience and six or more years of coaching experience.

Judges were sent a package by e-mail that contained an information letter (see Appendix D), a brief demographic questionnaire (to obtain information about curling qualifications/experiences; see Appendix E), and an expert assessment form that contained descriptions of the low- and high-criticality scenarios and rating scales (see Appendix F). The scenarios were described in words and a visual representation of each scenario was also provided to illustrate (a) the score, the position of the rocks, and the shot that was being attempted prior to the error, and (b) the score and position of the rocks following the attempted shot after the error was committed. The judges were asked to rate (a) the degree of situation-criticality they felt existed in each scenario (1 = *low criticality*, 7 = *high criticality*), (b) the degree to which each scenario was seen as being relevant or realistic for CTRS competitors (1 = *not at all relevant/realistic*, 7 = *highly relevant/realistic)*, and (c) the degree to which the visual/written descriptions of

the scenarios were clear and interpretable (1 = *extremely unclear* [*difficult to understand*], 7 = *extremely clear* [*easy to understand*]). Judges were also encouraged to provide written feedback about any aspect of the scenarios regarding situation criticality, relevance, and clarity.

Phase 2: Athlete data collection. Once the content-relevance of the SECQ scenarios had been established (see Results section), permission to conduct the study was obtained from the University of Alberta Research Ethics Board. Upon receipt of ethics approval, the organizers of selected CTRS events were contacted by letter (see Appendix G) to seek their permission to approach competitors at the events as potential participants. Following the approval of event organizers, the investigator (Mick Lizmore) travelled to three CTRS events (one in Ontario, one in Alberta, and one in British Columbia) where he directly approached competitors at the event sites (before or after competition at the respective rinks). Athletes were given an information letter (see Appendix H) and if they agreed to participate were then provided with a standardized set of instructions and test package.

The unique nature of the curling-rink environment during competitions necessitated that the participants complete the inventories in viewing areas, dressing rooms, or food-and-beverage service areas at the rinks. At their request, a small number of participants completed the test package in their hotels—these individuals subsequently returned the test packages to the researcher later in the event at the rink.

Participants were reminded both verbally and in writing that (a) their participation was voluntary, (b) their participation was not a condition of their involvement at the event or future events, (c) their participation did not affect their standing with the Canadian Curling Association, (d) their individual information would remain confidential, and (e) their individual identity would never be disclosed. In order to minimize any possible presentation order effects, the presentation order of the low- and high-criticality versions of the SECQ was counterbalanced (i.e., half of the sample responded to the high-criticality version of SECQ first, and half of the sample responded to the low-criticality version of the SECQ first). The demographic questionnaire was always administered first, and the Sport-MPS-2 was always administered last. The questionnaire package took between 10 and 20 minutes to complete.

Chapter 3

Results

Phase 1: SECQ Scenario Validation

The panel of expert judges rated the game situation that was to be included in each version of the SECQ as being highly relevant (M = 6.56, SD = .51) and clear (M = 6.50, SD =.71)—where a score of 7 indicated the highest levels of relevance and clarity on the respective rating scales. Results of a dependent *t*-test indicated that the judges viewed the mistake that occurred early in a close game to be less critical (M = 2.44, SD = .88) than the mistake late in a close game (M = 5.78, SD = 1.20), $t(8) = 8.17$, $p < .001$. The effect size for this difference in situation criticality ratings—using Cohen's (1977) effect size index for dependent means—was large ($d_z' = 2.76$).

Phase 2: Athlete Data Collection

As noted in the Participants section, 13 athletes were removed because they provided large amounts of missing data. Ten of these athletes missed an entire page of the test package and three athletes failed to respond to perceived parental pressure items. Of the remaining 343 participants, 182 (52.6%) indicated on the demographic questionnaire that they did not work with a coach.[7] These athletes did not respond to perceived coach pressure items in the Sport-MPS-2. Consequently, the PCP subscale was removed from all remaining data analyses.

[7] It is very common for CTRS-level adult curling teams in Canada to train and compete without a coach.

With the removal of 13 participants and the exclusion of all PCP items, there were only 39 missing data points among a possible 25,039 responses. To replace missing data, an intra-individual mean item score was calculated from the scores that were provided by the respondent on the remaining items of the intended subscale (see Dunn, Causgrove Dunn, & McDonald, 2012; Graham, Cumsille, & Elek-Fisk, 2003).

Preliminary Psychometric Analysis

Perfectionism. Given that (a) the current version of the Sport-MPS-2 contained only four of the original nine items that were designed to measure PPP, and (b) all PCP items had been removed, an assessment of the factor structure underlying the remaining 31 items was deemed appropriate. A Principal Axes factor analysis was conducted on the Sport-MPS-2 data. To determine the number of factors that best represented the latent dimensionality of the data, a combination of results from Cattell's (1978) scree test and a parallel analysis (Lautenschlager, 1989) was assessed (see Velicer, Eaton, & Fava, 2000).

Examination of the scree plot (see Figure 3) indicated the retention of four or five factors, whereas the parallel analysis results (see Table 1) indicated the retention of five factors. Consequently, both four- and five-factor solutions were examined. The resultant four- and five-factor solutions were subjected to oblique transformations (using Direct Oblimin) given that previous research has indicated that many of the Sport-MPS-2 subscales/factors are correlated (see Dunn et al., 2002; Dunn, Gotwals, et al., 2006; Gotwals & Dunn, 2009; Gotwals et al., 2010). The oblique five-factor solution (see Table 2) was retained over the four-factor

solution (see Appendix I) because five items in the four-factor solution failed to demonstrate simple structure (Thurstone, 1947) whereas only one item (i.e., Item 1) in the five-factor solution failed to demonstrate simple structure (where simple structure was defined as any item having a pattern coefficient ≥ |.30| on only one factor). The five factors accounted for 54.01% of the variance in the Sport-MPS-2 data prior to rotation.

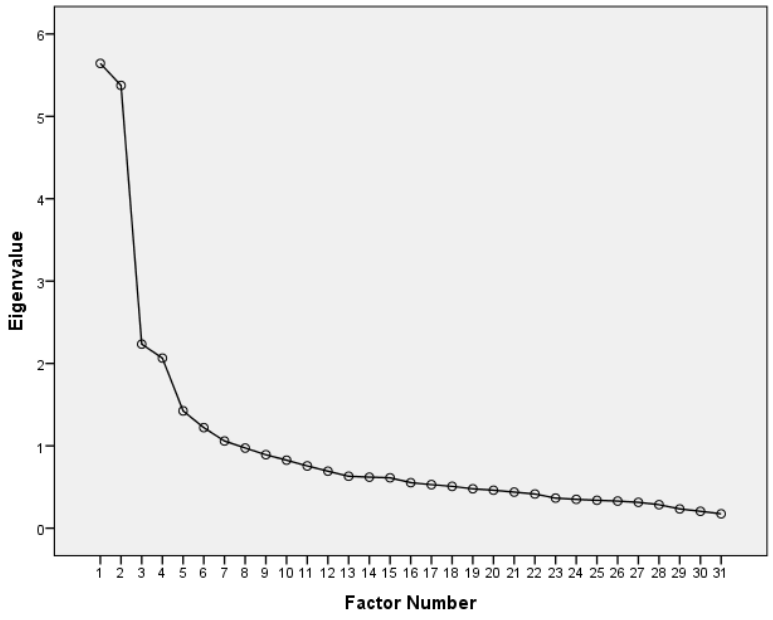

Figure 3. Eigenvalue scree plot for Sport-MPS-2 data.

Table 1

Eigenvalues from Exploratory Factor Analysis (EFA) of Sport-MPS-2 Data and Corresponding Eigenvalues from Parallel Analysis for the First Six Factors

	Eigenvalues	
Factor	Parallel analysis	EFA for Sport-MPS-2
1.	1.61	**5.64**
2.	1.52	**5.38**
3.	1.46	**2.24**
4.	1.41	**2.07**
5.	1.36	**1.43**
6.	1.32	1.22

Note. Eigenvalues derived from the EFA that exceed the corresponding parallel analysis criteria are in boldface.

Table 2

Pattern Coefficients from Principal Axes Factor Analysis of Sport-MPS-2 Data

Item			Factor				
A [a]	B [b]	Intended subscale	F1	F2	F3	F4	F5
23.	27.	ORG	**.91**	.02	-.03	.01	-.11
8.	9.	ORG	**.84**	.07	.00	-.13	-.08
4.	5.	ORG	**.77**	.04	-.08	-.09	-.10
15.	18.	ORG	**.76**	.05	-.03	-.09	.02
30.	34.	ORG	**.60**	-.07	.02	.06	.17
35.	41.	ORG	**.54**	-.08	.11	.10	.21
9.	10.	COM	.04	**.69**	.07	.07	-.02
34.	39.	COM	-.03	**.65**	.18	.15	-.10
27.	32.	COM	-.03	**.64**	.12	.13	-.04
2.	2.	COM	.06	**.61**	-.01	-.06	-.06
37.	42.	COM	-.01	**.54**	-.07	.02	.10
14.	16.	COM	.00	**.53**	.22	.10	-.03
24.	28.	COM	.00	**.51**	-.02	.03	.10
21.	24.	COM	-.08	**.47**	-.02	-.02	.14
17.	7.	PPP	-.09	.05	**.76**	.02	-.07
29.	11.	PPP	.04	.13	**.73**	-.02	.11
36.	15.	PPP	-.03	.03	**.71**	.05	-.02
6.	29.	PPP	.08	.01	**.54**	-.17	.07
12.	14.	DAA	.02	.03	.03	**.63**	-.08
16.	20.	DAA	-.06	.07	-.05	**.60**	-.04
10.	12.	DAA	-.14	.08	.00	**.59**	.02
26.	31.	DAA	.01	-.10	.01	**.58**	-.06
33.	37.	DAA	-.01	.09	-.01	**.55**	.16
3.	3.	DAA	-.05	.13	-.09	**.53**	.00
32.	36.	PS	.02	-.01	-.03	.01	**.76**
18.	21.	PS	.10	-.08	.07	-.02	**.73**
20.	23.	PS	-.02	-.01	.12	.10	**.60**
28.	33.	PS	.16	.10	.01	-.14	**.59**
7.	8.	PS	-.01	.29	.06	-.15	**.42**
14.	17.	PS	-.05	.14	-.02	-.28	**.39**
1.	1.	PS	.06	.12	-.12	.00	.29

Note. Factor loadings ≥ |.30| are in boldface. Subscale abbreviations: PS = personal standards; COM = concern over mistakes; PPP = perceived parental pressure; DAA = doubts about actions; ORG = organization. Interfactor correlations ranged from -.37 ($r_{F1.F4}$) to .39 ($r_{F2.F5}$).

[a] Column A contains the item numbers that correspond to the ordered location of items in the current version of the Sport-MPS-2.

[b] Column B contains the item numbers that correspond to the ordered location of items in the original Sport-MPS-2 (see Gotwals & Dunn, 2009).

As seen in Table 2, with the exception of Item 1 ("If I do not set the highest standards for myself in my sport, I am likely to end up a second-rate player."), all items had a meaningful loading (i.e., pattern coefficient ≥ |.30|) on only one factor, and all items loaded on the factor that they were intended to measure: F1 = Organization (*n* = 6); F2 = Concern Over Mistakes (*n* = 8); F3 = Perceived Parental Pressure (*n* = 4); F4 = Doubts About Actions (*n* = 6), and F5 = Personal Standards (*n* = 6). Subsequent analyses of the internal consistency (Cronbach's α) of each subscale indicated that all subscales had adequate levels of internal consistency ranging from .78 (doubts about actions) to .88 (organization). However, the assessment of subscale internal consistency revealed further problems with Item 1. Specifically, Cronbach's α for the personal standards subscale increased from .79 to .81 when Item 1 was removed. Item 1 was subsequently dropped from the personal standards subscale for all remaining data analyses given the apparent psychometric problems associated with this item.[8] With the removal of Item 1, the factor analytic and internal consistency results indicate that all items/subscales within the Sport-MPS-2 were functioning in accordance with theoretical expectations.

Reactions to mistakes. The factor structures of the low- and high-criticality versions of the 18-item SECQ were assessed with a Principal Axes factor analysis. To determine the number of factors that best represented the latent dimensionality of the SECQ, a combination of results from a scree-test (Cattell,

[8] The factor analytic solution (five factors) for the Sport-MPS-2 with Item 1 removed is contained in Appendix J

1978) and parallel analysis (Lautenschalger, 1989) was examined. The scree-test (see Figure 4) and parallel analysis results (see Table 3) for the low-criticality version of the SECQ clearly indicated the retention of two factors. Similarly, the scree test (see Figure 5) and parallel analysis results (see Table 3) for the high-criticality version of the SECQ also indicated the retention of two factors. Two factors were therefore chosen to reflect the latent dimensionality of the low- and high-criticality versions of the SECQ. Each solution was submitted to an oblique (Direct Oblimin) rotation because the variables/constructs under investigation were expected to be correlated.

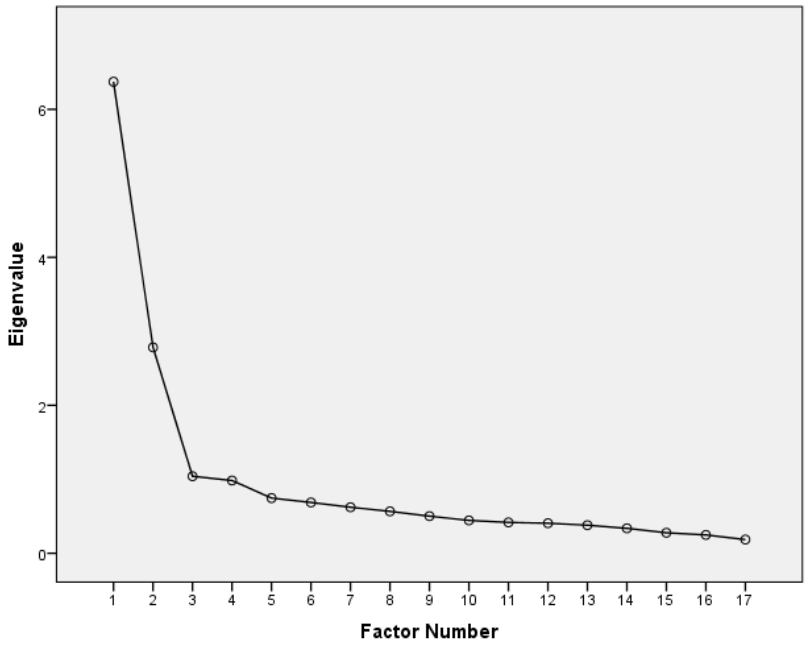

Figure 4. Eigenvalue scree plot for low-criticality SECQ data.

Table 3

Eigenvalues from Exploratory Factor Analysis (EFA) of SECQ Data for Low-Criticality and High-Criticality Scenarios and Corresponding Eigenvalues from Parallel Analysis for the First Six Factors

	Eigenvalues		
Factor	Parallel analysis	EFA for low-criticality	EFA for high-criticality
1.	1.42	**6.37**	**7.13**
2.	1.34	**2.78**	**2.52**
3.	1.27	1.04	1.21
4.	1.22	.98	.86
5.	1.17	.75	.70
6.	1.13	.69	.64

Note. Eigenvalues derived from each EFA that exceed the corresponding parallel analysis criteria are in boldface.

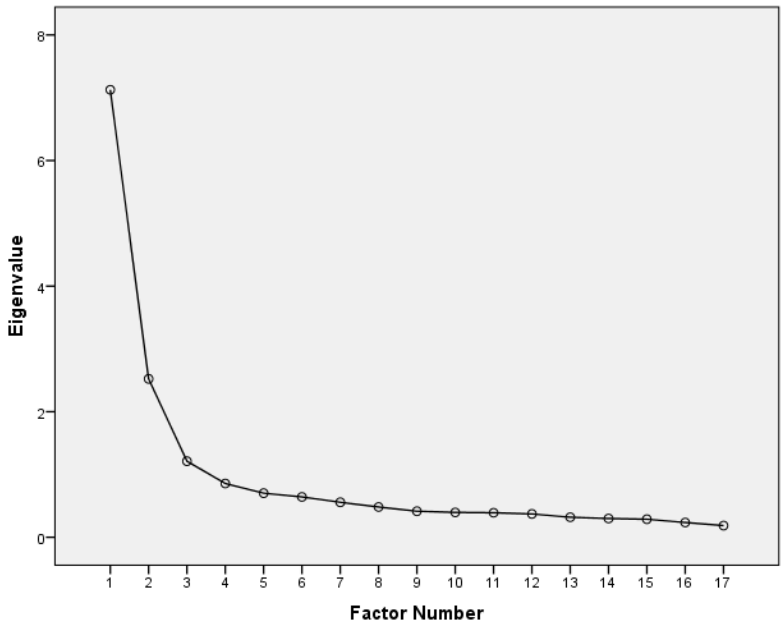

Figure 5. Eigenvalue scree plot for high-criticality SECQ data.

As seen in Tables 4 and 5, excellent simple structure was obtained across 17 of the 18 items for each version of the SECQ. One item (i.e., Item 5: "I would feel that if something can go wrong for the remainder of this game, it will") was problematic in both solutions. Item 5 was originally intended to measure optimism. However, as seen in the low-criticality solution (Table 4), Item 5 failed to have a meaningful loading ($\geq |.30|$) on the factor upon which the other optimism items loaded. In the high-criticality solution (Table 5), Item 5 had meaningful loadings on both factors and therefore failed to exhibit simple structure. Item 5 was subsequently removed from both the low- and high-criticality SECQ data sets for all remaining statistical analyses.[9]

All SECQ items that were originally intended to measure anger (n = 4) and dejection (n = 5) loaded on Factor 1 (see Tables 4 and 5). This factor clearly represents negative emotional reactions to mistakes and was labelled Anger/Dejection (Ang/Dej). Excluding Item 5, all items that were originally intended to measure self-confidence (n = 5) and optimism (n = 3) loaded on Factor 2. This factor clearly contains positive future-oriented cognitions that reflect athletes' beliefs that (a) they have the ability to personally succeed, and (b) a favourable outcome in competition is still possible. Factor 2 was therefore labelled Self-Confidence/Optimism (Con/Opt). Prior to rotation, the two factors accounted for 51.95% **(**54.86% with Item 5 removed**)** of the total variance for low-criticality data and 55.47% **(**56.77% with Item 5 removed**)** of the variance for high-criticality data.

[9] Factor analytic solutions for low- and high-criticality SECQ data with Item 5 removed are respectively contained in Appendix K and L.

Table 4

Pattern Coefficients from Principal Axes Factor Analysis of SECQ Low-Criticality Data

Item	Intended subscale	Full item description	Pattern coefficients	
			Factor 1	Factor 2
17.	Ang.	I would feel angry.	**.90**	.13
4.	Dej.	I would feel upset.	**.80**	-.02
6.	Ang.	I would feel furious.	**.79**	.18
13.	Ang.	I would feel annoyed.	**.78**	-.04
2.	Ang.	I would feel irritated.	**.74**	.03
15.	Dej.	I would feel disappointed.	**.73**	.00
11.	Dej.	I would feel unhappy.	**.68**	-.14
19.	Dej.	I would feel dejected.	**.58**	-.11
8.	Dej.	I would feel sad.	**.38**	-.16
5.	Opt.	I would feel that if something can go wrong for the remainder of this game, it will. (R)	**-.33**	.17
18.	Con.	I would feel confident of coming through under pressure.	.10	**.86**
10.	Con.	I would feel confident about performing well.	.05	**.79**
7.	Con.	I would feel confident I can meet the challenge.	.09	**.76**
20.	Opt.	I would expect the best for the rest of the game.	-.00	**.70**
9.	Opt.	I would feel optimistic about the future of this game.	-.10	**.60**
3.	Con.	I would feel self-confident.	-.04	**.56**
1.	Opt.	I would expect more good things than bad things to happen for the rest of this game.	-.07	**.40**
14.	Con.	I would feel less confident about my ability to perform. (R)	-.15	**.38**

Note. Factor loadings ≥ |.30| are in boldface. Interfactor correlation = -.42. Intended-subscale abbreviations: Ang. = anger; Dej. = dejection; Con. = self-confidence; Opt. = optimism.

