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Passfield, Louis (2015) Perfectionism and Burnout in Junior  
Athletes: A Three-Month Longitudinal Study. *Journal of Sport and  
Exercise Psychology*, 37 (3). pp. 305-315.

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Madigan, D. J., Stoeber, J., & Passfield, L. (2015). Perfectionism and burnout in junior athletes: A three-month longitudinal study. *Journal of Sport & Exercise Psychology*, 37, 305-315.

Perfectionism and Burnout in Junior Athletes:  
A Three-Month Longitudinal Study

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## Abstract

1  
2 Perfectionism in sports has been shown to be associated with burnout in athletes. Whether  
3 perfectionism predicts longitudinal changes in athlete burnout, however, is still unclear. Using a  
4 two-wave cross-lagged panel design, the present study examined perfectionistic strivings,  
5 perfectionistic concerns, and athlete burnout in 101 junior athletes (mean age 17.7 years) over 3  
6 months of active training. When structural equation modeling was employed to test a series of  
7 competing models, the best-fitting model showed opposite patterns for perfectionistic strivings  
8 and perfectionistic concerns. Whereas perfectionistic concerns predicted increases in athlete  
9 burnout over the 3 months, perfectionistic strivings predicted decreases. The present findings  
10 suggest that perfectionistic concerns are a risk factor for junior athletes contributing to the  
11 development of athlete burnout whereas perfectionistic strivings appear to be a protective factor.

12 *Keywords:* perfectionistic strivings, perfectionistic concerns, athlete burnout, junior  
13 athletes, longitudinal study  
14

## 1 Perfectionism and Burnout in Junior Athletes:

## 2 A Three-Month Longitudinal Study

3 Athlete burnout is an extreme form of sport disaffection the symptoms of which include a  
4 reduced sense of accomplishment, physical and emotional exhaustion, and sport devaluation  
5 (Raedeke & Smith, 2001). Burnout can have serious consequences for athletes, not only  
6 negatively impacting motivation and well-being but also resulting in reduced athletic  
7 performance and eventual drop-out from sport (Cresswell & Eklund, 2006; Gustafsson, Kenttä, &  
8 Hassmén, 2011). Athlete burnout is not just a risk to adult athletes with an established career of  
9 sports training and competition. Junior athletes are also at risk (e.g., Gould, Udry, Tuffey, &  
10 Loehr, 1996; Hill, Hall, Appleton, & Kozub, 2008; Jowett, Hill, Hall, & Curran, 2013).  
11 Consequently, considerable effort in sport and exercise psychology has been devoted to  
12 identifying personal and situational factors that contribute to athlete burnout. One personal factor  
13 that is supposed to contribute to athlete burnout is perfectionism (e.g., Appleton, Hall, & Hill,  
14 2009; Chen, Kee, Chen, & Tsai, 2008; Gotwals, 2011).

15 **Perfectionism**

16 Perfectionism is a personal disposition characterized by striving for flawlessness and  
17 setting exceedingly high standards for performance accompanied by tendencies for overly critical  
18 evaluations of one's behavior (Flett & Hewitt, 2002; Frost, Marten, Lahart, & Rosenblate, 1990;  
19 Hewitt & Flett, 1991). Consequently, perfectionism is best conceptualized as a multidimensional  
20 personality disposition (Enns & Cox, 2002). Factor analyses comparing various measures of  
21 multidimensional perfectionism have found two underlying dimensions: *perfectionistic strivings*  
22 (also called personal standards perfectionism) comprising perfectionist personal standards and a  
23 self-oriented striving for perfection and *perfectionistic concerns* (also called evaluative concerns  
24 perfectionism) comprising concerns about making mistakes, feelings of discrepancy between

1 one's standards and performance, and fears of negative evaluation and rejection by others if one  
2 fails to be perfect (see Stoeber & Otto, 2006, for a review).

3 The differentiation between perfectionistic strivings and perfectionistic concerns is of key  
4 importance when investigating the correlates and consequences of perfectionism because the two  
5 dimensions have shown different, sometimes opposite relationships. Whereas perfectionistic  
6 concerns consistently show positive relationships with negative processes and outcomes (e.g.,  
7 maladaptive coping, negative affect), perfectionistic strivings often show negative relationships  
8 with negative processes and outcomes and positive relationships with positive processes and  
9 outcomes (e.g., adaptive coping, positive affect; see again Stoeber & Otto, 2006). The same  
10 differential pattern of relationships has been found for perfectionism in sport. Whereas  
11 perfectionistic concerns in athletes are consistently associated with negative processes and  
12 outcomes, perfectionistic strivings in athletes are often associated with positive processes and  
13 outcomes (or inversely associated with negative processes and outcomes) particularly when the  
14 overlap with perfectionistic concerns is controlled for (see Stoeber, 2011, and Gotwals, Stoeber,  
15 Dunn, & Stoll, 2012, for reviews).

### 16 **Perfectionism and Athlete Burnout**

17 Regarding the development of athlete burnout, a number of theoretical models have been  
18 proposed (see Cresswell & Eklund, 2006, for a review). Of these, Smith's (1986) cognitive-  
19 affective model has received the greatest amount of empirical support. This model suggests that  
20 burnout is the product of chronic psychosocial stress. Consequently, personal factors that put  
21 athletes at risk of experiencing higher levels or more prolonged episodes of stress may contribute  
22 to athletes' developing symptoms of burnout. Because perfectionism is a personal factor that is  
23 associated with higher levels of daily stress (e.g., Hewitt & Flett, 1993), perfectionism in sport is  
24 regarded a contributing factor to athlete burnout.

1 A differential pattern of relationships for perfectionistic strivings and perfectionistic  
2 concerns has been found when investigating perfectionism and athlete burnout (Appleton et al.,  
3 2009; Chen et al., 2008; Gould et al., 1996). Hill et al. (2008), for example, examined  
4 perfectionism and athlete burnout in junior soccer players using self-oriented perfectionism and  
5 socially prescribed perfectionism,<sup>1</sup> which have been used as indicators of perfectionistic strivings  
6 and perfectionistic concerns (cf. Stoeber & Otto, 2006). Hill et al. (2008) found only  
7 perfectionistic concerns to show a positive relationship with burnout. In contrast, perfectionistic  
8 strivings showed a negative relationship with burnout once the overlap with perfectionistic  
9 concerns was controlled for. The same pattern of relationships has been found in multi-sport  
10 samples of junior athletes. Jowett et al. (2013), for example, examined junior athletes using the  
11 same indicators as Hill et al. (2008) of perfectionistic strivings and concerns. They too found only  
12 perfectionistic concerns to show a positive relationship with burnout whereas perfectionistic  
13 strivings showed a negative relationship once the overlap with perfectionistic concerns was  
14 controlled for (see also Appleton et al., 2009; Appleton & Hill, 2012).

### 15 **Limitations of Previous Research**

16 The studies on perfectionism and athlete burnout have provided important insights into the  
17 differential relationships that perfectionistic strivings and perfectionistic concerns show with  
18 burnout. In addition, the studies have suggested a number of possible explanations why  
19 perfectionistic concerns, but not strivings show positive relationships with athlete burnout.

