

How Should we Measure Psychological Resilience in Sport Performers?

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Abstract

Psychological resilience is important in sport because athletes must constantly withstand a wide range of pressures to attain and sustain high performance. To advance psychologists' understanding of this area, there exists an urgent need to develop a sport-specific measure of resilience. The purpose of this paper is to review psychometric issues in resilience research and to discuss the implications for sport psychology. Drawing on the wider general psychology literature to inform the discussion, the narrative is divided into three main sections relating to resilience and its assessment: adversity, positive adaptation, and protective factors. The first section reviews the different ways that adversity has been measured and considers the potential problems of using items with varying degrees of controllability and risk. The second section discusses the different approaches to assessing positive adaptation and examines the issue of circularity pervasive in resilience research. The final section explores the various issues related to the assessment of protective factors drawing directly from current measures of resilience in other psychology sub-disciplines. The commentary concludes with key recommendations for sport psychology researchers seeking to develop a measure of psychological resilience in athletes.

Keywords: adversity, positive adaptation, protective factors, psychometric, sport performance

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Resilience and vulnerability are often discussed in terms of major life adversity, such that a positive outcome (or lack of pathological outcomes) after experiencing such an event is viewed as evidence of resilience. However . . . motivated performance situations are also potentially stressful because they entail important consequences, yet are marked by uncertain chances of success (Seery, 2011, p. 1606).

As illustrated in this quote, the construct of resilience is pertinent to challenging situations that require humans to carry out personally meaningful activities. A performance context where individuals need to manage stress and adversity to accomplish their goals is the domain of competitive sport. Elite athletes commonly encounter numerous stressors throughout their sporting careers (see, e.g., McKay, Niven, Lavalley, & White, 2008; Noblet & Gifford, 2002). These demands are typically associated with competitive performance (e.g., preparation), the sport organization within which the athletes operate (e.g., finances), and personal “nonsporting” life events (e.g., bereavement). In view of these findings, the study of psychological resilience is important in sport because athletes must constantly withstand a wide range of pressures to attain and sustain high performance.

Over the past two decades, numerous definitions of resilience have been proposed in the psychology research literature (see, for a review, Fletcher & Sarkar, in press). Despite the construct being conceived in a variety of ways, most definitions incorporate two main conditions, namely exposure to adversity or risk and the attainment of positive adaptation or competence. To illustrate, Luthar, Cicchetti and Becker (2000) referred to resilience as a “dynamic process encompassing positive adaptation within the context of significant adversity” (p. 543). In accordance with this conceptualization, Luthar and Zelazo (2003) asserted that resilience itself is never directly measured (see also Luthar, 2006; Masten & Obradovic, 2006). Rather, they argued that resilience is inferred based on the direct assessment of the two distinct dimensions: adversity and positive adaptation. From a measurement perspective, resilience researchers have also been concerned with assessing factors that protect individuals from the stressors they encounter (see,

e.g., Connor & Davidson, 2003; Wagnild & Young, 1993). Examples of such qualities include: optimism, perseverance, an internal locus of control, self-efficacy, adaptability, and perceived social support. The assessment of such protective factors is consistent with Rutter's (1987) view that psychological resilience is the "positive role of individual differences in people's response to stress and adversity" (p. 316). Collectively, these definitional perspectives indicate that resilience measures need to consider three pivotal components – adversity, positive adaptation, and protective factors – in a tripartite fashion. Importantly, due to the fundamentally distinct nature of these concepts, researchers need to separately assess and analyze adversity, positive adaptation, and protective factors from the outset to realize a complete and accurate representation of resilience.

Since the assessment of resilience is inherently intertwined with definitional issues (Naglieri & LeBuffe, 2005; Windle, 2011), researchers have strived to address these concerns before measuring this desirable construct. Over the past decade, for example, academic scholars have sought to investigate some of the underlying issues of assessing resilience in relation to those who have experienced childhood maltreatment (Haskett, Nears, Ward, & McPherson, 2006; Heller, Larrieu, D'Imperio, & Boris, 1999; Kinard, 1998; Walsh, Dawson, & Mattingly, 2010). Importantly, the findings of this work are not easily applicable to competitive sport performers who actively utilize and optimize a constellation of characteristics to ultimately raise their performance level, as opposed to clinical populations who have essentially been "forced" to exhibit resilient qualities in order to maintain normal functioning (cf. Fletcher & Sarkar, 2012).

In light of these contextual differences, researchers have recently begun to investigate psychological resilience in the specific domain of sport performance (see, e.g., Fletcher & Sarkar, 2012; Galli & Vealey, 2008; Gucciardi, Jackson, Coulter, & Mallett, 2011). In all of the studies, it is interesting to note that the authors highlighted the need for a measure of psychological resilience for athletic performers to advance sport psychologists' understanding of this area. As a caveat to this recommendation, Gucciardi et al. (2011) argued that "before scholars can develop a sport-specific measure of resilience, there is a need for sport psychology researchers to provide a

comprehensive review of methodological issues pertaining to the measurement of resilience and how it can be applied to sport” (p. 431).