Table 5

Pattern Coefficients from Principal Axes Factor Analysis of SECQ High-Criticality Data

Item	Intended subscale	Full item description	Pattern coefficients	
			Factor 1	Factor 2
17.	Ang.	I would feel angry.	**.89**	.07
13.	Ang.	I would feel annoyed.	**.84**	.05
6.	Ang.	I would feel furious.	**.79**	.07
4.	Dej.	I would feel upset.	**.79**	.04
11.	Dej.	I would feel unhappy.	**.74**	-.04
15.	Dej.	I would feel disappointed.	**.72**	-.05
2.	Ang.	I would feel irritated.	**.71**	.03
19.	Dej.	I would feel dejected.	**.67**	-.15
8.	Dej.	I would feel sad.	**.42**	-.18
5.	Opt.	I would feel that if something can go wrong for the remainder of this game, it will. (R)	**-.34**	**.33**
10.	Con.	I would feel confident about performing well.	.08	**.83**
18.	Con.	I would feel confident about coming through under pressure.	.11	**.82**
7.	Con.	I would feel confident I can meet the challenge.	-.04	**.78**
3.	Con.	I would feel self-confident.	.02	**.59**
14.	Con.	I would feel less confident about my ability to perform. (R)	.07	**.59**
20.	Opt.	I would expect the best for the rest of this game.	-.22	**.55**
9.	Opt.	I would feel optimistic about the future of this game.	-.25	**.52**
1.	Opt.	I would expect more good things than bad things to happen for the rest of the game.	-.17	**.43**

Note. Factor loadings ≥ |.30| are in boldface. Interfactor correlation = -.47.

Intended-subscale abbreviations: Ang. = anger; Dej. = dejection; Con. = self-confidence; Opt. = optimism.

The internal consistencies (Cronbach's α) of all low-criticality (lc) and high-criticality (hc) SECQ subscales were acceptable: Ang/Dej-lc (α = .91), Con/Opt-lc (α = .83), Ang/Dej-hc (α = .92), and Con/Opt-hc (α = .86).

Descriptive Statistics

The means, standard deviations, internal consistencies, and bivariate correlations for all Sport-MPS-2 and SECQ subscales are shown in Table 6. On average, participants had moderate to high personal standards (*M* = 3.74) and organization (*M* = 3.60), and low concern over mistakes (*M* = 2.49), doubts about actions (*M* = 2.22) and perceived parental pressure (*M* = 2.09). On average, participants tended to report relatively low levels of Ang/Dej in both low- (*M* = 2.10) and high-criticality situations (*M* = 2.59), whereas participants tended to report moderate to high levels of Con/Opt in both low- (*M* = 3.97) and high-criticality situations (*M* = 3.51).

The correlations among Sport-MPS-2 subscales (see Table 6) ranged from -.37 ($r_{DAA.ORG}$) to .35 ($r_{PS.COM}$). In both low- and high-criticality scenarios, Ang/Dej was negatively correlated with Con/Opt (*p*s < .001), indicating that heightened Ang/Dej generally corresponds with decreased Con/Opt, and vice versa. Personal standards had small (but significant) positive correlations with Ang/Dej in both low- and high-criticality situations, and also with Con/Opt in the low-criticality situation. Concern over mistakes had strong positive correlations with Ang/Dej and moderate correlations with Con/Opt in both low- and high-criticality situations. Doubts about actions showed similar patterns of positive correlations with Ang/Dej and negative correlations with Con/Opt in both low-

and high-criticality situations (although the magnitude of these relationships appears to be smaller than the same correlations for concern over mistakes). Organization had weak negative correlations with Ang/Dej in low- and high-criticality situations, and weak positive correlations with Con/Opt in both situations. Perceived parental pressure was neither correlated with Ang/Dej nor Con/Opt in the low- and high-criticality situations. Overall, the correlation results indicate that, with the exception of PPP, the facets of perfectionism assessed by the Sport-MPS-2 in this study appear to be related to the emotional and cognitive responses of competitive curling athletes following mistakes in competition.

Table 6

Item Means, Standard Deviations, Internal Consistencies (α), and Bivariate Correlations (r) for Sport-MPS-2 and SECQ Subscales for Total Sample (N = 343)

	Sport-MPS-2					SECQ			
	PS	COM	PPP	DAA	ORG	Ang/Dej-lc	Con/Opt-lc	Ang/Dej-hc	Con/Opt-hc
	M = 3.74	*M* = 2.49	*M* = 2.09	*M* = 2.22	*M* = 3.60	*M* = 2.10	*M* = 3.97	*M* = 2.59	*M* = 3.51
Subscale	*SD* = .69	*SD* = .72	*SD* = .78	*SD* = .66	*SD* = .76	*SD* = .75	*SD* = .62	*SD* = .86	*SD* = .68
PS	α = .81	.35***	.21***	-.20***	.31***	.15**	.12*	.14**	.10
COM		α = .83	.36***	.28***	-.07	.46***	-.26***	.48***	-.28***
PPP			α = .79	-.01	.03	.06	-.03	.08	.00
DAA				α = .78	-.37***	.20***	-.19**	.16**	-.19***
ORG					α = .88	-.17**	.16**	-.13*	.23***
Ang/Dej-lc						α = .91	-.40***	.82***	-.39***
Con/Opt-lc							α = .83	-.33***	.76***
Ang/Dej-hc								α = .92	-.48***
Con/Opt-hc									α = .86

Note. Subscale abbreviations: PS = personal standards; COM = concern over mistakes; PPP = perceived parental pressure; DAA = doubts about actions; ORG = organization; Ang/Dej-lc = anger and dejection low-criticality; Con/Opt-lc = self-confidence and optimism low-criticality; Ang/Dej-hc = anger and dejection high-criticality; Con/Opt-hc = self-confidence and optimism high-criticality.

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

Perfectionism as a Function of Gender, Throwing Position, and Positional Responsibility

Prior to assessing perfectionism profiles, differences in athletes' perfectionism scores across gender, throwing position, and positional responsibility were assessed. This was deemed necessary to ensure that these variables would not inadvertently influence the formation of perfectionism groups/profiles that were to be created later in the study. A series of MANOVAs was therefore conducted with the five Sport-MPS-2 subscales entered as the dependent variables. Gender (male, female), throwing position (lead, second, third, fourth), and positional responsibility (front end, vice-skip, skip) were entered separately as the independent variables in each of the MANOVAs.

A significant multivariate test statistic was obtained for gender: Wilks' Λ = .842, F (5, 337) = 12.62, $p < .001$, partial $\eta^2 = .16$. Follow-up univariate F-tests revealed significant gender differences for doubts about actions and organization. Female athletes had lower doubts about actions (M = 2.02, SD = 0.56) than male athletes (M = 2.36, SD = 0.70): F (1, 341) = 23.23, $p < .001$, partial $\eta^2 = .06$. In contrast, female athletes had higher organization (M = 3.87, SD = 0.69) than male athletes (M = 3.40, SD = 0.75): F (1, 341) = 34.04, $p < .001$, partial $\eta^2 = .09$. No gender differences were found for personal standards, concern over mistakes, and perceived parental pressure (all ps > .05).

The multivariate test for throwing position was not significant: Wilks' Λ = .951, F (15, 919.67) = 1.12, p = .34, partial $\eta^2 = .02$. Similarly, the multivariate test for positional responsibility was not significant: Wilks' Λ = .949, F (10, 670)

= 1.78, p = .06, partial η^2 = .03. In other words, Sport-MPS-2 subscale scores did not differ as a function of playing position and playing responsibility.

Perfectionism Profiles

The overarching goal of this study was to determine if athletes with different profiles of perfectionism react with different levels of emotional and cognitive responses following personal mistakes in low- and high-criticality situations in curling. It was therefore necessary to create groups (i.e., clusters) of athletes who possessed similar (or different) profiles of perfectionism in sport. These profiles are based upon the combination of scores across all subscales contained within the Sport-MPS-2 (see Gotwals, 2011; Gucciardi et al., 2012; Sapieja et al., 2011; Vallance et al., 2006).

Given that two models of perfectionism have been proposed in the literature to organize the structure of different profiles of perfectionism—namely, the tripartite model (Stoeber & Otto, 2006) and the 2 × 2 model (Gaudreau & Thomson, 2010)—both models were considered as viable options in this study. As noted previously, the major difference between these two models (other than the specific labels that are used within each model to describe different profiles of perfectionism) is that the tripartite model classifies all people who have low perfectionistic strivings (i.e., low personal standards) as non-perfectionists (irrespective of their perfectionistic concerns), whereas the 2 × 2 model distinguishes between those who have low perfectionistic strivings combined with low perfectionistic concerns—labelled, non perfectionism—and those who have

low perfectionistic strivings combined with high perfectionistic concerns (labelled, pure evaluative concerns perfectionism).

To determine which, if either, of the two perfectionism frameworks (i.e., the tripartite model or the 2 × 2 model) provided the most appropriate representation of perfectionism profiles in the current study, Sport-MPS-2 data were subjected to a series of cluster analyses following similar protocols that have been employed in previous cluster-analytic studies of perfectionism in sport- (see Cumming & Duda, 2012; Gotwals, 2011; Gucciardi et al., 2012; Sapieja et al., 2011; Vallance et al., 2006) and non-sport settings (see Parker, 1997; Rice & Mirzadeh, 2000; Rice & Ashby, 2007). Specifically, Sport-MPS-2 subscale scores were subjected to a hierarchical cluster analysis using Ward's method and squared Euclidean distance measures (see Hair, Black, Babin, & Anderson, 2010). Competing cluster-solutions were compared (to be discussed later) and when one solution was finally selected, the data were subsequently re-analysed with a *K*-means non-hierarchical cluster analysis.

Given that gender differences were shown to exist on the DAA and ORG subscales in this study, and given that perfectionism clusters were to be formed on the basis of Sport-MPS-2 subscale scores, it became necessary to ensure that gender did not contribute to the formation of clusters. To this end, the scores for all five Sport-MPS-2 subscales were converted into standardized *z*-scores within gender prior to conducting the cluster analyses.

Statisticians (e.g., Hair et al., 2010) have noted that multivariate outliers can have adverse effects upon cluster-analytic solutions. Consequently, Sport-

MPS-2 data were screened for the presence of multivariate outliers using Mahalanobis distances that were assessed as χ^2 statistics (see Tabachnick & Fidell, 1996, pp. 66-68). Two multivariate outliers (χ^2 [5] > 20.515, $p < .001$) were detected and subsequently removed from the data set. The cluster analyses were therefore conducted upon perfectionism data provided by 341 athletes.

Given that no standard "stopping rules" exist that best determine the appropriate number of clusters to select (Hair et al., 2010; Rice & Ashby, 2007), the number of clusters to be retained was based largely upon (a) the number of clusters that theory expects (i.e., three clusters according to the tripartite model, and four clusters according to the 2 × 2 model), and (b) the number of clusters that have been identified in previous cluster-analytic studies of perfectionism in sport—namely, three clusters (Gucciardi et al., 2012; Martinent & Ferrand, 2006; Sapieja et al., 2011; Vallance et al., 2006) and four clusters (i.e., Cumming & Duda, 2012; Gotwals, 2011). However, strong consideration was also given to the proportionate change in the magnitude of the agglomeration coefficients that occurred when dissimilar clusters were combined into larger (i.e., fewer) clusters (see Hair et al., 2010). The logic of this latter protocol is that large changes occur in within-cluster sum-of-squares when highly dissimilar clusters are merged. When disproportionately large changes in within-cluster sum-of-squares occur, this indicates that relatively dissimilar clusters are being combined into a larger cluster (thereby increasing the degree of heterogeneity among the participant characteristics that are being used to form the clusters). This examination of the

proportionate changes in agglomeration coefficients is conceptually analogous to the logic involved in a scree test in factor analysis.

Table 7 contains the agglomeration coefficients and corresponding proportionate changes in within-cluster sum-of-squares for the final 10 stages of the cluster-formation process. A large proportionate increase in cluster heterogeneity resulted when two clusters were merged into one cluster (22.72%)—supporting the retention of two clusters—and a similarly large proportionate increase in cluster heterogeneity resulted when three clusters were merged into two clusters (19.47%)—supporting the retention of three clusters. Much smaller (and less abrupt) proportionate increases in cluster heterogeneity were observed at all preceding steps in the cluster-formation process (see Table 7). In other words, the agglomeration schedule provided the greatest amount of support for the retention of two- or three-cluster solutions. Two- and thee-cluster solutions were therefore retained for further examination. However, given the prominent role that theory plays in the selection and interpretation of cluster-analytic solutions (Hair et al., 2010), the viability of a four-cluster solution was also examined to determine if it could be interpreted using the 2 × 2 model of perfectionism.

Table 7

Agglomeration Schedule for the Final Ten Stages of Cluster Formation

Number of clusters	Agglomeration coefficient	Percentage change to next cluster
10	707.138	5.46%
9	745.769	5.35%
8	785.673	5.96%
7	832.495	5.65%
6	879.516	6.06%
5	932.857	9.95%
4	1025.649	10.14%
3	1129.65	19.47%
2	1349.615	22.72%
1	1656.282	—

A series of MANOVAs were employed to examine where between-cluster differences existed across the five Sport-MPS-2 subscales. Summarising these findings for the two-cluster solution, Cluster 1 had low (negative) *z*-scores on four of the five Sport-MPS-2 subscales (i.e., PS, COM, PPP, and DAA). In contrast, Cluster 2 (n = 108) had significantly higher (positive) mean *z*-scores than Cluster 1 (n = 233) on these same variables (all ps < .001). The two clusters did not differ on the organization subscale (see Appendix M).

The three-cluster solution provided strong support for the tripartite model of perfectionism (see Appendix N). The results of a MANOVA indicated that Cluster 1 (C1: n = 85) had high (positive) *z*-score means on the personal standards

and organization subscales (indicating high perfectionistic strivings) combined with low (negative) *z*-score means for concern over mistakes, perceived parental pressure, and doubts about actions (indicating low perfectionistic concerns). As such, the pattern of scores for C1 closely resembled a profile of healthy perfectionism as defined within the tripartite model of perfectionism. Cluster 2 (C2: $n = 148$) had low (negative) mean *z*-scores on the personal standards and concern over mistakes subscales. These scores were significantly lower than the PS and COM scores of clusters 1 and 3 ($ps < .001$). Cluster 2 had (negative) z-score means on the perceived parental pressure and organization subscales, and a positive *z*-score mean for doubts about actions ($Mz = -.29$). Collectively this pattern of scores closely resembled a profile of non-perfectionism that is specified within the tripartite model because athletes generally reported low perfectionistic strivings (i.e., low PS and low ORG). Cluster 3 (C3: $n = 108$) contained a high (positive) mean *z*-score on the personal standards subscale that was similar to the PS score for C1 (healthy perfectionism). However, C3 had the highest (positive) mean *z*-scores on the concern over mistakes, perceived parental pressure, and doubts about actions subscales among the three clusters (all $ps < .001$). The pattern of subscale scores for C3 (i.e., high perfectionistic strivings combined with high perfectionistic concerns) closely resembled a profile of unhealthy perfectionism that is specified within the tripartite model of perfectionism.

The four-cluster solution (see Appendix O) provided general support for the 2 × 2 model of perfectionism with one notable exception. Cluster 1 ($n = 85$) was identical to C1 in the three-cluster solution (i.e., high perfectionistic strivings

combined with low perfectionistic concerns) and closely resembled a profile of pure personal standards perfectionism that is defined within the 2 × 2 model of perfectionism. Cluster 2 (*n* = 148) was also identical to C2 in the three-cluster solution (i.e., low perfectionistic strivings combined with low perfectionistic concerns) and closely resembled a profile of non-perfectionism that is defined within the 2 × 2 model. Cluster 4 (C4: *n* = 79) contained a combination of high perfectionistic strivings (high positive mean *z*-scores on the PS and ORG subscales) combined with high perfectionistic concerns (high positive mean *z*-scores on the COM, PPP, and DAA subscales) that resembled a profile of mixed perfectionism that is defined within the 2 × 2 model.

Contrary to the theoretical tenets of the 2 × 2 model, the existence of a pure evaluative concerns perfectionism profile (i.e., low perfectionistic strivings combined with high perfectionistic concerns) was not evident in the four-cluster solution. Specifically, Cluster 3 (*n* = 29) had the highest (positive) mean *z*-scores on the COM and DAA subscales (indicating high perfectionistic concerns) among the four cluster. However, C3 also had a positive mean *z*-score on the personal standards subscale that was not significantly different than the mean PS *z*-scores of the pure personal standards group (i.e., C1) and the mixed perfectionism group (i.e., C4). In other words, C3 contained athletes who also had similar (above average) levels of perfectionistic strivings (i.e., personal standards) to those athletes in C1 and C4. Consequently, the pattern of Sport-MPS-2 scores in C3 did not match the profile of pure evaluative concerns perfectionism that is defined within the 2 × 2 model.

On the basis of the aforementioned results, the two-cluster solution was not retained because it depicted a purely dichotomous view of perfectionism (i.e., low vs. high) and because it did not fit with either of the two models of perfectionism that are predominately used in the literature to structure perfectionism profiles (i.e., the tripartite model and the 2 × 2 model). It is also worth noting that Hair et al. (2010) have suggested that two-cluster solutions often have "limited value in meeting many research objectives" (p. 529), which appears to be the case in this study. The four-cluster solution was not retained because a cluster reflecting pure evaluative concerns perfectionism (which should contain low perfectionistic strivings combined with high perfectionistic concerns) did not emerge from the data. The absence of this cluster is important because pure evaluative concerns perfectionism is a defining characteristic of the 2 × 2 model of perfectionism that primarily differentiates it from the tripartite model of perfectionism (see Gaudreau & Thompson, 2010).

The three-cluster solution was retained because it appeared to provide the most theoretically interpretable solution for the data. Specifically, there was a high degree of convergence between the profiles of perfectionism that emerged within the three-cluster solution and the structure of perfectionism that is specified within Stoeber and Otto's (2006) tripartite model of perfectionism. Moreover, the size of the proportionate changes in the agglomeration coefficients indicated that the three-cluster solution represented a viable solution in this study (see Table 7). The mean *z*-scores for each Sport-MPS-2 subscale in the three-cluster solution that were derived from the hierarchical cluster analysis (see Appendix N) were

subsequently selected as the initial seed points for inclusion within the *K*-means non-hierarchical cluster analysis.