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<sup>1</sup>Self-oriented perfectionism is an internally motivated form of perfectionism focused on high personal standards of performance whereas socially prescribed perfectionism is an externally motivated form of perfectionism focused on concerns about how others evaluate one's performance (Hewitt & Flett, 1991).

1 However, the studies have the limitation that they all employed cross-sectional designs and thus  
2 cannot provide evidence regarding the temporal (and possibly causal) relationships between  
3 perfectionism and athlete burnout. Consequently, there have been calls to examine the  
4 perfectionism–burnout relationship in athletes longitudinally (e.g., Cresswell & Eklund, 2006;  
5 Hill, Hall, Appleton, & Murray, 2010) to answer the important question of whether  
6 perfectionistic concerns are only a correlate of athlete burnout or whether perfectionistic concerns  
7 lead to increased burnout.

8         So far, only one study (Chen, Kee, & Tsai, 2009) has investigated the perfectionism–  
9 burnout relationship in athletes employing a longitudinal design. Examining perfectionism and  
10 burnout in junior athletes from schools over three months, the study used striving for perfection  
11 and negative reactions to imperfection as indicators of perfectionistic strivings and perfectionistic  
12 concerns (cf. Stoeber, Otto, Pescheck, Becker, & Stoll, 2007; Stoeber, Stoll, Salmi, & Tiikkaja,  
13 2009). The two perfectionism dimensions showed the expected cross-sectional relationships:  
14 Perfectionistic concerns showed positive correlations with two symptoms of athlete burnout  
15 (reduced sense of accomplishment, sport devaluation) while perfectionistic strivings showed  
16 negative correlations with all three symptoms (reduced sense of accomplishment, sport  
17 devaluation, physical and emotional exhaustion). Neither perfectionistic concerns nor  
18 perfectionistic strivings predicted changes in burnout across the three-month interval when a  
19 conventional level of significance ( $p < .05$ ) was applied. However, when marginally significant  
20 effects ( $p < .10$ ) were taken into account, perfectionistic strivings predicted longitudinal  
21 decreases in physical and emotional exhaustion.

22         Although Chen et al.'s (2009) study—providing the first longitudinal investigation of the  
23 perfectionism–burnout relationship in athletes—made a significant novel contribution to the  
24 literature on perfectionism and athlete burnout, their findings are surprising given that

1 longitudinal research investigating burnout in a work domain has found that perfectionistic  
2 concerns and doubts about actions—an aspect of perfectionism closely related to perfectionistic  
3 concerns—predicted increases in job burnout over time (Childs & Stoeber, 2012; Flaxman et al.,  
4 2012). We think that Chen et al.'s (2009) study had two limitations. First, data collection took  
5 place during the school summer holidays when junior athletes were not involved in active  
6 training. This is important because, according to Smith's (1986) cognitive-affective model,  
7 athlete burnout is a product of chronic stress, and research has shown consistent positive  
8 relationships between training load, perceived stress, and athlete burnout (see Goodger, Gorely,  
9 Lavalley, & Harwood, 2007, for a review). If junior athletes were on holiday, it can be expected  
10 that they had a lower training load and thus experienced less stress and risk of burnout than  
11 during term time. Consequently, results may be different if junior athletes are examined during  
12 the school term when they are in active training.

13       Second, Chen et al.'s (2009) study measured athlete burnout at the beginning and at the end  
14 of the three-month interval, but perfectionism only at the beginning. Hence the study could not  
15 examine the question of possible reciprocal pathways in the perfectionism–burnout relationship  
16 (viz. whether athlete burnout predicts longitudinal changes in perfectionistic strivings or  
17 concerns). According to a developmental analysis of perfectionism (Flett, Hewitt, Oliver, &  
18 Macdonald, 2002), one key factor in the development of perfectionism is social expectation (see  
19 also Damian, Stoeber, Negru, & Băban, 2013). If junior athletes display symptoms of burnout  
20 this may affect the expectations of significant others (parents, coaches, teammates) which may in  
21 turn affect junior athletes' perfectionism. In what direction, however, is unclear. On the one hand,  
22 junior athletes may perceive others to have lower expectations which, according to the social  
23 expectations model, should lead to reduced perfectionism. On the other hand, junior athletes who  
24 are experiencing symptoms of burnout may worry more about their performance, leading to



1 increased perfectionistic concerns, or compensate for reduced personal accomplishment with  
2 increased perfectionistic strivings. The latter mechanism may explain why, in a longitudinal  
3 study of perfectionism in employees and job burnout (Houkes, Winants, & Twellar, 2008)  
4 reduced personal accomplishment predicted increases in perfectionism over time. Houkes et al.,  
5 however, used a unidimensional measure of perfectionism. Consequently, it is unclear what  
6 aspect of multidimensional perfectionism may have been responsible for this increase.

### 7 **The Present Study**

8       Against this background, the aim of the present study was to expand on Chen et al.'s (2009)  
9 study and—using the same three-month, two-wave longitudinal design—reinvestigate the  
10 perfectionism–burnout relationship over a period when junior athletes are in active training.  
11 Moreover, the present study used a full cross-lagged design to explore possible reciprocal  
12 relationships of athlete burnout on perfectionism. Else, the present study followed Chen et al.  
13 (2009) and recruited academy athletes (see participants section for details) in line with other  
14 studies that recruited junior athletes from similar settings (e.g., Hill, Hall, & Appleton, 2010;  
15 Jowett et al., 2013).

16       Based on previous theory and empirical evidence from cross-sectional studies on  
17 perfectionism and athlete burnout (and the longitudinal studies showing perfectionistic concerns  
18 to predict increases in job burnout; Childs & Stoeber, 2012; Flaxman et al., 2012), we expected  
19 perfectionistic concerns to predict longitudinal increases in burnout. We also expected  
20 perfectionistic strivings to predict longitudinal changes in athlete burnout, but there were  
21 competing expectations as to the direction of the effect. On the one hand, perfectionistic strivings  
22 have shown negative relationships with athlete burnout in cross-sectional studies. Furthermore,  
23 Chen et al. (2009) found perfectionistic strivings to predict longitudinal decreases in exhaustion.  
24 Consequently, it could be expected that perfectionistic strivings would predict longitudinal

1 decreases in athlete burnout. On the other hand, researchers have cautioned that perfectionistic  
2 strivings—while having positive effects in the short term, for example, in competitions (Stoeber,  
3 Uphill, & Hotham, 2009)—may have detrimental effects on athletes' long-term development  
4 (Hall, 2006; Hall, Hill, & Appleton, 2012). Consequently, it could also be expected that  
5 perfectionistic strivings would predict longitudinal increases in athlete burnout.

## 6 **Method**

### 7 **Participants**

8 A sample of 103 junior athletes (82 male, 21 female) was recruited at two sports academies  
9 (68 from one academy, 35 from the other) to participate in the present study. Sports academies  
10 are part of the United Kingdom's further education system. Their main purpose is to recruit and  
11 develop promising junior athletes by providing them with a professional coaching environment  
12 while they study alongside their sporting commitments. Academy athletes are selected based on  
13 their ability (competitive performance in trials to enter the academy) and regularly compete at a  
14 regional, national, or international level. Participants' mean age was 17.7 years ( $SD = 0.8$ ; range  
15 = 16-19 years). Participants were involved in different sports (47 in soccer, 26 in rugby, 13 in  
16 basketball, 8 in athletics, and 9 in other sports [e.g., cycling, squash]) and trained on average 10.6  
17 hours per week ( $SD = 5.2$ ). Two participants, however, did not complete the measures on both  
18 occasions and so were excluded from the analyses, resulting in a final sample size of  $N = 101$  (80  
19 male, 21 female).

