

Review

Burnout and its relations with basic psychological needs and motivation among athletes: A systematic review and meta-analysis[☆]



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ABSTRACT

Objectives: The present study is a review on studies about the relationships between the three basic psychological needs/motivational regulations (i.e., amotivation, controlled regulation, extrinsic autonomous regulation, and intrinsic motivation) and burnout.

Design: A systematic review and meta-analysis.

Method: Studies were identified through five electronic databases and manual search using combinations of three groups of keywords. Three inclusion criteria were then used to screen the searched articles.

Results: Eighteen studies met the inclusion criteria and these studies varied considerably in terms of their study characteristics (e.g., characteristics of participants, study designs, and outcome measures). The results also showed that the three basic psychological needs, intrinsic motivation, extrinsic autonomous regulation, and amotivation had small to large effects on predicting global burnout and its three dimensions. However, controlled regulation showed no or weak correlations with the burnout subscales.

Conclusions: Self-determination theory was generally supported in explaining athlete burnout.

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It could take more than 10 years for athletes to acquire expertise or achieve successes in sport (Ericsson, 2007). Even though sport participation could be a source of enjoyment for athletes (Ryan & Deci, 2007), during the extended period of development, athletes are required to meet demands such as intensive training, school, and work (Gustafsson, Kenttä, & Hassmén, 2011). When athletes fail to meet these intensive demands or challenges, they are likely to suffer from a maladaptive psychological experience commonly known as athlete burnout (Smith, 1986). It has been reported that an athlete with burnout syndrome often describes loss of motivation and low needs satisfaction (Cresswell & Eklund, 2007; Gustafsson et al., 2011), which implies that there is a potential link between needs satisfaction/motivation and athlete burnout. The study was to systematically review studies about the relationships between the three basic psychological needs/motivational regulations and burnout.

Burnout

Although the term *burnout* has been popularly used in the sport domain, the concept of burnout in the sport domain was not well-defined until 1997 (Goodger, Gorely, Lavallee, & Harwood, 2007;

Raedike & Smith, 2001). Similar to other concepts used in sport psychology (e.g., stress and anxiety), the early definition of burnout was borrowed from the work domain. For example, Maslach and Jackson (1984) described burnout as a psychological syndrome including emotional exhaustion, reduced sense of accomplishment, and depersonalization. Although Maslach and Jackson's (1984) definition is attractive and targets salient symptoms of burnout, it is largely grounded in the field of human services (Raedeke & Smith, 2001) where the social and environmental context is different from sports. For example, depersonalization (cynicism) is not a salient dimension in athlete burnout (Raedeke & Smith, 2001). As interest in burnout among athletes increases, the concept of burnout specific to the sport domain was developed by Raedeke (1997), building upon Maslach and Jackson's (1984) work. Raedeke (1997) coined burnout as a chronic psychological syndrome consisting of emotional and physical exhaustion (i.e., feelings of extreme low energy and tired), reduced sense of accomplishments (i.e., feelings of lack of improvement and success), and sport devaluation (i.e., feelings of detached and negative attitudes toward sport). This definition has been widely embraced by other researchers to examine athlete burnout (Cresswell & Eklund, 2003; Goodger et al., 2007). For more details on historical development and definition of burnout, readers may refer to the chapter written by Goodger, Lavallee, Gorely, and Harwood (2010).

Measurement issues related to athlete burnout have been also discussed along with the contextualization of burnout in sport. One popular athlete burnout scale, Athletic Burnout Questionnaire

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(ABQ) was developed based on the Raedeke's (1997) definition (Raedeke & Smith, 2001). The ABQ consists of 15 items measuring three dimensions of burnout (i.e., physical/emotional exhaustion, reduced sense of accomplishment, and sport devaluation). A global burnout score can be computed by averaging all the item responses in the three subscales. The psychometric properties of the ABQ has been supported (Raedeke & Smith, 2001). For example, the measurement model exhibited a good fit to the data collected from youth athletes in individual and team sports, and good test-retest reliabilities were found (Raedeke & Smith, 2001). More recent studies added empirical evidence to support its reliability and validity (Cresswell & Eklund, 2007; Lonsdale, Hodge, & Rose, 2009; Quested & Duda, 2011). An alternative to the ABQ is the Eades Athlete Burnout Inventory (Eades, 1991; Gustafsson, 2007), which is another scale developed specifically for determining athlete burnout. However, this scale has been criticized for issues such as low internal consistency for two of its factors (Gustafsson, 2007). Consequently, the ABQ has been more popularly utilized in studying athlete burnout.

Studying athlete burnout is important as there are several implications of burnout on athletes' health and sport performance (Goodger et al., 2007). For example, burnout was shown to be associated with various health issues such as affective (e.g., depressed mood), cognitive (e.g., cynicism), physical (e.g., illness), behavioral (e.g., diminished performance), and motivational (e.g., lack of enjoyment) symptoms (Schaufeli & Buunk, 2003; Taris, 2006). Understanding the mechanism of burnout can help practitioners (e.g., coaches) to prevent these symptoms as well as to enhance sport performance (Hodge, Lonsdale, & Ng, 2008). Studying burnout can also help practitioners prevent dropout in sport (Cresswell & Eklund, 2003; Goodger et al., 2007). Such practical implications highlight the importance for understanding the mechanism of burnout among athletes.

