

Development and Evaluation of the Psychometric Properties of the Short Defense Style Questionnaire (DSQ-26) in Sport

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ABSTRACT

The purpose of the present study was to develop and evaluate a measure of defense mechanisms that is useable in sports research: the short Defense Style Questionnaire (DSQ-26). A total of 296 competitive athletes completed the DSQ-26 and other self-report questionnaires both before and after a sport competition. Results of Principal Component Analyses (PCA) on the pre-competitive data showed evidence for a 2-factor model that included adaptive (e.g., humor, anticipation, self-assertion, altruism, self-observation) and maladaptive defenses (e.g., help rejecting complaining, splitting other, projection, dissociation, intellectualization, devaluation/self, fantasy, devaluation of other). Confirmatory factor analyses conducted on both the pre- and intra-competitive data showed an acceptable fit of the data for the 2-factor, 13-defense model of DSQ-26, supporting the factorial structure identified within the PCAs. Correlations between DSQ-26 subscales, coping, affective states, perceived stress and control scores provided evidence for criterion-related validity of the DSQ-26 scores. Overall, this study provides support for the reliability and validity of the short DSQ-26 scores with recommendations for the use and development of this measure of defense mechanisms in stressful situations.

Key words: defense mechanisms, Defense Style Questionnaire, stress, coping, emotion.

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Novelty and Significance

What is already known about the topic?

- The role of defense mechanisms is fundamental in psychological adaptation and physical health.
- Diagnostic assessment of defense functioning became one of the major axes of psychological and psychopathological evaluation.
- A better understanding of defense mechanisms is necessary in order to develop more effective prevention strategies and interventions.

What this paper adds?

- Provides support for the reliability and validity of the short version of the DSQ, the most widely used self-report instrument for the measurement of defense mechanisms.
- External validity of the DSQ-26 indicated relationships between defense, coping, affective states, perceived stress and control in accordance with theoretical expectations and previous empirical studies.
- Supplies recommendations for the use and development of the measure of defense mechanisms in stressful situations.

Beginning with Sigmund Freud's initial conceptualizations to more recent work, defense mechanisms remain as a fundamental construct in psychoanalytic and

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psychodynamic theory (Buckley, 1995; Cramer, 2000). Moreover, the importance of defenses was highlighted by its inclusion in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) and defined as “automatic psychological processes that protect the individual against anxiety and internal and external dangers or stressors” (APA, 1994, p. 751). The literature has reported that defenses can be associated with various symptoms of mental distress and the process of psychotherapy (for a review, see Bond, 2004). Further studies have also explored the role of defenses in psychological adjustment and physical health, demonstrating that this concept is not limited to pathology, but rather a part of normal and everyday functioning as well (e.g., Bond, 2004; Cramer, 2008, 2014).

Defense mechanisms have since been associated to other constructs, such as adaptation and coping (Bonsack, Despland, & Spagnoli, 1998; Bouchard & Thériault, 2003; Cramer, 2000; Lazarus & Folkman, 1984). Empirical studies have highlighted the role of defenses in adapting to stressful situations, in performance and in adaptive outcomes. For example, in the context of recovery after surgery, defense mechanisms were a better predictor for recovery than coping (Fulde, Junge, & Ahrens, 1995). Defense mechanisms also predicted marital adjustment (Bouchard & Thériault, 2003) and overall adjustment in a sample of adolescents (Erickson, Feldman, & Steiner, 1997). Other empirical studies examining the context of sport competition demonstrated that athletes with higher performance used more mature defense than athletes with lower performance (Nicolas & Jebrane, 2008a). More recently, investigations in extreme situations (space analogs and polar stations) confirmed the importance of defense mechanisms in understanding adaptation processes (Nicolas, Sandal, Weiss, & Yusupova, 2013; Nicolas, Suedfeld, Weiss, & Gaudino, 2015). However, there remain many issues with the different qualitative and quantitative methodologies used to assess defenses. The two primary methods currently used to measure defenses are by observer rating and self-report. The observer-rated methods (e.g., life vignette method, Vaillant, 1976; Q-sort method, Roston, Lee, & Vaillant, 1992; and Defense Mechanism Rating Scales (DMRS), Perry & Cooper, 1989) enable the researcher to identify the behavioral manifestations of mental processes that may be outside of the person’s awareness and to also control social desirability. However, this method has its limitations, including being more costly and time consuming, and the issue of inter-observer reliability (Bond, 2004; Kramer, 2010).