The *z*-score (and raw score) means for each Sport-MPS-2 subscale in the three-cluster non-hierarchical solution are contained in Table 8 (although it should be noted that the MANOVA was conducted on the *z*-scores because these scores had been used to form the clusters). As was the case with the hierarchical cluster analysis, strong support for Stoeber and Otto's (2006) tripartite model of perfectionism was obtained. Specifically, members of Cluster 1 (n = 128) had, on average, high perfectionistic strivings (i.e., high PS and ORG) combined with low perfectionistic concerns (i.e., low COM, PPP, and DAA). This pattern of Sport-MPS-2 subscale scores resembles a profile of healthy perfectionism within the tripartite model. Members of Cluster 2 (n = 124) had, on average, low perfectionistic strivings (i.e., low PS and ORG) combined with low perfectionistic concerns (i.e., low COM and PPP, and moderate DAA).This pattern of Sport-MPS-2 subscale scores closely resembles a profile of non-perfectionism within the tripartite model. Members of Cluster 3 (n = 89) had, on average, high personal standards (Mz = .43) indicating high perfectionistic strivings. However, in comparison to Clusters 1 and 2, members of C3 had the highest (positive) mean *z*-scores on the COM, PPP and DAA subscales—a pattern of scores that is indicative of high perfectionistic concerns. The overall pattern of high perfectionistic strivings combined with high perfectionistic concerns closely resembles a profile unhealthy perfectionism within the tripartite model. Collectively, the characteristics of the three clusters bear remarkable similarity to

profiles of healthy/adaptive-, unhealthy/maladaptive-, and non-perfectionism that have been seen in previous research in sport- (e.g., Gucciardi et al., 2012; Martinent & Ferand, 2006; Sapieja et al., 2011) and non-sport settings (e.g., Parker, 1997; Rice & Mirzadeh, 2000; Rice & Ashby, 2007), which further supports the retention of a three-cluster solution.

The stability (or reliability) of the non-hierarchical solution (with respect to cluster-membership classification of athletes following the hierarchical analysis) was assessed by examining the proportion of athletes who remained in the same conceptually-labelled clusters going from the hierarchical solution to the non-hierarchical solution. A total of 283 athletes (82.5%) remained in the same clusters following the non-hierarchical analysis. The level of re-classification stability was further assessed using Cohen's Kappa coefficient: a value of .73 was obtained which indicates a "substantial" level of agreement (see Landis & Koch, 1977, p. 165) between the membership-composition of athletes in the hierarchical and non-hierarchical solutions.

Table 8

Sport-MPS-2 Descriptive Statistics and Univariate Test Statistics for Between-Cluster Comparisons of Mean z-Scores (Following the Non-Hierarchical [K-Means] Cluster Analysis)

	Clusters (N = 341)								
	Cluster 1 (n = 128)		Cluster 2 (n = 124)		Cluster 3 (n = 89)				
	Raw scores	*z*-scores	Raw scores	*z*-scores	Raw scores	*z*-scores	Univariate test statistics [a]		
Subscale	*M/SD*	*M/SD*	*M/SD*	*M/SD*	*M/SD*	*M/SD*	$F(2,338)$	p	η^2_p
PS	4.14/.46	$.58_a$/.66	3.13/.53	$-.89_b$/.77	4.04/.46	$.43_a$/.66	159.73	<.001	.49
COM	2.31/.53	$-.26_a$/.74	2.17/.56	$-.46_a$/.77	3.24/.61	1.04_b/.85	108.03	<.001	.49
PPP	1.97/.61	$-.16_a$/.77	1.71/.55	$-.49_b$/.71	2.82/.80	$.93_c$/1.03	81.05	<.001	.32
DAA	1.74/.48	$-.74_a$/.73	2.43/.53	$.31_b$/.78	2.61/.62	$.62_c$/.90	92.19	<.001	.35
ORG	4.10/.47	$.67_a$/.60	3.22/.71	$-.50_b$/.93	3.45/.74	$-.21_c$/.95	68.00	<.001	.29

Note. *z*-score means with different subscripts indicate within-row differences between clusters following post-hoc independent *t*-tests with Bonferroni corrections (all *p*s < .05). Subscale abbreviations: PS = personal standards; COM = concern over mistakes; PPP = perceived parental pressure; DAA = doubts about actions; ORG = organization.

[a] Statistical tests to examine between-cluster differences were computed on *z*-scores rather than raw scores.

A final validity check was conducted on the three-cluster solution to further support (or refute) the researcher's decision to select three clusters and to interpret these clusters using Stoeber and Otto's (2006) tripartite model of perfectionism. As noted in the cluster-analysis literature (see Breckenridge, 1989), replication is an essential part of the cluster-validation process. Ideally, cluster replication should be conducted with an independent sample (Morizot & Le Blanc, 2005), after which researchers should examine the degree to which similar clusters emerge across samples (Breckenridge, 1989). Although an independent sample was not available in this study, the current sample can actually be viewed as an independent sample relative to other studies that have conducted cluster analyses on Sport-MPS-2 data provided by athletes. To the best of the researcher's knowledge, only one previously published study (i.e., Sapieja et al., 2011) has cluster analyzed Sport-MPS-2 data that resulted in the creation of a three-cluster solution.[10] Using the same hierarchical and non-hierarchical clustering techniques employed in this study, Sapieja et al. obtained three perfectionism clusters (among a sample of male youth soccer players) that closely fit with Stoeber and Otto's definitions of healthy perfectionism, unhealthy perfectionism, and non-perfectionism.

[10] Previous cluster-analytic studies with athletes who have responded to subscales contained within the Sport-MPS-2 have also supported the retention of three clusters (i.e., Gucciardi et al., 2012; Martinent & Ferrand, 2006; Vallance et al., 2006). However, each of these studies used the original Sport-MPS (Dunn, Causgrove Dunn. et al., 2006) to measure perfectionism (rather than the Sport-MPS-2) and therefore only assessed PS, COM, PPP, and PCP. Given that the original Sport-MPS does not measure doubts about actions and organization, these studies did not provide mean subscale scores for DAA and ORG that were necessary for inclusion as seed points in the *K*-means analysis.

The mean Sport-MPS-2 subscale scores for the PS, COM, PPP, DAA, and ORG subscales from each of the three clusters reported by Sapieja et al. (2011, p. 34) were entered as the initial seed points in a *K*-means non-hierarchical analysis for the current sample. The degree to which athletes in the current sample were classified into the same conceptually-labelled clusters (i.e., healthy perfectionism, unhealthy perfectionism, and non-perfectionism) was then assessed. A total of 304 athletes (89.1%) were re-classified into the same conceptual clusters following the *K*-means analysis. The level of classification agreement/stability was further assessed using Cohen's Kappa: a value of .82 was obtained indicating an "almost perfect" level of classification agreement (Landis & Koch, 1977, p. 165). These results appear to provide further support for the appropriateness of the researcher's decision to select a three-cluster solution and to use Stoeber and Otto's (2006) tripartite model of perfectionism as the interpretative framework for organizing (or classifying) athletes' perfectionism profiles in this study.

The distributional characteristics of the three clusters according to gender, playing position, and playing responsibility was assessed (see Table 9). No significant differences in the proportional representation of these variables across the three clusters were present (as assessed with χ^2 statistics), indicating that neither gender, playing position, nor playing responsibility appear to have been related to the formation of the perfectionism clusters.

Table 9

Distribution of Athletes According to Gender, Throwing Position, and Positional Responsibility Accross the Three Perfectionism Clusters

	Cluster (N = 341)				
Variable	Cluster 1 (healthy perfectionism) (n = 128)	Cluster 2 (non-perfectionism) (n = 124)	Cluster 3 (unhealthy perfectionism) (n = 89)	Total Athletes	χ^2
Gender					.91 (2), p = .64
Male	71 (55%)	76 (61%)	51 (57%)	198	
Female	57 (45%)	48 (39%)	38 (43%)	143	
Throwing position					6.10 (6), p = .41
Lead	31 (24%)	36 (29%)	17 (19%)	84	
Second	28 (22%)	33 (27%)	26 (30%)	87	
Third	32 (25%)	30 (24%)	20 (23%)	82	
Skip	37 (29%)	24 (20%)	25 (28%)	86	
Positional responsibility					4.79 (4), p = .31
Front-End	57 (45%)	71 (58%)	44 (49%)	172	
Vice-Skip	32 (25%)	26 (21%)	20 (22%)	78	
Skip	39 (30%)	26 (21%)	25 (28%)	90	

Note. Two participants did not indicate their throwing positions and one participant did not indicate their positional responsibility.

Reactions to Mistakes as a Function of Perfectionism and Situation Criticality

To determine if the emotional and cognitive reactions of competitive curling athletes (following personal mistakes in competition) differ as a function of athletes' perfectionism profiles and game situation criticality, a 3 × 2 (Perfectionism Cluster × Situation Criticality) repeated-measures doubly multivariate MANOVA (with repeated measures on situation criticality) was conducted (see Schutz & Gessaroli, 1987; Vallance et al., 2006). The dependent variables in the analysis were the Ang/Dej and Con/Opt subscales of the SECQ.

The overall multivariate test statistic revealed no significant within-subjects interaction (i.e., Perfectionism × Situation Criticality) effects: Wilks' Λ = .994, F (4, 674) = 0.485, p = .75, partial η^2 = .00. However, omnibus multivariate test statistics revealed a significant between-subjects effect for group (Wilks' Λ = .924, F [4, 674] = 6.812, $p < .001$, partial η^2 = .04) and a significant within-subjects effect for situation criticality (Wilks' Λ = .419, F [2, 337] = 233.193, $p <$ .001, partial η^2 = .58).

Regarding the between-subjects effect, follow-up univariate F-tests identified significant group effects for both Ang/Dej (F [2, 338] = 10.683, $p <$ .001, partial η^2 = .06) and Con/Opt (F [2, 338] = 6.084, $p < .005$, partial η^2 = .04). Post-hoc contrasts (using Bonferroni corrections) were then conducted to determine where perfectionism groups (i.e., clusters) differed in terms of their Ang/Dej and Con/Opt responses. Table 10 contains the estimated marginal means and 95% confidence intervals associated with these post-hoc contrasts.

Table 10

Means and Confidence Intervals (C.I.) for Tests of Group Main Effects

	SECQ subscales					
	Anger/Dejection			Self-Confidence/Optimism		
		95% C.I.			95% C.I.	
Cluster	*M*	Lower	Upper	*M*	Lower	Upper
C1 (Healthy perfectionists)	2.24_{a}	2.11	2.37	3.87_{a}	3.77	3.98
C2 (Non-perfectionists)	2.22_{a}	2.10	2.35	3.72_{ab}	3.62	3.83
C3 (Unhealthy perfectionists)	2.66_{b}	2.50	2.81	3.58_{b}	3.46	3.71

Note. Means with different subscripts in the same column differ at $p < .005$.

No significant difference was obtained on the mean Ang/Dej responses of Cluster 1 (healthy perfectionists) and Cluster 2 (non-perfectionists); however, Cluster 3 (unhealthy perfectionists) had significantly higher mean Ang/Dej scores than Clusters 1 and 2 (*p*s < .005). These results indicate that, irrespective of situation criticality, unhealthy perfectionists had higher mean Ang/Dej responses following failure in competition than healthy perfectionists and non-perfectionists.

The post-hoc contrasts conducted on Con/Opt scores revealed no significant differences between Cluster 1 (healthy perfectionists) and Cluster 2 (non-perfectionists), and between Cluster 2 (non-perfectionists) and Cluster 3 (unhealthy perfectionists). However, the difference in Con/Opt responses of Cluster 1 (healthy perfectionists) and Cluster 3 (unhealthy perfectionists) was significant ($p < .005$). Irrespective of situation criticality, healthy perfectionists tended to have higher mean Con/Opt responses following failure in competition than unhealthy perfectionists (see Table 10).

Regarding within-subjects effects, follow-up univariate *F*-tests revealed significant situation criticality main effects for both Ang/Dej (F [1, 338] = 332.183, $p < .001$, partial $\eta^2 = .50$) and Con/Opt (F [1, 338] = 331.021, $p < .001$, partial $\eta^2 = .50$). As seen in Table 11, irrespective of athletes' perfectionism profile, mean Ang/Dej responses were higher when athletes committed an error in the high-criticality situation than in the low-criticality situation. In contrast, athletes' reported higher mean Con/Opt responses when they committed an error in the low-criticality situation than in the high-criticality situation.

Table 11

Means and Confidence Intervals (C.I.) for Tests of Situation criticality Main Effects

	SECQ subscales					
	Anger/Dejection			Self-Confidence/Optimism		
		95% C.I.			95% C.I.	
Situation criticality	*M*	Lower	Upper	*M*	Lower	Upper
Low	2.13_a	2.05	2.21	3.96_a	3.89	4.02
High	2.62_b	2.53	2.71	3.50_b	3.42	3.57

Note. Means with different subscripts in the same column differ at $p < .001$.

Chapter 4

Discussion

The overarching purpose of this study was to determine if athletes with different profiles of perfectionism differed in terms of their emotional and cognitive responses to personal failure in low- and high-criticality competitive situations. To achieve this goal, cluster analyses were employed to establish theoretically interpretable profiles of perfectionism that captured the underlying structure of perfectionism among a sample of competitive adult curling athletes. Overall, results indicated that athletes who displayed a healthy profile of perfectionism (i.e., high perfectionistic strivings combined with low perfectionistic concerns) tended to report lower levels of *negative reactive emotions* (i.e., anger/dejection) and higher levels of *positive future-oriented cognitions* (i.e., self-confidence/optimism) following personal mistakes than athletes who displayed an unhealthy profile of perfectionism (i.e., high perfectionistic strivings combined with high perfectionistic concerns). Overall, the results indicated that athletes who possessed a healthy profile of perfectionism tended to respond to personal mistakes in competition in a more adaptive or functional manner than athletes who possessed an unhealthy profile of perfectionism.

Perfectionism Profiles

The cluster analyses that were conducted on athletes' Sport-MPS-2 responses yielded a three-cluster solution (see Table 8) that was highly interpretable from the perspective of Stoeber and Otto's (2006) tripartite model of

perfectionism. Specifically, cluster analyses yielded (a) a group of *healthy perfectionists* (C1: *n* = 128) who had high perfectionistic strivings (i.e., high PS and ORG) combined with low perfectionistic concerns (i.e., low COM, PPP, and DAA), (b) a group of *unhealthy perfectionists* (C3: *n* = 89) who had high perfectionistic strivings (i.e., high PS and moderate ORG) combined with high perfectionistic concerns (i.e., high COM, PPP, and DAA), and (c) a group of *non-perfectionists* (C2: *n* = 89) who had low perfectionistic strivings (i.e., low PS and ORG) combined with low perfectionistic concerns (i.e., low COM, low PPP, and moderate DAA). The underlying characteristics of these three clusters are very similar to the characteristics of other profiles of perfectionism that have been reported in both the general psychology literature (e.g., Parker, 1997; Rice & Mirzadeh, 2000) and sport psychology literature (e.g., Gucciardi et al., 2012; Martinent & Ferrand, 2006; Sapieja et al., 2011).

The selection of a three-cluster solution in this study is noteworthy on a number of levels. First, the emergence of three interpretable clusters indicates that Stoeber and Otto's (2006) tripartite model of perfectionism provides a useful conceptual framework for studying perfectionism in the sport of curling. Second, the three-cluster solution appears to support a categorical view of perfectionism in which "different types of perfectionists differ qualitatively in their characteristics" (Flett & Hewitt, 2002, p. 18) as opposed a dimensional view of perfectionism in which people can be ordered on a continuum according to the amounts of perfectionism (i.e., high, moderate, or low) that they possess (Flett & Hewitt, 2002). The apparent categorical structure of perfectionism obtained in this study

is similar to the categorical structure of perfectionism obtained in previous studies with athletes (e.g., Gucciardi et al., 2012; Sapieja et al., 2011) but differs from the dimensional structure of perfectionism that was reported by Vallance et al. (2006) who obtained three clusters that represented high, moderate, and low levels of perfectionism among a sample of male youth ice hockey players. Clearly, more research into the categorical versus dimensional nature of perfectionism in sport is required to shed light on this important conceptual issue that has been prominent in the perfectionism literature for over a decade (see Flett & Hewitt, 2002).

It is also worth noting that the current cluster-analytic results failed to provide empirical support for one of the four profiles of perfectionism proposed within Gaudreau and Thompson's (2010) 2 × 2 model of dispositional perfectionism—a model that has received a growing amount of attention in sport perfectionism research over the last three years since its inception (e.g., Cumming & Duda, 2012; Gaudreau & Verner-Filion, 2012; Hill, 2013). A four-cluster solution was examined in this study, and although three of the four clusters could be interpreted using the conceptual framework provided by the 2 × 2 model, support for the fourth cluster—pure evaluative concerns perfectionism—was not obtained.

According to Gaudreau and Thompson (2010), a profile of pure evaluative concerns perfectionism is represented by a combination of low perfectionistic strivings (i.e., low PS and ORG) with high perfectionistic concerns (i.e., high COM, DAA, and PPP); no such cluster was evident in the four-cluster solution. The cluster that most closely resembled pure evaluative concerns perfectionism

(in the four-cluster solution) contained a pattern of Sport-MPS-2 scores that reflected high perfectionistic concerns (i.e., high COM and DAA); this pattern of scores met one criterion for defining pure evaluative concerns perfectionism. However, the cluster also contained high perfectionistic strivings, as evidenced by personal standards scores that did not differ significantly from the personal standards scores in the two clusters that reflected pure personal standards perfectionism (i.e., high strivings combined with low concerns) and mixed perfectionism (i.e., high strivings combined with high concerns). The failure to find a cluster that fully reflected the characteristics of pure evaluative concerns perfectionism (in the four-cluster solution) is noteworthy because the 2 × 2 model is primarily differentiated from Stoeber and Otto's (2006) tripartite model on the basis that people who have the combination of low perfectionistic strivings with high perfectionistic concerns are classified as perfectionists within the 2 × 2 model. In contrast, the tripartite model classifies all people who have low perfectionistic strivings (irrespective of their perfectionistic concerns) as non-perfectionists because "the strivings component of perfectionism [forms] an integral element of […] perfectionism" (Stoeber, 2011, p. 141). In other words, Stoeber argued that people who do not possess high perfectionistic strivings should not be labelled as perfectionists. Although support for the existence of a pure evaluative concerns perfectionism cluster was not evident in this study, it is important to acknowledge that a recent study by Cumming and Duda (2012) with athletes did obtain a four-cluster solution that was interpretable using the 2 × 2

model of perfectionism and contained a cluster that did reflect pure evaluative concerns perfectionism.

Using an adapted (and abbreviated) version of the Frost-MPS (Frost et al., 1990), Cumming and Duda (2012) selected a four-cluster solution to represent different profiles of perfectionism among a sample of 194 vocational dance students. All four clusters obtained by Cumming and Duda were labelled in accordance with the 2 × 2 model: namely, *pure personal standards perfectionism* (i.e., high strivings [PS] combined with low concerns [COM and DAA]), *mixed perfectionism*, (i.e., high strivings [PS] combined with high concerns [COM and DAA]), *pure evaluative concerns perfectionism* (i.e., low strivings [PS] combined with moderate [COM] and high [DAA] concerns), and *non-perfectionism* (i.e., low strivings [PS] combined with low concerns [COM and DAA]). In light of Cumming and Duda's findings, and given the relative infancy of the 2 × 2 model compared to the more established tripartite model of perfectionism (Stoeber & Otto, 2006), more research examining the validity and usefulness of the two models in the domain of competitive sport is warranted. Furthermore, given that three of the four perfectionism profiles defined within the 2 × 2 model (i.e., pure personal standards perfectionism, mixed perfectionism, and non-perfectionism) were evident in the four-cluster solution that was examined in this study, more research investigating the validity and usefulness of retaining a pure evaluative concerns perfectionism cluster among athletes would seem particularly prudent.