Self-determination theory and burnout

In an effort to advance understanding of athlete burnout, a number of theories or models such as cognitive-affective model (Smith, 1986), total-quality-recovery model (Kenttä & Hassmen, 1998), perspective of stress and recovery (Kallus & Kellmann, 2000), and failure-adaptation model (Tenenbaum, Jones, Kitsantas, Sacks, & Berwick, 2003) have been proposed for examining the mechanism of burnout. Though the tenets of these theories may vary from each other (see Gustafsson, 2007; Gustafsson et al., 2011 for reviews of these models), they attribute burnout to insufficient recovery and maladaptive behaviors in training (Goodger et al., 2007). However, the aforementioned models, though endowed with their individual merits, could not fully explain the mechanism of athlete burnout (Gustafsson et al., 2011). More recently, self-determination theory (SDT; Deci & Ryan, 1985, 2000), a theory for studying human motivation, has been popularly used as a promising theoretical framework for explaining athlete burnout and its antecedents in sport settings (Cresswell & Eklund, 2005a; Lonsdale et al., 2009; Lonsdale & Hodge, 2011). To the best of our knowledge, there is lack of evidence to suggest that SDT provides a better understanding of sport-related burnout than the aforementioned models. Thus, it is plausible that SDT may provide complementary or distinct explanations of athlete burnout instead of being a theoretical framework that can fully explain athlete burnout.

SDT is a meta-theory comprising of five mini-theories (Deci & Ryan, 2000). Of which, two theories deemed more relevant to the current study are discussed below. The first of the two – the basic psychological needs theory (BPNT) – has been used to examine athlete burnout (Quested & Duda, 2011). The BPNT addresses the relationships between the three basic psychological needs and

psychological health/well-being (Deci & Ryan, 1985, 2000). The three basic psychological needs are autonomy (the need to experience ownership of one's own actions and choices), competence (the need to feel competent in doing optimally challenging activities and to achieve desired outcomes), and relatedness (the need to have sense of belongings and mutual respects). According to the BPNT, burnout is negatively predicted by autonomy, competence, and relatedness.

Another mini-theory within SDT (i.e., Organismic Integration Theory) revolves around the distinction between different types of motivation or behavioral regulation (Deci & Ryan, 2000). These behavioral regulations are classified as non-regulation, controlled regulation, extrinsic autonomous regulation, and intrinsic regulation (Deci & Ryan, 1987). Firstly, non-regulation or amotivation concerns status of lack of intention or value to act. Secondly, external regulation and introjected regulation are the two controlled regulations or controlled motivation. External regulation refers to those behaviors performed to satisfy external contingencies, which is a highly controlled form of extrinsic regulation. Introjected regulation represents those regulated behaviors undertaken to avoid guilt or anxiety or to reach ego-enhancement. Thirdly, identified regulation and integrated regulation are the two extrinsic autonomous regulations or extrinsic autonomous motivation. Identified regulation refers to the phenomenon of people identifying and accepting personal importance or value of behaviors. Integrated regulation is a more autonomous extrinsic regulation. Here, behaviors are performed with a condition where values or needs are fully integrated or assimilated to the self. Lastly, intrinsic regulation or intrinsic motivation is characterized by an individual participates an activity for inherent interest or enjoyment (Deci & Ryan, 2000; Ryan & Deci, 2000).

The aforementioned behavioral regulations can be represented on a continuum, ranging from low (amotivation) to high (intrinsic motivation) self-determined motivation. Self-determined motivation refers to the extent to which an individual's behavior is regulated by processes that are aligned with his/her own sense of self (Deci & Ryan, 1985). In the case of the present study, how an athlete's behavior is regulated will determine his/her self-determined motivation, and a self-determination index (SDI) has been used to reflect an athlete's perception of self-determination (Vallerand, 2001). Within SDT, low self-determined motivation is believed to result in negative motivational outcomes such as burnout. In addition, previous studies have shown that burnout were more likely to be found in athletes with high levels of amotivation and controlled regulations (Curran, Appleton, Hill, & Hall, 2011; Quested & Duda, 2011).

The current study

More studies have now applied SDT to investigate athlete burnout (Goodger et al., 2007; Lonsdale & Hodge, 2011). However, no attempt has been made to systematically synthesize and quantify those findings. Systematic reviews provide the readers a window for understanding the existing literature on the use of SDT in explaining burnout among athletes. Meta-analyses allow researchers to draw conclusions based on previous studies by reporting findings and offers evidence to support whether SDT is a viable theory framework to study athlete burnout (Ng et al., 2012). Findings from both systematic reviews and meta-analyses can also provide valuable guidelines for future studies within the discipline. Therefore, the primary purpose of this study is to examine the relationships between SDT and burnout among athletes through a systematic review approach. Whenever possible, a meta-analysis was conducted to quantify findings from the previous studies. According to SDT (Deci & Ryan, 2000), it was hypothesized that burnout would be negatively influenced by the three basic

psychological needs, intrinsic motivation, and extrinsic autonomous regulations (i.e., identified regulation and integrated regulation). It was also hypothesized that burnout would be positively predicted by amotivation and controlled regulations (i.e., external regulation and introjected regulation).