Translated and validated in numerous languages, the Defense Style Questionnaire (DSQ) is the most widely used self-report instrument for the measurement of defense mechanisms (Bond, Gardner, Christian, & Sigal, 1983; Bond, 2000, 2004). The DSQ was designed to assess conscious derivatives of defenses and to elicit manifestations of a person’s characteristic style when dealing with conscious or unconscious conflict. However, there have been criticisms concerning the factorial structure of this measure. Thus, the DSQ has undergone numerous revisions in an effort to increase its reliability and validity (e.g., Andrews, Pollock, & Stewart, 1989; Andrews, Singh & Bond, 1993; Bond, Perry, Gautier, Goldenberg, Oppenheimer, & Simand, 1989; Chabrol, Rousseau, Rodgers, Callahan, Pirlot, & Sztulman, 2005; Ramkissoon, 2014; Thygesen, Drapeau, Trijsburg, Lecours, & de Roten, 2008). Since the original version (DSQ-81; Bond *et alii*, 1983), several significant changes have been made to improve the content, factorial and discriminant validity of the DSQ scores, as well as to propose a shorter version of the questionnaire (Ramkissoon, 2014; Thygesen *et alii*, 2008). However, additional improvements can be made to further improve its psychometric properties (Ramkissoon, 2014; San Martini, Roma, Sarti, Lingiardi, & Bond, 2004; Thygesen *et alii*, 2008).

Several classifications for defense mechanisms have been proposed, whereby defenses are generally ranked according to a theoretical and empirical hierarchy of adaptiveness or maturity (Bond, 2004; Vaillant, Bond, & Vaillant, 1986). In most cases,

defenses are classified into three categories, namely adaptive/mature, intermediate/neurotic, and maladaptive/immature based on the general adaptive value of the defense (Bowins 2004; Trijsburg, Van t'Spijker, Van, Hesselink, & Duivenvoorden, 2000; Vailland, 1994). Adaptive defenses are correlated with greater mental health whereas maladaptive defenses are significantly correlated with mental illness and greater symptomatology (for a review, Bond, 2004).

The theory of defense suggests that individuals have a repertoire of defenses that are used according to the various stressors they are experiencing (Perry, Metzger & Sigal, 2015). While greater attention has been paid to understanding these adaptation-related mechanisms such as defenses in recent years, there is a lack of research on the psychometric properties of the associated instrument (DSQ) when used in stressful situations. This is surprising given the increasing evidence that defenses are involved not only in health and wellbeing (for reviews, Bond, 2004; Endler & Parker, 2002) but also in performance (e.g., Bouchard & Thériault, 2003; Nicolas & Jebrane, 2008a) and adaptation processes (e.g., Erickson *et alii*, 1997; Nicolas *et alii*, 2013, 2015). Greater evidence regarding the reliability and validity of DSQ scores is warranted because its factorial validity has yet to be examined in situations of high stress with non-clinical participants.

The present study aimed to address these gaps in the literature by proposing the development of an inventory: (a) that provides an easy assessment of a person's defense mechanisms when subjected to stressful situations; and (b) that allows practitioners and researchers to adapt preparations and interventions according to the individual's defense style. Moreover, this study aimed to establish the construct validity of this inventory, which is a process that involves three stages: substantive, structural, and external (Messick, 1995). The substantive stage of construct validation defines and delineates the construct under investigation. The structural stage pertains to establishing evidence of factorial validity and reliability relative to the construct of interest whereas the external stage examines whether the construct under investigation is related to other variables in accordance with the theoretical expectations (Martinet, Guillet-Descas, & Moiret, 2015; Messick, 1995). This article addressed the efforts we have made in all three of the stages of construct validation. Firstly, we developed and assessed the psychometric properties of a version of the DSQ designed to satisfy the practice's request for an economic, valid, and change sensitive psychometric instrument to ecologically quantify defenses in stressful situations (i.e., the substantive and structural stages). Secondly, because defenses are related to psychological adaptation processes, it was of primary importance to examine the relationships between DSQ scores and coping, affective states, perceived stress, and control scores during stressful situations such as sport competitions (i.e., the external stage).