### 20 **Procedure**

21 The study was approved by the university's ethics committee. Informed consent was  
22 obtained from all participants. In addition, parental consent was obtained from participants below  
23 the age of 18 (as per the ethics committee's recommendation). Questionnaires were distributed  
24 during training in the presence of the first author. Participants were administered all measures

1 twice separated by three months, once in January (Time 1 [T1]) and then again in April 2014  
2 (Time 2 [T2]). During this period, all participants were in regular seasonal training and  
3 competition with the exception of those involved in athletics who were in pre-seasonal training.  
4 The three-month interval was considered sufficient because previous research has shown that this  
5 time interval allows researchers to capture changes in athlete burnout during periods of active  
6 training (e.g., Martinent, Decret, Guillet-Descas, & Isoard-Gauthier, 2014; see also Cresswell &  
7 Eklund, 2005). Furthermore, it was the same interval used by Chen et al. (2009).

## 8 **Measures**

9 **Perfectionism.** To measure perfectionism, we used the subscales from two  
10 multidimensional measures of perfectionism in sport: the Sport Multidimensional Perfectionism  
11 Scale (SMPS; Dunn et al., 2006) and the Multidimensional Inventory of Perfectionism in Sport  
12 (MIPS; Stoeber et al., 2007). To measure perfectionistic strivings, we used two indicators: the  
13 MIPS subscale capturing striving for perfection (5 items; e.g. “I strive to be as perfect as  
14 possible”) and the SMPS subscale capturing personal standards (7 items; e.g. “I have extremely  
15 high goals for myself in my sport”), and then standardized the scale scores before combining  
16 them to measure perfectionistic strivings (cf. Dunkley, Zuroff, & Blankstein, 2003). To measure  
17 perfectionistic concerns, we also used two indicators, the SMPS subscale capturing concerns over  
18 mistakes (8 items; e.g., “People will probably think less of me if I make mistakes in  
19 competition”) and MIPS subscale capturing negative reactions to imperfection (5 items; e.g., “I  
20 feel extremely stressed if everything does not go perfectly”), and again standardized the scale  
21 scores before combining them to measure perfectionistic concerns. The four subscales have  
22 demonstrated reliability and validity in numerous studies (e.g., Chen et al., 2009; Dunn et al.,  
23 2006; Stoeber, Uphill, & Hotham, 2009). Moreover, both are reliable and valid indicators of  
24 perfectionistic strivings and perfectionistic concerns (e.g., Gotwals et al., 2012; Stoeber, Stoll, et

1 al., 2009). Participants were asked to indicate to what degree each statement characterized their  
2 attitudes in their sport responding on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

3 **Athlete burnout.** To measure burnout, we used the Athlete Burnout Questionnaire (ABQ;  
4 Raedeke & Smith, 2001). The ABQ comprises three subscales capturing the key symptoms of  
5 athlete burnout: reduced sense of accomplishment (5 items; e.g., “I am not achieving much in my  
6 sport”), physical and emotional exhaustion (5 items; e.g., “I am exhausted by the mental and  
7 physical demands of my sport”), and devaluation (5 items; e.g., “I’m not into my sport like I used  
8 to be”). The subscales were combined to create a total score of athlete burnout (e.g., Hill, 2013).  
9 The ABQ is the most widely-used measure of athlete burnout and has demonstrated reliability  
10 and validity in numerous studies (e.g. Cresswell & Eklund, 2005; Lemyre, Roberts, & Stray-  
11 Gundersen, 2007; Lonsdale & Hodge, 2011). With no particular time frame specified,  
12 participants were asked how often they experienced the symptoms described in the statements  
13 responding on a scale from 1 (*almost never*) to 5 (*almost always*).

## 14 **Results**

### 15 **Preliminary Analyses**

16 First, we inspected the data for missing values. Because very few item responses were  
17 missing ( $i = 8$ ), missing responses were replaced with the mean of the item responses of the  
18 corresponding scale (ipsatized item replacement; Graham, Cumsille, & Elek-Fisk, 2003). Next  
19 we computed Cronbach’s alphas for our variables (see Table 1) which were all satisfactory  
20 except for athlete burnout at T1 ( $\alpha = .68$ ) which was acceptable. Next, following  
21 recommendations by Tabachnick and Fidell (2007), participants’ data were screened for  
22 multivariate outliers regarding the six variables included in the analyses (cf. Table 1). No  
23 participant showed a Mahalanobis distance larger than the critical value of  $\chi^2(6) = 22.46$ ,  $p <$   
24  $.001$ . Finally, we conducted two Box’s  $M$  tests to examine if the variance–covariance matrices

1 showed any differences between academies or gender. Because Box's  $M$  is highly sensitive to  
2 even minor differences, it is tested against a  $p < .001$  significance level (Tabachnick & Fidell,  
3 2007). Both tests were nonsignificant at the  $p < .001$  significance level with  $F_s < 1.72$ ,  $p_s > .022$ .  
4 Therefore, all further analyses were collapsed across academies and gender.

### 5 **Descriptive Statistics and Correlations**

6 The sample reported low-to-moderate levels of burnout at both time points (Table 1). This  
7 is in line with previous cross-sectional research (e.g., Hill, 2013:  $M = 2.16$ ; Jowett et al., 2013:  $M$   
8  $= 2.13$ ).<sup>2</sup> We then inspected the bivariate correlations between all variables (see again Table 1).  
9 All correlations were in line with previous findings from cross-sectional studies except that  
10 perfectionistic concerns did not show significant correlations with athlete burnout. As regards  
11 longitudinal correlations, Chen et al. (2009) reported similar negative correlations between T1  
12 striving for perfection and all T1 and T2 symptoms of burnout (except T1 exhaustion, which was  
13 only marginally significant), but found negative correlations between T1 negative reactions to  
14 imperfection and T1 reduced sense of accomplishment and T1 and T2 devaluation.

### 15 **Structural Equation Modeling**

16 To examine whether perfectionism predicted longitudinal changes in athlete burnout, and  
17 vice-versa, we employed structural equation modeling (SEM) with manifest variables to test and  
18 compare a series of competing cross-lagged models (Kline, 2005). Because Mardia's coefficient  
19 was 9.25 with a critical ratio of 4.74 ( $p < .001$ ) indicating significant deviations of the data from  
20 multivariate normality, we employed Mplus 7.0 (Muthén & Muthén, 1998-2012) using robust

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<sup>2</sup>Chen et al. (2009) used a 6-point scale (instead of the usual 5-point scale) when measuring burnout, so the mean levels of burnout in the present study are not directly comparable to the levels reported by Chen et al.