The purpose of this paper is to review psychometric issues in resilience research and to discuss the implications for sport psychologists seeking to measure this phenomenon in an athletic context. Drawing on the broader measurement literature in this area to inform the discussion, the narrative is divided into three main sections relating to resilience and its assessment: adversity, positive adaptation, and protective factors. It is anticipated that the psychometric lessons learned in general psychology, combined with our knowledge of resilience-related topics in sport, will help researchers begin to answer the question: How should we measure psychological resilience in sport performers?

Measuring Adversity

Luthar and Cicchetti (2000) stated that adversity “typically encompasses negative life circumstances that are known to be statistically associated with adjustment difficulties” (p. 858). Based on this approach, adversity is defined in terms of statistical probabilities; that is, a life condition qualifies as a risk indicator if it is significantly associated with maladjustment in critical domains (Masten, 2001). Exposure to parental divorce, for example, constitutes an adversity since children experiencing it are two to three times more likely than those from non-divorced families to exhibit psychological and behavioral problems (Hetherington & Elmore, 2003). From a measurement perspective, this indicates that an incident can only represent an adversity or risk if the problems displayed are greater than those exhibited in normative populations. However, in their recent review of definitions, concepts and theories of resilience, Fletcher and Sarkar (in press) argued that “when adversity is defined as an event that predicts maladjustment it precludes the inclusion of ongoing daily stressors under the rubric of resilience, despite a growing body of evidence to the contrary” (p. 8). This observation is particularly pertinent in the sport context since athletes typically experience regular everyday hassles that are embedded in their sporting careers, such as relationship problems, inadequate preparation, and logistical issues (see, e.g., Thelwell, Weston, & Greenlees, 2007). Indeed, in addition to encountering major “nonsporting”

life adversities (see, e.g., Tamminen, Holt, & Neeley, 2013), athletes also encounter more common demands associated with competitive performance and the sport organization within which they operate. For example, Mellalieu, Neil, Hanton, and Fletcher (2009) identified five general categories of performance-related stressors in elite and non-elite sport performers. These consisted of preparation, injury, expectations, self-presentation, and rivalry. Most recently, Arnold and Fletcher (2012) synthesized the research that has identified the organizational stressors encountered by athletes. The demands were abstracted into 31 subcategories, which formed four categories: leadership and personal issues, cultural and team issues, logistical and environmental issues, and performance and personal issues. Accordingly, when assessing adversity in athletic performers, it is imperative that sport psychology researchers consider the inclusion of both significant life events and ongoing daily stressors.

In empirical studies of resilience, three broad approaches have been employed to measure adversity: multiple-item checklists of negative life events, single life occurrences, and the simultaneous consideration of multiple risks to form an overall adversity estimate (see, for a review, Luthar & Cushing, 1999). The first measurement strategy is commonly reflected in the use of checklists, such as the Life Events Checklist (Work, Cowen, Parker, & Wyman, 1990), that assess adverse events in an individual's life. To gain a more complete picture of adversity, scholars have also measured daily hassles to assess stressors that have lower severity but greater chronicity than major life events. The Daily Hassles Scale (Kanner, Coyne, Schaefer, & Lazarus, 1981) is a good example of this approach. From a measurement perspective, a main concern with such strategies involves the validation of the instruments as measures of adversity. When investigating the stress-buffering effects of resilience, for example, Pinquart (2009) attempted to address this concern by providing construct validity for a daily hassles measure since adolescents with more daily hassles were found to show higher levels of psychological distress. Although employing an outcome-dependent approach is clearly relevant when assessing adversity, Fletcher and Sarkar (in press) recently argued that ostensibly positive life events – that are *not* typically associated with a higher probability of undesirable outcomes – can also make substantial

contributions to adversity counts. To illustrate in an athletic context, winning an important sport competition is unlikely to be labeled as an adversity but will nonetheless require athletes to positively adapt to the inevitable heightened expectations related to success (cf. Kreiner-Phillips & Orlick, 1993). Notwithstanding this point, to ensure that a measure of adversity does in fact represent its intended concept, researchers seeking to measure psychological resilience in sport performers should provide empirical evidence of the associations between scores on an adversity measure and other conceptually related indices (cf. Masten, Best, & Garmezy, 1990).