STAGE 1: THE SUBSTANTIVE AND STRUCTURAL STAGES OF THE DSQ-26D

METHOD

Participants

Two hundred and ninety-six athletes (33% female; M age= 21.61, SD = 6.32) participated in this study. Athletes were drawn from a variety of individual and team sports (soccer, handball, swimming, basketball, badminton, cycling, gymnastics, athletics, and tennis). They trained an average of 6.45 hours a week (SD = 4.58) and had been practicing their sport for an average of 9.25 years (SD = 4.06).

Measure

The purpose of the DSQ 60-item version is to measure the conscious derivatives of 30 defense mechanisms with two items per defense (Thygesen *et alii*, 2008). Scores for each defense are calculated by taking the mean of the two items representing the defense. Style scores are derived by taking the mean of the defenses. Three style dimensions were identified most of the time: Adaptive/mature, intermediate/neurotic, and maladaptive/immature. The adaptive/mature style includes defense mechanisms and items such as anticipation (“When I have to face a difficult situation I try to imagine what it will be like and plan ways to cope with it”) or humor (“I’m able to laugh at myself pretty easily”). The intermediate/neurotic style includes defense mechanisms and items such as idealization (“I always feel that someone I know is like a guardian angel”) or reaction formation (“I often find myself being very nice to people who by all rights I should be angry at”). The maladaptive/immature style includes acting out (“I often am driven to act impulsively”) or dissociation (“When there’s real danger, it’s as if I’m not there and I feel no fear”).

Recent research has provided evidence for the validity and reliability of the DSQ-60 scores (e.g., Petraglia, Thygesen, Lecours, & Drapeau, 2009; Thygesen *et alii*, 2008). The substantive stage of construct validity was examined by ensuring that the item content was covering the intended construct within the context of a stressful situation such as sport competitions. Hence, the comprehensibility, acceptability, relevance and completeness of all the DSQ-60 items for a sporting context were discussed with twelve competitive athletes not involved in this study. No changes were considered necessary. The items are rated using a Likert type scale ranging from 1 (strongly disagree) to 9 (strongly agree).

Procedure

The study was conducted in accordance with ethical guidelines and was approved by the institutional review board of the local University. Athletes’ participation was voluntary, their anonymity was ensured, and parental consent was required for athletes under 18 years of age. Data collection occurred: (a) within two hours before a competitive event to collect information on their pre-competitive psychological state (this time frame did not interfere with the preparation routines of athletes, Nicolas, Gaudreau, & Franche, 2011); and (b) within a two hour window after the competition to collect information on their psychological state during the competition (this time frame has often been used in the literature on competition, Martinent, Nicolas, Gaudreau, & Campo, 2013; Nicolas *et alii*, 2011).

Data analyses

Principal Component Analyses (PCA) and Confirmatory Factor Analyses (CFA) were used to evaluate the structural stage of the DSQ in stressful situations (i.e., sport competition). Three objectives were of interest, namely (a) to determine the number of factors of the DSQ-60 in stressful situations, (b) to select the defense mechanisms of the preliminary version of the DSQ-60 used to measure each dimension in the final version of the DSQ-60 using a calibration sample, and (c) to cross-validate the final version of the DSQ-60 among a validation sample. The pre-competitive and intra-competitive data sets were used as the calibration and validation samples, respectively.