Potential reasons why different profiles (i.e., clusters) of perfectionism have emerged across a number of independent studies involving athletes (e.g.,

Cumming & Duda, 2012; Gotwals, 2011; Gucciardi et al., 2012; Sapieja et al., 2011; Vallance et al., 2006) is worthy of discussion. It is possible that different cluster solutions have emerged across studies due to differences in the demographic characteristics of the samples (Gucciardi et al., 2012). For example, the sample in Cumming and Duda's study was largely comprised of female athletes (87%) whereas the samples in the studies conducted by Sapieja et al. and Vallance et al. were entirely comprised of male athletes. It is conceivable that gender differences in perfectionism (see Dunn, Gotwals, & Causgrove Dunn, 2005; Haase, Prapavessis, & Owens, 2013) may play a role in the creation of perfectionism clusters that emerge across different studies (although this did not appear to be the case in the current study: see Table 9).

It is also possible that differences in the age of athletes may potentially influence the perfectionism profiles that emerge across studies given that certain dimensions of perfectionism (e.g., perceived parental pressure) may be more salient for youth athletes than adult athletes (see Dunn, Gotwals, et al., 2006). In the extant literature, some cluster-analytic studies have examined profiles of perfectionism among youth athletes (e.g., Sapieja et al., 2011; Vallance et al., 2006) whereas other studies have employed samples that are largely comprised of adult athletes (i.e., Gotwals, 2011; Gucciardi et al., 2012). The emergence or absence of different clusters across studies may also be influenced by sample size and/or the unique characteristics of some athletes within these studies. Sample sizes employed in cluster analytic studies of perfectionism among athletes have ranged from 117 (Gotwals, 2011) to 423 (Gucciardi et al., 2012) and it is possible

that participants with certain idiosyncratic characteristics may exist within different samples that have influenced the formation of clusters within these studies (especially where smaller sample sizes were employed).

Cluster formation is also highly dependent upon the variables that are included in the analysis (see Hair et al., 2010). Differences across studies in the variables/subscales that are used in a cluster analysis will likely influence the clusters that emerge in these studies (Hair et al., 2010) and the inclusion or exclusion of these variables is often dependent upon the measurement instrument/s that researchers employ to assess the constructs under investigation. This is particularly noteworthy in the context of cluster-analytic studies that have examined perfectionism profiles among athletes because there is a large degree of variability in the variables/subscales that have been used to measure perfectionism. For example, Cumming and Duda (2012) focussed their assessment of perfectionism on three subscales (i.e., PS, COM, and DAA) that were taken from the Frost-MPS (Frost et al., 1990), Gucciardi et al. (2012) and Vallance et al. (2006) used the four subscales (i.e., PS, COM, PPP, and PCP) of the Sport-MPS (Dunn, Causgrove Dunn, et al., 2006), Martinent and Ferrand (2006) used the four subscales of the Sport-MPS and two subscales (i.e., socially prescribed perfectionism and other-oriented perfectionism) from the Hewitt-MPS (Hewitt & Flett, 1991), and Gotwals (2011) and Sapieja et al. (2011) used all six subscales (i.e., PS, COM, PPP, PCP, DAA, and ORG) of the Sport-MPS-2 (Gotwals & Dunn, 2009). In contrast, the clusters reported in the current study were generated using scores from five subscales of the Sport-MPS-2 (with PCP

being omitted due to missing data). Until more studies are conducted with comparable sample demographics (e.g., similar age, gender, sport type, and competition level) that employ similar measurement instruments (with comparable sets of subscales), it will be difficult for researchers to determine which (if any) existing models of perfectionism provide the most appropriate conceptual framework/s for organizing and structuring perfectionism profiles in sport. Clearly this is an area that requires more attention in future research.

Reactions to Mistakes

As noted previously, irrespective of situation criticality, athletes in this study who were classified as having a healthy profile of perfectionism had, on average, significantly lower levels of anger/dejection and significantly higher levels of self-confidence/optimism following mistakes than athletes who were classified as having an unhealthy profile of perfectionism (see Table 10). It is therefore necessary to discuss the potential reasons why these response differences occurred.

Theory suggests that the perception (and corresponding interpretation) of personal failure is quite different for healthy and unhealthy perfectionists. Hamachek (1978) proposed that healthy perfectionists (a) do not feel the need to be overly precise (or overly perfect) in terms of accomplishing these high performance standards, and (b) view failure as a natural (though unwanted) aspect of the performance process that is encountered in achievement settings. In contrast, unhealthy perfectionists have a tendency to feel that "they could—and should—do better" and that even their best efforts "never quite seem good

enough" (Hamachek, 1978, p. 27). Moreover, unhealthy perfectionists have an intense need to avoid failure (Blatt, 1995; Gucciardi et al., 2012) and typically view any personal mistake as an unacceptable part of the performance process. Indeed, any public display of imperfection (such as a personal performance error in competition) is particularly threatening to the self-worth of unhealthy perfectionists because their self-worth is often highly contingent upon the error-free attainment of high performance standards (Blatt, 1995; Burns, 1980; Hall, Hill, & Appleton, 2012). Given the aforementioned perceptual and motivational differences that are believed to exist between healthy and unhealthy perfectionists, it appears to be theoretically sensible that healthy perfectionists would experience less anger/dejection and higher self-confidence/optimism following personal mistakes in competition (irrespective of situation criticality) than unhealthy perfectionists.

Anger and dejection are both negative reactionary emotions that can result when personally meaningful goals are blocked (Averill, 1982; Frijda, 1994). Anger can also be experienced when something (e.g., a mistake) occurs that an athlete believes should not have happened (Vallance et al., 2006). Dejection can occur when an athlete feels highly discouraged by his or her efforts to achieve personally meaningful goals (such as flawless performances and competitive success) and when the athlete "does not believe that he or she is making sufficient progress to achieve a meaningful goal (. . .) following actual or perceived failure" (Jones et al., 2005, p. 411). Consequently, given the antecedent conditions that are linked with causing anger and dejection, it does not seem surprising that

unhealthy perfectionists would be particularly prone to experiencing these negative reactive emotions when personal performance errors occur in competition (because such errors greatly threaten their performance goals and self concept). In contrast, healthy perfectionists should be less susceptible to experiencing the same intensity of negative reactive emotions because they perceive less "threat towards their achievement of personally meaningful goals" (Sagar & Stoeber, 2009) and less threat to their self-concept (than unhealthy perfectionists) in failure-related situations (see Conroy, Willow, & Metzler, 2002).

Although the specific performance goals of the athletes in this study were not examined, recent research has shown that adaptive (or healthy) perfectionists have different achievement goals than maladaptive (or unhealthy) perfectionists in sport. For example, in a study of 423 elite athletes (*M* age = 25.64 years) from a variety of sports, Gucciardi et al. (2012) compared achievement goals of athletes who formed clusters of adaptive perfectionists (i.e., high perfectionistic strivings combined with low perfectionistic concerns), maladaptive perfectionists (i.e., high perfectionistic strivings combined with high perfectionistic concerns), and non-perfectionists (i.e., low perfectionistic strivings). Gucciardi et al. reported that adaptive perfectionists had significantly higher mastery approach goals (i.e., motivated to achieve self- and task-referenced standards of competence: see Elliot & McGregor, 2001) than maladaptive perfectionists, whereas maladaptive perfectionists had significantly higher mastery avoidance goals (i.e., motivated to avoid displaying self- and task-referenced incompetence), performance approach

goals (i.e., motivated to display normative competence), and performance avoidance goals (i.e., motivated to avoid displaying normative incompetence) than adaptive perfectionists. If the cluster of unhealthy perfectionists in the current study also had stronger motives to avoid displaying self-, task- and normative-incompetence (than the cluster of healthy perfectionists), then the public failure of unhealthy perfectionists (i.e., following personal mistake in competition) would likely exacerbate the degree to which they experienced anger/dejection. Future research would benefit from the assessment of achievement goals and motives that athletes with different profiles of perfectionism adopt in performance settings. Such information could shed additional light upon the underlying reasons why unhealthy perfectionists appear to experience stronger negative emotional responses (i.e., anger/dejection) following mistakes in competition than healthy perfectionists.

An explanation for why healthy perfectionists reported stronger positive future-oriented cognitions (i.e., self-confidence/optimism) than unhealthy perfectionists is also necessary. According to theory and empirical research (see Vealey et al., 1998), self-confidence in sport can be developed when an athlete demonstrates ability (i.e., competence) and/or when an athlete receives social support (i.e., positive feedback) from other people (e.g., coaches, parents, and teammates) in the performance environment (also see Hays et al., 2007). Similarly, state optimism is likely to be elevated when an individual assesses a favorable change in environmental conditions that increase the (perceived) likelihood of achieving a valued goal, whereas state optimism is likely to be

reduced when the individual assesses an unfavourable change in environmental conditions that decreases the (perceived) likelihood of achieving a valued goal (Sweeny et al., 2006). Given that personal performance errors in competition are the antithesis of athletes' efforts to accomplish personally meaningful goals in sport, it again seems reasonable to propose that the aforementioned motivational and perceptual differences that exist between healthy and unhealthy perfectionists (regarding the attainment of performance goals and/or avoidance of public displays of imperfection) may influence athletes' self-confidence and optimism levels following personal mistakes in competition.

Unhealthy perfectionists have great difficulty accepting mistakes or failure (Lundh, 2004; Lundh, Saboonchi, &Wångby, 2008); they also have a tendency to adopt an all-or-nothing view of assessing their performance endeavours (Tangney, 2002) such that even the slightest mistake during competition may be evaluated as a complete performance failure. In contrast, theorists suggest that healthy perfectionists are inclined to view mistakes as a natural (though unwanted) part of the performance process (Hamachek, 1978). Consequently, it would seem logical that unhealthy perfectionistic athletes would become less optimistic about achieving their performance goals (i.e., flawless attainment of high performance standards and avoiding any displays of normative incompetence) than healthy perfectionistic athletes when personal mistakes occur in competition, especially when these mistakes may reduce the chances of competitive success for the athlete's team. Moreover, given the tendency of unhealthy perfectionists to engage in harsh self-criticism (Hall et al., 2012), it is not surprising that unhealthy

perfectionistic athletes would have lower confidence in their own abilities to perform successfully (following mistakes in competition) than healthy perfectionistic athletes who are much less critical of themselves and their own performance efforts (Gucciardi et al., 2012). Stated differently, if unhealthy perfectionistic athletes believe that nothing they do is ever good enough (Hamachek, 1978), and if personal performance errors occur in competition that reinforce this largely irrational self-defeating belief (see Campbell & Di Paula, 2002), it is understandable how/why unhealthy perfectionistic athletes would experience less self-confidence/optimism than healthy perfectionistic athletes following mistakes in competition.

Although speculative, it is also possible that athletes who have an unhealthy profile of perfectionism report lower levels of self-confidence/optimism following mistakes in competition (than athletes who have a healthy profile of perfectionism) because unhealthy perfectionists may have lower perceptions of personal control in the performance setting. In a study of 139 undergraduate students, Rice, Bair, Castro, Cohen, and Hood (2003) measured the degree to which maladaptive (i.e., unhealthy) perfectionists differed in the degree to which they perceived personal control in achievement settings compared to adaptive (i.e., healthy) perfectionists. Rice et al. reported that maladaptive perfectionists (i.e., those with high perfectionistic strivings combined with high perfectionistic concerns) had significantly lower levels of perceived control (as measured by the personal control subscale of the Spheres of Control Scale: Paulhus, 1983) than adaptive perfectionists (i.e., those with high perfectionistic strivings combined

with low perfectionistic concerns). Rice et al. suggested that this lower degree of perceived personal control among maladaptive perfectionists reflected a lack of self-confidence in their abilities to obtain a valued outcome in achievement settings. Future research may wish to investigate the degree to which healthy and unhealthy perfectionistic athletes differ with respect to the perceived control that they adopt in competitive sport settings, and to assess the extent to which perceived control may mediate the degree to which athletes (with different profiles of perfectionism) experience changes to their self-confidence/optimism levels following mistakes in competition.

Decreased self-confidence and decreased optimism are generally viewed as undesirable cognitive states (or traits) for people who perform in achievement settings (see Carver et al., 2010; Grove & Heard, 1997; Nicholls, Polman, Levy, & Backhouse, 2008; Norlander & Archer, 2002). It is therefore important to recognize that two of the Sport-MPS-2 subscales that measured dimensions of perfectionistic concerns in this study (i.e., COM and DAA) were both negatively correlated (*r*s ranged from -.19 to -.28, *p*s < .01) with self-confidence/optimism in low- and high-criticality situations (see Table 6). These negative correlations indicate that increases to athletes' levels of COM and DAA were generally associated with corresponding decreases to athletes' self-confidence/optimism levels following personal mistakes in both low- and high-criticality situations. These findings appear to be consistent with previous research that has also identified the potentially debilitative link between heightened perfectionistic concerns and athletes' performance-related cognitions in sport.

Stoeber et al. (2007) examined the relationship between negative reactions to imperfection—a dimension of perfectionistic concerns that is measured by the MIPS (Stöber et al., 2004)—and trait or state self-confidence among independent samples of university athletes, female soccer players, and high school athletes. Stoeber et al. reported significant negative correlations between reactions to imperfection and athletes' trait and state self-confidence levels. These findings indicated that as athletes' negative reactions to imperfection increased, there tended to be a corresponding decrease in athletes' trait or state self-confidence levels in sport.

Frost and Henderson (1991) examined relationships between concern over mistakes (COM) and doubts about action (DAA)—dimensions of perfectionistic concerns that were measured by the Frost-MPS (Frost et al., 1990)—and trait self-confidence among a sample of 40 intercollegiate female athletes. Both COM and DAA were negatively correlated with trait self-confidence levels (r = -.61 and r = -.33 respectively; ps < .05), indicating that increases to athletes' COM and DAA levels generally corresponded with decreases to athletes' trait self-confidence in sport. Frost and Henderson also reported a pattern of significant positive correlations between dimensions of perfectionistic concerns (i.e., COM and DAA) and a host of negative/debilitative reactions to mistakes including the inability to forget about mistakes and the tendency to feel disappointed in ones' self in competition.

Interestingly, Frost and Henderson (1991) also found significant negative correlations (ps < .05) between (a) athletes' COM scores and coaches'

assessments of the athletes' abilities to respond well to mistakes or pressure during competition (r = -.38), and (b) athletes' DAA scores and these same coaching assessments (r = -.42). In other words, as athletes' levels of COM and DAA increased, coaches were more likely to rate the athletes as recovering poorly from mistakes, performing poorly under pressure, and adapting poorly to changing circumstances in competition. Frost and Henderson's findings, when considered in conjunction with the correlation results reported in this study (Table 6) and Stoeber et al.'s (2007) study, reinforce that heightened perfectionistic concerns are typically associated with maladaptive functioning in sport (see Gotwals et al., 2012; Hall et al., 2012).

Although no specific *a priori* hypotheses were presented in this study regarding the emotional and cognitive reactions of non-perfectionists following failure, it is worth noting that the anger/dejection responses of non-perfectionists were significantly lower than the anger/dejection responses of unhealthy perfectionists (see Table 10), whereas the anger/dejection responses of non-perfectionists did not differ from those reported by healthy perfectionists.[11] It is possible that non-perfectionists reported less anger/dejection than unhealthy perfectionists because (a) the error-free attainment of high performance standards is not as motivationally salient to non-perfectionists as it is to unhealthy perfectionists, and (b) non-perfectionists are not overly concerned about the failure to meet exactingly high performance standards. Consequently, personal mistakes in competition may not pose the same degree of threat to the attainment

[11] The non-perfectionists did not differ from either the healthy- or unhealthy-perfectionists in terms of their self-confidence/optimism responses.

of personally meaningful goals for non-perfectionists as these same mistakes pose for unhealthy perfectionists. It is also likely that these mistakes in competition pose much less threat to the self-concept of non-perfectionists than unhealthy perfectionists (because the self-worth of unhealthy perfectionists is highly contingent upon the attainment of high performance standards: see Hall et al., 2012). It is possible that the lower levels of perfectionistic strivings (i.e., personal standards) that were held by the non-perfectionists in this study protected them from experiencing negative emotions like anger and dejection because reductions in goal importance are typically associated with less intense emotional responses when less meaningful goals are threatened (see Frijda, 1986, 1988; Lazarus, 1991, 1993; Smith & Ellsworth, 1987).

Situation Criticality

This study expanded upon the work of Vallance et al. (2006) by examining the degree to which situation criticality influenced the intensity of athletes' emotional and cognitive reactions to mistakes in competition. As seen in Table 11, regardless of athletes' perfectionism profiles, athletes reported less anger/dejection and more self-confidence/optimism following a mistake in the low-criticality situation than the high-criticality situation. These results indicate that increases in the degree of situation criticality within competition appear to have an amplifying effect on the emotional and cognitive responses of athletes following mistakes or failure in sport.

With respect to anger, results of this study appear to mirror the results of Vallance et al.'s (2006) work with male youth ice hockey players where the self-

reported state anger levels of athletes were significantly higher following a mistake in a high-criticality situation (i.e., missed scoring opportunity late in a tied game) than a low-criticality situation (i.e., missed scoring opportunity early in a tied game). The current study extends the work of Vallance et al. by demonstrating that situation criticality appears to influence both the emotional (i.e., anger/dejection) and cognitive (i.e., self-confidence/optimism) reactions of athletes following personal mistakes in competition.

According to ratings provided by the expert judges who assessed the degree of situation criticality (i.e., perceived importance) in the two game scenarios that were presented to the current sample of curling athletes, the error that occurred early in the game was viewed as being significantly less important ($p < .001$) than the same error when it occurred late in the game ($d_z' = 2.76$). Athletes' appraisals of the perceived importance of the two scenarios were not evaluated in this study. Nevertheless, it seems reasonable to conclude that participants also deemed their mistake as having less importance (with respect to the overall outcome of the game) in the low-criticality situation than the high-criticality situation because an error early in the game (i.e., low-criticality situation) "represents a situation in which steps can be taken to diminish" the impact of the mistake through "greater effort later on" (Carver & Scheier, 1994, p. 194). Regardless of the specific reasons why athletes apparently perceived differences in situation criticality in the two scenarios that were presented in this study, it seems likely that differences in perceived importance (and differences in

the perceived opportunity to redress the error later in the game: see Dunn & Nielsen, 1996) influenced athletes' threat appraisals in each scenario.

Threat represents the potential for loss or harm in a given situation (Folkman & Lazarus, 1985). All things being equal, a high-criticality competitive situation (where personally meaningful goals are at stake) will likely be perceived by athletes as posing a greater degree of threat (and contain a greater potential for harm if failure occurs) than a low-criticality situation. Thus, the appraisal of harm following a mistake in a high-criticality situation is likely to incur stronger harm-based reactionary emotions such as anger, sadness, and/or disappointment (see Folkman & Lazarus, 1985) than the same mistake in a low-criticality situation. Support for this theoretical position is provided in a study conducted by Smith and Ellsworth (1987) in which a sample of undergraduate students were asked to appraise the importance of an introductory psychology midterm exam and to rate their emotional states (a) 20 minutes prior to taking the exam, and (b) immediately after they received their grades on the exam. Prior to the exam, there was no relationship between perceived importance and anger (presumably because no harm or perceived injustice had occurred prior to taking the exam, thereby causing little if any increase or variability in anger scores). However, after receiving their marks on the exam, there was a significant positive correlation (r = .28, $p < .01$) between perceived importance of the exam and anger. In other words, as students placed a higher degree of importance on the exam, there was a corresponding increase in state anger levels immediately after exam marks were returned to the students (presumably because students who placed a higher degree

of importance on the exam felt a greater sense of injustice [or harm] if they performed to a lower standard on the exam than they had expected).