An additional issue about life event measures pertains to potential measurement confounds; that is, variables that may influence the result of an investigation. In the context of assessing resilience, this concern specifically relates to the “controllability” of items. Numerous instruments using multiple-item checklists contain both “uncontrollable” events (e.g., serious illness) and “controllable” incidents (e.g., excessive smoking). While the inclusion of both types of circumstances appears intuitively reasonable, Luthar and Cushing (1999) suggested that the inclusion of controllable demands may artificially inflate associations between stressors and outcomes (see also Masten et al., 1988). In order to mitigate such associations, items that could be construed as clearly controllable by an individual, or as indexes of maladjustment, should ideally be excluded from potential measures (cf. Lin, Sandler, Ayers, Wolchik, & Leucken, 2004). With this in mind, sport psychology researchers developing a measure of psychological resilience in sport performers should therefore systematically identify the stressors encountered by athletes and, using a panel of experts, rate these stressors in terms of their controllability. If the majority of raters agree that the occurrence of a particular event is likely to be beyond the control of a typical athlete, it should be retained as part of a measure of uncontrollable sport-related stressors. Although events that are under a person’s control could also be potentially stressful, from a methodological perspective, an instrument including only uncontrollable incidents (i.e., free of confounds) is deemed to be the most rigorous type of assessment strategy in resilience research.

A further consideration when using multiple-item inventories to measure adversity relates

to the heterogeneity of events sampled. There is a need to differentiate between chronic circumstances and acute events since the effects associated with each of these categories can differ (Masten, Neemann, & Adenas, 1994). Indeed, in the context of athletic performance, Fletcher, Hanton and Mellalieu (2006) noted that sport psychology researchers should take into account the different properties of stressors, such as the duration (chronic vs. acute), frequency (rare vs. common occurrence), and intensity (high vs. low demand). Particularly relevant in the context of assessing adversity is whether it is appropriate to treat events that vary in intensity or seriousness, such as the death of a loved one or financial difficulties in the family, as comparable to one another (Luthar & Cushing, 1999). Failure to account for varying degrees of seriousness may at first glance appear to be problematic from a measurement perspective. However, studies that have examined weighted negative events, based on a respondent's estimation of relative impact, have shown little difference in weighted and unweighted scores (see, e.g., Swearingen & Cohen, 1985). Furthermore, relying on individuals to judge severity for themselves could potentially lead to spurious conclusions. Specifically, this approach can confound severity with individuals' responses to adversity, which is an outcome of interest (Kessler, 1997). To illustrate in a sport context, if an athlete classifies a performance slump, for example, as highly intense it could signify the severity of the event itself or it could be an indicator of maladjustment.

Although solely assessing the number of events experienced may not fully capture the meaningful variability in adversity, frequency counts will avoid these potential ambiguities in measuring adversity (Seery, Holman, & Silver, 2010). Thus, when developing a measure of psychological resilience in sport performers, researchers in this area should request that athletes only indicate how *often* they encountered an adversity or stressor, rather than how intense or severe it was.

The second approach to assessing adversity has been based on specific life stressors. Examples of single life occurrences include war, serious illness, child abuse, and parental divorce. In an athletic context, examples include performance slumps (see, e.g., Grove & Stoll, 1998), career transitions (see Wylleman, Alfermann, & Lavallee, 2004), choking under pressure (see Hill, Hanton, Matthews, & Fleming, 2010), serious injuries (see e.g., Shearer, Mellalieu, &

Shearer, 2011), disordered eating (see e.g., Papathomas & Lavalley, 2012), and emotional abuse (see e.g., Stirling & Kerr, 2008). As noted by Richters and Weintraub (1990), the main psychometric issue when considering such distal risk factors (i.e., factors that have a remote causal influence on a specific outcome), is that individuals demonstrating positive adaptation may actually be facing low proximal risks (i.e., risks that represent an immediate vulnerability). From a measurement perspective, it is important to note that single risk indices, such as a career-ending injury, are typically of a distal nature; they do not impinge on an individual directly but are influenced indirectly by various proximal variables, such as the availability of support. A specific event that has received considerable attention in an athletic context is the return to sport following a serious injury (see, for a review, Podlog & Eklund, 2007). Using this incident as an illustration, sport psychology researchers (e.g., Rees, Mitchell, Evans, & Hardy, 2010) have identified a strong association between injury-related stressors (e.g., incapacitation) and negative psychological responses (e.g., devastation). Accordingly, athletic performers appear to be at high risk of maladjustment if they encounter a serious injury. However, in reality, they may be facing low proximal risk particularly if they perceive that social support is available to them since the detrimental relationship between stressors and psychological responses is reduced for those with high levels of perceived social support (Rees et al., 2010). With this example in mind, sport psychology researchers seeking to measure psychological resilience in sport performers should recognize that although examining distal risks can yield critical insights on successful adaptation in the face of adversity, they convey little information about the proximal processes by which they operate.