First, the factor structure of the DSQ-60 scores was examined through a PCA because this type of analysis can help researchers determine the number of factors. Second, the potential problematic defense mechanisms were deleted using a systematic and sequential procedure (e.g., Martinent *et alii*, 2015). The decision to eliminate a defense mechanism was based on the factor loadings of the PCA results. The remaining data was then subjected to a follow-up PCA. This process continued as long as an item with factor loadings of .35 or higher on two factors simultaneously or with a factor loading of less than .40 on all the factors could be found. Because the model generation strategy used in the calibration sample through defense mechanism deletion could be susceptible to capitalization on chance, the final model of the calibration sample must be evaluated by fitting it to another sample using a CFA (Martinent *et alii*, 2015). We thus subjected data from the validation sample to a CFA using the final model obtained with the follow-up PCAs on the calibration sample. The CFA model was tested using maximum likelihood estimation on covariance matrices. Multiple fit indices were chosen to achieve a comprehensive evaluation of fit (Hu & Bentler, 1999): chi-square (χ^2), comparative fit index (CFI), standardized root mean square residual (SRMR), and root mean squared error of approximation (RMSEA). For CFI, values above .90 are traditionally considered reasonable model fit whereas for SRMR and RMSEA, values below .08 are traditionally considered reasonable model fit (Hu & Bentler, 1999; Martinent *et alii*, 2013, 2015).

RESULTS

A PCA with Varimax rotation was conducted using the mean scores for each defense mechanism. Examination of the eigenvalue scree plot (i.e., scree test) and eigenvalues above 2 (i.e., $\lambda_1 = 5.7$; $\lambda_2 = 2.6$) suggested keeping two factors. However, several defense mechanisms had loadings below the cut-off value of .40 whereas other defense mechanisms had loadings exceeding the values of .35 on the two factors simultaneously. Therefore, using the procedures outlined in the data analysis section, we reassessed the calibration model through systematic and sequential item deletion. Following each item deletion, a follow-up PCA was computed. This process resulted in a final DSQ-26 model including 2 factors. The first factor contained defenses considered to be mature (i.e., humor, anticipation, self-assertion, altruism, self-observation) and was thus called adaptive defense. The second factor contained defenses considered to be immature (i.e., help rejecting complaining, splitting other, projection, dissociation, intellectualization, devaluation/self, fantasy, devaluation other) and was thus named maladaptive defense (Because PCA solution corresponded directly with the 2-factor 13-defense model results of the CFA for the validation sample -see Figure 1-, we choose not to present PCA results. For interested readers, PCA results are available on request to the first author).

The 2-factor 13-defense model of DSQ-26 provided an acceptable fit to the data of the validation sample: $\chi^2(64) = 179.90$, $p < .05$, CFI = .91, SRMR = .071, RMSEA = .078. All λ were significant ($t > 1.96$) (It is noteworthy that the 2-factor 13-defense model of DSQ-26 also provided an acceptable fit to the data of the calibration sample: $\chi^2(64) = 175.91$, $p < .05$, CFI = .90, SRMR = .072, RMSEA = .077. Given that the CFA solution of the calibration sample corresponded directly with the 2-factor 13-defense model results of the CFA for the validation sample (see Figure 1), we choose not to present CFA results of the calibration sample. For interested reader, results are available on request to the first author). Standardized factor loadings and error variances are

