



## Evaluation of the psychometric properties of a modified Positive and Negative Affect Schedule including a direction scale (PANAS-D) among French athletes



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### ABSTRACT

**Objectives:** The goal of these studies was to provide validity and reliability evidence of a modified Positive and Negative Affect Schedule (PANAS) including a direction scale (PANAS-D). Study 1 tested the validity and reliability of the PANAS-D to measure both intensity and direction of affects. Study 2 examined the relationships between direction of affects and selected variables (i.e., coping, attainment of achievement goals and sport satisfaction) by controlling for intensity of affects.

**Method:** A total of 306 and 296 athletes (studies 1 and 2) completed the PANAS-D and other self-report questionnaires. Data were analysed with reliability, confirmatory factor analyses (study 1) and correlational analyses (studies 1 and 2).

**Design:** Cross-sectional with self-reported questionnaires.

**Results:** In study 1, the 4-factor structure of the PANAS-D (intensity and direction of positive affect and negative affect) fitted the data adequately. Multiple-group CFAs showed that PANAS-D was partially invariant across the two measurement occasions (before and after competition). The patterns of relationships between PANAS-D, attainment of achievement goals and coping provided evidence for the criterion-related validity of the PANAS-D. In study 2, direction of positive affect and negative affect were associated with selected outcomes (i.e., coping, attainment of sport achievement goals, and/or sport satisfaction) after intensity of these affective states were held constant.

**Conclusions:** This study provided support for the reliability and validity of the PANAS-D (study 1) and the incremental validity of the direction of affective states (study 2), supporting the distinction between athletes' intensity and direction of affective states.

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Two theoretical conceptions have guided research on the structure of affective states. From the categorical perspective, they are organized in distinct categories such as anger, anxiety, or happiness (Lazarus, 2000). From the dimensional perspective, affective states are categorised into higher-order dimensions (e.g., positive and negative affects) on the basis of the relationships among discrete emotions (Watson, Clark, & Tellegen, 1988). A consensus has emerged that both conceptions have relative

advantages and limitations (Lazarus, 2000). Categorical conceptualization offers the advantage for more refined discrimination of psychological meanings whereas dimensional conceptualization offers the advantage for a parsimonious representation of the global affective space (Lazarus, 2000).

Researchers in sport psychology have traditionally focused on the intensity of affective states with a predominant focus on pre-competitive anxiety based on the rationale that this affective state is thought to affect athletic performance (Mellalieu, Hanton, & Fletcher, 2006). This literature has consistently shown that athletes can experience a wide range of affects – at various intensities – likely to facilitate or impair sport performance (e.g., Hanin, 2007; Martinent, Campo, & Ferrand, 2012). In recent years, growing empirical attention has been allocated to the direction component of affective states in an effort to further disentangle the anxiety

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performance relationship; i.e., perceived facilitating or debilitating effects of athletes' affective states on their performance (e.g., Hanin, 2007; Martinent & Ferrand, 2009). Despite their respective pleasant and unpleasant valence, positive and negative affective states can be perceived by athletes either as facilitating or debilitating for their sport performance (Hanin, 2007). A positive affective state – experienced at a particular intensity level – could thus be interpreted as facilitating for performance for a certain athlete at a particular point in time and as debilitating for the same athlete at other points in time (Lazarus, 2000; Martinent et al., 2012; Martinent, Nicolas, Gaudreau, & Campo, 2013).

Originally, the addition of a direction scale (Jones & Swain, 1992) to the Competitive State Anxiety Inventory-2 (CSAI-2, Martens, Burton, Vealey, Bump, & Smith, 1990) has resulted in a plethora of publications investigating the direction of athletes' pre-competitive state anxiety (see for a review Mellalieu et al., 2006). Especially, this literature has consistently shown that anxiety direction is associated with key athletic outcomes (e.g., sport performance) after controlling for anxiety intensity (Mellalieu et al., 2006). Specifically, the more elite or better performers in competition interpreted the intensity of their anxiety symptoms as more facilitative compared to less elite or poorer performers, despite no differences in anxiety intensity levels (Jones & Swain, 1992; Mellalieu et al., 2006). However, this reliance on anxiety is problematic because athletes' affective experiences cannot be accurately described by the presence or lack of anxiety (Martinent & Ferrand, 2009). Examining whether the direction of affective states other than anxiety was associated with theoretically selected variables after intensity of these affective states were held constant would provide strong evidence for the usefulness and relevance of the concept of direction of affective states in sport settings. Specifically, highlighting significant relationships between direction of affective states and important competitive outcomes such as attainment of achievement goals, utilization of coping strategies or sport satisfaction controlling for intensity of affective states would clearly demonstrate that direction of affective states do not overlap with intensity of affective states in their relationships with relevant theoretically competitive outcome variables.