Method

Search and selection

Studies were initially identified by searching through five electronic databases (i.e., ERIC, PsycARTICLES, PsycINFO, SPORTDiscus, and MEDLINE) with the period from inception to July 2012. Combinations of three groups of keywords were used: (a) burnout, OR overtraining, OR staleness, OR dropout, OR exhaustion; AND (b) sport*, OR athlete*; AND (c) motivation, OR self-determined motivation, OR basic psychological needs, OR intrinsic motivation, OR extrinsic motivation. A total of 546 articles were found during the first round of search. Three inclusion criteria were used to screen the searched studies. Firstly, the study must be quantitative in nature. Secondly, the participants must be athletes and include dancers. Athlete refers to a gifted or trained person who is fit to compete in a sport that is physically demanding in nature (Kent, 2006). Given that dancing is a physically demanding and competitive sport, dancers should be considered as athletes (Hincapié, Morton, & Cassidy, 2008). Thirdly, relationships between the three basic psychological needs/types of motivation aligned with SDT and burnout (global burnout and/or each of the three dimensions) must be reported. Additional studies ($n = 7$) were identified from the reference lists in the studies identified during the first round of search and key sport psychology journals. Eventually, eighteen articles were selected for further analysis (see Fig. 1).

Data abstraction

The following data were extracted from the selected studies ($N = 18$): author(s), publication year, demographics of participants

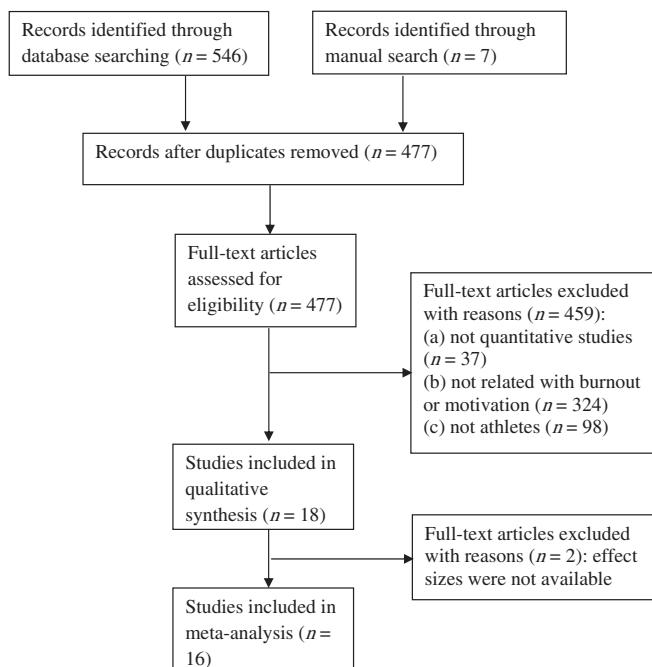


Fig. 1. Diagram showing study selection process.

(e.g., age), purpose, study design (e.g., cross-sectional design), outcome measures (e.g., burnout and basic psychological needs), results, and effect size (r ; e.g., the relationship between devaluation and autonomy). In an effort to extract as many effect sizes as possible, corresponding authors of the studies that did not report the zero-order correlations were contacted. An average effect size was computed in cases where a given study provided more than one effect sizes concerning one effect (Brewin, Kleiner, Vasterling, & Field, 2007). The extract data were synthesized and quantified.

Meta-analytical procedure

Although a meta-analysis increases statistical power and one can use as few as two studies for the analysis (Cohn & Becker, 2003), four groups of effect sizes were combined in order to minimize Type I and Type II errors given a small number of studies per variable was included in meta-analyses (Rosenthal, 1991). Specifically, in line with SDT (Deci & Ryan, 1987), external regulation and introjected regulation were combined as controlled regulations, and integrated regulation and identified regulation were combined as an extrinsic autonomous regulation before conducting meta-analyses in this study. There are two popular estimating methods for meta-analysis (Field & Gillett, 2010), namely, methods by Hunter and Schmidt (2004) and Hedges and Olkin (1985). The major difference between them is that the former method allowing the correction of artefacts such as measuring errors to adjust the weighted effect sizes (Hunter & Schmidt, 2004). However, the bias in both methods is considered to be negligible in practical settings (Field & Gillett, 2010). The method by Hedges and his colleague (1985) was used in this study, since artefacts correction could be especially problematic when analyzing a small number of studies per variable such as in our case (Rosenthal, 1991). In our study, the average-weighted mean correlations between burnout and the three basic psychological needs/types of motivation were computed through this method. According to Cohen (1988), an r value of .10, .30, or .50 indicates a small, medium, or large effect respectively.