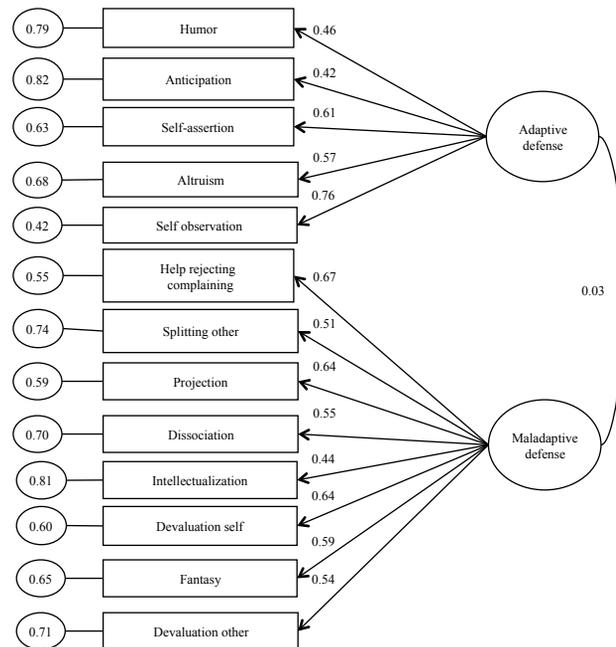


Figure 1. Measurement model of the 2-factor 13-item model of DSQ-26. Circles represent latent constructs and squares represent manifest variables. All parameters are standardized and significant at $p < .05$ excepted the correlation between the two latent constructs which was non-significant. Residual variances are shown in small circles.

shown in Figure 1. The correlation between the two latent constructs (i.e., mature and immature defense) was not significant ($\rho = .03$), suggesting that the two dimensions of the DSQ-26 are tapping unique dimensions of defense in stressful situations such as sport competitions.

We assessed the reliability of the DSQ-26 by examining Cronbach's alphas of the DSQ-26 subscales. Alpha coefficients indicated that reliability of the 2 subscales was acceptable for both the calibration and validation samples, with Cronbach's alphas ranging from .68 to .82 (Table 1).

Table 1. Descriptive Statistics of the DSQ-26.

	Pre-competition		Intra-competition	
	Maladaptative defense	Adaptative defense	Maladaptative defense	Adaptative defense
Mean	3.11	5.98	3.02	5.73
Standard Deviation	1.04	1.08	1.05	1.22
Cronbach α	.80	.68	.82	.77

STAGE 2: STAGE 2: THE EXTERNAL STAGE OF DSQ-26

External validity of the scale was also examined by investigating the relationships between defenses and coping, affective states, perceived stress and control. These

psychological constructs were chosen because they are all embedded in the psychological adaptation process (Cramer, 2000; Kramer, 2010; Lazarus, 2000) and several empirical studies have underlined their relationships in general psychology (Bouchard & Thériault, 2003; Erickson *et alii*, 1997; Fulde *et alii*, 1995), sport competitions (Nicolas & Jebrane, 2008a,b) and extreme situations (Nicolas *et alii*, 2013, 2015).

METHOD

Participants, Procedure and Data Analysis

Participants also completed self-report questionnaires designed to measure coping strategies, affective states, perceived stress and control on each measurement occasion. Criterion-related convergent validity evidence of the DSQ-26 scores was determined based on correlations between defense subscales and coping, affective states, perceived stress and control. Correlations are interpreted using Cohen's (1988) criteria (i.e., small $\leq .30$; medium = $.30$ to $.50$; large $\geq .50$).

Measures

The French version (Nicolas, Martinent, & Campo, 2014) of the Positive and Negative Affect Schedule (PANAS) is composed of two 10-item subscales measuring positive affect and negative affect (Watson, Clark, & Tellegen, 1988). Participants were asked to rate the intensity of each symptom on a 5-point Likert scale ranging from 1 (not at all or very slightly) to 5 (extremely). Cronbach's alphas ranged from $.74$ to $.83$ (Table 1).

The Coping Inventory for Competitive Sport (CICS; Gaudreau & Blondin, 2002) is a French questionnaire that contains 39 items measuring coping strategies in a sport context. Consistent with previous research, (e.g., Martinent *et alii*, 2013; Nicolas *et alii*, 2011), the 10 subscales were organized in three second-order dimensions, namely a) task-oriented (mental imagery, thought control, effort expenditure, seeking support, logical analysis, and relaxation), b) distraction-oriented (mental distraction and distancing), and c) disengagement-oriented coping (venting of unpleasant emotions and disengagement or resignation). Each item was rated on a 5-point Likert scale ranging from 1 (does not correspond at all) to 5 (corresponds very strongly). Cronbach's alphas ranged from $.74$ to $.85$ (Table 1).