The third strategy of measuring adversity involves the constellation of specific, discrete risk factors that are combined to form an overall approximation of the adversity encountered. This cumulative risk approach, exemplified in the work of Sameroff and colleagues (e.g., Gutman, Sameroff, & Cole, 2003; Sameroff, Gutman, & Peck, 2003), typically involves computing a total risk score across different high-risk sociodemographic dimensions, such as low parental income and minority group membership, and subsequently assigning counts of one

versus zero for each risk index. Researchers are increasingly using this measurement approach given that people experience multiple challenges simultaneously rather than in isolation (Fletcher & Sarkar, in press; Heller et al., 1999; Luthar, 2006). Indeed, this assessment strategy has high face and ecological validity since it reflects the coexistence of multiple stressors in the real world. Notwithstanding the benefits of summated risk inventories, it is important that scholars examine the “riskiness” (Luthar & Cushing, 1999, p. 138) of individual variables before developing composite measures of adversity in resilience research. Large family size, for example, has been frequently used as a component within aggregated risk constellations. Although a high ratio of children to adults tends to be associated with relatively poor child outcomes (Garrett, Ng’andu, & Ferron, 1994), scholars have conversely found the co-residence of another adult to be negatively associated with the quality of parenting (Chase-Lansdale, Brooks-Gunn, & Zamsky, 1994). Hence, when assessing constellations of multiple risks in the domain of competitive sport, it is important that researchers are attentive to each of the individual items included within a composite measure of adversity to determine if they do, in fact, represent high risk for athletes.

Measuring Positive Adaptation

In conjunction with the assessment of adversity, researchers striving to develop a measure of psychological resilience in sport performers need to separately assess positive adaptation. Positive adaptation or competence has been defined as “[adaptation] that . . . is substantially better than what would be expected given exposure to the risk circumstance being studied” (Luthar & Zelazo, 2003, p. 515). In studies of resilience in children and adolescents, researchers have typically operationalized positive adaptation in terms of achieving the social, behavioral, and educational milestones appropriate to their stage of development (Luthar et al., 2000; Masten, 2001). Accordingly, assessments of competence are usually derived from classmate, parent, and teacher ratings to gauge if children and adolescents are developing healthy and meaningful relationships with peers, are well-behaved, and are attaining good academic marks respectively. In contrast, adult resilience studies have generally focused on self-reported well-being and distress, with competence indices including longevity (see, e.g., Danner, Snowdon, & Friersen,

2001), physical and mental health status (see, e.g., Campbell-Sills et al., 2006), and career success (see, e.g., Bartley, Head, & Stansfield, 2007). Interestingly, it has been argued that the sole use of internal well-being indices is somewhat inadequate since it is unrealistic to expect individuals to instantly alleviate the emotional ramifications of critical threats to personal values, such as experiencing a serious injury (cf. Olsson, Bond, Burns, Vella-Brodrick, & Sawyer, 2003). To provide a more balanced representation of positive adaptation, Luthar, Sawyer and Brown (2006) suggested that scholars working with children and adults should learn from each other's methods as they consider strategies for assessing competence.

In a similar fashion to the measurement of adversity, three broad approaches have been employed to measure positive adaptation: multiple-item measures on a continuum between adjustment and maladjustment, the absence of serious psychopathology, and the integration of multiple domains of competence (see, for a review, Luthar & Cushing, 1999). As alluded to earlier, the first measurement strategy typically involves (external) ratings of young people's success at meeting stage-salient developmental tasks or (internal) ratings of adult's symptoms related to well-being. When researchers use multiple-item instruments to assess competence, a major problem is the difficulty of gauging "high competence" within the sample being examined since the reference group is usually the sample itself and not any larger normative group. As a result, when using such measures, little is known about how the most competent (resilient) individuals within the sample compare with those in low-risk groups. When employing this particular assessment strategy, scholars should interpret their findings with caution since it is possible – if one were to make comparisons with the general population for example – that the highest levels of competence within the sample were merely the best of a generally poorly functioning group (cf. Mulholland, Watt, Philpott, & Sarlin, 1991). In order to address potential interpretive ambiguities in athlete-related resilience studies that lack a quantitative benchmark, sport psychology researchers should provide qualitative characterizations to help describe high and low levels of competence achieved by a subset of athletes within the group in question.

An additional concern about multiple-item scales of competence pertains to the validity

