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Research article

Balancing Demands and Resources in Sport: Adaptation and Validation of the Demand-Induced Strain Compensation Questionnaire for Use in Sport

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Abstract

Too high demands, combined with a lack of resources, are often detrimental to athletic health and well-being. However, a valid and reliable instrument to investigate different dimensions of demands and resources in sport is currently unavailable. Therefore, the present study examines the psychometric properties of an existing and well-validated survey instrument on demands and resources at task-level that was adapted to sport. This instrument, the Demand-Induced Strain Compensation Questionnaire for Sport (DISQ-SPORT), was empirically tested among 1,101 athletes (416 females and 685 males) from a variety of sports and in different languages. Results supported the proposed six-factor structure of the instrument, consisting of physical, cognitive, and emotional demands and resources. Internal consistencies of all subscales were satisfactory and the instrument was invariant across type of sport, competitive level and language. Continued evaluation of the psychometric properties of the DISQ-SPORT, especially in terms of content validity and test-retest stability, is nevertheless warranted. Theoretical and practical implications as well as areas for future research are discussed.

Key words: Athletes, multidimensionality principle, DISQ-SPORT, psychometrics, measurement invariance.

Introduction

Engaging in sport, whether as a recreational runner or as a professional football player, is often a highly demanding endeavor. Moreover, demands placed on both recreational and elite athletes are on the rise due to a fast-developing and increasingly competitive environment, both face-to-face (Soligard et al., 2016) and online (Latter, 2015). It has been suggested that balancing these high demands (e.g., high levels of concentration, a negative team atmosphere) with sufficient resources (e.g., emotional support from teammates or coach) is important in terms of staying motivated, obtaining personal growth, and performing optimally. However, when there are insufficient resources available to cope with demands in sport (i.e., a high demands-low resources imbalance), negative consequences such as a lack of motivation (Tabei et al., 2012), athlete burnout (Raedeke and Smith, 2004; Smith, 1986), decreased performance (Halson and Jeukendrup, 2004), and even injury (Andersen and Williams, 1988) may ensue for athletes. Therefore, more insight into common demands placed on athletes and resources available to cope with these demands can be valuable for preventing negative consequences of sport participation. At the same time, it may provide clues on how to improve athletes' health, well-being, and performance.

A few questionnaires have been developed so far that aim to measure particular demands or resources in the sport context. For instance, Arnold and colleagues (2013) developed the Organizational Stressor Indicator for Sport Performers (OSI-SP). Other instruments are the Media Stressors in Football Questionnaire (MSFQ; Kristiansen et al., 2012), the Perceived Available Support in Sport Questionnaire (PASS-Q; Freeman et al., 2011), and the Basic Needs Satisfaction in Sport Scale (BNSSS; Ng et al., 2011). However, these existing measures frequently focus on just one particular demand or resource. In addition, some of these demands and resources can be considered organization-level characteristics (e.g., selection processes, leadership, job security). A valid and reliable instrument that simultaneously measures different dimensions of both *task-level* demands (e.g., need for precision) and resources (e.g., autonomy) in sport is currently unavailable. To address this, the present study aims to investigate the psychometric properties of an adapted survey instrument to simultaneously measure *multidimensional* (i.e., physical, cognitive, and emotional) demands and resources in sport at task-level. We based this survey instrument on theoretical models and psychometric instruments that were developed in the domain of work and organizational (W/O) psychology that have considerably advanced our understanding of the role of demands and resources at task-level.

The nature of demands and resources

The cognitive-affective stress model of athlete burnout, as developed by Smith (1986), proposes that the first stage of the burnout process is characterized by high situational demands (e.g., pressure to perform, intense physical effort) that outweigh the resources available to athletes. Indeed, several studies have empirically demonstrated that too high sport demands are detrimental to athletic health and well-being, in particular when athletes lack sufficient resources to cope with those demands (DeFreese and Smith, 2013; Raedeke and Smith, 2004; Williams et al., 1991). Likewise, elite sport performers appraised sport-related stressors (e.g., an argument with a coach, lack of social cohesion) as threatening when they experienced little perceived control and few coping resources (Hanton et al., 2012). So, demands and resources in sport cannot be appropriately considered independently from each other. In other words,

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when considering demands it is vital to simultaneously take into account the availability and potential use of resources.