An adapted French version of the sporting context of the mastery scale (Pearlin & Schooler, 1978) and perceived stress scale (Cohen & Williamson, 1988) was used to measure perceived control and stress in a sporting context. Specifically, this scale is comprised of two 3-item subscales measuring the degree to which sport competition is appraised as stressful and controllable (Nicolas *et alii*, 2015). Cronbach's alphas ranged from $.73$ to $.82$ (Table 1).

RESULTS

As indicated in Table 1, results showed significant positive correlations between precompetitive adaptive defenses and pre- and intra-competitive task-oriented coping ($r = .25$ and $.27$), pre-competitive distraction-oriented coping ($r = .11$), pre-competitive perceived control ($r = .19$), and intra-competitive positive affect ($r = .11$). Similarly,

significant positive correlations emerged for intra-competitive adaptive defenses and pre- and intra-competitive task-oriented coping ($r = .16$ and $.32$), intra-competitive distraction-oriented coping ($r = .14$), pre-competitive perceived control ($r = .12$), and intra-competitive positive affect ($r = .11$).

In contrast, results showed significant positive correlations between pre-competitive maladaptive defenses and pre- and intra-competitive negative affect ($r = .23$ and $.18$), pre- and intra-competitive distraction-oriented coping ($r = .15$) and disengagement-oriented coping ($r = .34$ and $.16$), and pre- and intra-competitive perceived stress ($r = .23$ and $.12$). Similarly, significant positive correlations emerged between intra-competitive maladaptive defenses and pre- and intra-competitive negative affect ($r = .20$ and $.30$) and disengagement-oriented coping ($r = .25$ and $.24$), intra-competitive distraction-oriented coping ($r = .26$) and task-oriented coping ($r = .14$), and pre- and intra-competitive perceived stress ($r = .11$ and $.17$) (see Table 2 for more details).

Table 2. Descriptive Statistics DSQ-26 subscales and correlations with Coping, Affective States, Perceived Stress and Control Subscales.

	<i>M</i>	<i>SD</i>	α	Pre-competition		Intra-competition	
				Maladaptive defense	Adaptive defense	Maladaptive defense	Adaptive defense
Pre-competition							
Positive affect intensity	3.34	0.64	.83	-.08	.08	-.02	-.06
Negative affect intensity	1.80	0.50	.74	.23*	.07	.20*	.03
Task-oriented coping	2.57	0.63	.06	.06	.25*	.08	.16*
Distraction-oriented coping	2.03	0.62	.88	.15*	.11	.06	.07
Disengagement-oriented coping	1.61	0.56	.73	.34*	-.07	.25*	-.06
Perceived stress	3.18	1.33	.76	.23*	.06	.11	.10
Perceived control	5.03	1.22	.82	-.01	.19*	.03	.12*
Intra-competition							
Positive affect intensity	3.18	0.68	.80	-.01	.11	.00	.11
Negative affect intensity	2.02	0.68	.80	.18*	-.05	.30*	.04
Task-oriented coping	2.66	0.56	.85	.04	.27*	.14*	.32*
Distraction-oriented coping	1.77	0.67	.79	.15*	.07	.26*	.14*
Disengagement-oriented coping	2.04	0.76	.80	.16*	.03	.24*	.06
Perceived stress	3.36	1.62	.77	.12*	-.02	.17*	.07
Perceived control	4.60	1.25	.77	-.05	.03	-.02	.06

Note: * = $p < .05$

DISCUSSION

The DSQ-26 was developed: (a) to address the dearth of studies examining the psychometric properties of the DSQ when used to assess defenses in stressful situations among individuals presenting no psychiatric condition; and (b) as a briefer version which can be easily used with participants in a stressful situation such as sport competitions. Following the suggestions of Thygesen *et alii* (2008), this study used both exploratory and confirmatory factor analyses to determine the best empirical and theoretically-relevant factor solution of the DSQ. The results of the psychometric evaluation indicated that the DSQ-26 is a promising questionnaire with good construct validity. Firstly, PCA results revealed the existence of two underlying factors labelled adaptive and maladaptive defenses, which are congruent with the literature. Specifically, humor, anticipation, self-assertion, altruism, and self-observation were retained within the adaptive defenses, whereas the maladaptive defenses included help rejecting complaining, splitting other, projection, dissociation, intellectualization, devaluation/self, fantasy, and devaluation other. Although most of the previously published studies have supported a three-factor solution of the DSQ (e.g., Andrews *et alii*, 1989, 1993; Bond *et alii*, 1989; Thygesen *et alii*, 2008), these divergent results are not as incongruent as