In order to generate our study findings (unconditional inferences), a random-effect model was applied to conceptualize the meta-analysis (Field & Gillett, 2010). As a random-effect model was applied, the Q -test was used to examine whether a true effect size will vary between studies (i.e., heterogeneity; Field & Gillett, 2010). A significant Q -value indicates heterogeneity. I^2 statistics were used interpret the magnitude of heterogeneity when significant Q -values were shown. Moderation analyses could be conducted for explaining heterogeneous effect sizes when values of I^2 are higher than 75% (Higgins, Thompson, Deeks, & Altman, 2003). However, moderation analyses (if applicable) were not conducted in our study given the small number of the studies included in our review, which increases the second-order sampling errors (Brewin et al., 2007; Hunter & Schmidt, 1990). In an effort to address publication bias, analysis of "fail-safe number" was conducted (Rosenthal, 1979). The analysis determines the number of nonsignificant missing studies needed to bring a meta-analyzed correlation to a small effect ($r \leq .10$). A relatively large "fail-safe number" indicates the calculated effect size is unlikely to be due to publication biases (Ng et al., 2012).

Lastly, two sets of multiple regression analyses were conducted (i.e., regressed global burnout on the three basic psychological needs and regressed global burnout on different types of motivation) to examine the unique effect of each need/motivation on global burnout based on the method proposed by Viswesvaran and Ones (1995). Correlation matrices were created using the weighted effect sizes of bivariate correlations and the harmonic mean of sample sizes underpinning each weighted effect size. Each formed matrix was then used as an input for a multiple regression analysis (cf. Viswesvaran & Ones, 1995).

Table 1

Description of the included studies on burnout and basic psychological needs/motivation.

No	Author(s)	Participants	Purpose and design	Measures
1	(Quested & Duda, 2011)	$N = 219, M = 18.4$ years old ($SD = 2.3$), vocational dancers, UK	(a) Purpose: BPN → burnout (b) Design: longitudinal	(a) BPN – Autonomy: a three-item subscale (Sheldon, Elliot, Kim & Kasser, 2001); Competence: items adapted from IMI (McAuley, Duncan & Tammen, 1989); Relatedness: a five-item subscale (Richer & Vallerand, 1998) (b) Burnout – ABQ (Raedeke & Smith, 2001)
2	(Curran et al., 2011)	$N = 149, M = 16.2$ years old ($SD = 2.0$), elite soccer players, UK	(a) Purpose: self-determined motivation → burnout (b) cross-sectional	(a) Self-determined motivation - SMS (Pelletier et al., 1995) (b) Burnout – ABQ (Raedeke & Smith, 2001)
3	(Lonsdale & Hodge, 2011)	$N = 119, M = 24.7$ years old ($SD = 8.5$), athletes attending various individual and team sports, New Zealand	(a) Purpose: self-determined motivation → burnout (b) Design: longitudinal	(a) Self-determined motivation – BRSQ (Lonsdale et al., 2008) (b) Burnout – ABQ (Raedeke & Smith, 2001)
4	(Isoard-Gauthier, Oger, Guillet & Martin-Krumm, 2010)	$N = 461, M = 15.7$ years old ($SD = 1.2$), handball players, France	(a) Purpose: self-determined motivation → burnout (b) Design: cross-sectional	(a) Self-determined motivation – SMS (Pelletier et al., 1995) (b) Burnout – ABQ (Raedeke & Smith, 2001)
5	(Quested & Duda, 2010)	$N = 392, M = 15.7$ years old ($SD = 2.3$), vocational dance students, UK	(a) Purpose: BPN → exhaustion (b) Design: cross-sectional design	(a) BPN – Autonomy: a three-item subscale (Sheldon et al., 2001); Competence: items adapted from IMI (McAuley et al., 1989); Relatedness: a five-item subscale (Richer & Vallerand, 1998) (b) Emotional and physical exhaustion – ABQ (Raedeke & Smith, 2001)
6	(Lonsdale et al., 2009)	$N = 201, M = 22.9$ years old ($SD = 7.2$), athletes attending various individual and team sports, Canada	(a) Purpose: BPN → self-determined motivation → burnout (b) Design: cross-sectional design	(a) BPN – items adapted from needs satisfaction at work (Deci et al., 2001) and competence in sport (McAuley et al., 1989) (b) Self-determined motivation – BRSQ (Lonsdale et al., 2008) (c) Burnout – ABQ (Raedeke & Smith, 2001)
7	(Amorose, Anderson-Butcher & Cooper, 2009)	$N = 93, M = 15.8$ years old ($SD = 1.3$), volleyball players, USA	(a) Purpose: BPN → burnout (b) Design: longitudinal	(a) BPN – Autonomy: adapted items (Hollemeake & Amorose, 2005); Competence: adapted from the IMI (McAuley et al., 1989); Relatedness: a five-item subscale (Richer & Vallerand, 1998) (b) Burnout – ABQ (Raedeke & Smith, 2001)
8	(Quested & Duda, 2009)	$N = 59, M = 20.1$ years old ($SD = 3.3$), hip hop dancers, UK	(a) Purpose: BPN → exhaustion (b) Design: cross-sectional	(a) BPN – Autonomy: a three-item subscale (Sheldon et al., 2001); Competence: adapted from IMI (McAuley et al., 1989); Relatedness: a five-item subscale (Richer & Vallerand, 1998) (b) Emotional and physical exhaustion – subscale from the ABQ (Raedeke & Smith, 2001)
9	(Hodge et al., 2008)	$N = 133, M = 19.7$ years old ($SD = \text{NR}$), elite rugby players, New Zealand	(a) Purpose: BPN → burnout (b) Design: cross-sectional	(a) BPN – adapted from needs satisfaction at work (Deci et al., 2001) and competence in sport (McAuley et al., 1989) (b) Burnout – ABQ (Raedeke & Smith, 2001)
10	(Lonsdale et al., 2008)	$N = 316, M = 19.4$ ($SD = \text{NR}$), athletes attending various individual and team sports, New Zealand	(a) Purpose: self-determined motivation → burnout (b) Design: cross-sectional	(a) Self-determined motivation – BRSQ (Lonsdale et al., 2008) (b) Burnout – ABQ (Raedeke & Smith, 2001)
11	(Perreault, Gaudreau, Lapointe & Lacroix, 2007)	$N = 259, M = 14.8$ years old ($SD = 1.5$), student-athletes attending various individual and team sports, Canada	(a) Purpose: BPN → burnout (b) Design: cross-sectional	(a) BPN – Autonomy: four item scale (Blais & Vallerand, 1992); Competence: four item scale (Losier, Vallerand & Blais, 1993);