Theoretical models in the domain of work stress have tried to explain how occupational stress reactions can be explained by two types of task or job characteristics: job demands and job resources. Job demands can be defined as those properties of the work setting that require immediate or sustained physical, cognitive and/or emotional effort (De Jonge and Dormann, 2017). Examples of job demands are workload, time pressure, role conflict, and physical exertion. Job resources are conceptually similar to coping options; they can be broadly conceptualized as job-related assets that can be employed when an employee has to deal with demands at work. Examples of job resources are job control, job variety and workplace social support (De Jonge and Dormann, 2017).

Early theoretical models, such as the Demand-Control (DC) Model (Karasek, 1979) and the Effort-Reward Imbalance (ERI) Model (Siegrist et al. 1986), identified demands and resources from a generic point of view. That is, demands and resources are considered as global and unidimensional constructs. In an attempt to further advance understanding of the interplay between demands and resources at work, De Jonge and Dormann (2003, 2006) developed the Demand-Induced Strain Compensation (DISC) Model. Like Smith's (1986) cognitive-affective stress model, the DC Model, and the ERI Model, the DISC Model assumes that the combination of high demands and low resources will increase the risk of poor health, well-being and performance. When high demands are coupled with sufficient resources they will be associated with positive outcomes. That is, a balance between high demands and high resources will increase health, well-being, and performance (De Jonge et al., 2014). However, new and innovative is the idea that De Jonge and Dormann (2003, 2006) reasoned that there are three specific types of demands, resources, and outcomes. More specifically, the multidimensionality principle of their model proposes that demands, resources and outcomes each consist of a predominantly physical, cognitive, or emotional element (De Jonge and Dormann, 2003, 2006). Empirical support for this principle has been found in different domains such as health care (De Jonge et al., 2004; Lavoie-Tremblay et al., 2014), technology (Van de Ven et al., 2014), education (Feuerhahn et al., 2013), and services like police (Chrisopoulos et al., 2010).

In agreement with the multidimensionality principle of the DISC Model, we propose that both demands and resources in sport consist of a predominantly physical, cognitive, or emotional element. Translated to the sport setting, physical demands are those demands primarily associated with the muscular-skeletal system (i.e., sensorimotor and physical aspects of sport behavior). Without stressing the body physically, athletes will likely not develop and maximize their potential for peak performance. Hence, high physical demands are frequently an innate aspect of engaging in sport. Second, cognitive demands impinge primarily on information processing and complex decision-making (e.g., Hanton et al., 2005). For instance, athletes often have to cope with pressure and deal with expectations from themselves and people around them (Anshel and Sutarso, 2007; Hanton et al., 2005; Mellalieu et al., 2009). Lastly, emotional demands in sport are mainly concerned with the effort needed to deal with emotions arising from disappointment about one's own performance, criticism or negative feedback (e.g., Nicholls et al., 2006), from interactions with others (e.g., opponents, referees, audience), and conflict (Hanton et al., 2005; Fletcher et al., 2012). Existing instruments that were designed to assess demands in sport, such as the OSI-SP (Arnold et al., 2013), focus merely on organization-level characteristics, whereas the demands discussed here concern task-level characteristics.

Resources can also consist of a primarily physical, cognitive, or emotional component. First, physical resources in sport are primarily focused on the opportunity to regulate physical exertion, such as being able to take a physical break or to divide one's training load according to one's current physical capacity. Second, cognitive resources are primarily associated with control and informational support. This often comes in the form of the opportunity to determine a variety of training aspects, or when athletes have access to knowledge (e.g., through meetings or clinics) to solve challenges. Lastly, emotional resources in sport mainly concern the opportunity to express emotions freely or receive emotional support from others (e.g., from a teammate or a coach). In addition to having a direct positive effect on athletic health, well-being, and performance, adequate resources can also mitigate the impact of high demands on athletes' strain and improve health and well-being. An empirical study among high-level tennis players by Rees and Hardy (2004) found support for this process. The authors showed that that emotional support reduced feeling flat (a negative performance state), but also buffered the negative relation between competition pressure and feeling flat.

The present study

Identifying (high/low) demands and (high/low) resources would be particularly relevant for athletes, coaches and sport management (Lonsdale et al., 2007). Moreover, an interesting question is whether the multidimensional nature of demands and resources, as put forward by the DISC Model (De Jonge and Dormann, 2006) can also be detected in the sport domain. To measure the six different dimensions of job demands and job resources, De Jonge and colleagues (2007) developed the Demand-Induced Strain Compensation Questionnaire, abbreviated DISQ. Several empirical studies have demonstrated psychometric support for the DISQ across different countries and job sectors (e.g., Bova et al., 2013; De Jonge et al., 2012; Van de Ven et al., 2014). Therefore, the first objective of the present study is to assess the validity and reliability (i.e., internal consistency) of an adapted version of the DISQ for use in a sport context.