of such measures regarding their conceptual relevance to the adversity being examined. Specifically, it has been argued that indices used to assess positive adaptation should be specific to the particular risk under scrutiny in terms of domains assessed and stringency of criteria used (see, for a review, Fletcher & Sarkar, in press). To illustrate, when communities carry high risk for antisocial problems, it would be appropriate to assess socially conforming behaviors (see, e.g., Seidman & Pedersen, 2003), whereas among competitive athletes who typically seek out challenging situations to attain success and well-being, other indicators would be more contextually relevant. These include sport-related indices such as subjective performance (cf. Nicholls, Polman, & Levy, 2010), athlete satisfaction (cf. Jowett & Cramer, 2009), and flow (cf. Swann, Keegan, Piggott, & Crust, 2012), and general well-being indices such as life satisfaction and psychological well-being (cf. Lundquist, 2011). Importantly, although measuring risk can involve one or more negative events, competence should ideally be assessed across multiple “theoretically similar” (Luthar et al., 2000, p. 548) domains since an overly narrow conceptualization of positive adaptation can convey a misleading picture of success in the face of adversity (Luthar, 2006; Luthar & Zelazo, 2003). As a caveat to this assertion, when resilience is based on two or three confined domains of competence, it is important that scholars explicitly state that success in the particular areas cannot be assumed to generalize to other spheres. With regards to the stringency of criteria, assessment decisions should be determined by the seriousness of the risk under consideration (Luthar, 2006; Luthar et al., 2000; Luthar & Zelazo, 2003). Specifically, if an individual is exposed to a serious life adversity (e.g., direct exposure to terrorist attacks) it is sufficient to justify the existence of positive adaptation in terms of the absence of psychiatric symptoms. If the adversity is not as severe, but is nonetheless relatively taxing (e.g., operating in a demanding sport environment on a daily basis), then it is entirely appropriate to expect excellent functioning in the specific domain (e.g., peer recognition of athletic performance) as evidence of positive adaptation.

The second approach to assessing competence has been based on the absence versus presence of psychiatric symptoms. Measures based on this premise are most commonly employed

with individuals at high risk for serious psychopathology, such as military personnel (see e.g., Schaubroeck, Riolli, Peng, & Spain, 2011). Although sport performers are unlikely to encounter many incidents associated with a high probability of mental distress, there are a number of instances where athletes may be at-risk of maladaptive behaviors (Shearer et al., 2011). For example, it would be pertinent for sport psychology researchers to utilize this measurement strategy when investigating resilience in young athletes who have a family history of major psychiatric disorders (cf. Conrad & Hammen, 1993). In such situations, assessments would typically be derived from interviews with various informants. From a measurement perspective, the main concern when using this approach relates to potential reliability threats regarding information across respondents and among the interviewers conducting the assessments. Scholars need to consider the different sources of information when using this measurement strategy particularly when the target individual is a child (Windle, 1999). In relation to childhood maltreatment, for example, discrepancies between child, parent, and teacher reports are well-documented (see Haskett et al., 2006; Heller et al., 1999; Kinard, 1998; Walsh et al., 2010). Thus, a child may be considered competent based on the information from a parent but he or she may not be considered competent on the basis of a teacher. Moreover, questions have arisen about whether a teacher's evaluation accurately reflects a child's overall psychopathology when their knowledge is derived primarily from limited contact in a classroom environment (Kinard, 1998). In the context of competitive sport, it may be slightly less problematic for a coach to provide an accurate reflection of an athlete's mental state given that a coach is often the first person that an athlete looks to for advice, guidance and support when they are experiencing difficulty (Bowes & Jones, 2006). Notwithstanding this observation, it is critical that sport personnel conducting assessment interviews are provided with appropriate clinical training to ensure that there is sufficient reliability among those arriving at diagnoses. Indeed, when employing this particular measurement approach with athletic performers, sport psychologists in this area should incorporate tests of inter-rater reliability to ensure adequate consistency among interviewers.

The third strategy of measuring positive adaptation involves the integration of scores

across different domains of adjustment. As with summative approaches to measuring risk, a crucial requirement in using this strategy is that individual domains of functioning must be carefully examined before scholars derive an overall competence index. To illustrate, when investigating school-based behavioral competence among inner-city adolescents, Luthar and McMahon (1996) examined four component dimensions within two composite constructs: peer acceptance (high popularity and low isolation) and prosocial leadership (high prosocial orientation and low aggressiveness). Interestingly, while using this aggregated approach, they found that a reputation of popularity characterized disruptive bullies to a similar extent as it did prosocial leaders. Thus, although peer acceptance may be considered to be a desirable resilience-related attribute in teenage groups, it would be inappropriate to use popularity to connote behavioral competence in this particular population.

A related concern of this measurement strategy pertains to the issue of circularity pervasive in resilience research (Harvey & Delfrabro, 2004; Kinard, 1998; Luthar & Zelazo, 2003; Masten & Obradovic, 2006; Windle, 2011). Specifically, the distinction between antecedent (protective) factors and positive outcomes is often blurred in the resilience literature. To illustrate, good peer relationships is sometimes considered to be a factor that predicts competence (Seidman & Pedersen, 2003) and is sometimes deemed to be an outcome of positive adaptation (Bolger & Patterson, 2003). In a similar fashion, self-efficacy has been considered to be both a precursor and a consequence of resilience (Kinard, 1998). Whichever approach is taken, scholars need to provide a clear justification of their decision and should reflect high relevance to the specific research question being addressed. In an athletic context, for example, high self-efficacy might be seen as a protective factor when exploring the ramifications of confidence for athletes' performance and well-being. In contrast, improvements in self-efficacy might be considered to be a positive outcome if sport psychology researchers sought to understand what helps injured athletes obtain confidence after experiencing such an incident. Indeed, Luthar and Zelazo (2003) remarked that "the interchangeable examination of constructs as predictors and as outcomes should not be seen as reflecting confusion in the resilience literature; quite to the

contrary, it is essential for advancing scientific knowledge” (pp. 516-517).