(continued on next page)

Table 1 (continued)

No	Author(s)	Participants	Purpose and design	Measures
12	(Lemyre, Roberts & Stray-Gundersen, 2007)	$N = 141$, $M = 20.1$ years old ($SD = 4.8$), athletes attending various winter sports, Norway	(a) Purpose: self-determined motivation → burnout (b) Design: longitudinal	Relatedness: a five-item subscale (Richer & Vallerand, 1998) (b) Burnout – ABQ (Raedeke & Smith, 2001) (a) Self-determined motivation – SMS (Pelletier et al., 1995) (b) Burnout – ABQ (Raedeke & Smith, 2001)
13	(Lemyre, Treasure & Roberts, 2006)	$N = 44$, $M = 20.1$ years old ($SD = 1.3$), college swimmers, USA	(a) Purpose: self-determined motivation → burnout (b) Design: longitudinal	(a) Self-determination motivation – situational motivation scale (Guay, Vallerand & Blanchard, 2000) (b) Burnout – ABQ (Raedeke & Smith, 2001)
14	(Cresswell & Eklund, 2005a)	$N = 102$, $M = 24.8$ years old ($SD = \text{not reported}$), professional rugby players, New Zealand	(a) Purpose: self-determined motivation → burnout (b) Design: longitudinal	(a) Self-determination motivation – SMS (Pelletier et al., 1995) (b) Burnout – ABQ (Raedeke & Smith, 2001)
15	(Cresswell & Eklund, 2005b)	$N = 392$, $M = 25.3$ years old ($SD = 4.3$), amateur rugby players, New Zealand	(a) Purpose: self-determined motivation → burnout (b) Design: cross-sectional design	(a) Self-determination motivation – SMS (Pelletier et al., 1995) (b) Burnout – ABQ (Raedeke & Smith, 2001)
16	(Cresswell & Eklund, 2005c)	$N = 199$, $M = 25.9$ years old ($SD = 3.0$), professional rugby players, New Zealand	(a) Purpose: self-determined motivation → burnout (b) Design: cross-sectional	(a) Self-determination motivation – SMS (Pelletier et al., 1995) (b) Athlete burnout – ABQ (Raedeke & Smith, 2001)
17	(Raedeke & Smith, 2001), Study 3	$N = 208$, $M = 19.6$ years old ($SD = 1.3$), athletes attending various individual and team sports, USA	(a) Purpose: self-determined motivation → burnout (b) Design: cross-sectional	(a) Self-determination motivation – SMS (Pelletier et al., 1995) (b) Burnout – ABQ (Raedeke & Smith, 2001)
18	(Gould et al., 1996)	$N = 62$, $M = 16.4$ years old ($SD = 2.4$), tennis players, USA	(a) Purpose: self-determined motivation → burnout (b) Design: cross-sectional	(a) Self-determination motivation – SMS (Pelletier et al., 1995) (b) Athlete burnout – Eades Athletic Burnout Inventory (Eades, 1991)

Note. BPN = basic psychological needs; → = relationship; SEM = structural equation modeling; IMI = Intrinsic Motivation Inventory; ABQ = Athlete Burnout Questionnaire; SMS = Sport Motivation Scale; BRSQ = Behavioral Regulation in Sport Questionnaire; NR = not reported.

Results

Study characteristics

A summary of the selected studies ($N = 18$) is presented in Table 1. All the studies were conducted in western nations (e.g., New Zealand, United Kingdom, and United States). They were published between 1996 and 2011. A total of 3549 participants were recruited in the studies (from 44 to 461), and the mean ages in each study ranged from 14.8 to 25.9 years old. The participants attended various sports. More studies applied the cross-sectional design ($n = 12$) rather than the longitudinal design ($n = 6$).

Research purposes and measurements

Seven studies (#1, #5, #6, #7, #8, #9, #11) examined the relationships between the three basic psychological needs and burnout. Twelve studies (#2, #3, #4, #6, #10, #12, #13, #14, #15, #16, #17, and #18) examined the relationships between self-determined motivation and burnout. Study #6 was unique in which the relationships among the three basic psychological needs, self-determined motivation, and burnout were investigated.