As a first test of factorial validity of the adapted DISQ, termed the Demand-Induced Strain Compensation Questionnaire for Sport (DISQ-SPORT), we tested whether a six-factor model that takes into account the construct (demands and resources) as well as the three dimensions (physical, cognitive and emotional) would provide a better fit to the data as compared to a two-factor solution model for the constructs demands and resources only. Second, we examined the internal consistency of the proposed dimensions of the DISQ-SPORT. Finally, we tested for measurement equivalence by examining if the measurement model of the DISQ-SPORT is invariant across type of sport (individual or team sport), competitive level (elite or recreational), and language (Dutch, English, or German).

Methods

Procedure and participants

Prior to athlete recruitment, the study received institutional ethical approval. Athletes were approached through different sport organizations in The Netherlands, Germany and the United Kingdom from April, 2015 to December, 2015, and after a major running event in Belgium in October, 2016. Athletes were asked to fill out an online survey consisting of questions related to demographic characteristics, demands, and resources. This convenience sample consisted of 1,101 athletes (416 females, 685 males, M_{age} = 36.2, *SD* = 12.4) from Belgium (n = 647), The Netherlands (n = 214), Germany (n = 111), the United Kingdom (n = 46), Austria (n = 18), Switzerland (n = 16), the US (n = 7), and a small number of other countries (n = 42). The three languages of the questionnaire (Dutch, English, and German) sufficed for this sample. Athletes were active in either team or individual sports (55% individual, 45% team). Athletic skill level was categorized as recreational (i.e., amateur level; n = 900) and elite (i.e., (semi-)professional at national or international level; n = 201).

DISQ-SPORT instrument

We adapted the original DISQ instrument (De Jonge et al., 2007) to the sport domain, based on (1) the relevance of items to sport, (2) the requirement of at least three items per dimension (to be able to determine internal consistency) of demands and resources, and (3) an initial exploratory factor analysis. The *demands* scale consisted of twelve items measuring physical demands (4 items; e.g., “In my sport, I have to perform physical activities in uncomfortable or impractical postures”), cognitive demands (4 items; e.g., “In my sport, I have to remember many things simultaneously”), and emotional demands (4 items; e.g., “In my sport, I have to deal with a negative atmosphere within the group I belong to”). The *resources* scale consisted of nine items measuring physical resources (3 items; e.g., “In my sport, I have the opportunity to take a physical break when things get physically strenuous”), cognitive resources (3 items; e.g., “In my sport, I have the opportunity to determine my own training method(s)”), and emotional resources (3 items; e.g., “In my sport, I can find a listening ear in others (e.g., teammates or coaches) when an upsetting situation has occurred”).

For both demands and resources, athletes indicated to what extent their sport requires them to deal with the three types of demands and to what extent they had access to the three types of resources. All items were scored on a 5-point, frequency-based Likert scale, ranging from 1 (“Never”) to 5 (“(Almost) always”). Items were translated from Dutch to English and German using a translation/back-translation procedure (Brislin, 1980).

Data analysis

To test the factorial structure of the DISQ-SPORT, confirmatory factor analyses (CFAs) were conducted using Mplus software (version 7.31; Muthén and Muthén, 2010). Specifically, two models were compared: a two-factor solution model, which considers demands and resources as two latent and correlated factors (Model 1); and a six-factor solution that considers six latent and correlated factors since demands and resources can each be characterized by cognitive, emotional or physical content (Model 2).

To evaluate the fit of the factor models to the data, we used the following model fit indices and cut-off values for studies with observations > 250 and between 12 and 30 observed variables as recommended in the literature (Hair et al., 2010): the comparative fit index (CFI; ≥ 0.92), the Tucker–Lewis index (TLI; ≥ 0.92), the Standardized Root Mean square Residual (SRMR; ≤ 0.08), and the Root Mean Square Error of Approximation (RMSEA; ≤ 0.06). Finally, for internal consistency, omega total (McDonald, 1999) was calculated with a set criterion of 0.70 for sufficient reliability (Nunnally and Bernstein, 1994).