1 maximum likelihood estimation to test these models, with the accompanying mean-adjusted chi-  
2 square test statistic that is robust to non-normality (Satorra & Bentler, 1994). To ensure an  
3 accurate evaluation of model fit, we chose the following fit indices that minimize the impact of  
4 sample size: comparative fit index (CFI) and Tucker-Lewis Index (TLI [also known as non-  
5 normed fit index, NNFI]; see Kline, 2005). Because it is recommended to examine a range of  
6 incremental and absolute fit indices (e.g., Hu & Bentler, 1999; MacCallum & Austin, 2000), we  
7 additionally included the standardized root mean square residual (SRMR), Akaike information  
8 criterion (AIC), and Bayesian information criterion (BIC). Lower values of AIC and BIC indicate  
9 better model fit (with BIC penalizing the number of parameters included in the model more  
10 strongly than AIC; Burnham & Anderson, 2002). Regarding the other indices, we used the  
11 following cut-off values (in parentheses) as benchmarks for acceptable model fit (CFI > .90, TLI  
12 > .90, SRMR < .10; Marsh, Hau, & Wen, 2004) and good model fit (CFI > .95, TLI > .95, SRMR  
13 < .08; Marsh et al., 2004).

14 We then tested five competing models which included different relationships between  
15 perfectionism and athlete burnout (see Nordin-Bates, Hill, Cumming, Aujla, & Redding, 2014,  
16 for a recent example of this approach). Additionally, this approach has been applied in studies  
17 with a small sample size (e.g.,  $N = 85$ ; Zacher & de Lange, 2011). Model 1 included stability  
18 coefficients only (perfectionistic strivings T1 → perfectionistic strivings T2, perfectionistic  
19 concerns T1 → perfectionistic concerns T2, athlete burnout T1 → athlete burnout T2) and served  
20 as a baseline model. Model 2 additionally included cross-lagged paths from perfectionism to  
21 burnout (perfectionistic strivings T1 → athlete burnout T2, perfectionistic concerns T1 → athlete  
22 burnout T2) whereas Model 3 included cross-lagged paths from burnout to perfectionism (athlete  
23 burnout T1 → perfectionistic strivings T2, athlete burnout T1 → perfectionistic concerns T2).

1 Combining Models 2 and 3, Model 4, included all cross-lagged paths between perfectionism and  
2 burnout and constrained paths to be equal. Finally, Model 5 also included all cross-lagged paths,  
3 but did not constrain paths to be equal. To compare the fit of the nested models, we used Satorra-  
4 Bentler chi-square difference tests (Satorra & Bentler, 2001).

### 5 **Results of Structural Equation Modeling**

6 The fit indices and model comparisons are reported in Table 2. Model 1 provided adequate  
7 fit to the data. It also revealed high stability of perfectionism (perfectionistic strivings T1 →  
8 perfectionistic strivings T2:  $\beta = .63$ ; perfectionistic concerns T1 → perfectionistic concerns T2:  $\beta$   
9 =  $.68$ , both  $ps < .001$ ) and athlete burnout (athlete burnout T1 → athlete burnout T2:  $\beta = .78$ ,  $p <$   
10  $.001$ ) over time. Model 2 provided support for the influence of perfectionism on burnout  
11 (perfectionistic strivings T1 → athlete burnout T2:  $\beta = -.36$ ; perfectionistic concerns T1 →  
12 athlete burnout T2:  $\beta = .28$ , both  $ps < .001$ ). In addition, this model provided better fit than Model  
13 1. Model 3 provided no support for the influence of burnout on perfectionism (athlete burnout T1  
14 → perfectionistic strivings T2:  $\beta = .09$ ; athlete burnout T1 → perfectionistic concerns T2:  $\beta = -$   
15  $.06$ , both  $ps > .05$ ) and did not provide better fit than Model 1.

16 To assess the equivalence of the cross-lagged effects, Model 4 was compared to Model 5.  
17 Model 5 provided a better fit based on the Satorra-Bentler chi-square difference test, indicating  
18 that the cross-lagged effects were not equivalent. Model 5 also provided better fit than Model 1.  
19 Model 5 had a nonsignificant chi-square, had the lowest AIC and, although it did not provide a  
20 better fit than Model 2 based on the Satorra-Bentler chi-square difference test, provided  
21 significantly better fit than Models 3 and 4. We think that this model is also more realistic (i.e.,  
22 the effect of burnout on perfectionism is unlikely to be zero) and consequently we considered  
23 Model 5 providing the best fit (see Figure 1).





1 It is important to note however, that this applies only to the perfectionistic concerns and not the  
2 perfectionistic strivings dimension of perfectionism because the latter appears to be a protective  
3 factor against athletes developing burnout. The opposing longitudinal effects found for  
4 perfectionistic strivings and perfectionistic concerns dovetail with previous findings from cross-  
5 sectional studies. These previous studies show only perfectionistic concerns to be positively  
6 correlated with athlete burnout whereas perfectionistic strivings often show negative correlations,  
7 particularly when the overlap with perfectionistic concerns is controlled for.

8 The present study expands on Chen et al.'s (2009) study—which was first to examine  
9 longitudinal relationships between perfectionism and athlete burnout in junior athletes and found  
10 perfectionistic strivings to predict marginal decreases in physical and emotional exhaustion—in  
11 two ways: First, the present study found perfectionistic strivings to predict significant decreases  
12 in total burnout (combining reduced sense of accomplishment, physical and emotional  
13 exhaustion, and sport devaluation). Second, the present study also found perfectionistic concerns  
14 to predict significant increases in total burnout. As to potential reasons for the difference in  
15 findings, we can only speculate. Both studies employed a two-wave design examining changes in  
16 athlete burnout over a three-month period, but Chen et al.'s study examined burnout over the  
17 summer school holidays when athletes were unlikely to have high training loads. In contrast, the  
18 present study examined burnout during term time when junior athletes were in active training. As  
19 research has shown positive relationships between training load, perceived stress, and athlete  
20 burnout (Goodger et al., 2007), the difference in findings may be due to athletes experiencing  
21 greater training stress in the present study compared to Chen et al.'s study. According to the  
22 diathesis-stress model of perfectionism (Hewitt & Flett, 1993), this may have resulted in  
23 individual differences in athletes' perfectionism having stronger and more pronounced effects in  
24 the present study.

1       The present study's finding that perfectionistic concerns predicted longitudinal increases in  
2 athlete burnout was as expected (and dovetails with previous findings from longitudinal studies  
3 on perfectionism in employees and job burnout; Childs & Stoeber, 2012; Flaxman et al., 2012).  
4 In contrast, the finding that perfectionistic strivings predicted longitudinal decreases in athlete  
5 burnout—while in line with findings from cross-sectional studies—did not meet expectations that  
6 perfectionistic strivings may only have positive short-term effects (e.g., boosting performance in  
7 a competition), but would have detrimental long-term effects. In this, however, it is important to  
8 note that the cross-lagged models we tested controlled for the overlap between perfectionistic  
9 strivings and perfectionistic concerns. Consequently, the negative longitudinal effect of  
10 perfectionistic strivings on burnout represents an effect of “pure perfectionistic strivings” (i.e.,  
11 perfectionistic strivings minus the shared variance with perfectionistic concerns). Pure  
12 perfectionistic strivings differ from perfectionistic strivings because they lack those aspects of  
13 perfectionism that perfectionistic strivings share with perfectionistic concerns (e.g., self-criticism  
14 and conditional self-acceptance). Some researchers consider these aspects central to the  
15 experience of perfectionism and are therefore skeptical of whether the adaptive effects of pure  
16 perfectionistic strivings are relevant to understanding perfectionism (e.g., Hall et al., 2012; Hill,  
17 2014). Whereas we can follow this argument, we think that it is important to investigate the  
18 unique relationships of perfectionistic strivings and perfectionistic concerns to better understand  
19 the differential relationships that the two dimensions of perfectionism show with respect to how  
20 perfectionism predicts individual differences in athletes' motivation, performance, and well-being  
21 (cf. Gotwals et al., 2012; Stoeber, 2011).