Other research in sport has also highlighted the potential role that differences in situation criticality can have upon the emotional, cognitive, or behavioural responses of athletes. For example, Krane et al. (1994) found that female intercollegiate softball players reported more anxiety prior to batting when the score was close and there were runners in scoring positions (i.e., high-criticality situations) than when the score differential in the game was larger and/or there were no runners in scoring positions (i.e., low-criticality situations). Similarly, Nicholls, Holt, and Polman (2005) recounted the words of a male international-level golfer who had experienced much higher levels of anxiety than he had ever previously experienced when playing the final hole of a competition where the possibility of securing his first ever championship victory as a 17-year old existed (presumably because the player began to place a much higher degree of perceived importance on winning the event as his realisation of this goal became more salient towards the end of the competition). Collectively, the results of various studies in the sport psychology literature (also see Dunn & Nielsen, 1996; Vallance et al., 2006) reinforce the need to consider perceived situation criticality as an environmental factor that may influence the emotional and cognitive responses of athletes in competitive sport settings.

Chapter 5

General Discussion

Although the primary focus of this thesis was to assess the degree to which different profiles of perfectionism influenced the emotional and cognitive responses of athletes following failure or mistakes in low- and high-criticality situations, a number of additional findings (that were indirectly related to this purpose) emerged that are worthy of discussion and which give rise to potentially valuable lines of future research. For example, the original intention of the researcher was to treat anger, dejection, self-confidence, and optimism as separate constructs. However, as seen in Tables 4 and 5, when curling athletes' SECQ responses were factor analyzed, scree test (see Figure 4 and Figure 5) and parallel analysis results (see Table 3) indicated that the latent dimensionality of the SECQ was best represented by two (as opposed to four) factors, with anger and dejection items loading on one factor and self-confidence and optimism items loading on another factor. Although the two-factor solution provided a more parsimonious structure to SECQ responses than would have been represented by a four-factor solution, it is important to discuss (a) why these results may have occurred, and (b) the potential implications that combining the four constructs into two composite constructs may have for future inferential (and conceptual/ measurement) purposes.

The fact that anger and dejection items loaded on a single factor may not be entirely unexpected in light of previous research that has identified strong (positive) relationships between these constructs. The anger and dejection items

contained within the SECQ were based upon items taken directly from the Sport Emotion Questionnaire (SEQ) that was developed by Jones et al. (2005). Jones et al. reported a strong positive correlation (r = .73) between anger and dejection factors following a confirmatory factor analysis of SEQ responses provided by 300 male (M age = 21.61 years) and 218 female athletes (M age = 20.71 years) from a variety of sports. The magnitude of this inter-factor correlation indicates that there is a high degree of conceptual and/or empirical overlap between anger and dejection in sport. Other studies have also reported strong positive correlations between the anger and dejection subscales of the SEQ with data provided by team-sport athletes (M age = 20.32 years, r = .90; Allen, Jones, & Sheffield, 2009) and individual-sport athletes (M age = 48.28 years, r = .67; Dewar & Kavussanu, 2011).

Despite the strong positive relationships that have been shown to exist between anger and dejection in sport, it should be acknowledged that anger and dejection may still "represent qualitatively different experiences" for athletes (Jones et al., 2005, p. 425) because the two constructs are believed to have different antecedent conditions. Anger can occur when an athlete perceives that an unjust demeaning offense has been committed toward the athlete by the self or by others (Lazarus, 2000), whereas dejection can occur following an individual's perception that the likelihood of achieving a highly valued goal has become greatly reduced or entirely diminished (Jones et al., 2005). If anger and dejection do indeed have different antecedent conditions, it is entirely possible that athletes can become angry while experiencing little (if any) dejection (and vice versa). For

example, a competitive curling athlete could become angry with him/herself following a careless throwing error that resulted from a lack of attention to the task (i.e., a mistake has happened that should not have happened) but the same athlete may experience no dejection because the mistake is perceived as having little (if any) impact upon the team's chances of competitive success (i.e., the goal of beating the opposing team has not been diminished). In contrast, the athlete may become dejected by the consistently superior play of an opposing team that creates an almost insurmountable lead for the opposing team on the scoreboard (i.e., the goal of competitive success is greatly diminished), yet the athlete may experience no sense of anger because he/she is also playing consistently well and the opposing team is deserving of its lead based on superior play (i.e., there is no perception of injustice or a demeaning offense against oneself).

It is possible that the failure scenarios employed in this study contained the antecedent conditions that elicited anger and dejection to the same degree for the curling athletes; this would produce similar intensity patterns of anger and dejection responses among participants, which would produce high correlations among the items of the two subscales that would ultimately contribute to the creation of a composite factor in the factor analysis. Alternatively, it is also possible that athletes in this study simply did not differentiate between anger and dejection, and therefore responded with a more general negative reactive emotional state following a personal mistake or failure. In light of the current findings, it is recommended that investigators give careful consideration to the antecedent conditions that are embedded within failure situations in future

research that is designed to determine if anger and dejection (following failure in sport) should be measured and conceptualized as separate or combined constructs.

The fact that self-confidence and optimism also loaded on a common factor is also noteworthy and may not be overly surprising given Carver et al.'s (2010) position that (dispositional) optimism is a generalized version of confidence and that people who are generally optimistic "should tend to be confident and persistent in the face of diverse life challenges" (p. 880). Previous research in sport has confirmed that dispositional optimism is positively correlated with athletes' beliefs (i.e., confidence) in their abilities to perform. For example, Nicholls et al. (2008) found that confidence was positively correlated with trait optimism ($r = .38$, $p < .01$) in a large sample of athletes ($N = 677$; M age = 22.66 years) who competed in a variety of competitive levels ranging from international-level sport to beginner-level sport. In other words, as an athlete's level of self-confidence increases, there appears to be a corresponding increase in the likelihood of the athlete believing that good things will happen in the future (i.e., optimism). To the best of the researcher's knowledge, this thesis is the first study of its kind to measure self-confidence and optimism as state-constructs (as opposed to dispositional/trait-constructs) together in sport. Consequently, further research is required to determine if there are any conceptual (or empirical) advantages (or disadvantages) to measuring state self-confidence and state-optimism as combined or separate constructs in competitive sport settings.

The self-confidence items in this study were intended to examine athletes' momentary beliefs about their own abilities to perform well, whereas the

optimism items in this study were intended to examine athletes' beliefs about the overall likelihood of achieving competitive success immediately after the mistake had occurred. In light of the factor analytic results, it is possible that participants interpreted the self-confidence items in terms of momentary confidence in both their own abilities and their team's abilities to "meet the challenge," "perform well," and "come through under pressure" (see items 7, 10, and 18 respectively in Tables 4 and 5). Although this explanation is entirely speculative, future research in team-sport settings may wish to examine the extent to which athletes interpret self-confidence items (in failure situations) in terms of confidence in their own individual abilities or in terms of confidence in their team's abilities. Irrespective of future research directions, the fact that athletes reported lower self-confidence/optimism levels following failure in high- as opposed to low-criticality situations in competition appears to support the position that self-confidence and optimism levels may shift from moment to moment (see Carver et al., 2010), and that there may be value in conceptualizing and measuring optimism as a state-like construct (rather than a purely dispositional construct) in sport.

As seen in Table 9, there were no differences in the proportional representation of male and female athletes across the three perfectionism clusters (indicating that the composition of the perfectionism clusters did not appear to be influenced by gender). Nevertheless, data analyses conducted prior to the cluster analyses did indicate that female athletes had significantly lower doubts about actions and significantly higher organization levels than male athletes. The corresponding effect sizes for these gender differences were moderate in size, and

although it is unclear why these gender differences occurred, it should be noted that previous research has also found significant differences in perfectionism levels between male and female athletes (e.g., Dunn et al., 2005). It is therefore recommended that researchers who work with male and female athletes in a single study should check for gender differences prior to potentially combining the perfectionism data of male and female participants into a single data set for analytic purposes.

One important change that was made to the Sport-MPS-2 in this study (relative to previous studies that have used the Sport-MPS or Sport-MPS-2) relates to the reduction in the number of perceived parental pressure items that were used. Specifically, only four of the original nine items from the PPP subscale were used in this study in an effort to reduce the overall time that it would take respondents to complete the questionnaire package. The fact that all four PPP items demonstrated excellent simple structure (Thurstone, 1947), all four items had factor loadings ≥.53 on the PPP factor (see Table 2), and the resulting four-item PPP subscale had an acceptable level of internal consistency ($\alpha = .79$) indicates that an abbreviated version of the PPP subscale may be worth using in future research settings. However, before employing an abbreviated version of the PPP subscale in future investigations, more research involving different samples of athletes (from different sports, with different age groups, and different competitive levels) is required to determine if important information about PPP is lost (or if the content representativeness of the subscale is undermined: see Messick, 1989) following the deletion of these items.

Limitations

Although the overall results of this study are theoretically interpretable and support the view that both perfectionism and situation criticality play a role in the emotional and cognitive responses of athletes following mistakes in sport (see Vallance et al., 2006), the study is not without limitations. For example, it must be acknowledged that participants reported the intensity of their emotional and cognitive responses that they *thought* they would experience if they encountered the failure scenarios that were presented. As such, athletes' actual state-levels of anger, dejection, self-confidence, and optimism following mistakes in competition were not assessed. This may undermine the validity of inferences that researchers might make regarding state-level responses of athletes in actual failure situations in competition.

Another limitation of this study relates to the fact that no effort was made to assess athletes' threat/harm appraisals in each failure scenario (and the meaning of this failure relative to their achievement goals). This limits the ability of researchers to evaluate potential differences in the underlying appraisal processes that athletes (with different profiles of perfectionism) may use and how these appraisal differences may influence the degree to which anger, dejection, self-confidence, and optimism are experienced following personal mistakes in competition.

It must also be acknowledged that the failure scenarios presented to the athletes may not have been previously experienced by some (or even any) of the athletes who participated in this study. Although this obviously creates inferential

validity problems, it should still be recognized that the researcher went to extensive lengths (through consultations with expert judges and high-level technical officials/coaches from the Canadian Curling Association) to ensure that the scenarios were both realistic and relevant to participants. It must also be acknowledged that many different types of errors can occur in the sport of curling; these can relate to throwing errors, communication errors, sweeping errors, or strategic (game plan) errors that can influence a team's chances of competitive success. It is therefore possible that different failure scenarios may have lead to different emotional and cognitive response patterns among the participants.

As noted previously, the study is limited by the fact that different profiles (i.e., clusters) of perfectionism may have emerged if different measures of perfectionism were employed. Although the Sport-MPS-2 has been established as a valid and reliable measure of perfectionism in sport (see Gotwals & Dunn, 2009; Gotwals et al., 2010), other domain-specific measures (e.g., the MIPS: Stöber et al., 2004) and global measures of perfectionism exist (e.g., Frost-MPS [Frost et al., 1990]; Hewitt-MPS [Hewitt & Flett, 1991]; Almost Perfect Scale-Revised [Slaney, Rice, Mobley, Trippi, & Ashby, 2001]); use of these other measures may have changed the athlete composition of the clusters (or even changed the number and/or theoretical interpretability of the clusters). Indeed, the fact that 52.6% of athletes within the present sample did not work with a coach prevented the researcher from making inferences about the potential role that differences in perceived coach pressure may have had upon the emotional and cognitive responses of athletes following a mistake or failure.

As is the case with most studies that employ cluster analytic techniques, the clusters that emerged and the corresponding interpretation of the clusters were largely dependent upon the sample-specific data obtained within the study. In other words, when statements are made about athletes having high or low perfectionistic strivings and concerns, these statements are based upon comparisons with other scores from the same data set within this study, yet the same inferences may not be entirely appropriate (or valid) in another data set. For example, the mean personal standards score—a key indicator of perfectionistic strivings—for the cluster of healthy perfectionists in this study was 4.14 (*SD* = .46: see Table 8). However, in a study that generated three profiles (clusters) of perfectionism that also reflected Stoeber and Otto's (2006) tripartite model of perfectionism, Gucciardi et al. (2012) reported a mean personal standards score of 4.37 (*SD* = .71) in an adaptive perfectionism cluster. Thus, it is difficult to determine what absolute scores are needed to classify an athlete (within a single study) as having high (or low) perfectionistic strivings or concerns (see Rice & Ashby, 2007, for a related discussion).

Finally, it must be acknowledged that inferences from the results of this study must be largely limited to competitive (as opposed to recreational) adult athletes in the sport of curling. It is possible that athletes who compete at different competitive levels or who compete in different sports may respond with different levels of anger, dejection, self-confidence, and optimism following mistakes in competition. For example, a high-level singles tennis player may make a mistake (e.g., serve a double fault) at an important stage of a tennis match (e.g., serving at

30-40 when tied 5-5 in the final set). Although the current results would indicate that the tennis player may experience higher anger/dejection and lower self-confidence/optimism (than if the error had occurred earlier in the first set of the match game), the intensity of the anger, dejection, self-confidence, and optimism levels of the tennis player may not be comparable to the curling athletes in this study. It is conceivable that the tennis player may experience higher levels of anger/dejection than curling competitors because the tennis player has no opportunity to diffuse responsibility for the error (whereas the curling athlete may diffuse the degree of personal responsibility for the error by blaming part [or all] of the mistake on the other three members of the team who were directly involved in the outcome of the shot). Having said this, it is also possible that the tennis player may experience less dejection because he/she does not need to rely on teammates to be successful and therefore feels that he/she has a higher level of control over the pending outcome of the match (assuming that the athlete has sufficiently high levels of personal confidence to deal with the situation). Obviously more research is required to assess the degree to which athletes from different sports experience different levels of negative emotional states and future-oriented positive cognitions following instances of mistakes in competition.

Practical Implications and General Conclusions

Overall, the results of this study indicate that different profiles of perfectionism and differences in situation criticality appear to play a role in the emotional and cognitive responses of competitive curling athletes following personal mistakes in competition. These findings have potentially important

implications for athletes and practitioners (e.g., coaches and sport psychologists) who either compete or work in the sport of curling and whose goal is to enhance athletic performance in competition.

Simply making athletes aware of the fact that they are likely to be more emotionally and/or cognitively vulnerable following mistakes in high (as opposed to low) criticality situations may be the first step in helping athletes to quickly (and effectively) cope with any corresponding changes to their emotional and cognitive states. As noted by Ravizza (2006), "awareness is the first step to gaining control of any pressure situation" (p. 228), therefore athletes need to be aware of situations that may differentially impact their emotional and/or cognitive states (following mistakes) and how any corresponding changes in emotional and/or cognitive states may deviate from levels that the athlete typically associates with optimal performance. Stated differently, "in order to compensate and adjust" to unwanted changes in emotional and cognitive states, athletes "must first be aware that they are not where they need to be" (Ravizza, 2006, p. 229) from an emotional or cognitive perspective. Helping athletes to recognize when these changes may occur and what situations are likely to cause these changes may aid athletes to more effectively prepare for these moments and to engage in pre-rehearsed mental skills that can alter emotional and cognitive states to enhance performance (e.g., positive self-talk [see Zinsser et al., 2006], positive imagery [see Vealey & Greenleaf, 2006], and breathing techniques to control arousal [see Williams & Harris, 2006]).

It may also be important to help athletes recognize the implications that heightened anger/dejection and reduced self-confidence/optimism may have upon performance. Although performance (following failure) was not examined in this study, helping athletes to understand the potentially debilitative effects that simultaneous increases in anger/dejection and decreases in self-confidence/optimism can have upon performance (see Carver et al., 2010; Grove & Heard, 1997; Keller & Dauenheimer, 2003; Lazarus, 2000; Nicholls et al., 2008; Norlander & Archer, 2002; Vast et al., 2010) may also provide athletes with a motivational incentive to counter these responses. To this end, encouraging athletes to set process goals (e.g., the athlete focuses on his/her delivery on the next shot) as opposed to outcome goals (e.g., the athlete focuses on beating his/her opponent: see Gould, 2006) may provide some momentary relief from the increased dejection and decreased optimism that may be experienced following a performance error in a high-criticality situation.

With respect to perfectionism, the current results may also have some important practical implications for athletes. One important consideration is helping athletes to understand that the performance goals they set for themselves (and their team) and the way in which they evaluate or judge their performances relative to these goals can both impact the degree to which athletes experience anger/dejection and self-confidence/optimism following mistakes in competition. It is extremely rare that a competitive curling athlete achieves a perfect (100%) shooting percentage for his/her performance in a single game (where a 100% shooting percentage means that the athlete executed every shot/throw exactly as

intended throughout the entire game).[12] The difficulty of achieving a 100% shooting percentage in curling can be seen in an examination of world-class performances: the percentages of the winning teams at the last four World Curling Championships did not exceed 89% for either men or women (World Curling Federation, 2013).[13] As such, the likelihood of committing a performance error in any game is extremely high, even for the best players in the world. Consequently, athletes who have an unhealthy profile of perfectionism (i.e., those who have very high performance standards, engage in overly harsh self-criticism of their performance efforts, and consistently doubt [or are unsatisfied] with their preparation) are particularly vulnerable to experiencing heightened anger/dejection and decreased self-confidence/optimism following performance errors that will almost inevitably occur in competition. It therefore seems prudent that these athletes be made aware of their self-defeating irrational beliefs regarding the manner in which they evaluate their performance endeavours (e.g., performance is only acceptable when absolutely no errors are committed), and that fundamental changes to this belief system are necessary (see Hall et al., 2012) in order to alleviate the potentially debilitative emotional and cognitive responses that these athletes are likely to experience following personal mistakes in competition. As noted by Hall et al., "Interventions aimed at managing perfectionism are clearly unnecessary for people who strive to achieve high

[12] These shooting percentages are subjective and based on statisticians' assessments. There are no separate recordable statistics for sweeping or line calling.

[13] The average shooting percentages of the winning teams of the last four World Curling Championships were 86.75% for men and 82.25% for women. Furthermore, a total of only 35 individual ratings of 100% were achieved in all games at these World Championships, indicating that a 100% shooting percentage is achieved less than 1% of the time by world-class athletes (i.e., 35 times in 4600 player-games).

standards, endorse mastery goals, eschew avoidance goals, and engage in reflective performance appraisal rather than self-critical derision" (p. 166). In contrast, interventions aimed at managing perfectionism for athletes who are rarely satisfied with their performance endeavours (i.e., unhealthy perfectionists) should be encouraged.