In line with previous studies (e.g., Bova et al., 2013), measurement invariance of the DISQ-SPORT across sport type (individual or team), competitive level (recreational or elite), and language (Dutch, English, or German) was tested using sequential procedures as proposed by Vandenberg and Lance (2000), Cheung and Rensvold (2002), as well as De Jonge and colleagues (2008). Multiple group confirmatory factor analyses (MGCFAs) using four steps were conducted in which we compared four nested models (Vandenberg and Lance, 2000). First, to test configural invariance (i.e., the same set of items would be associated with the same construct; Cheung and Rensvold, 2002), we ran a multigroup analysis with free parameters (configural model). Second, to test metric invariance (i.e., a construct would be manifested in the same way across samples), we ran a multigroup analysis with fixed factor loadings (metric model). Third, to test structural invariance, we ran a multigroup analysis with fixed variance and covariances (scalar model). This method is an advanced, systematic approach to conducting tests of measurement invariance.

Table 1. Goodness-Of-Fit Statistics for Confirmatory Factor Analyses of the Demand-Induced Strain Compensation Questionnaire for Sport (DISQ-SPORT).

	N	χ2	df	CFI	TLI	SRMR	RMSEA
Model 1 (2-factor)	1101	4989.25*	188	.65	.61	.122	.152
Model 2 (6-factor)	1101	727.57*	174	.96	.95	.044	.054

χ2: chi-square; df: degrees of freedom; GFI: goodness-of-fit Index; CFI: comparative fit index; TLI: Tucker–Lewis index; RMSEA: root-mean- square-error-of-approximation. * $p < 0.001$.

Results

Factorial validity

Table 1 shows the fit indices for both confirmatory factor models (CFAs). A six-factor model (Model 2) showed a significantly better fit with the data as compared to a two-factor solution (Model 1; $\Delta\chi^2$ (14) = 4,261.68, p < 0.001; ΔCFI = 0.31: ΔTLI = 0.34), and revealed a satisfactory fit of the model with the data (CFI = 0.96, TLI = 0.95, SRMR = 0.044, RMSEA = 0.054 [0.050; 0.058]). Thus, Hypothesis 1 that a six-factor model would better fit our data compared to a two-factor model was supported.

Means for different groups (elite vs. recreational athletes; individual vs. team sports), omega total, and correlations for the different latent factors are displayed in Table 2. With regard to the internal consistency of the subscales, all six dimensions showed sufficiently high reliability (> 0.70). Intercorrelations between latent factors ranged from -0.47 to 0.54, indicating that the different dimensions of demands and resources are related but unique. Standardized factor loadings of the different items are displayed in Table 3.

Measurement invariance

To test measurement invariance of the DISQ-SPORT across sport type (individual or team), competitive level (recreational or elite) and language (Dutch, English or German) we conducted several multigroup CFAs in which we compared three nested models (Table 4). Fit indices of all nested models showed a slight deterioration of the $\chi2$. As $\Delta\chi2$ can be overly sensitive to minor changes in model fit, Cheung and Rensvold (2002) have argued that values of ΔCFI equal to or less than 0.01 indicate that the hypothesis of invariance should not be rejected, whereas values of ΔTLI equal to or less than 0.02 indicate that the hypothesis of invariance is sustainable (Vandenberg and Lance, 2000). In all the analyses ΔCFI and ΔTLI were ≤.01, except for a ΔCFI and ΔTLI of .02 for language when the factor covariances were constrained. Taken together, these findings support the equality of factor loadings, variances, and covariances of the DISQ-SPORT across sport type, competitive level, and language.

Table 3. **Standardized factor loadings**

Subscale and items	Loading
Physical demands	
Physical effort.	.68
Lifting or moving heavy objects.	.68
Quick and continuous physical activity.	.65
Uncomfortable physical activities.	.63
Cognitive demands	
Work very precisely.	.90
Remember many things.	.87
Concentration and precision.	.85
Mental effort.	.81
Emotional demands	
Angry people.	.84
Unrealistic expectations.	.83
Negative atmosphere.	.80
Problems of others.	.75
Physical resources	
Exertion management.	.83
Physical break opportunity.	.73
Opportunity to decide posture.	.72
Cognitive resources	
Determining training intensity.	.94
Determining training method.	.91
Access to information.	.56
Emotional resources	
Finding a listening ear.	.92
Freely expressing emotions.	.88
Emotional support.	.83

Table 2. **Internal consistencies (Omega Total) of the study variables, latent factor correlations and mean scores (N = 1101). Data are means (±SD)**