Measuring Protective Factors

The thrust of early research examining resilience involved the search for factors that protected an individual from the stressors they encountered (see, for a review, Luthar, 2006). To illustrate, Garmezy (1991) unearthed characteristics of young people who thrived whilst living in difficult circumstances and he subsequently clustered the identified resilient qualities around three key themes: dispositional attributes (i.e., personality) of the individual, family cohesion and warmth, and the availability and utilization of social support. As briefly mentioned earlier, these “resilient qualities” have commonly been referred to as protective factors in the psychology research literature. Protective factors have been defined as “influences that modify, ameliorate, or alter a person’s response to some environmental hazard that predisposes to a maladaptive outcome” (Rutter, 1985, p. 600). This line of inquiry has provided significant contributions to the assessment of resilience by addressing the question: What characteristics help people flourish in adversity? During the past three decades, over a dozen measures of resilience have been developed and validated by various researchers (see, for a review, Windle, Bennett, & Noyes, 2011). Importantly, these instruments have predominantly focused on assessing a constellation of characteristics that enable individuals to adapt to the demands they encounter. Drawing directly from current resilience scales in other psychology sub-disciplines, six psychometric issues will be explored and discussed forthwith related to the assessment of protective factors.

The first problem with this approach is that the majority of measures focus on resilient qualities at the level of the individual only (Ahern, Kiehl, Sole, & Byers, 2006; Naglieri & LeBuffe, 2005; Windle et al., 2011). For example, items on the Connor-Davidson Resilience Scale (CD-RISC; Campbell-Sills & Stein, 2007; Connor & Davidson, 2003) solely tap into personal factors of resilience including control, commitment, challenge, adaptability, and problem-solving. Furthermore, the Resilience Scale (RS; Wagnild & Young, 1993) assesses five resilient characteristics exclusively based at the individual level: equanimity, perseverance, self-reliance, meaningfulness, and existential aloneness. Whereas features of the individual are

undoubtedly important for positive adaptation in the face of adversity, the availability of resources from family (e.g., close bonds with at least one parent) and the community (e.g., support from peers) are also invaluable (see e.g., Collishaw et al., 2007; Horton & Wallander, 2001). When considering resilience across different levels of analysis, scholars need to be aware that the meaning of constructs may differ (Zautra, Hall, & Murray, 2008). Zautra et al. (2008) cited the example of trust; a factor that has been found to be an important aspect of resilience in elite sport (Fletcher & Sarkar, 2012). Specifically, they argued that although this quality is best understood at the level of the person in terms of his or her social interactions, trust may be best characterized by cohesiveness and collaborative ties at the family and community levels respectively. To gain a better understanding of resilience in sport performers, the development of a measurement instrument capable of assessing a range of protective mechanisms within multiple domains represents the optimal approach for advancing the field.

The second concern relates to the limited evidence base for the selection of items within current measures of resilience (Atkinson, Martin, & Rankin, 2009; Davydov, Stewart, Ritchie, & Chaudieu, 2010). For example, the Brief Resilient Coping Scale (BRCS; Sinclair & Wallston, 2004) was developed solely using Polk's (1997) classification of resilience phenomenon. Although a conceptual framework underpinned the instrument, the authors did not provide a justification as to why this particular perspective was prioritized over others. Furthermore, although the content of the CD-RISC was drawn from a number of different peer-reviewed sources (e.g., Kobasa, 1979; Lyons, 1991; Rutter, 1985), Connor and Davidson (2003) also included putative resilience factors – with questionable theoretical basis – based on the memoirs of Sir Edward Shackleton's expedition in the Antarctic in 1912 (Alexander, 1998). In relation to instrument development, Davydov et al. (2010) remarked that “scales incorporate different constructs according to individual authors' concepts of resilience and underlying mechanisms” (p. 488). To illustrate, the Brief Resilience Scale (BRS; Smith et al., 2008) was solely derived from a dictionary definition of resilience (the ability to “bounce back” or recover from stress) favored by the lead author. Hence, the items included in this measure, such as ‘I tend to bounce

back quickly after hard times' and 'it is hard for me to snap back when something bad happens', are based on a somewhat narrow conceptualization of resilience. When developing a resilience scale for sport performers, researchers need to clearly justify their approach to item development and, perhaps most importantly, they should exploit the vast empirical knowledge in key resilience-related areas.