they may seem. Indeed, the present results are consistent with a recent 2-factor version of the DSQ found by Ramkissoon (2014) using another non-clinical population (i.e., employees from a large organization). Moreover, previous empirical studies conducted within stressful situations (e.g., sport competitions, extreme situations) have underlined that adaptive and maladaptive defenses are the most frequently reported styles in these stressful situations (Nicolas & Jebrane, 2008a, b; Nicolas *et alii*, 2013, 2015). Hence, results of the present study support early suggestions that the DSQ can differentiate between maladaptive and adaptive styles (Bond, 1992).

Secondly, CFA results showed acceptable fit between participants' item responses and the DSQ-26 (i.e., 2-factor 13-defense model of the DSQ) for both the pre-competitive and intra-competitive assessments. Following the suggestions of Thygesen *et alii* (2008), an iterative approach was used on the calibration sample to determine the best defenses to be included in the measure with a sample of athletes within the context of sport competitions. It is worth noting that 17 defense mechanisms, identified as problematic (factor loadings <.40 and/or defenses loading on both the mature and immature factors during the exploratory factor analyses) were deleted from the preliminary version of the DSQ. Similarly, large numbers of defenses with inadequate loadings and/or theoretically inconsistent groupings have been reported on previous versions of the DSQ. For example, 14 of the 24 defenses from the DSQ-81 were retained after exploratory factor analysis by Bond *et alii* (1983), whereas 14 of 30 defenses from the DSQ-60 were retained after CFAs by Thygesen *et alii* (2008). Similarly, Ramkissoon (2014) recently stated that "a smaller set of 37 items [of 88 items] may be used as a base to develop another version of the DSQ-88 for a non-clinical employee population" (p. 298).

The DSQ-26 corroborates the styles of the previous versions of the DSQ (Andrews *et alii*, 1993; Bond *et alii*, 1983; Thygesen *et alii*, 2008) given that all the defense mechanisms in the adaptive style of the DSQ-26 were already included in the adaptive style of the DSQ-60. Similarly, for the maladaptive style, all the defense mechanisms of the DSQ-26 were included in the maladaptive style of the DSQ-60 or DSQ-40. These styles, which were supported by the current data, may reflect particular behaviors used by athletes to deal with stress, conflict and anxiety in a competitive situation. The nature of the adaptive style is attributed to athletes who tend to: use humor in order to distance themselves from situations; anticipate and plan activities; express themselves while respecting others; help others feel good; and be aware of the consequences of their actions. In contrast, the maladaptive style refers to athletes who are inclined to: displace their problems onto others who they believe never understand them; project their problems onto others who they believe mistreat them; describe their feelings, thoughts and behaviors as something that is unreal; rationalize their activities rather than express themselves directly; devalue themselves thinking they are worthless; prefer to fantasize rather than act; and devalue others.

Thirdly, in contrast to most previous DSQ studies, internal consistency and intercorrelations for the styles were reported (of all previous studies, only Thygesen *et alii*, 2008 reported these intercorrelations). In previous DSQ research, internal consistency was generally acceptable only for the maladaptive style, leading several scholars to suggest that the maladaptive or immature factor is the strongest and most valid (Saint-Martin, Valls, Rousseau, Callahan, & Chabrol, 2013). In the present study, internal consistency coefficients showed that the two dimensions of the DSQ-26 (adaptive defenses and maladaptive defenses) had acceptable reliability for both the calibration and validation samples (i.e., before and during sport competition). Moreover, the non-

significant correlation found between adaptive and maladaptive defenses suggested that they are assessing unique dimensions of the defense mechanism construct, as expected from a theoretical point of view (see Bond, 1992; Ramkissoon, 2014).