Although theorists and researches will typically argue that increased anger/dejection and/or decreased self-confidence/optimism are likely to impede performance in various achievement settings (see Carver et al., 2010; Grove & Heard, 1997; Keller & Dauenheimer, 2003; Lazarus, 2000; Nicholls et al., 2008; Norlander & Archer, 2002; Vast et al., 2010), it is important to recognise that there may be instances when reduced anger and/or heightened optimism may not be entirely beneficial to the performer. For example, Lazarus (2000) proposed that increased anger can sometimes be conducive to athletic performance because anger may lead to the mobilization of energy that may be necessary to improve performance. This might be the case in curling where a front-end (lead or second) player, whose primary role is to powerfully sweep six shots during an end, may benefit from a momentary increase in anger that leads to the mobilization of energy that incites him/her to sweep with more power and/or persistence (on a specific shot). This increased sweeping power may be conducive to a superior outcome (had the shot not received the same degree of sweeping). Similarly there may be times when downward shifts in optimism actually assist an athlete in preparing for (or even avoiding) future disappointment or dejection (Carver et al., 2010; Sweeny et al., 2006). For example, in a three- or four-day curling

competition (like those sampled in this study) where a team may spend up to eight or nine hours competing in a given day, players can become vulnerable to exhausting their physical and mental resources. A team that concedes to an opponent prior to being mathematically defeated in a game (because the team understands the realistic likelihood that the game will be lost) may benefit from the additional rest that conceding affords them (as opposed to playing out the game as a function of unrealistically high optimism in hopes of winning the game). Future research may wish to investigate situational circumstances where heightened anger and decreased optimism may actually help athletes in competitive situations in curling. However, it is still advocated that under most conditions, maintaining relatively low levels of anger/dejection and high levels of self-confidence/optimism in sport will give athletes the best opportunity of being successful in competition (see Carver et al., 2010; Grove & Heard, 1997; Keller & Dauenheimer, 2003; Lazarus, 2000; Nicholls et al., 2008; Norlander & Archer, 2002; Vast et al., 2010).

In the sport of high-level competitive curling where "intense nervous tension and mental pressure [often exist] in a close-scoring game" (Watson, 1950, p. 169), one mistake late in the game has the potential to destroy the performance of an ill-prepared athlete (Lukowich et al., 1986) who cannot effectively control or cope with the myriad of emotional and cognitive responses that may ensue. Indeed, as noted by Lukowich and colleagues (1986)—all of whom won gold medals at World Curling Championships during their respective careers—the ideal circumstance following mistakes in a game is to have a team of "four

players who are able to control their emotions, without anger, [and who] are prepared to retaliate constructively as a team unit" (p. 112) in order to maximise their chances of competitive success. It is hoped that the results of this thesis may pave the way for future research that investigates what these 'constructive retaliations' might look like from the perspective of athletes' perfectionism profiles and their emotional/cognitive responses following personal (or team) failure in competition.

Chapter 6

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Appendices

Appendix A

Demographic Questionnaire

Competitive Curling Questionnaire

Please fill out all of the information requested below. All of the questions that you are answering will remain confidential and are going to be analyzed within a larger sample of questionnaires.

Current Throwing Position (please circle one): Lead Second Third Fourth

Positional Responsibility (please circle one): Front-End Vice-Skip Skip

Age (in years): _____ (years)

Gender (please circle one): Male Female

Years of Competitive Curling: _____ (years)

Do you have a team coach?: (please circle one) Yes No

On average, how many times per week do you practice during the season? _____

Highest Personal Ranking on the Canadian Team Ranking System (CTRS) in *the Last Four Years* (if applicable): _____ (please use supplemental lists if necessary)

◯ Please check this if you have not been on a team that has played in a CTRS-ranked event in the *last four years*.

Highest Level of Competition (circle one if applicable): Regional Provincial National International

Appendix B

Sport Multidimensional Perfectionism Scale-2 (Sport-MPS-2)

INSTRUCTIONS The purpose of this questionnaire is to identify how players view certain aspects of their competitive experiences in sport. Please help us to more fully understand how players view a variety of their competitive experiences by indicating the extent to which you **agree or disagree** with the following statements. (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 experiences on the team that you have most recently played with. **There are no right or wrong answers** so please don't spend too much time on any one statement; simply choose the answer that best describes how you view each statement.

	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 my 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.	On the day of competition I have a routine that I try to follow.	1	2	3	4	5
5.	I feel like my coach criticizes me for doing things less than perfectly in competition.	1	2	3	4	5
6.	I hate being less than the best at things in my sport.	1	2	3	4	5
7.	I have and follow a pre-competitive routine.	1	2	3	4	5
8.	If I fail in competition, I feel like a failure as a person.	1	2	3	4	5
9.	Only outstanding performance during competition is good enough in my team.	1	2	3	4	5
10.	I usually feel unsure about the adequacy of my pre-competition practices.	1	2	3	4	5

11.	Only outstanding performance in competition is good enough for my coach.	1	2	3	4	5
12.	I rarely feel that my training fully prepares me for competition.	1	2	3	4	5
13.	The fewer mistakes I make in competition, the more people will like me.	1	2	3	4	5
14.	It is important to me that I be thoroughly competent in everything I do in my sport.	1	2	3	4	5
15.	I follow pre-planned steps to prepare myself for competition.	1	2	3	4	5
16.	Prior to competition, I rarely feel satisfied with my training.	1	2	3	4	5
17.	In competition, I never feel like I can quite meet my parents' expectations.	1	2	3	4	5
18.	I think I expect higher performance and greater results in my daily sport-training than most players.	1	2	3	4	5
19.	I feel like I can never quite live up to my coach's standards.	1	2	3	4	5
20.	I feel that other players generally accept lower standards for themselves in sport than I do.	1	2	3	4	5
21.	I should be upset if I make a mistake in competition.	1	2	3	4	5
22.	My coach sets very high standards for me in competition.	1	2	3	4	5
23.	I follow a routine to get myself into a good mindset going into competition.	1	2	3	4	5
24.	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
25.	My coach expects excellence from me at all times: both in training and competition.	1	2	3	4	5
26.	I rarely feel that I have trained enough in preparation for a competition.	1	2	3	4	5

27.	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
28.	I have extremely high goals for myself in my sport.	1	2	3	4	5
29.	Only outstanding performance during competition is good enough in my family.	1	2	3	4	5
30.	I develop plans that dictate how I want to perform during competition.	1	2	3	4	5
31.	I feel like my coach never tries to fully understand the mistakes I sometimes make.	1	2	3	4	5
32.	I set higher achievement goals than most athletes who play my sport.	1	2	3	4	5
33.	I usually have trouble deciding when I have practiced enough heading into a competition.	1	2	3	4	5
34.	People will probably think less of me if I make mistakes in competition.	1	2	3	4	5
35.	I set plans that highlight the strategies I want to use when I compete.	1	2	3	4	5
36.	My parents have always had higher expectations for my future in sport than I have.	1	2	3	4	5
37.	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 C

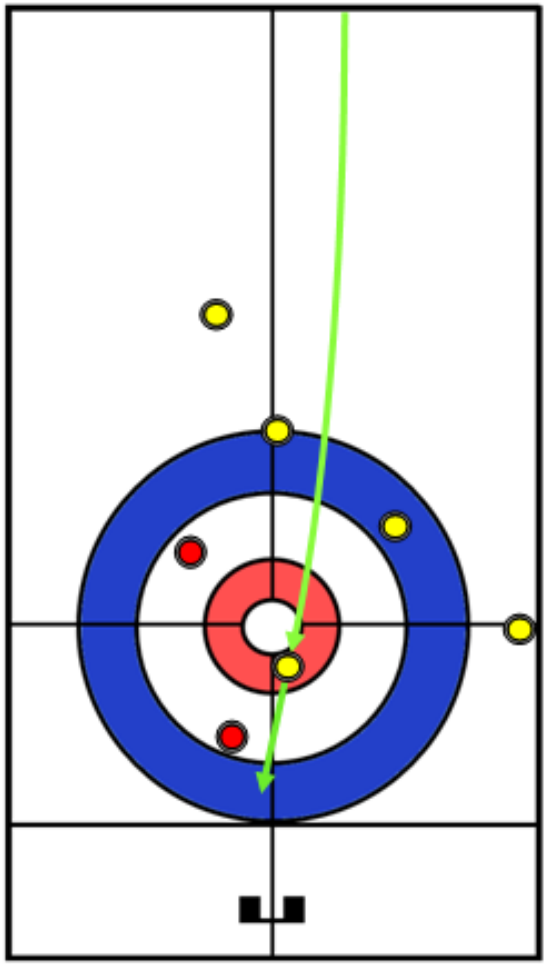
Sport Emotion and Cognition Questionnaire (SECQ)

Imagine you are playing your position with your team in an important game in an important competition. You are playing against an opponent of approximately equal skill in the **second end** of a ten-end game with excellent and consistent playing conditions. Both teams are playing well.

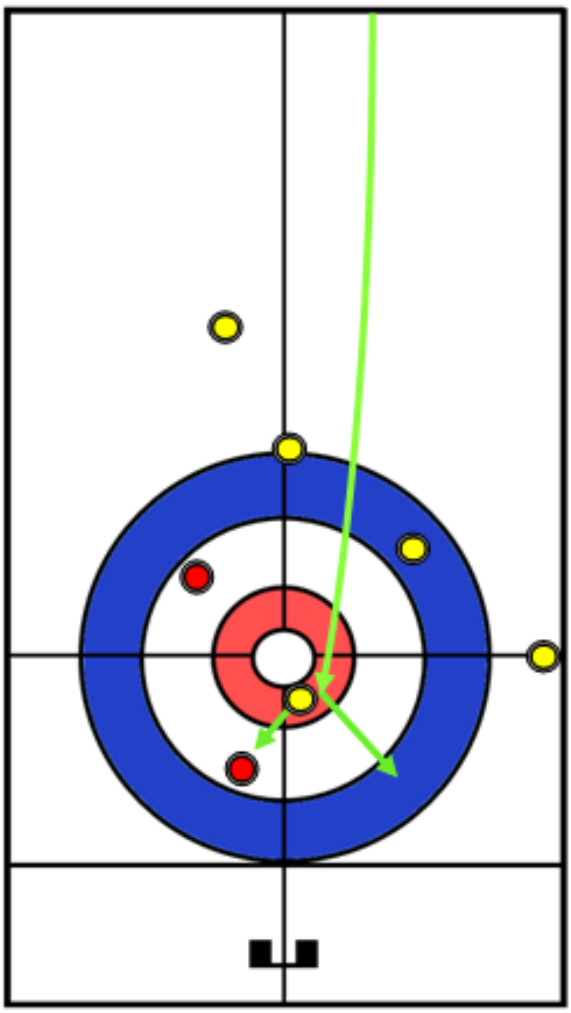
Your team has the hammer. You are playing red stones and it is your (skip's) final shot of the end. There is an open draw to the button for one, but your team is playing well and you decide to play a short tap-back for three that will put your team up 2 points without hammer if the shot is made. If the shot is missed, it could put your team down by 2 points with hammer.

The diagrams below show the scoreboard before the shot is attempted and the shot that your team is attempting to make.

	End	1	2	3	4	5	6	7	8	9	10	11	Total
Your Team		0											0
		1											1



<u>You commit an error (e.g., sweeping error, line calling error, throwing error) and the shot is missed.</u> As a result of your mistake, your team gives up a steal of one. (See diagram below).



Your team now faces a 2-point deficit with 8 ends to play. (See scoreboard below).

	End	1	2	3	4	5	6	7	8	9	10	11	Total
Your Team		0	0										0
		1	1										2

Please read the items on the following page and rate how you would feel or react if this situation had <u>just occurred in the second end of your game.</u>

In the context of the shot described on the previous 2 pages, which of the following errors would you have most likely committed given your position/role on the team (please circle one):

☞Sweeping Error ☞Line Calling Error ☞Throwing Error

If your team had just missed this shot because of your error in the second end of a 10-end game to go down by two points with eight ends to play, <u>how would you feel or react at the start of the next end?</u>

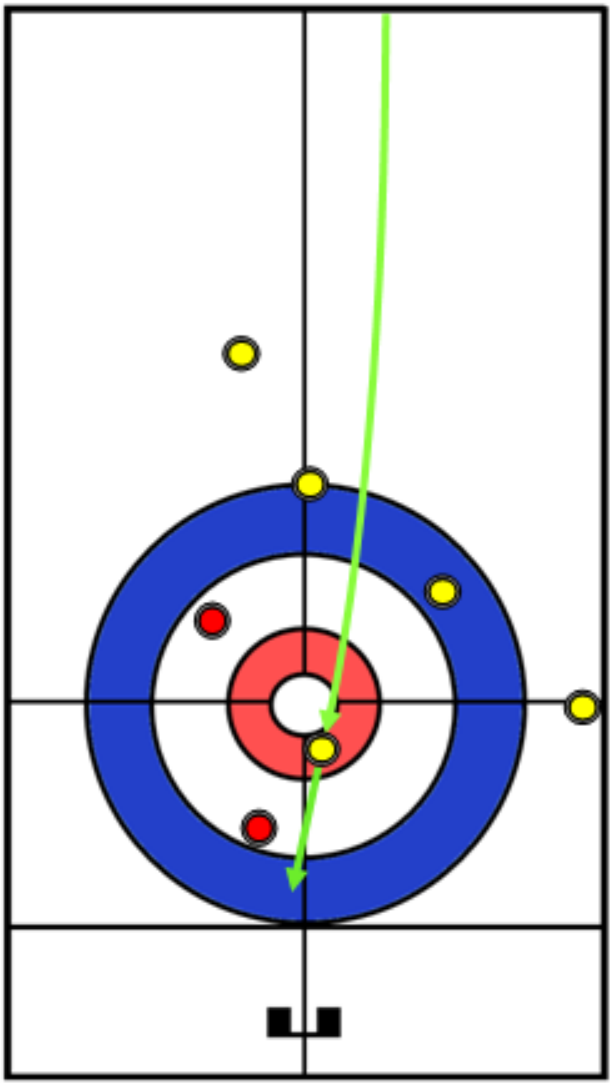
		Not at all		**Somewhat**		**Very Much So**
1.	I would expect more good things than bad things to happen for the rest of the game.	1	2	3	4	5
2.	I would feel irritated.	1	2	3	4	5
3.	I would feel self-confident.	1	2	3	4	5
4.	I would feel upset.	1	2	3	4	5
5.	I would feel that if something can go wrong for the remainder of this game, it will.	1	2	3	4	5
6.	I would feel furious.	1	2	3	4	5
7.	I would feel confident I can meet the challenge.	1	2	3	4	5
8.	I would feel sad.	1	2	3	4	5
9.	I would feel optimistic about the future of this game.	1	2	3	4	5
10.	I would feel confident about performing well.	1	2	3	4	5
11.	I would feel unhappy.	1	2	3	4	5
12.	I would not expect things to go our way for the rest of this game.	1	2	3	4	5
13.	I would feel annoyed.	1	2	3	4	5
14.	I would feel less confident about my ability to perform	1	2	3	4	5
15.	I would feel disappointed.	1	2	3	4	5
16.	I would not count on good things happening for the rest of this game.	1	2	3	4	5
17.	I would feel angry.	1	2	3	4	5
18.	I would feel confident of coming through under pressure.	1	2	3	4	5
19.	I would feel dejected.	1	2	3	4	5
20.	I would expect the best for the rest of this game.	1	2	3	4	5

Imagine you are playing your position with your team in an important game in an important competition. You are playing against an opponent of approximately equal skill in the **eighth end** of a ten-end game with excellent and consistent playing conditions. Both teams are playing well.

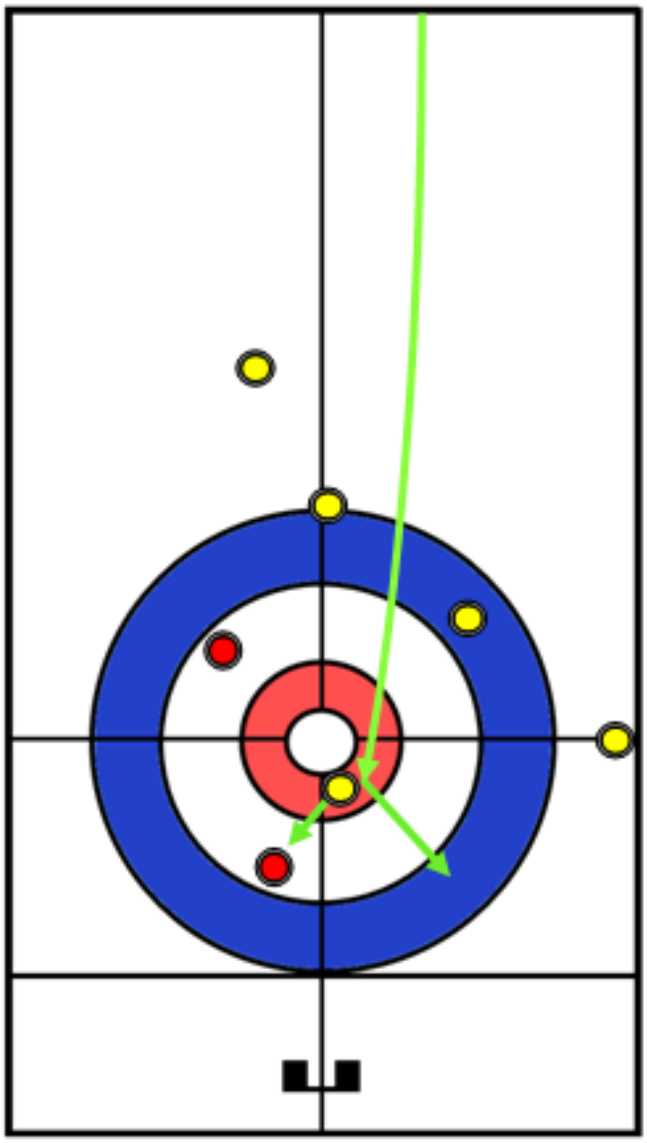
Your team has the hammer. You are playing red stones and it is your (skip's) final shot of the end. There is an open draw to the button for one, but your team is playing well and you decide to play a short tap-back for three that will put your team up 2 points without hammer if the shot is made. If the shot is missed, it could put your team down by 2 points with hammer.

The diagrams below show the scoreboard before the shot is attempted and the shot that your team is attempting to make.

	End	1	2	3	4	5	6	7	8	9	10	11	Total
Your Team		0	2	0	0	1	1	0					4
		1	0	0	2	0	0	2					5



<u>You commit an error (e.g., sweeping error, line calling error, throwing error) and the shot is missed.</u> As a result of your mistake, your team gives up a steal of one. (See diagram below).



Your team now faces a 2-point deficit with 2 ends to play. (See scoreboard below).