The third issue with measuring protective factors is that the qualities assessed are specific to the context in which they arise and cannot be easily generalized to other populations (Davydov et al., 2010; Ungar et al., 2008). For example, the Suicide Resilience Inventory-25 (SRI-25; Osman et al., 2004) assesses characteristics that dissuade individuals from considering suicide as an option. Moreover, the Trauma Resilience Scale (TRS; Madsen & Abell, 2010) specifically assesses protective factors associated with positive adaptation following violence. Indeed, all the resilience inventories to date have been developed for use in non-sport contexts, such as psychiatric patients (see, e.g., Connor & Davidson, 2003; Madsen & Abell, 2010; Osman et al., 2004). This is particularly problematic for sport psychology researchers since constructs that are meaningful to non-sport participants, such as spirituality in clinical samples, are unlikely to be entirely relevant to athletic performers (cf. Fletcher & Sarkar, 2012). Gucciardi et al. (2011) recently argued that "important protective (e.g., teammate support) and vulnerability (e.g., rigorous training schedules) factors are likely not to be adequately captured when using [current resilience] measures . . . that were developed with other populations in mind" (p. 431). Hence, as a prerequisite to developing a sport-specific measure of resilience, scholars need to comprehensively review risk and protective factors in the context of athletic performance.

The fourth problem concerns the validity of current scales purporting to assess resilient qualities. More specifically, a number of inventories measure phenomenon that are related to resilience but are conceptually distinct from the construct. For example, the BRS provides a measure of recovery from stress and the BRCS and the CD-RISC were designed to assess an individual's stress-coping ability. Whereas recovery and coping are often discussed in relation to resilience, and sometimes used interchangeably with the term, there is growing evidence to

suggest that they should be conceived as conceptually distinct from resilience (see, for a review, Fletcher & Sarkar, in press). To provide further illustrations, the Dispositional Resilience Scale (DRS; Bartone, Ursano, Wright, & Ingraham, 1989) presents a measure of hardiness and the Ego-Resiliency Scale (ER89, Block & Kremen, 1996) was developed to assess ego-resiliency.

Although both constructs share a number of similarities with the attributes of resilience, they do not contain all of the relevant features (Windle, 2011). In addition, as Windle (2011) noted, both hardiness and ego-resiliency are considered to be stable personality traits, whereas resilience is deemed to be a dynamic process that changes over time. Accordingly, it is important that future measures in this area distinguish resilience from a number of related terms to ensure that they do not divert researchers' attention from examining the true nature of resilience.

The fifth issue with this approach is that a set of questions at a single point in time may only capture state characteristics as opposed to assessing an individual's thoughts, feelings and behavior throughout the entire process of dealing with adversity. Based on this premise, Hoge, Austin, and Pollack (2007) argued that "a true resilience scale would measure an individual's reaction to an experimental stress paradigm or to stressful life events or traumas over time" (p. 147). In view of this proposition, it is worth noting that longitudinal studies are important in determining the stability of resilience across an individual's lifespan (Heller et al., 1999; Kinard, 1998; Luthar, 2006; Walsh et al., 2010; Windle, 1999). Indeed, in the sport psychology literature, there is a consensus that longitudinal research is needed to investigate resilient characteristics and performance throughout the entire process of managing potentially stressful situations (Fletcher & Sarkar, 2012; Galli & Vealey, 2008; Gucciardi et al., 2011). In relation to developing and validating a sport-specific measure of resilience, Gucciardi et al. (2011) argued that it is crucial that researchers explore the factor structure stability and item consistency in a longitudinal fashion. Moreover, when employing a prospective research design, it has been proposed that scholars should ideally obtain measurements on at least three separate occasions, with assessments spaced far enough in time to enable the hypothesized protective factors to exert their effects (Luthar et al., 2000). To illustrate, in the context of sport performance, it would be useful

to assess an athlete's resilient qualities before, during, and after an adverse event (e.g., serious injury) to determine any potential changes in the relationship between stressors and positive adaptation (e.g., performance and well-being). Indeed, utilizing a longitudinal design when researching this desirable construct represents a useful approach that is consistent with the conceptualization of resilience as a dynamic process of positive adaptation to adversity (Luthar, 2006).

The sixth problem with exclusively assessing resilient qualities relates to the limited knowledge gleaned regarding the relationship between protective factors and stressors. Specifically, current measures of resilience predominantly focus on the sole assessment of variables that are implicitly assumed to be associated with positive adaptation in the face of adversity (Olsson et al., 2003). However, without the simultaneous measurement of context-specific stressors, this connection cannot be corroborated. Examining the interplay between resilient characteristics and adverse events is an important aspect of resilience research since it highlights the processes underlying vulnerability or adaptation (Luthar & Zelazo, 2003; Naglieri & LeBuffe, 2005; Rutter, 2006; Windle, 2011). Indeed, Rutter (2006) argued that "resilience is an interactive concept that can only be studied if there is a thorough measurement of risk and protective factors" (p. 3).