Fourthly, evidence for validity of the DSQ-26 is also demonstrated by its subscales' relation to coping, affective states, perceived stress and control in accordance with theoretical expectations and previous empirical studies (e.g., Bouchard & Thériault, 2003; Erickson *et alii*, 1997; Fulde *et aliii*, 1995; Nicolas & Jebrane, 2008a; Nicolas *et alii*, 2013, 2015). Specifically, significant positive correlations emerged between adaptive defenses and positive affect, perceived control, and task- and distraction-oriented coping. In contrast, significant positive correlations were observed between maladaptive defenses and negative affect, perceived stress, and disengagement- and distraction-oriented coping.

Diagnostic assessment of defense functioning became one of the major axes of psychological and psychopathological evaluation (Bond, 2004; Cramer, 2014; Perry *et alii*, 2015). Individuals may differ in their adaptation when responding to stressors by using more or less adaptive defenses (Cramer, 2014; Perry *et alii*, 2015); hence, a better understanding of these mechanisms is necessary in order to develop more effective prevention strategies and interventions. Nevertheless, caution should be taken in the determination of whether defenses are adaptive or not. The issue of adaptiveness depends primarily on the complex and dynamic interaction between the characteristics of the situation (e.g., environmental and physical stressors) and the individual (e.g., age, personality, goals) (Cramer, 2000; Lazarus & Folkman, 1984). Moreover, in addition to the style of defense (adaptive or maladaptive), the level and frequency of use of defenses could influence the adaptiveness of defense according to the situation and the persons' characteristics. For instance, the use of inappropriate and/or excessive defense styles might induce deleterious consequences such as a reduction in performance (Nicolas & Jebrane, 2008a; Tenenbaum, Jones, Kistantas, Sacks, & Berwick, 2003) and difficulties adapting to situations (e.g., Bouchard & Thériault, 2003; Erickson *et alii*, 1997; Fulde *et alii*, 1995; Nicolas *et alii*, 2013, 2015). Indeed, individuals with fewer symptoms of mental illness reported a larger repertoire and a more flexible utilization of defenses which were adapted to the context (Cramer, 2014; Perry *et alii*, 2015).

Given that all variables used in the present study were measured using a single source of data (self-report questionnaires), the findings may be distorted due to method bias. This is particularly relevant when investigating the current topic, as one of the most frequent criticisms of self-report questionnaires used to assess defenses is that these mechanisms are largely unconscious processes and are thus difficult to assess using a self-report method. However, Bond and colleagues (Bond *et alii*, 1983, 1989) originally designed the DSQ to assess conscious derivatives of defenses. These authors argued that individuals are able to be aware of their thoughts, emotions and behaviors when they are faced with internal or external stressors (Bond, 1986), despite having a lack of consciousness in defensive functioning (Plutchik, Kellerman, & Conte, 1979; Thygesen *et alii*, 2008). Nevertheless, future research should complement self-reported data with observer-rated methods and/or informant-ratings (e.g., coach or teammates). Another limitation of the present study was that correlational analyses did not shed light on the interactions between adaptive and maladaptive defenses. Alternative methodologies (e.g. cluster analysis) may provide researchers and practitioners with a useful way to examine complex naturally-occurring combinations of defenses. In this perspective, multivariate profiles of defenses could be seen as useful heuristics to explicate consequential motivational, self-regulatory and achievement correlates of defenses.

In conclusion, the development of a short version of the DSQ adapted for a stressful context (i.e., the DSQ-26) proposes an economic, valid, and change sensitive psychometric instrument to quantify defenses during stressful situations. The present study suggested that adaptive and maladaptive defenses should be conceptualized as, and therefore measured as, separate dimensions that independently contribute to the individual's experience related to stressful situations (such as sport competitions). The current study also suggested that measuring adaptive and maladaptive defenses (using a self-report questionnaire such as the DSQ-26) made it possible to explore the independent contributions of these constructs to the psychological functioning and adjustment of individuals in stressful settings.

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