Different non-sport-specific scales were administered to assess the athletes' three basic psychological needs across the reviewed studies. For the measurements of self-determined motivation, most

studies employed the Sport Motivation Scale (Pelletier et al., 1995), followed by the use of the Behavioral Regulation in Sport Questionnaire (Lonsdale, Hodge, & Rose, 2008). Regarding burnout measures, seventeen studies used the ABQ (Raedeke & Smith, 2001), and only one study (#18) used the Eades Athletic Burnout Inventory (Eades, 1991; see Table 1).

Narrative results

Regardless of the instruments used to measure the three basic psychological needs, six studies (#1, #6, #7, #8, #9, and #11) fully supported the tenet of SDT, showing the negative relationships between the three basic psychological needs and global burnout/burnout subscales (i.e., physical/emotional exhaustion, reduced sense of accomplishment, and sport devaluation). One study (#8), however, found that autonomy and competence did not influence physical/emotional exhaustion.

Regarding the relationships between types of motivation and global burnout/burnout subscales, eight studies (#2, #3, #4, #6, #10, #12, #13, and #18) supported the tenet of SDT that global burnout/burnout subscales was negatively predicted by self-determined motivation. Four studies, on the other hand, only partially supported the tenet (#14, #15, #16, and #17). To be specific, these four studies found no or trivial relationships between burnout subscales and controlled regulations.

Meta-analytic results

The above narrative results provided a general idea about the current state of the reviewed literature including the conflicting results. It should be noted that a comprehensive review should focus on results of weighed effect sizes (Johson & Boynton, 2008). Table 2 shows the meta-analytic results of the relationships between the three basic psychological needs and global burnout/burnout subscales. As expected, the negative impact of the three basic psychological needs on global burnout/burnout subscales were evidenced ($r = -.64$ to $-.22$). Publication biases were not found ($k = 3$ to 5, fail-safe number = 7–20). Compared with reduced sense of accomplishment, exhaustion showed weaker correlations with autonomy and competence (i.e., non-overlapped confidence interval). Compared with devaluation, exhaustion showed smaller relations (although there were no significant differences) with the three basic psychological needs.

The relationships between motivation and global burnout/burnout subscales are presented in Table 3. Global burnout/burnout subscales were negatively correlated with self-determination index ($r = -.56$ to $-.38$; $k = 4$ to 5, fail-safe number = 16–23), intrinsic motivation ($r = -.46$ to $-.22$; $k = 2$ to 7, fail-safe number = 9–18), and extrinsic autonomous regulations ($r = -.28$ to $-.09$; $k = 2$ to 4, fail-safe number = 6–8). In addition, global burnout/burnout subscales were positively correlated with amotivation ($r = .31$ to $.68$; $k = 2$ to 7, fail-safe number = 14–41). However, controlled regulations showed no or trivial correlations with the burnout subscales ($r = .09$ to $.15$; $k = 7$, fail-safe number = 4–5). In general, compared with other burnout constructs, exhaustion generally showed weaker correlations with the different types of motivation.

Results of multiple regressions

The authors first tested the model in which the three basic psychological needs predicted global burnout, and the results showed that competence ($\beta = -.34$, $p < .01$) was the strongest predictor, followed by autonomy ($\beta = -.28$, $p < .01$) and relatedness ($\beta = -.18$, $p < .01$). Findings of the other model in which the authors regressed global burnout on regulations showed that controlled regulations ($\beta = .61$, $p < .01$) was the strongest predictor, followed by amotivation ($\beta = .24$, $p < .01$), intrinsic motivation ($\beta = -.21$, $p < .01$), and extrinsic autonomous regulations ($\beta = -.20$, $p < .01$).

Discussion

The relationships between burnout and the three basic psychological needs/self-determined motivation were reviewed and,

wherever possible, included in meta-analyses. The findings of the present study were discussed revolving around the theoretical framework of SDT, magnitude of weighted effect sizes, and the measurement issues on exhaustion and behavioral regulations.

In line with SDT, the meta-analytic findings supported that the three basic psychological needs negatively influenced global burnout and each of the three burnout dimensions, even though there was one study (#8) showing that autonomy and competence did not predict exhaustion. The insignificant relationships could be due to the low statistical power of the analyses (i.e., power = .49 for the link between autonomy and exhaustion; power = .28 for the link between competence and exhaustion). Regardless of the conflicting findings, the weighted effect sizes were generally ranged from moderate to high, indicating that the BPNT is an important mini-theory to explain mechanism of athlete burnout. In addition, competence and autonomy were stronger predictors of global burnout compared to relatedness. This finding is consistent with SDT, which postulates that the need for relatedness often has a less proximal role in predicting athlete burnout, compared with the other two basic psychological needs (Deci & Ryan, 2000).

Although exhaustion is believed to be the central of athlete burnout (Goodger et al., 2010), the study found that exhaustion generally yielded weaker relationships (although some were not significantly different) with the basic psychological needs than did the other two burnout dimensions. The weaker relationships could be attributed to limitations of the measurement tool (ABQ; Quested & Duda, 2010, 2011). One possible explanation is that motivational processes are more relevant to emotional exhaustion rather than to physical fatigue (Quested & Duda, 2011; Reinboth, Duda, & Ntoumanis, 2004). Thus, the lower relationship between exhaustion and the basic psychological needs may be attributed to the limitation of the ABQ (Quested & Duda, 2010, 2011). In other words, emotional exhaustion and physical fatigue were measured within a subscale through the ABQ, and therefore it may be difficult to delineate both states separately (Quested & Duda, 2010, 2011). The possibility could be examined in future studies by separating emotional exhaustion and physical fatigue or including another measurement specific to measure emotional exhaustion to see if needs satisfaction is more influenced by emotional exhaustion than physical exhaustion.