22       One possible explanation of the longitudinal effect we found in the present study  
23 suggesting that pure perfectionistic strivings predict decreases in burnout is that the athletes of  
24 our study who were high in perfectionistic strivings coped better with the pressures of active

1 training than the athletes low in perfectionistic strivings. Hill, Hall, and Appleton's (2010) study  
2 investigating perfectionism, coping, and athlete burnout in junior athletes found perfectionistic  
3 strivings to correlate positively with problem-focused coping and negatively with avoidant  
4 coping. Problem-focused coping in turn showed a negative correlation with burnout whereas  
5 avoidant coping showed a positive correlation. These findings suggest that perfectionistic  
6 strivings may have a negative effect on burnout because athletes high in perfectionistic strivings  
7 apply coping strategies that protect them from burning out (problem-solving coping) instead of  
8 coping strategies that increase the risk of burnout (avoidant coping) (see Hill, Hall, & Appleton,  
9 2010, Figure 1). Another possible explanation is that the athletes of our study who were high in  
10 perfectionistic strivings felt a greater sense of self-determination regarding their sport  
11 involvement and this served as a protective buffer against burnout. Jowett et al. (2013)  
12 investigated perfectionism, motivation, and athlete burnout in junior athletes and found  
13 perfectionistic strivings to show a positive correlation with autonomous motivation which was  
14 conceptualized as the combination of intrinsic motivation, integrated regulation, and identified  
15 regulation (cf. Ryan & Deci, 2000). Autonomous motivation in turn showed a negative  
16 correlation with burnout, suggesting that perfectionistic strivings may have a negative effect on  
17 burnout because athletes high in perfectionistic strivings are motivated in ways that protect them  
18 from burnout (autonomous motivation) and not in ways that increase the risk of burnout  
19 (controlled motivation) (see Jowett et al., 2013, Figure 2).

20 Researchers have also sought to identify possible mediators of the perfectionism–burnout  
21 relationship that could explain why perfectionistic concerns show a positive relationship with  
22 athlete burnout, but not perfectionistic strivings. One possible mediator is coping. Hill, Hall, and  
23 Appleton (2010) found that avoidant coping mediated the relationship between perfectionistic  
24 concerns and athlete burnout. Another possible mediator is motivation. Jowett et al. (2013) found

1 that controlled motivation—comprising introjected regulation (behaviors are performed to avoid  
2 guilt or anxiety) and external regulation (behaviors are performed to satisfy an external demand)  
3 (see Ryan & Deci, 2002, for details)—partially mediated the relationship between perfectionistic  
4 concerns and athlete burnout.

### 5 **Limitations and Future Research**

6 It is important to note that the present study had a number of limitations. First, as the study  
7 had 101 athletes the sample was relatively small. Hence the study may have lacked the statistical  
8 power to detect smaller effects (e.g., athlete burnout predicting longitudinal changes in  
9 perfectionism). Future studies should aim to recruit larger samples and investigate cross-lagged  
10 relationships with greater statistical power to replicate the present findings and examine if further  
11 longitudinal effects emerge (e.g., reciprocal effects of burnout predicting decreased  
12 perfectionistic strivings). Second, future studies need to determine if the present findings  
13 replicate if other indicators of perfectionistic strivings and concerns—such as self-oriented and  
14 socially prescribed perfectionism (cf. Hill et al., 2008)—are used. Third, the study did not include  
15 any variables that could serve as possible mediators explaining why perfectionistic strivings  
16 predicted longitudinal decreases in burnout whereas perfectionistic concerns predicted  
17 longitudinal increases. Future longitudinal studies should therefore include variables that  
18 previous cross-sectional studies indicate to be potential mediators of the perfectionism–burnout  
19 relationship such as adaptive versus maladaptive coping (Hill, Hall, & Appleton, 2010) or  
20 autonomous versus controlled motivation (Jowett et al., 2013).

21 Finally, and perhaps most importantly, the present study was a short-term longitudinal  
22 study examining the perfectionism–burnout relationship over a three-month interval. Hence,  
23 future research using longer time intervals is needed to investigate if the negative effect of  
24 perfectionistic strivings (decreasing burnout) is maintained, or if the effect is short-lived and will

1 turn positive (increasing burnout) in the long run. Furthermore, longer time intervals may be  
2 needed to find any reciprocal effects of burnout on perfectionism. Previous research on athlete  
3 burnout has established that three months are sufficient to examine changes in burnout (e.g.,  
4 Cresswell & Eklund, 2005), but it is unclear if three months are sufficient to examine changes in  
5 perfectionism. Whereas there are studies investigating perfectionism in adolescents that were able  
6 to predict longitudinal changes in perfectionism over five to nine months (Damian et al., 2013;  
7 Stoeber, Otto, & Dalbert, 2009), three months may have been too short for burnout to effect any  
8 changes in junior athletes' perfectionism.

### 9 **Implications**

10         Given the present findings, practitioners should look at reducing perfectionistic concerns  
11 in athletes. There is evidence from clinical studies that cognitive-behavioral interventions and  
12 guided self-help can reduce perfectionistic concerns (e.g., Egan et al., 2014; Pleva & Wade,  
13 2007). However, further studies are required to test the efficacy of such interventions in athletes.

### 14 **Conclusion**

15         Despite these limitations, the present study makes an important contribution to the  
16 literature because it is the first longitudinal study providing empirical support (at conventional  
17 levels of significance) for the view that perfectionism contributes to athlete burnout. In this,  
18 however, the two underlying dimensions of perfectionism—perfectionistic strivings and  
19 perfectionistic concerns—appear to have opposite longitudinal effects on athlete burnout when  
20 their overlap was controlled for. Only perfectionistic concerns predicted longitudinal increases in  
21 burnout indicating that the concerns dimension of perfectionism undermines athletes' well-being.  
22 In contrast, perfectionistic strivings predicted longitudinal decreases in burnout, suggesting that  
23 athletes who are striving for perfection may be protected from burnout as long as they are not  
24 overly concerned about making mistakes and do not show strong negative reactions to

1 imperfection. Regarding athlete burnout, perfectionism in sport thus appears to be a “double-  
2 edged sword” (Stoeber, 2014) providing a shield against athlete burnout while at the same time  
3 putting athletes at a greater risk of burning out.