	1	2	3	4	5	6	Elite (n = 201)	Recreational (n = 900)	Individual (n = 946)	Team (n = 155)
1. Physical demands	.76						3.34 (.77)	2.48 (.70)	2.53 (.75)	3.32 (.67)
2. Cognitive demands	.46	.91					3.98 (.60)	2.55 (1.05)	2.61 (1.06)	4.06 (.62)
3. Emotional demands	.25	.54	.88				2.31 (.59)	1.56 (.73)	1.57 (.70)	2.51 (.63)
4. Physical resources	-.12	-.31	-.29	.81			3.20 (.80)	3.81 (.88)	3.82 (.86)	2.99 (.81)
5. Cognitive resources	-.20	-.37	-.31	.42	.85		2.75 (.84)	4.02 (.90)	4.00 (.87)	2.46 (.81)
6. Emotional resources	.12	.22	.12	.08	-.03	.91	3.84 (.72)	3.28 (1.19)	3.30 (1.17)	3.87 (.71)

Omega total coefficients are on diagonal. All correlations ≥ 0.08 are significant at $p < 0.01$; all correlations ≥ 0.12 are significant at $p < 0.001$.

Table 4. **Goodness-Of-Fit Statistics for Multigroup Analyses of the DISQ-SPORT.**

		$\chi2$	$\Delta\chi2$	df	Δ df	CFI	ΔCFI	TLI	ΔTLI	RMSEA
Sport Type	Configural model	977.13*		348		.95		.94		.057
	Metric model	1008.94*	31.81*	363	15	.95	.00	.94	.00	.057
	Scalar model	1133.07*	124.13*	378	15	.94	.01	.93	.01	.060
Competitive Level	Configural model	993.74*		348		.95		.93		.058
	Metric model	1046.20*	52.46*	363	15	.94	.01	.93	.00	.058
	Scalar model	1178.92*	132.72*	378	15	.93	.01	.93	.00	.062
Language	Configural model	1245.59*		522		.95		.94		.062
	Metric model	1330.62*	85.03*	552	30	.94	.01	.94	.00	.062
	Scalar model	1648.91*	318.29*	582	30	.92	.02	.92	.02	.071

$\chi2$: chi-square; *df*: degrees of freedom; GFI: goodness-of-fit Index; CFI: comparative fit index; TLI: Tucker-Lewis index; RMSEA: root-mean-square-error-of-approximation. Delta changes refer to the present model compared with the previous model.
* $p < 0.001$

Discussion

The present study tested the psychometric properties of the Demand-Induced Strain Compensation Questionnaire for Sport (DISQ-SPORT), in order to assess athletes' perceptions of physical, cognitive, and emotional demands and resources. Results of confirmatory factor analyses provided evidence for the three-dimensionality of both demands and resources in a sport context as proposed by the DISC Model (De Jonge and Dormann, 2006). Moreover, correlations between scales indicated they are measuring different dimensions of demands and resources. Invariance testing also provided support for the factorial invariance of the DISQ-SPORT across sport type, competitive level, and language. Finally, all subscales of the DISQ-SPORT showed satisfactory internal consistencies.

The relatively poor fit of the two-factor model, which considers demands and resources as two latent factors, is in contrast with the notion that demands and resources are global and unidimensional constructs, as put forward by the DC Model (Karasek, 1979), the ERI Model (Siegrist et al., 1986), and Smith's (1986) cognitive-affective stress model. Rather, our findings suggest that these characteristics cannot be considered from a generic point of view, and that the specificity of demands and resources is important to take into account - not only in work but also in sport. These results are in accordance with the three-dimensional structure of demands and resources found by previous empirical studies conducted in different work domains, such as health care, education, and technology (cf. Van den Tooren et al., 2011). Therefore, in both the work and sport domain it seems worthwhile to describe these performance settings in terms of specific demands and resources. The current findings also underscore the potential of models originating in W/O psychology models to investigate health, well-being, and performance in sport.