	End	1	2	3	4	5	6	7	8	9	10	11	Total
Your Team		0	2	0	0	1	1	0	0				4
		1	0	0	2	0	0	2	1				6

Please read the items on the following page and rate how you would feel or react if this situation had <u>just occurred in the eighth end of your game</u>

In the context of the shot described on the previous 2 pages, which of the following errors would you have most likely committed given your position/role on the team (please circle one):

☞Sweeping Error ☞Line Calling Error ☞Throwing Error

If your team had just missed this shot because of your error in the eighth end of a 10-end game to go down by two points with two ends to play, <u>how would you feel or react at the start of the next end?</u>

		Not at all		**Somewhat**		**Very Much So**
1.	I would expect more good things than bad things to happen for the rest of the game.	1	2	3	4	5
2.	I would feel irritated.	1	2	3	4	5
3.	I would feel self-confident.	1	2	3	4	5
4.	I would feel upset.	1	2	3	4	5
5.	I would feel that if something can go wrong for the remainder of this game, it will.	1	2	3	4	5
6.	I would feel furious.	1	2	3	4	5
7.	I would feel confident I can meet the challenge.	1	2	3	4	5
8.	I would feel sad.	1	2	3	4	5
9.	I would feel optimistic about the future of this game.	1	2	3	4	5
10.	I would feel confident about performing well.	1	2	3	4	5
11.	I would feel unhappy.	1	2	3	4	5
12.	I would expect things to go our way for the rest of this game.	1	2	3	4	5
13.	I would feel annoyed.	1	2	3	4	5
14.	I would feel less confident about my ability to perform	1	2	3	4	5
15.	I would feel disappointed.	1	2	3	4	5
16.	I would count on good things happening for the rest of this game.	1	2	3	4	5
17.	I would feel angry.	1	2	3	4	5
18.	I would feel confident of coming through under pressure.	1	2	3	4	5
19.	I would feel dejected.	1	2	3	4	5
20.	I would expect the best for the rest of this game.	1	2	3	4	5

Appendix D

Information Letter for Expert Judges

Faculty of Physical Education and Recreation

E488 Van Vliet Centre

Edmonton, Alberta, Canada, T6G 2H9

August, 2012

Dear NAME OF JUDGE,

We are currently doing a study looking into curling athletes' responses to failure in curling. This is part of a joint initiative of the **University of Alberta** and the **Canadian Curling Association (CCA)**. The purpose of this letter is to ask for your help to evaluate two curling scenarios. These scenarios will be part of an instrument that we will be giving to athletes in the 2012/2013 season in a larger study of curling athletes. The project is part of Mick Lizmore's Master's thesis (supervised by Dr. John Dunn). There are no direct benefits to you from being part of this study. Your knowledge of the sport of curling will help us to assess how suitable the scenarios are for the study.

We would ask that you fill out the attached package. The package consists of a demographic survey and a brief rating scale. This package should only take about 10 minutes to complete. ***Completion and return of the package indicates your consent to participate in this study***. Not returning the package will indicate a decision ***not*** to participate.

Procedures

(1) An electronic or hard copy of the survey package will be sent to you.

(2) The survey package will take **about 10 minutes** to complete.

(3) The survey package will need to be completed and returned to Mick Lizmore. This can be done by e-mail: ***lizmore@ualberta.ca*** or regular mail to "***Dr. John Dunn, E-488 Van Vliet Centre, Faculty of Physical Education & Recreation, University of Alberta, Edmonton, AB, T6G 2H9***"**).** The package must be returned by **September 1st, 2012** to be part of the study.

Ethical Considerations

(1) Completion and return of this package (to the researcher) indicates your choice to participate in the study.

(2) All individual information you give will be kept strictly confidential. Only the research team (Mick Lizmore and Dr. John Dunn) will have access to your personal results.

(3) There are no known risks associated with the study protocol.

(4) You are free to ask that your data be removed from the study at any time. This request can be made in writing or verbally.

(5) The study has been approved by the Research Ethics Board at the University of Alberta. A copy of the ethics approval is available.

Data and Information

(1) All data will be coded and stored in a locked office. Only the researchers (i.e., Mick Lizmore and Dr. John Dunn) will have access to this office.

(2) All data will be destroyed five years post-publication.

(3) A summary of all judges' ratings of the items will be provided to you upon request. This can be done once all judges' ratings have been collected and analyzed (estimated December 31st, 2012).

(4) We will be happy to discuss any part of the study with you on the phone or over e-mail.

We hope that the information above is clear. Please feel free to contact Mick Lizmore (e-mail: lizmore@ualberta.ca) or Dr. John Dunn (780-492-2831; e-mail: john.dunn@ualberta.ca) with any questions or concerns. If you wish to speak to someone about the ethical issues of the study, please contact the University of Alberta Research Ethics Office, at 780-492-2615.

We hope that you will consider participating in this study. Mick Lizmore will contact you again within the next week (by phone or e-mail). This will be done to check that you received this letter and to answer any questions you might have. If you wish to know more about our current research program before deciding to participate, a summary of Dr. John Dunn's research interests and applied sport psychology work can be found at the following website: http://www.ualberta.ca/~jdunn/.

Thank you.

Sincerely,

Mick Lizmore, B.A. John G. H. Dunn, PhD

Appendix E

Expert Demographic Form

Date:_____

The purpose of this assessment is to obtain your opinion as an expert in curling regarding the degree to which two curling situations differ in terms of situation criticality. Situation criticality refers to the degree to which a game situation is perceived as being important by the performers who find themselves in the situation. Previous research directly examining situation criticality in sport has labelled various situations as "highly critical." For example, an instance in a hockey game where a player misses a clear chance for a goal on a breakaway late in the *third period* of a tied hockey game would be viewed as "highly critical." In contrast, if the same situation had occurred during the *first period* of the game, the situation would be viewed as "less critical."

The two scenarios that you will read on the following pages describe the same situation, with one of the scenarios occurring early in a curling game and the other scenario occurring later in a curling game. The scenarios loosely describe an actual game situation that was taken from a Canadian Curling Association database. The scenarios will eventually be included in an instrument that is being given to competitive and elite curling athletes across Canada at events registered on the Canadian Team Ranking System. We want to ensure that expert judges can identify the differences in situation criticality before we give the questionnaires to the athletes. Your help in this endeavour is much appreciated.

The format of the scenarios you are about to rate is identical to the format that participants will see when they complete questions about their psychological and emotional responses to the scenarios.

Expert Information

Gender (please circle one):	Male Female
Years of Competitive Curling (if applicable):	_____ (years)
Years of Coaching Curling:	_____ (years)
Level of NCCP Curling Coach Certification:	_____
Highest Level of Curling Competition Played (circle one):	None Regional Provincial National International
Highest Curling Achievement (if applicable):	_____

Appendix F

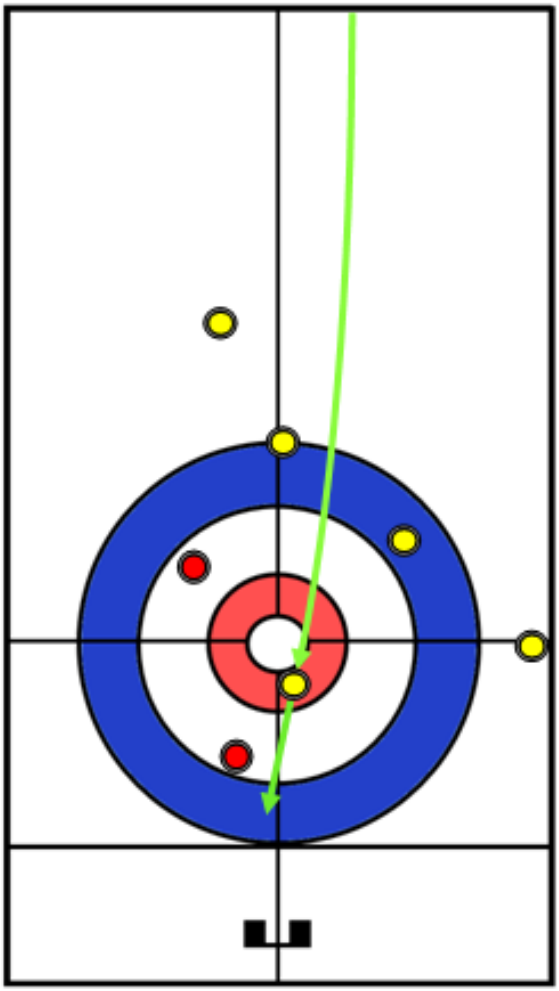
Expert Assessment Form for Situation Relevance, Clarity, and Criticality

Imagine you are playing your position with your team in an important game in an important competition. You are playing against an opponent of approximately equal skill in the **second end** of a ten-end game with excellent and consistent playing conditions. Both teams are playing well.

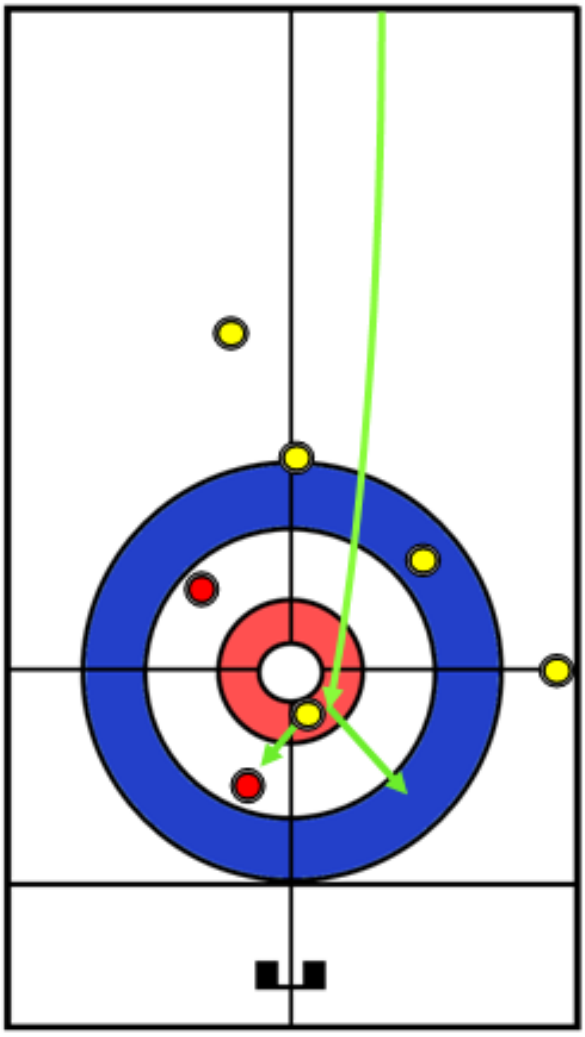
Your team has the hammer. You are playing red stones and it is your (skip's) **final shot** of the end. There is an open draw to the button for one, but your team is playing well and you decide to play a short tap-back for three that will put your team up 2 points without hammer if the shot is made. If the shot is missed, it could put your team down by 2 points with hammer.

The diagrams below show the scoreboard before the shot is attempted and the shot that your team is attempting to make.

	End	1	2	3	4	5	6	7	8	9	10	11	Total
Your Team		0											0
		1											1



<u>You commit an error (e.g., sweeping error, line calling error, throwing error) and the shot is missed.</u> As a result of your mistake, your team gives up a steal of one. (See diagram below).



Your team now faces a 2-point deficit with 8 ends to play. (See scoreboard below).

	End	1	2	3	4	5	6	7	8	9	10	11	Total
Your Team		0	0										0
		1	1										2

Using the following 7-point scale, please rate the degree of <u>situation criticality</u> that you would associate with the situation described on the previous two pages.

Low Criticality						High Criticality
1	2	3	4	5	6	7

On the following 7-point scale, please rate the degree to which you feel the situation describes a relevant/realistic situation that might be encountered by athletes competing at CTRS events.

Not at al relevant/ Realistic						Highly relevant/ realistic
1	2	3	4	5	6	7

On the following 7-point scale, please rate the clarity of the scenario that was described on the previous pages. (Stated differently, how easy was it for you to follow/understand the situation that was described?)

Extremely Unclear (difficult to understand)						Extremely Clear (easy to understand)
1	2	3	4	5	6	7

In the space provided below, feel free to make any additional comments about the scenario that was described on the previous two pages.

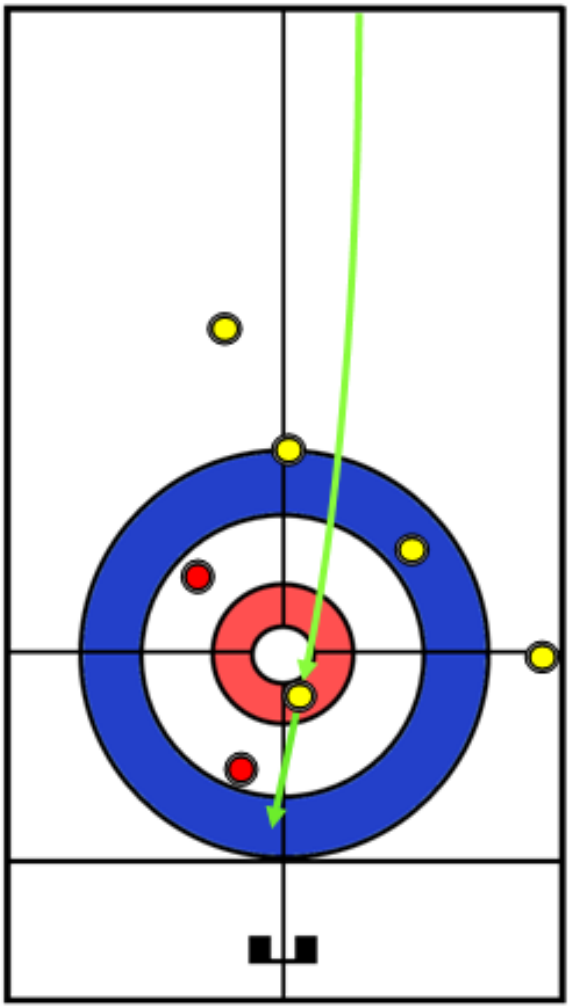
_____
_____
_____
_____
_____
_____

Imagine you are playing your position with your team in an important game in an important competition. You are playing against an opponent of approximately equal skill in the **eighth end** of a ten-end game with excellent and consistent playing conditions. Both teams are playing well.

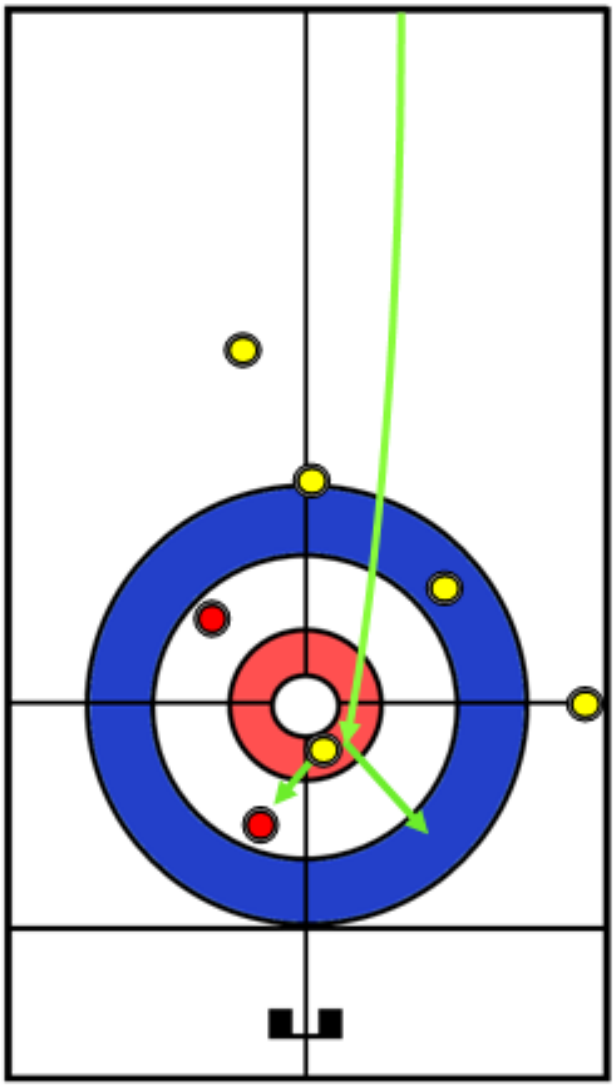
Your team has the hammer. You are playing red stones and it is your (skip's) **final shot** of the end. There is an open draw to the button for one, but your team is playing well and you decide to play a short tap-back for three that will put your team up 2 points without hammer if the shot is made. If the shot is missed, it could put your team down by 2 points with hammer.

The diagrams below show the scoreboard before the shot is attempted and the shot that your team is attempting to make.

	End	1	2	3	4	5	6	7	8	9	10	11	Total
Your Team		0	2	0	0	1	1	0					4
		1	0	0	2	0	0	2					5



<u>You commit an error (e.g., sweeping error, line calling error, throwing error) and the shot is missed.</u> As a result of your mistake, your team gives up a steal of one. (See diagram below).



Your team now faces a 2-point deficit with 2 ends to play. (See scoreboard below).

	End	1	2	3	4	5	6	7	8	9	10	11	Total
Your Team		0	2	0	0	1	1	0	0				4
		1	0	0	2	0	0	2	1				6

Using the following 7-point scale, please rate the degree of <u>situation criticality</u> that you would associate with the situation described on the previous two pages.

Low Criticality						High Criticality
1	2	3	4	5	6	7

On the following 7-point scale, please rate the degree to which you feel the situation describes a relevant/realistic situation that might be encountered by athletes competing at CTRS events.

Not at al relevant/ Realistic						Highly relevant/ realistic
1	2	3	4	5	6	7

On the following 7-point scale, please rate the clarity of the scenario that was described on the previous pages. (Stated differently, how easy was it for you to follow/understand the situation that was described?)

Extremely Unclear (difficult to understand)						Extremely Clear (easy to understand)
1	2	3	4	5	6	7

In the space provided below, feel free to make any additional comments about the scenario that was described on the previous two pages.

_____
_____
_____
_____
_____
_____

****THANK YOU FOR YOUR HELP AND COOPERATION****

Appendix G

Information Letter for Event Organizers

UNIVERSITY OF ALBERTA
Faculty of Physical Education and Recreation

E488 Van Vliet Centre
Edmonton, Alberta, Canada, T6G 2H9

Date

Name
Event
Location
Address

To whom it may concern:

As part of a sport psychology research project **that is a joint initiative between the Faculty of Physical Education and Recreation at the University of Alberta and the Canadian Curling Association (CCA)**, we are currently conducting a study looking into competitive and elite curling athletes' cognitive and emotional responses to failure in curling. The purpose of this letter is to ask for your permission to approach the athlete's during your event. The study is titled ***Motivational Orientations and Reactions to Performance Situations in Curling,*** and will be conducted by Mick Lizmore (under the supervision of Dr. John Dunn) as part of Mick Lizmore's Master's thesis. In the present study we are attempting to:

- examine the relationship between athletes' perfectionist orientations and the cognitive/emotional reactions that are experienced following failure in competition

Perfectionism reflects an intense striving for the attainment of very high performance standards. Cognitive and emotional reactions to failure reflect a variety of responses individuals might have to situations during a curling match.

It is our intention that the results of the study will be used to help researchers and coaches gain a better understanding of both perfectionism and reactions to failure in the sport of curling. We hope that the information will ultimately be used to help practitioners and coaches identify athletes who may be prone to maladaptive reactions to failure and thereby take action to decrease the potential effects that these maladaptive reactions can have in curling. There is currently a lack of research examining the impact that personality (e.g., perfectionism) has on athletes' tendencies to react to failure in adult team sports such as curling. If nothing else, the results of the study will be sued to enhance the self-awareness of curlers to aid them in understanding factors that influence their emotional responses in competition.

We ask for your permission to approach athletes at your event either before the competition begins or during the event (between games). We will never be assessing players during games or when they are on the ice.

Procedures

In terms of the commitments that would be involved for the teams, the following is a summary of the procedures that we would employ at your event:

(1) At the athletes' convenience, they would complete four brief self-report questionnaires to measure demographic characteristics, cognitive and emotional reactions, and perfectionist orientations. (Copies of the questionnaires have been attached for your perusal).
(2) The four questionnaires will take **no more than one 20-minute session** to complete.
(3) The questionnaires would be completed in the curling club and would be scheduled to meet the convenience of the teams.
(4) All questionnaires will be administered by Mick Lizmore. Mick is a second year Master's student working at the University of Alberta in the area of sport psychology under the supervision of Dr. John Dunn.