With reference to the relationships between types of motivation and burnout, the meta-analytic findings generally confirmed our hypotheses that are in line with SDT (i.e., burnout would be negatively influenced by intrinsic motivation and extrinsic autonomous regulations, while it would be positively predicted by amotivation and controlled regulations). However, controlled regulations showed no or trivial correlations with burnout subscales

Table 2
Meta-analytic results of the relationships between burnout and basic psychological needs.

Variables	Study #	k	N	r	95% CI	Q	I^2	Orwin's fail-safe N
Global burnout & autonomy	1, 6, 7, 11	4	772	-.50**	(-.55, -.44)	2.75	.00	18
Global burnout & competence	1, 6, 7, 11	4	772	-.52**	(-.58, -.46)	3.65	17.89	20
Global burnout & relatedness	1, 6, 7, 11	4	772	-.43**	(-.54, -.31)	10.49*	71.39	15
Exhaustion & autonomy	1, 5, 6, 8, 11	5	1130	-.25**	(-.31, -.25)	1.49	.00	8
Exhaustion & competence	1, 5, 6, 8, 11	5	1130	-.22**	(-.28, -.16)	4.77	16.19	7
Exhaustion & relatedness	1, 5, 6, 8, 11	5	1130	-.26**	(-.31, -.20)	2.08	.00	9
Accomplishment & autonomy	1, 6, 11	3	679	-.44**	(-.50, -.37)	1.11	.00	12
Accomplishment & competence	1, 6, 11	3	679	-.64**	(-.70, -.57)	4.72	57.58	20
Accomplishment & relatedness	1, 6, 11	3	679	-.38**	(-.55, -.18)	18.86**	88.14	10
Devaluation & autonomy	1, 6, 11	3	679	-.40**	(-.57, -.19)	18.69**	89.30	11
Devaluation & competence	1, 6, 11	3	679	-.38**	(-.51, -.23)	9.62**	79.13	10
Devaluation & relatedness	1, 6, 11	3	679	-.40**	(-.53, -.24)	10.66**	81.24	10

Note. ** $p < .01$, * $p < .05$; Study # refers to those presented in Table 1 k = number of independent samples; r = average-weighted correlation coefficient; CI = confidence interval; Accomplishment = reduced sense of accomplishment.

Table 3

Meta-analytic results of the relationships between burnout and motivation.

Variables	Study #	k	N	r	95% CI	Q	I^2	Orwin's fail-safe N ^a
Global burnout and SDI	2, 6, 12, 13	4	535	-.56**	(-.66, -.44)	9.15*	67.20	23
Global burnout and amotivation	6, 10	2	517	.68**	(.61, .75)	2.10	52.32	NA
Global burnout and controlled regulations	6, 10	2	517	.48**	(.41, .55)	.02	.00	NA
Global burnout and extrinsic autonomous regulations	6, 10	2	517	-.27**	(-.45, -.08)	5.10*	80.41	NA
Global burnout and intrinsic motivation	6, 10	2	517	-.46**	(-.53, -.39)	10.02**	90.02	NA
Exhaustion and SDI	2, 3, 6, 12, 13	5	654	-.38**	(-.45, -.32)	3.93	.00	16
Exhaustion and amotivation	3, 4, 6, 14, 15, 16, 17	7	1682	.31**	(.20, .42)	36.03**	83.35	14
Exhaustion and controlled regulations	3, 4, 6, 14, 15, 16, 17	7	1682	.09	(-.05, .22)	45.50**	86.81	NA
Exhaustion and extrinsic autonomous regulations	3, 6, 14, 17	4	630	-.09*	(-.19, .00)	4.12	28.79	NA
Exhaustion and intrinsic motivation	3, 4, 6, 14, 15, 16, 17	7	1682	-.22**	(-.32, -.12)	27.49**	78.18	9
Accomplishment and SDI	2, 3, 6, 12, 13	5	654	-.50**	(-.56, -.44)	2.54	.00	23
Accomplishment and amotivation	3, 4, 6, 14, 15, 16, 17	7	1682	.51**	(.46, .57)	13.39*	55.18	33
Accomplishment and controlled regulations	3, 4, 6, 14, 15, 16, 17	7	1682	.15*	(.01, .28)	45.04*	86.68	4
Accomplishment and extrinsic autonomous regulations	3, 6, 14, 17	4	622	-.28**	(-.35, -.20)	2.43	.00	8
Accomplishment and intrinsic motivation	3, 4, 6, 14, 15, 16, 17	7	1682	-.31**	(-.39, -.22)	22.69**	73.56	13
Devaluation and SDI	2, 3, 6, 13	4	513	-.55**	(-.61, -.48)	.60	.00	21
Devaluation and amotivation	3, 4, 6, 14, 15, 16, 17	7	1682	.60**	(.54, .66)	18.94**	68.31	41
Devaluation and controlled regulations	3, 4, 6, 14, 15, 16, 17	7	1682	.15	(-.03, .33)	83.56**	92.82	5
Devaluation and extrinsic autonomous regulations	3, 6, 14, 17	4	622	-.22**	(-.35, -.08)	9.54*	68.56	6
Devaluation and intrinsic motivation	3, 4, 6, 14, 15, 16, 17	7	1682	-.38**	(-.48, -.27)	36.02**	83.34	18