4

## References

- 1  
2 Appleton, P. R., Hall, H. K., & Hill, A. P. (2009). Relations between multidimensional  
3 perfectionism and burnout in junior-elite male athletes. *Psychology of Sport and Exercise*,  
4 *10*, 457-465. doi: 10.1016/j.psychsport.2008.12.006
- 5 Appleton, P. R., & Hill, A. P. (2012). Perfectionism and athlete burnout in junior elite athletes:  
6 The mediating role of motivation regulations. *Journal of Clinical Sport Psychology*, *6*, 129-  
7 145.
- 8 Burnham, K. P., & Anderson, D. R. (2002). *Model selection and multimodel inference: A*  
9 *practical information-theoretic approach* (2nd ed.). New York: Springer.
- 10 Chen, L. H., Kee, Y. H., Chen, M.-Y., & Tsai, Y.-M. (2008). Relation of perfectionism with  
11 athletes' burnout: Further examinations. *Perceptual and Motor Skills*, *106*, 811-820. doi:  
12 10.2466/pms.106.3.811-820
- 13 Chen, L. H., Kee, Y. H., & Tsai, Y.-M. (2009). An examination of the dual model of  
14 perfectionism and adolescent athlete burnout: A short-term longitudinal research. *Social*  
15 *Indicators Research*, *91*, 189-201. doi: 10.1007/s11205-008-9277-9
- 16 Childs, J. H., & Stoeber, J. (2012). Do you want me to be perfect? Two longitudinal studies on  
17 socially prescribed perfectionism, stress and burnout in the workplace. *Work & Stress*, *26*,  
18 347-364. doi: 10.1080/02678373.2012.737547
- 19 Cresswell, S. L., & Eklund, R. C. (2005). Changes in athlete burnout and motivation over a 12-  
20 week league tournament. *Medicine and Science in Sports and Exercise*, *37*, 1957-1966.
- 21 Cresswell, S. L., & Eklund, R. C. (2006). Changes in athlete burnout over a thirty-week "rugby  
22 year". *Journal of Science and Medicine in Sport*, *9*, 125-134. doi:  
23 10.1016/j.jsams.2006.03.017
- 24 Damian, L. E., Stoeber, J., Negru, O., & Băban, A. (2013). On the development of perfectionism

- 1 in adolescence: Perceived parental expectations predict longitudinally increases in socially  
2 prescribed perfectionism. *Personality and Individual Differences*, 55, 688-693. doi:  
3 10.1016/j.paid.2013.05.021
- 4 Dunkley, D. M., Zuroff, D. C., & Blankstein, K. R. (2003). Self-critical perfectionism and daily  
5 affect: Dispositional and situational influences on stress and coping. *Journal of Personality  
6 and Social Psychology*, 84, 234-252.
- 7 Dunn, J. G. H., Causgrove Dunn, J., Gotwals, J. K., Vallance, J. K. H., Craft, J. M., & Syrotuik,  
8 D. G. (2006). Establishing construct validity evidence for the Sport Multidimensional  
9 Perfectionism Scale. *Psychology of Sport and Exercise*, 7, 57-79. doi:  
10 10.1016/j.psychsport.2005.04.003
- 11 Egan, S. J., van Noort, E., Chee, A., Kane, R. T., Hoiles, K. J., Shafran, R., & Wade, T. D. (2014).  
12 A randomised controlled trial of face to face versus pure online self-help cognitive  
13 behavioural treatment for perfectionism. *Behaviour Research and Therapy*, 63, 107-113. doi:  
14 10.1016/j.brat.2014.09.009
- 15 Enns, M. W., & Cox, B. J. (2002). The nature and assessment of perfectionism: A critical  
16 analysis. In G. L. Flett & P. L. Hewitt (Eds.), *Perfectionism* (pp. 33-62). Washington, DC:  
17 American Psychological Association. doi: 10.1037/10458-002
- 18 Flaxman, P. E., Ménard, J., Bond, F. W., & Kinman, G. (2012). Academics' experiences of a  
19 respite from work: Effects of self-critical perfectionism and perseverative cognition on post  
20 respite well-being. *Journal of Applied Psychology*, 97, 854-865.
- 21 Flett, G. L., & Hewitt, P. L. (2002). Perfectionism and maladjustment: An overview of theoretical,  
22 definitional, and treatment issues. In P. L. Hewitt & G. L. Flett (Eds.), *Perfectionism* (pp. 5-  
23 31). Washington, DC: American Psychological Association.
- 24 Flett, G. L., Hewitt, P. L., Oliver, J. M., & Macdonald, S. (2002). Perfectionism in children and



- 1 their parents: A developmental analysis. In G. L. Flett, & P. L. Hewitt (Eds.), *Perfectionism*  
2 (pp. 89-132). Washington, DC: American Psychological Association.
- 3 Frost, R. O., Marten, P., Lahart, C., & Rosenblate, R. (1990). The dimensions of perfectionism.  
4 *Cognitive Therapy and Research, 14*, 449-468. doi: 10.1007/BF01172967
- 5 Goodger, K., Gorely, T., Lavallee, D., & Harwood, C. (2007). Burnout in sport: A systematic  
6 review. *The Sport Psychologist, 21*, 127-151.
- 7 Gotwals, J. K. (2011). Perfectionism and burnout within intercollegiate sport: A person-oriented  
8 approach. *The Sport Psychologist, 25*, 489-510.
- 9 Gotwals, J. K., Stoeber, J., Dunn, J. G. H., & Stoll, O. (2012). Are perfectionistic strivings in  
10 sport adaptive? A systematic review of confirmatory, contradictory, and mixed evidence.  
11 *Canadian Psychology, 53*, 263-279.
- 12 Gould, D., Udry, E., Tuffey, S., & Loehr, J. (1996). Burnout in competitive junior tennis players:  
13 I. A quantitative psychological assessment. *The Sport Psychologist, 10*, 322-340.
- 14 Graham, J. W., Cumsille, P. E., & Elek-Fisk, E. (2003). Methods for handling missing data. In J.  
15 A. Schinka & W. F. Velicer (Eds.), *Handbook of psychology: Research methods in*  
16 *psychology* (Vol. 2, pp. 87-114). New York: Wiley.
- 17 Gustafsson, H., Kenttä, G., & Hassmén, P. (2011). Athlete burnout: An integrated model and  
18 future research directions. *International Review of Sport and Exercise Psychology, 4*, 3-24.  
19 doi: 10.1080/1750984X.2010.541927
- 20 Hall, H. K. (2006). Perfectionism: A hallmark quality of world class performers, or a  
21 psychological impediment to athletic development? In D. Hackfort & G. Tenenbaum  
22 (Eds.), *Essential processes for attaining peak performance* (Vol. 1, pp. 178-211). Oxford,  
23 UK: Meyer & Meyer.
- 24 Hall, H. K., Hill, A. P., & Appleton, P. R. (2012). Perfectionism: A foundation for sporting