Ethical Issues

(1) It will be made clear to all athletes that their participation in the study is entirely voluntary, and that their decision to participate (or not) will have no impact upon their playing status on their respective teams or their standing with the CCA.
(2) All information supplied by the players will be kept strictly confidential, and the anonymity of individual players will be ensured at all times. Only the research team will have access to individual results. Teammates, parents, and coaches will not be given access to individual results.
(3) There are no inherent psychological or physical risks associated with the protocol.
(4) The study has been approved by the Research Ethics Board at the University of Alberta. A copy of the ethics clearance is available upon request.

Copies of the information letters and consent forms that we would present to players are attached.

Retention of Data and Information Dissemination

(1) All data will be coded and stored in a locked office to which only the researchers (i.e., Mick Lizmore and Dr. John Dunn) will have access.
(2) All data will be destroyed five years post publication (i.e., following conference presentations, journal publications, etc.).
(3) An executive report of the study's findings will be provided to the CCA.
(4) We will be happy to discuss, on the telephone or over e-mail, any aspect of the study with your organizing committee.
(5) Participants (i.e., the athletes) can ask for a free copy of the report from the researchers when the report has been completed in August of 2013.

We hope that the information above makes our intent and procedures clear. Please feel free to contact Mick Lizmore (e-mail: lizmore@ualberta.ca) or Dr. John Dunn (780-492-2831; e-mail: john.dunn@ualberta.ca) if you have any questions or concerns about the study. If you wish to speak to someone who is not directly involved with this study but understands the ethical issues relating to the study, please contact the University of Alberta Research Ethics Office, at 780-492-2615.

We hope that you will consider our request to allow us to conduct the study. The results of should make a valuable contribution to understanding the attitudes and experiences of competitive curling athletes in Canada. In the event that you wish to know more about our current research program before making any decision about participation, a summary of Dr. John Dunn's research and applied sport psychology consulting work can be found at the following website: http://www.ualberta.ca/~jdunn/

Thank you for your consideration.
Sincerely,

Mick Lizmore, B.S. John G. H. Dunn, PhD

Appendix H

Information Letter for Athletes

UNIVERSITY OF ALBERTA
Faculty of Physical Education and Recreation

E488 Van Vliet Centre
Edmonton, Alberta, Canada T6G 2H9

Date

Dear Curling Athlete,

The purpose of this letter is to ask you to consider participating in a research project. The project is titled *Motivational Orientations and Reactions to Performance Situations in Curling*. This is part of a joint initiative of the **University of Alberta** and the **Canadian Curling Association (CCA)**. The research is part of Mick Lizmore's Masters thesis (supervised by Dr. John Dunn).

The purpose of this study is to examine how the motivations of curling athletes are related to their responses in situations that may occur during a game. The results of this study will have no direct benefits to you at this time. It is hoped that the information you provide will eventually be used to enhance mental skills programs used with curling athletes. These programs could be developed to assist curling athletes in Canada to improve performance.

We would ask that you fill out the attached package. The package consists of a demographic survey and three questionnaires. This package should only take about 20 minutes to complete. You will be asked to provide information about your experiences in curling. You will *not* be asked to put your name on anything. No individual information will be shared with anyone other than the researchers at any time. All data will be coded and stored in a locked office at the University of Alberta. There are no known risks involved with the research.

Please understand that your participation in the study is voluntary. ***Completion and return of the package indicates your consent to participate in this study***. Not returning the package will indicate a decision ***not*** to participate. You are free to ignore any questions that you do not wish to answer. You may decline to participate or withdraw at any time. This decision will not impact your standing with the CCA. A decision to withdraw or not participate can be done either in writing or verbally at any time.

The study has been approved by the Human Research Ethics Board at the University of Alberta. You are not required to participate. The information that you provide will only be accessed by the researchers (i.e., Mick Lizmore and Dr. John Dunn). Information is kept for a period of five years following any publication of the group information. After 5 years all individual information will be destroyed. You can obtain a free copy of the final report by contacting Mick Lizmore or Dr. John Dunn when the report has been completed in August 2013.

We hope that the information above is clear. Please feel free to contact Mick Lizmore (e-mail: lizmore@ualberta.ca) or Dr. John Dunn (780-492-2831; e-mail: john.dunn@ualberta.ca) with any questions or concerns. If you wish to speak to someone about the ethical issues of the study, please contact the University of Alberta Research Ethics Office, at 780-492-2615.

We hope that you will consider this request to participate. We want to reinforce that we only need you for one 20-minute session. We would also like to remind you that ***completion and return of the package indicates your consent to participate in this study***. Not returning the package will indicate a decision ***not*** to participate. If you wish to know more about our current research program before deciding about participation, a summary of Dr. John Dunn's research interests and applied sport psychology work can be found at the following website: http://www.ualberta.ca/~jdunn/

Thank you.

Sincerely,

Mick Lizmore, BA

John G.H. Dunn, PhD

Appendix I

Pattern Coefficients from Principal Axes Factor Analysis of Sport-MPS-2 Data (Four-Factor Model)

Item			Factor			
A[a]	B[b]	Intended subscale	F1	F2	F4	F5
23.	27.	ORG	**0.93**	-0.14	0.00	0.08
8.	9.	ORG	**0.86**	-0.05	0.05	-0.05
4.	5.	ORG	**0.78**	-0.07	-0.04	-0.01
15.	18.	ORG	**0.78**	0.04	0.00	-0.04
30.	34.	ORG	**0.61**	0.09	-0.03	0.01
35.	41.	ORG	**0.55**	0.10	0.05	0.02
32.	36.	PS	0.04	**0.71**	-0.12	-0.10
28.	33.	PS	0.18	**0.65**	-0.02	-0.17
18.	21.	PS	0.12	**0.63**	-0.04	-0.17
7.	8.	PS	0.00	**0.60**	0.11	-0.07
20.	23.	PS	-0.01	**0.52**	0.04	-0.02
14.	17.	PS	-0.04	**0.51**	0.00	-0.26
21.	24.	COM	-0.08	**0.42**	0.12	0.19
37.	42.	COM	-0.01	**0.42**	0.09	0.27
24.	28.	COM	-0.01	**0.38**	0.13	0.26
1.	1.	PS	0.07	**0.36**	-0.12	0.03
2.	2.	COM	0.05	0.30	0.19	0.24
17.	7.	PPP	-0.08	-0.16	**0.79**	-0.03
29.	11.	PPP	0.05	0.07	**0.76**	-0.06
36.	15.	PPP	-0.03	-0.12	**0.72**	-0.02
6.	29.	PPP	0.09	0.02	**0.56**	-0.23
14.	16.	COM	0.00	0.22	**0.38**	**0.32**
12.	14.	DAA	-0.02	-0.18	0.00	**0.59**
16.	20.	DAA	-0.09	-0.10	-0.07	**0.59**
10.	12.	DAA	-0.17	-0.04	-0.03	**0.56**
3.	3.	DAA	-0.07	-0.02	-0.09	**0.56**
33.	37.	DAA	-0.04	0.11	-0.05	**0.52**
26.	31.	DAA	-0.02	-0.22	-0.06	**0.48**
34.	39.	COM	-0.05	0.23	**0.38**	**0.44**
27.	32.	COM	-0.04	0.29	**0.32**	**0.42**
9.	10.	COM	0.03	**0.35**	0.28	**0.38**

Note. Factor loadings ≥ |.30| are in boldface. Subscale abbreviations: PS = personal standards; COM = concern over mistakes; PPP = perceived parental pressure; DAA = doubts about actions; ORG = organization. Interfactor correlations ranged from -.35 ($r_{F1.F4}$) to .25 ($r_{F2.F1}$).

[a]Column A contains the item numbers that correspond to the ordered location of items in the current version of the Sport-MPS-2.

[b]Column B contains the item numbers that correspond to the ordered location of items in the original Sport-MPS-2 (see Gotwals & Dunn, 2009).

Appendix J

Pattern Coefficients from Principal Axes Factor Analysis of Sport-MPS-2 Data (Item 1 Removed)

Item			Factor				
A[a]	B[b]	Intended subscale	F1	F2	F3	F4	F5
23.	27.	ORG	**.91**	.02	-.03	.02	-.11
8.	9.	ORG	**.84**	.07	.01	-.13	-.08
4.	5.	ORG	**.77**	.04	-.08	-.09	-.09
15.	18.	ORG	**.76**	.05	-.03	-.09	.02
30.	34.	ORG	**.60**	-.06	.01	.06	.18
35.	41.	ORG	**.55**	-.08	.10	.10	.21
9.	10.	COM	.04	**.69**	.06	.07	-.02
34.	39.	COM	-.04	**.64**	.17	.16	-.08
27.	32.	COM	-.03	**.64**	.12	.14	-.03
2.	2.	COM	.06	**.61**	-.01	-.06	-.08
37.	42.	COM	.00	**.56**	-.08	.02	.10
24.	28.	COM	.00	**.52**	-.02	.03	.09
14.	16.	COM	.00	**.52**	.22	.11	-.03
21.	24.	COM	-.07	**.48**	-.02	-.02	.12
17.	7.	PPP	-.09	.03	**.76**	.03	-.07
29.	11.	PPP	.03	.11	**.73**	-.02	.10
36.	15.	PPP	-.04	.01	**.73**	.05	-.03
6.	29.	PPP	.07	.00	**.55**	-.17	.07
12.	14.	DAA	.01	.03	.05	**.63**	-.09
16.	20.	DAA	-.06	.07	-.04	**.59**	-.04
10.	12.	DAA	-.14	.08	-.01	**.59**	.03
26.	31.	DAA	.00	-.10	.02	**.57**	-.07
33.	37.	DAA	-.01	.10	-.02	**.55**	.17
3.	3.	DAA	-.05	.13	-.09	**.53**	.00
32.	36.	PS	.03	.02	-.06	.01	**.77**
18.	21.	PS	.11	-.05	.04	-.03	**.72**
20.	23.	PS	-.02	.00	.09	.11	**.62**
28.	33.	PS	.18	.12	-.01	-.15	**.57**
7.	8.	PS	.00	.31	.05	-.16	**.40**
14.	17.	PS	-.04	.15	-.02	-.28	**.36**

Note. Factor loadings ≥ |.30| are in boldface. Subscale abbreviations: PS = personal standards; COM = concern over mistakes; PPP = perceived parental pressure; DAA = doubts about actions; ORG = organization. Interfactor correlations ranged from -.37 ($r_{F1.F4}$) to .37 ($r_{F2.F5}$).

[a]Column A contains the item numbers that correspond to the ordered location of items in the current version of the Sport-MPS-2.

[b]Column B contains the item numbers that correspond to the ordered location of items in the original Sport-MPS-2 (see Gotwals & Dunn, 2009).

Appendix K

Pattern Coefficients from Principal Axes Factor Analysis of SECQ Low-Criticality Data (Item 5 Removed)

Item	Intended subscale	Full item description	Pattern coefficients	
			Factor 1	Factor 2
17.	Ang.	I would feel angry.	**.89**	.12
4.	Dej.	I would feel upset.	**.80**	-.04
6.	Ang.	I would feel furious.	**.78**	.17
13.	Ang.	I would feel annoyed.	**.77**	-.06
2.	Ang.	I would feel irritated.	**.74**	.02
15.	Dej.	I would feel disappointed.	**.73**	-.01
11.	Dej.	I would feel unhappy.	**.67**	-.16
19.	Dej.	I would feel dejected.	**.57**	-.12
8.	Dej.	I would feel sad.	**.38**	-.16
18.	Con.	I would feel confident of coming through under pressure.	.10	**.86**
10.	Con.	I would feel confident about performing well.	.05	**.79**
7.	Con.	I would feel confident I can meet the challenge.	.09	**.76**
20.	Opt.	I would expect the best for the rest of the game.	.00	**.70**
9.	Opt.	I would feel optimistic about the future of this game.	-.09	**.60**
3.	Con.	I would feel self-confident.	-.04	**.56**
1.	Opt.	I would expect more good things than bad things to happen for the rest of this game.	-.07	**.40**
14.	Con.	I would feel less confident about my ability to perform. (R)	-.15	**.39**

Note. Factor loadings ≥ |.30| are in boldface. Interfactor correlation = -.41.

Intended-subscale abbreviations: Ang. = anger; Dej. = dejection; Con. = self-confidence; Opt. = optimism.

Appendix L

Pattern Coefficients from Principal Axes Factor Analysis of SECQ High-Criticality Data (Item 5 Removed)

Item	Intended subscale	Item description	Pattern coefficients	
			Factor 1	Factor 2
17.	Ang.	I would feel angry.	**.89**	.07
13.	Ang.	I would feel annoyed.	**.84**	.04
4.	Dej.	I would feel upset.	**.79**	.04
6.	Ang.	I would feel furious.	**.79**	.07
11.	Dej.	I would feel unhappy.	**.74**	-.04
15.	Dej.	I would feel disappointed.	**.72**	-.06
2.	Ang.	I would feel irritated.	**.71**	.03
19.	Dej.	I would feel dejected.	**.67**	-.15
8.	Dej.	I would feel sad.	**.42**	-.19
10.	Con.	I would feel confident about performing well.	.07	**.83**
18.	Con.	I would feel confident about coming through under pressure.	.10	**.81**
7.	Con.	I would feel confident I can meet the challenge.	-.04	**.77**
3.	Con.	I would feel self-confident.	.02	**.60**
14.	Con.	I would feel less confident about my ability to perform. (R)	.06	**.58**
20.	Opt.	I would expect the best for the rest of this game.	-.23	**.55**
9.	Opt.	I would feel optimistic about the future of this game.	-.25	**.52**
1.	Opt.	I would expect more good things than bad things to happen for the rest of the game.	-.18	**.43**

Note. Factor loadings ≥ |.30| are in boldface. Interfactor correlation = -.46.

Intended-subscale abbreviations: Ang. = anger; Dej. = dejection; Con. = self-confidence; Opt. = optimism.

Appendix M

Descriptive Statistics and Univariate Test Statistics for Between-Cluster Comparisons of Mean Sport-MPS-2 *z*-Scores in the Two-Cluster Solution (Following a Hierarchical Cluster Analysis)

	Cluster (N = 341)						
	Cluster 1 (n = 233)		Cluster 2 (n = 108)				
	Raw scores	*z*-scores	Raw scores	*z*-scores	Univariate test statistics [a]		
Subscale	*M/SD*	*M/SD*	*M/SD*	*M/SD*	$F(1,339)$	p	η^2_p
PS	3.61/.71	-.20/1.03	4.06/.46	.46/.68	36.92	< .001	.10
COM	2.19/.53	-.42/.74	3.16/.59	.93/.83	228.82	< .001	.40
PPP	1.81/.57	-.37/.72	2.73/.82	.81/1.04	147.18	< .001	.30
DAA	2.08/.61	-.22/.92	2.52/.65	.47/.96	40.60	< .001	.11
ORG	3.64/.73	.06/.97	3.54/.76	-.08/.99	1.40	= .238	.00

Note. Subscale abbreviations: PS = personal standards; COM = concern over mistakes; PPP = perceived parental pressure; DAA = doubts about actions; ORG = organization.

[a]Statistical tests to examine between-cluster differences were computed on *z*-scores rather than raw scores.

Appendix N

Descriptive Statistics and Univariate Test Statistics for Between-Cluster Comparisons of Mean Sport-MPS-2 *z*-Scores in the Three-Cluster Solution (Following a Hierarchical Cluster Analysis)

	Cluster (*N* = 341)								
	Cluster 1 (*n* = 85)		Cluster 2 (*n* = 148)		Cluster 3 (*n* = 108)				
	Raw scores	*z*-scores	Raw scores	*z*-scores	Raw scores	*z*-scores	Univariate test statistics [a]		
Subscale	*M/SD*	*M/SD*	*M/SD*	*M/SD*	*M/SD*	*M/SD*	*F*(2,338)	*p*	η^2_p
PS	4.16/.47	$.61_a$/.68	3.29/.62	$-.67_b$/.90	4.06/.46	$.46_a$/.68	98.07	<.001	.37
COM	2.35/.58	$-.19_a$/.81	2.10/.48	$-.55_b$/.66	3.16/.59	$.93_c$/.83	124.32	<.001	.42
PPP	1.87/.57	$-.30_a$/.71	1.78/.57	$-.41_a$/.72	2.73/.82	$.81_b$/1.04	73.98	<.001	.30
DAA	1.59/.42	$-.97_a$/.64	2.35/.52	$.21_b$/.77	2.52/.65	$.47_c$/.96	85.88	<.001	.34
ORG	4.09/.49	$.66_a$/.64	3.39/.73	$-.29_b$/.96	3.54/.76	$-.08_b$/.99	30.61	<.001	.15

Note. *z*-score means with different subscripts indicate within-row differences between clusters following post-hoc independent *t*-tests with Bonferroni corrections (all *p*s < .05). Subscale abbreviations: PS = personal standards; COM = concern over mistakes; PPP = perceived parental pressure; DAA = doubts about actions; ORG = organization.

[a] Statistical tests to examine between-cluster differences were computed on *z*-scores rather than raw scores.

Appendix O

Descriptive Statistics and Univariate Test Statistics for Between-Cluster Comparisons of Mean Sport-MPS-2 *z*-Scores in the Four-Cluster Solution (Following a Hierarchical Cluster Analysis)

	Cluster (*N* = 341)										
	Cluster 1 (*n* = 85)		Cluster 2 (*n* = 148)		Cluster 3 (*n* = 29)		Cluster 4 (*n* = 79)				
	Raw scores	*z*-scores	Raw scores	*z*-scores	Raw scores	*z*-scores	Raw scores	*z*-scores	Univariate test statistics[a]		
Subscale	*M/SD*	*M/SD*	*M/SD*	*M/SD*	*M/SD*	*M/SD*	*M/SD*	*M/SD*	*F*(3,337)	*P*	η^2_p
PS	4.16/.47	$.61_a$/68	3.29/.62	$-.67_b$/.90	3.90/.50	$.23_a$/.90	4.12/.44	$.54_a$/.63	66.99	<.001	.37
COM	2.35/.58	$-.19_a$/.81	2.10/.48	$-.55_b$/.66	3.42/.53	1.29_c/.76	3.07/.59	$.80_d$/.82	87.88	<.001	.44
PPP	1.87/.57	$-.30_a$/71	1.78/.57	$-.41_a$/.72	1.88/.59	$-.27_a$/.77	3.04/.65	1.21_b/.82	87.67	<.001	.44
DAA	1.59/.42	$-.97_a$/64	2.35/.52	$.21_b$/.77	2.94/.57	1.09_c/.74	2.37/.61	$.24_b$/.93	69.81	<.001	.38
ORG	4.09/.49	$.66_a$/64	3.39/.73	$-.29_b$/.96	2.84/.55	-1.02_c/.69	3.79/.66	$.27_d$/.85	39.93	<.001	.26

Note. *z*-score means with different subscripts indicate within-row differences between clusters following post-hoc independent *t*-tests with Bonferroni corrections (all *p*s < .05). Subscale abbreviations: PS = personal standards; COM = concern over mistakes; PPP = perceived parental pressure; DAA = doubts about actions; ORG = organization.

[a]Statistical tests to examine between-cluster differences were computed on *z*-scores rather than raw scores.