Note. ^a Orwin's Fail-safe N is not applicable to a meta-analysis with only two studies; ** $p < .01$, * $p < .05$; SDI = Self-Determination Index; Study # refers to those presented in Table 1; k = number of independent samples; r = average-weighted correlation coefficient; CI = confidence interval; Accomplishment = reduced sense of accomplishment; NA = not applicable.

though the magnitudes of relationships between other types of motivation and burnout subscales were ranged from small to high. It is worthwhile to note that the unexpected findings (as opposed to SDT) or the effect sizes were heterogeneous (see Table 3). Although we were unable to perform any moderation analysis here, one potential moderator for the heterogeneous findings could be due to the use of different scales for measuring controlled regulations (i.e., Sport Motivation Scale, Pelletier et al., 1995; Behavioral Regulation in Sport Questionnaire, Lonsdale et al., 2008). Even though earlier works suggested that the Sport Motivation Scale had adequate psychometric properties (Pelletier et al., 1995), more recent works raised some concerns on its validity (Lonsdale et al., 2008). For example, increasing evidence demonstrated that this instrument might not produce scores conforming to the proposed factorial structure in particular to its subscales of controlled regulations (Mallett, Kawabata, Newcombe, Otero-Forero, & Jackson, 2007), and low internal reliability in some dimensions was found in several empirical studies (e.g., Cresswell & Eklund, 2005b; Gould, Udry, Tuffey, & Loehr, 1996). Another example is that two studies (#6, #10) which used the Behavioral Regulation in Sport Questionnaire showed a significant relationship between global burnout and controlled regulations (see Table 3). This may explain why controlled regulation was a significant predictor for global burnout in the second regression model, because the weighted effect size was based on the two studies (#6, #10) that used the Behavioral Regulation in Sport Questionnaire. Consequently, future research may need to consider using other measures, instead of the Sport Motivation Scale, to investigate relationships between the self-determined motivation and burnout among athletes.

Regardless of the inconsistent findings, reduced sense of accomplishment and devaluation in general showed stronger relationships with different types of motivation. This was consistent with the above findings in that exhaustion generally yielded weaker relationships with the three basic psychological needs than did with the other two burnout dimensions. This is because the three basic psychological needs are presumably nutrients for self-determined motivation, which could carry their effects (the relationships between the three basic psychological needs and burnout) toward self-determined motivation (Deci & Ryan, 2000).

Limitations

A few limitations should be noted in the current research. Firstly, the studies included in this review exclusively relied on self-report measures, which may lead to a common-method variance bias. However, the self-reported data on the three basic psychological needs, motivation, and burnout may be the most valid measurement method in the studies. Participants were deemed to be in the best positions to report on their own levels of needs satisfaction, self-determined motivation, and burnout. Secondly, some potentially relevant studies such as in-progress articles or unpublished dissertations/theses could have been included. However, the use of fail-safe number delimited, to some extent, the problem of publication bias (Rosenthal, 1979).

Implications

Keeping the limitations in mind, there are several implications derived from the current findings. Firstly, athletes' basic psychological needs and self-determined motivation should be monitored and enhanced to prevent burnout. For example, a coach can provide autonomy supportive coaching climates (e.g., choice) to athletes to improve their autonomy. Secondly, more than half of the studies used a cross-sectional design. Thus, researchers are encouraged to use longitudinal data to better examine the relationships between the three basic psychological needs/motivation and burnout. Since all the previous studies were conducted in the western societies, future studies should be conducted in other parts of the world to increase generalizability of the findings. Thirdly, researchers may need to consider using scales with sound psychometric properties, particularly to assess the three basic psychological needs and behavioral regulations in sports (e.g., Basic Need Satisfaction in Sport Scale; Ng, Lonsdale, & Hodge, 2011). Moreover, only one study included both the three basic psychological needs and self-determined motivation. More studies could include the both constructs to better understand relationships with athlete burnout through SDT (Lonsdale et al., 2009). Finally, the scope of this study was confined to systematically review studies on the relationships between the three basic psychological needs/motivational regulations and burnout, future meta-analytic studies would aim at reviewing other relevant constructs or

contextual factors aligned with other burnout models (e.g., cognitive-affective model; Smith, 1986). Findings from these studies could provide an indirect approach of comparing different burnout models and identify which would be a better model to explain athlete burnout.

In summary, the present review has shown that the three basic psychological needs and different types of motivation are generally significant indicators of global burnout and each of its three dimensions. The basic psychological needs and motivation showed small to large effects on predicting burnout, which confirmed the significance of using SDT as a framework for studying athlete burnout.

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¹ Note: references marked with an asterisk indicate studies included in the systematic review.

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