Theoretical and practical implications

A first major contribution of this study is that it seems useful to differentiate between physical, cognitive, and emotional types of demands and resources in sport. Moreover, the DISQ-SPORT allows for measuring these specific types of demands and resources in sport in a valid and reliable way. From an applied perspective, distinguishing between different dimensions of demands and resources at task-level in sport allows coaches, consultants, and scientists to more accurately identify opportunities to redesign demands and resources within the sport setting. Thus, practitioners can use the DISQ-SPORT to minimize the risk of athlete burnout, or aiding recovery from stress-related issues. Furthermore, as lowering demands may not always be feasible, redesigning (i.e., optimizing) resources may be a better and more effective approach for preventing negative outcomes of sport participation (DeFreese et al., 2015). For instance, when an imbalance between high emotional demands and low emotional resources becomes evident, appropriate measures can be taken to provide an athlete with adequate emotional support. Consequently, health, well-being, and performance of athletes can be improved by allowing more specific targeting of means to minimize an imbalance.

Second, we found support for the suitability of the original DISQ instrument to the sport domain. These findings point toward the generality of the DISQ instrument across different domains (e.g., sport, health care, education, and technology). Although the six-factor structure of demands and resources appears to be highly applicable to the sport domain, it seems that a few items might be better suited for either the work or sport context. For instance, having to lift or move heavy objects may not be a general and characteristic physically demanding feature of sport. Therefore, it might also be that new items should be added in this respect. Testing and evaluating instruments is an ongoing process and continued evaluation of the psychometric properties of the DISQ-SPORT, especially in terms of content validity, is warranted. One strength of the DISQ-SPORT, however, is that it can be applied to a variety of sports. More importantly, the present study advances previous research by enabling simultaneous measurement of task-level physical, cognitive, and emotional demands and resources in sport. So, the DISQ-SPORT differentiates itself from other instruments measuring either demands, such as the OSI-SP (Arnold et al., 2013) or resources, such as the PASS-Q (Freeman et al., 2011), separately.

Limitations and future directions

The psychometric properties of the DISQ-SPORT were tested using a large and diverse athlete sample in terms of gender, sports, and nations. The present study is, however, not without limitations. First, since we only had access to athletes from countries characterized by more individualistic cultures, our findings cannot be generalized to countries with more collectivistic cultures. Resources such as autonomy and emotional support might be perceived differently in more collectivistic cultures, where there is a stronger focus on cohesion and help-seeking (Schinke et al., 2014). An interesting avenue for future research is therefore to include cross-cultural investigations regarding demands and resources in sport.

Second, it is important to note that the DISQ-SPORT limits its scope to the measurement of external task-level resources (e.g. autonomy, emotional support) as opposed to internal or personal resources (e.g., self-efficacy, coping behaviors). Internal resources are personal capacities that impact an individual's sense of their ability to control and impact upon their environment successfully (e.g., optimism, self-efficacy, coping style). In dealing with demands, internal and external resources can be of equivalent use (Hobfoll, 2002). However, compared to internal resources, job resources can be adjusted more easily and effectively (Demerouti et al., 2001). Finally, as this study did not assess reliability in terms of test-retest stability, future studies could examine the stability of the DISQ-SPORT using a longitudinal design. The same is true for factorial stability over time (cf. De Jonge et al., 2008). In addition, future studies should test for concurrent validity by including indicators of health and well-being, such as injuries, mood and motivation, as well as performance indicators. This would also enable researchers to test the second main principle of the DISC Model, namely the matching principle. According to the matching principle, the increased specificity of the measures of demands and resources, and the degree to which these constructs match each other determines the extent to which stress-buffering effects and activation-enhancing of resources are observed (De Jonge et al., 2010). The matching principle thus predicts that emotional support from teammates is most likely to moderate the relation between emotional demands (e.g., an angry coach) and emotional outcomes (e.g., feelings of emotional exhaustion; cf. Rees and Hardy, 2004).

Conclusion

The combination of high demands and low resources might increase the risk of poor health, well-being and performance of athletes. In contrast, when high demands are coupled with sufficient resources they might be associated with positive outcomes. The current study set out to advance measurement of demands and resources at task-level in sport based on an existing questionnaire developed in the work context and with a strong theoretical foundation. The results of the present study provide initial evidence that the DISQ-SPORT is a valid and reliable instrument to simultaneously measure demands and resources among both recreational and elite athletes from a variety of sports. Moreover, taking into account the multidimensional nature of both demands and resources appears to be relevant for both theory and practice.

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Key points

- Confirmatory factor analyses provided evidence for the three-dimensional nature of both demands and resources in sport.
- Invariance testing provided support for the factorial invariance of the DISQ-SPORT across sport type, competitive level, and language.
- Taking into account the multidimensional nature of both demands and resources in sport seems to be relevant for both theory and practice.

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