- 1 excellence or an uneasy pathway toward purgatory? In G. C. Roberts & D. C. Treasure  
2 (Eds.), *Advances in motivation in sport and exercise* (3rd ed., pp. 129-168). Champaign, IL:  
3 Human Kinetics.
- 4 Hewitt, P. L., & Flett, G. L. (1991). Perfectionism in the self and social contexts:  
5 Conceptualization, assessment, and association with psychopathology. *Journal of*  
6 *Personality and Social Psychology*, *60*, 456-470. doi: 10.1037/0022-3514.60.3.456
- 7 Hewitt, P. L., & Flett, G. L. (1993). Dimensions of perfectionism, daily stress, and depression: A  
8 test of the specific vulnerability hypothesis. *Journal of Abnormal Psychology*, *102*, 58-65.
- 9 Hill, A. P. (2013). Perfectionism and burnout in junior soccer players: A test of the 2 × 2 model of  
10 dispositional perfectionism. *Journal of Sport & Exercise Psychology*, *35*, 18-29.
- 11 Hill, A. P. (2014). Perfectionistic strivings and the perils of partialling. *International Journal of*  
12 *Sport and Exercise Psychology*, *12*, 302-315. doi: 10.1080/1612197X.2014.919602
- 13 Hill, A. P., Hall, H. K., & Appleton, P. R. (2010). Perfectionism and athlete burnout in junior elite  
14 athletes: The mediating role of coping tendencies. *Anxiety, Stress, & Coping*, *23*, 415-430.  
15 doi: 10.1080/10615800903330966
- 16 Hill, A. P., Hall, H. K., Appleton, P. R., & Kozub, S. A. (2008). Perfectionism and burnout in  
17 junior elite soccer players: The mediating influence of unconditional self-acceptance.  
18 *Psychology of Sport and Exercise*, *9*, 630-644. doi: 10.1016/j.psychsport.2007.09.004
- 19 Hill, A. P., Hall, H. K., Appleton, P. R., & Murray, J. J. (2010). Perfectionism and burnout in  
20 canoe polo and slalom athletes: The mediating influence of validation and growth-seeking.  
21 *The Sport Psychologist*, *24*, 16-34.
- 22 Houkes, I., Winants, Y. H., & Twellaar, M. (2008). Specific determinants of burnout among male  
23 and female general practitioners: A cross-lagged panel analysis. *Journal of Occupational*  
24 *and Organizational Psychology*, *81*, 249-276. doi: 10.1348/096317907X218197

- 1 Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis:  
2 Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1-55.
- 3 Jowett, G. E., Hill, A. P., Hall, H. K., & Curran, T. (2013). Perfectionism and junior athlete  
4 burnout: The mediating role of autonomous and controlled motivation. *Sport, Exercise, and*  
5 *Performance Psychology, 2*, 48-61.
- 6 Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York:  
7 Guilford.
- 8 Lemyre, P.-N., Roberts, G. C., & Stray-Gundersen, J. (2007). Motivation, overtraining, and  
9 burnout: Can self-determined motivation predict overtraining and burnout in elite athletes?  
10 *European Journal of Sport Science, 7*, 115-126. doi: 10.1080/17461390701302607
- 11 Lonsdale, C., & Hodge, K. (2011). Temporal ordering of motivational quality and athlete burnout  
12 in elite sport. *Medicine and Science in Sports and Exercise, 43*, 913-921. doi:  
13 10.1249/MSS.0b013e3181ff56c6
- 14 MacCallum, R. C., & Austin, J. T. (2000). Applications of structural equation modeling in  
15 psychological research. *Annual Review of Psychology, 51*, 201-226. doi:  
16 10.1146/annurev.psych.51.1.201
- 17 Marsh, H. W., Hau, K., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-  
18 testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu  
19 and Bentler's (1999) findings. *Structural Equation Modeling, 11*, 320-341. doi:  
20 10.1207/s15328007sem1103\_2
- 21 Martinent, G., Decret, J.-C., Guillet-Descas, E., & Isoard-Gauthier, S. (2014). A reciprocal  
22 effects model of the temporal ordering of motivation and burnout among youth table tennis  
23 players in intensive training settings. *Journal of Sports Sciences, 32*, 1648-1658. doi:  
24 10.1080/02640414.2014.912757

- 1 Muthén, L. K., & Muthén, B. O. (1998-2012). *Mplus user's guide* (7th ed.). Los Angeles: Muthén  
2 & Muthén.
- 3 Nordin-Bates, S. M., Hill, A. P., Cumming, J., Aujla, I. J., & Redding, E. (2014). A longitudinal  
4 examination of the relationship between perfectionism and motivational climate in  
5 dance. *Journal of Sport & Exercise Psychology*, *36*, 382-391. doi: 10.1123/jsep.2013-0245
- 6 Pleva, J., & Wade, T. D. (2007). Guided self-help versus pure self-help for perfectionism: A  
7 randomised controlled trial. *Behaviour Research and Therapy*, *45*, 849-861. doi:  
8 10.1016/j.brat.2006.08.009
- 9 Raedeke, T. D., & Smith, A. L. (2001). Development and preliminary validation of an athlete  
10 burnout measure. *Journal of Sport & Exercise Psychology*, *23*, 281-306.
- 11 Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic  
12 motivation, social development, and well-being. *American Psychologist*, *55*, 68-78.
- 13 Satorra, A., & Bentler, P. M. (1994). Corrections to test statistics and standard errors in  
14 covariance structure analysis. In A. von Eye & C. C. Clogg (Eds.), *Latent variable analysis:  
15 Applications for developmental research* (pp. 399-419). Thousand Oaks, CA: Sage.
- 16 Satorra, A., & Bentler, P. M. (2001). A scaled difference chi-square test statistic for moment  
17 structure analysis. *Psychometrika*, *66*, 507-514. doi: 10.1007/BF02296192
- 18 Smith, R. E. (1986). Toward a cognitive-affective model of athletic burnout. *Journal of Sport  
19 Psychology*, *8*, 36-50.
- 20 Stoeber, J. (2011). The dual nature of perfectionism in sports: Relationships with emotion,  
21 motivation, and performance. *International Review of Sport and Exercise Psychology*, *4*,  
22 128-145. doi: 10.1080/1750984X.2011.604789
- 23 Stoeber, J. (2014). Perfectionism in sport and dance: A double-edged sword. *International  
24 Journal of Sport Psychology*, *45*, 385-394.

- 1 Stoeber, J., & Otto, K. (2006). Positive conceptions of perfectionism: Approaches, evidence,  
2 challenges. *Personality and Social Psychology Review, 10*, 295-319. doi:  
3 10.1207/s15327957pspr1004\_2
- 4 Stoeber, J., Otto, K., & Dalbert, C. (2009). Perfectionism and the Big Five: Conscientiousness  
5 predicts longitudinal increases in self-oriented perfectionism. *Personality and Individual*  
6 *Differences, 47*, 363-368. doi: 10.1016/j.paid.2009.04.004
- 7 Stoeber, J., Otto, K., Pescheck, E., Becker, C., & Stoll, O. (2007). Perfectionism and competitive  
8 anxiety in athletes: Differentiating striving for perfection and negative reactions to  
9 imperfection. *Personality and Individual Differences, 42*, 959-969. doi:  
10 10.1016/j.paid.2006.09.006
- 11 Stoeber, J., Stoll, O., Salmi, O., & Tiikkaja, J. (2009). Perfectionism and achievement goals in  
12 young Finnish ice-hockey players aspiring to make the Under-16 national team. *Journal of*  
13 *Sports Sciences, 27*, 85-94. doi: 10.1080/02640410802448749
- 14 Stoeber, J., Uphill, M. A., & Hotham, S. (2009). Predicting race performance in triathlon: The  
15 role of perfectionism, achievement goals, and personal goal setting. *Journal of Sport &*  
16 *Exercise Psychology, 31*, 211-245.
- 17 Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston, MA:  
18 Pearson.
- 19 Zacher, H., & de Lange, A. H. (2011). Relations between chronic regulatory focus and future time  
20 perspective: Results of a cross-lagged structural equation model. *Personality and Individual*  
21 *Differences, 50*, 1255-1260. doi: 10.1016/j.paid.2011.02.020