Although several scholars have outlined the promises of considering the direction of affective states in addition to their intensity (Hanin, 2007; Martinent et al., 2012; Martinent & Ferrand, 2009), few studies have explored simultaneously the intensity and direction of positive and negative affective states (Martinent et al., 2013; Mellalieu, Hanton, & Jones, 2003; Robazza & Bortoli, 2007). Mellalieu et al. (2003) investigated how facilitators and debilitators of cognitive and perceived physiological symptoms associated with competitive anxiety differed in their experience of precompetitive affective states (nature, intensity and direction) in preparation for and with regard to actual performance. Findings showed that anxious facilitators differed significantly from debilitators in regard to the nature of these symptoms as well as their direction with respect to preparation for and actual performance. Performers who interpreted anxiety symptoms as facilitative labelled significantly more positive affective states and experienced these affects as more facilitating (large effect sizes) than did individuals who interpreted their anxiety symptoms as debilitating (Mellalieu et al., 2003). Robazza and Bortoli (2007) extended the notion of directional perceptions beyond anxiety to anger by assessing rugby players' perception of the facilitative or debilitating effects of trait anger symptoms. Their findings revealed a general tendency of rugby players to experience a moderate frequency of anger symptoms and to interpret their symptoms as facilitative rather than debilitating (Robazza & Bortoli, 2007). Martinent et al. (2013) explored affective profiles of athletes – based on affect intensity and direction – before and during the competition. Four similar profiles of athletes

were identified for the two measurement occasions: high positive affect facilitators, facilitators, low affect debilitators, and high negative affect debilitators. However, the analyses they computed did not shed light on the incremental validity of the direction of affective states.

A significant limitation in this area was that these studies have mainly investigated direction of affective states in using self-report measures not psychometrically validated (e.g., Martinent et al., 2013; Mellalieu et al., 2003; Robazza & Bortoli, 2007). Most of the time, researchers added the direction scale by Jones and Swain (1992) to an existing published self-report without testing whether the modified self-report (including both intensity and direction scales) was a psychometrically sound questionnaire (see for an exception on the CSAI-2 Revised Martinent, Ferrand, Guillet, & Gauthier, 2010). Another limitation of previous studies was that statistical analyses performed did not shed light on the incremental validity of the intensity and direction of affective states. This approach prevents examining the independent contribution of the intensity and direction dimensions of affects in their relationships with other variables.

Based on the dimensional approach of affective states, Watson et al. (1988) developed the Positive and Negative Affect Schedule (PANAS) comprising two 10-item adjective checklist subscales. During scale development, the PANAS items were empirically derived from a larger list of 27 adjectives within nine mood categories (attentive, excited, proud, strong, distressed, angry, fearful, guilty, and nervous), which were originally proposed by Zevon and Tellegen (1982). Positive Affect (PA) reflects the extent to which a person feels enthusiastic, active, and alert (Watson et al., 1988), with low PA being a state of sadness and lethargy. Negative Affect (NA) is conceptualized as a general dimension of subjective distress and unpleasurable engagement that subsumes a variety of aversive mood states including anger, nervousness, or fear, with low NA being a state of calmness and serenity (Watson et al., 1988). The PANAS is one of the most frequently used instruments to assess affect intensity (level) in social (e.g., Koestner, Lekes, Powers, & Chicoine, 2002), health (e.g., Brown & Ryan, 2003), educational (e.g., Sideridis, 2005) as well as sport and exercise psychology (e.g., Crocker, 1997; Gaudreau & Blondin, 2002). Of particular importance in the context of the present study, the PANAS in this present form assesses only the intensity of positive and negative affective states and not their direction (i.e., perceiving an affective state as beneficial or harmful for sport performance).

As a result, the main purpose of this current research was to provide validity and reliability evidence of a modified PANAS including a direction scale (PANAS-D). Specifically, through two studies, we tested the validity and reliability of the PANAS-D for measuring both the intensity and direction of affective states (study 1) and we examined the relationships between direction of affective states and theoretically selected variables by controlling for intensity of affective states (study 2).

## Study 1

Acknowledging the frequent use of the PANAS in sport and exercise literature, Crocker (1997) tested its factorial structure with a confirmatory factor analysis (CFA) on a sample of youth sport participants. Results supported the hypothesized two-factor model. However, the large residual of several items suggested that the two-factor model did not fully account for the conceptual specificity of adjectives such as irritated, distressed, and upset. This result might suggest the existence of a latent construct not included in the hypothesized model; the negative affect scale of the PANAS, designed as a general dimension of distress, might comprise distinct subscales of discrete, yet interrelated, categories of

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