Before sport psychology researchers investigate the associations between risk and protective factors, they need to consider a number of psychometric issues depending on which of the two main strategies – variable-focused or person-focused – are employed (see, for a review, Windle, 1999). When examining the relationships between adversity, protective factors, and competence (i.e., variable-focused approaches), measurement issues pertain to the reliance on statistics to detect such interactive processes (Luthar & Cushing, 1999). Firstly, multivariate analyses convey nothing about how many individuals within a particular sample meet the dual criteria of high risk and high competence. In addition, when using this strategy, it is difficult to isolate which (specific) risk and protective factors are contributing to the interaction and to the inferred resiliency processes. Secondly, when resilience studies involve interactive concepts there

are potential problems with the instability of findings. More specifically, the sheer number of risk and protective factors may substantially reduce statistical power given that interaction effects in statistical models are typically associated with small effect sizes and as a result, are notoriously unstable (see, Rutter, 1983, for detailed discussions of this issue). When isolating a subset of individuals who have experienced high risk and demonstrated high competence (i.e., person-focused approaches), empirical studies of resilience are less prone to statistical fallacies.

Notwithstanding the benefit of individual-based measurement, there is a concern regarding the variations in stringency for categorizing individuals as resilient (Luthar & Cushing, 1999). To illustrate, whereas some investigators have provided labels of resilience among high-risk individuals if their competence scores were in the top 16% (+1SD) of the research sample (see, e.g., Cicchetti, Rogosch, Lynch & Holt, 1993), others have employed competence cut-off scores based on quartiles or thirds of distributions (see, e.g., Flores, Cicchetti, & Rogosch, 2005). To help reduce ambiguities that may arise due to variations in quantitatively delineated resilience, qualitative analyses of exemplar resilient individuals can provide a valuable addition in elucidating the nature of this complex psychological phenomenon.

Concluding Remarks

There is a consensus in the sport psychology literature that a measure of psychological resilience in athletes is needed to advance researchers' understanding of this desirable construct (Fletcher & Sarkar, 2012; Galli & Vealey, 2008; Gucciardi et al., 2011). Drawing on the broader psychometric literature in this area, this review has discussed a variety of measurement approaches and issues in the empirical study of resilience. Hopefully, this paper has helped to explain how psychological resilience should be measured in sport performers. The key recommendations to emerge from this discussion, for sport psychology researchers seeking to develop a measure of psychological resilience in athletes, are that:

- Measures of resilience need to consider three pivotal components – adversity, positive adaptation, and protective factors – in a tripartite fashion. Importantly, due to the fundamentally distinct nature of these concepts, researchers need to separately assess and

analyze adversity, positive adaptation, and protective factors from the outset.

- To gain a comprehensive picture of adversity, researchers should assess both significant life events and ongoing daily stressors.
- Researchers should provide empirical evidence of the associations between scores on an adversity measure and other conceptually related indices.
- When assessing adversity, items that could be construed as clearly controllable by athletes should ideally be excluded from potential measures.
- Relying on athletes to judge the severity of adverse events themselves could potentially lead to spurious conclusions. Frequency counts will avoid potential ambiguities in measuring adversity.
- Whereas an examination of distal risks can yield critical insights on successful adaptation in the face of adversity, it is also invaluable for scholars to scrutinize the proximal processes underlying the specific distal risks.
- When assessing constellations of multiple risks, researchers should be attentive to each of the individual items included within a composite measure of adversity to determine if they do, in fact, represent high risk for athletes.
- When employing multiple-item instruments to assess competence, little is known about how the most competent (resilient) individuals within the sample compare with those in low-risk groups. Ambiguities in this context can be partially addressed by providing qualitative characterizations of a subset of individuals within the group being examined.
- Indices used to assess positive adaptation should be specific to the particular risk under scrutiny in terms of domains assessed and stringency of criteria used. Among competitive athletes, excellence in subjective sport performance and global well-being are likely to be of particular relevance.
- Sport personnel assessing psychiatric symptoms in athletes should be provided with appropriate clinical training to ensure that there is sufficient reliability among those arriving at

diagnoses.

- Individual domains of functioning should be carefully examined before researchers derive an overall competence index.
- Scholars should provide a clear justification of their decision to examine constructs as either predictors or outcomes and should reflect high relevance to the specific research question being addressed.
- Researchers need to: assess a range of protective factors across different levels of analysis, clearly justify their approach to item development, comprehensively review risk and protective factors in the specific context of sport performance, distinguish resilience from a number of related terms, utilize a longitudinal design, and examine the interplay between stressors and protective factors.

It is hoped that these psychometric lessons gleaned from general psychology will provide the platform for generating an accurate and reliable measure of psychological resilience in sport performers. The breadth of measurement strategies within the wider resilience research is indeed critical for the refinement of future measures in this area:

The mélange of empirical approaches across the last two decades allows for a more fine-grained scrutiny than has been heretofore possible, in honing in on central principles . . . regarding risk, competence, and the associations between these and protective forces (Luthar & Cushing, 1999, p. 152).

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