1 Table 1  
 2 *Descriptive Statistics, Cronbach's Alphas, and Bivariate Correlations*

Variable	1	2	3	4	5	6
Perfectionism T1						
1. Perfectionistic strivings						
2. Perfectionistic concerns	.54***					
Perfectionism T2						
3. Perfectionistic strivings	.71***	.44***				
4. Perfectionistic concerns	.52***	.73***	.71***			
5. Athlete burnout T1	-.31**	.08	-.11	.00		
6. Athlete burnout T2	-.40***	.14	-.20*	.08	.78***	
<i>M</i>	0.00	0.00	0.00	0.00	2.37	2.40
<i>SD</i>	0.93	0.91	0.92	0.94	0.68	0.74
Cronbach's alpha	.85	.80	.82	.86	.68	.76

3 *Note.*  $N = 101$ . T1 = Time 1, T2 = Time 2 (three months later).

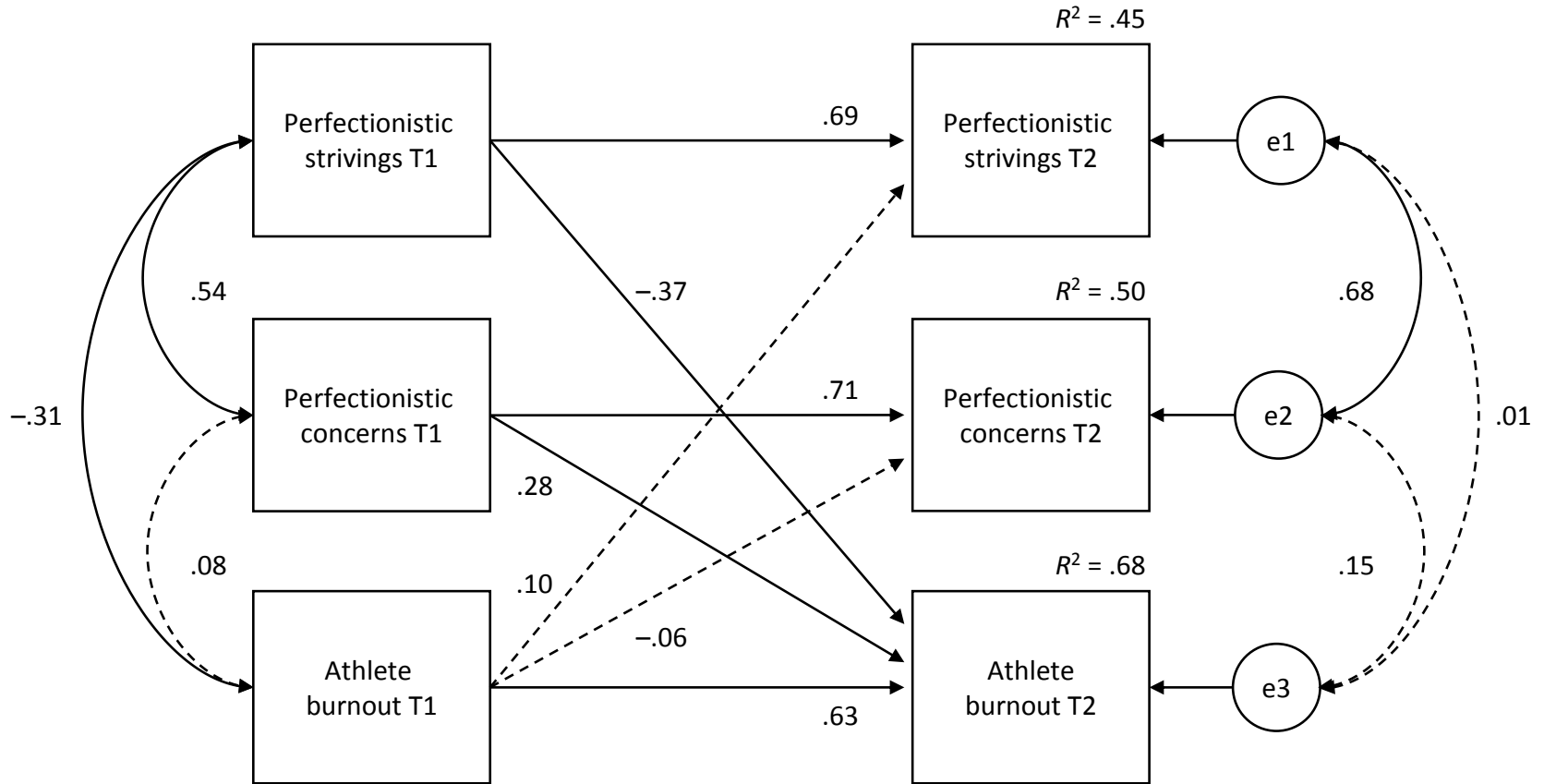
4 \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

1 Table 2.  
2 *Model fit indices and model comparisons*

Model (M)	$\chi^2$	Scaling factor	<i>df</i>	CFI	TLI	SRMR	AIC	BIC	Model comparisons		
									Comparison	$\Delta\chi^2$	$\Delta df$
M1: stability coefficients only	32.21***	1.07	6	.91	.82	.08	1196.14	1251.05			
M2: perfectionism T1 → athlete burnout T2	10.40*	1.11	4	.98	.93	.07	1177.26	1237.40	M2 vs. M1	23.15***	2
M3: athlete burnout T1 → perfectionism T2	28.65***	1.02	4	.91	.75	.07	1194.87	1255.02	M3 vs. M1	4.48	2
M4: reciprocal effects (constrained equal)	32.86***	1.03	5	.90	.78	.08	1197.58	1255.11	M4 vs. M1	0.49	1
M5: reciprocal effects (unconstrained)	5.47	1.03	2	.99	.93	.05	1175.35	1240.72	M5 vs. M1	26.45***	4
									M5 vs. M2	4.97	2
									M5 vs. M3	23.36***	2
									M5 vs. M4	27.39***	3

3 *Note.* *N* = 101. Scaling factor = Satorra-Bentler  $\chi^2$  scaling correction factor, *df* = degrees of freedom, CFI = comparative fit index, TLI  
4 = Tucker-Lewis index (also known as non-normed fit index, NNFI), SRMR = standardized root mean square residual, AIC = Akaike  
5 information criterion, BIC = Bayesian information criterion. Note that model comparisons are restricted to nested models. All  $\chi^2$   
6 difference tests are Satorra-Bentler  $\chi^2$  difference tests. T1 = Time 1, T2 = Time 2 (three months later).  
7 \**p* < .05. \*\*\**p* < .001.

1



2

3 *Figure 1.* Model 5 (M5: reciprocal effects [unconstrained]).  $N = 101$ . All path coefficients are standardized, and nonsignificant  
 4 paths ( $p \geq .05$ ) are indicated by dashed lines. T1 = Time 1, T2 = Time 2 (three months later).