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Resilience Through the Lens of Interactionism: A Systematic Review

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This systematic review presents findings from a conceptual and methodological review of resilience measures using an interactionist theoretical framework. The review is also intended to update findings from previous systematic reviews. Two databases (EBSCOHost and Scopus) were searched to retrieve empirical studies published up until 2013, with no lower time limit. All articles had to meet specific inclusion criteria, which resulted in 17 resilience measures selected for full review. Measures were conceptually evaluated against an interactionist framework and methodologically reviewed using Skinner's (1981) validity evidence framework. We conclude that inconsistencies associated with the definition and operationalization of resilience warrant further conceptual development to explain resilience as a dynamic and interactive phenomenon. In particular, measures of resilience may benefit from a greater focus on within-person variance typically associated with behavioral consistency across situations. The use of alternative measurement modalities to self-report scales, such as situational judgment tests, is proposed as a way of advancing knowledge in this area.

Keywords: adult resilience, measurement, interactionism, psychological assessment, systematic review

Resilience is a phenomenon that results from the interaction between individuals and their environment (Rutter, 2006) and is not something that individuals innately possess. Currently, there is considerable disparity in the way resilience is operationalized (e.g., trait or process), which has highlighted the need for clarity with respect to definition and measurement (Luthar & Brown, 2007) and prompted calls for a critical review of resilience measures (Cicchetti, Rogosch, Lynch, & Holt, 1993; Kumpfer, 1999; Luthar, Cicchetti, & Becker, 2000; Luthar & Cushing, 1999). The lack of agreement on how resilience should be operationalized (Luthar & Cicchetti, 2000) is not peculiar to the resilience construct; rather, it is a commonly found challenge associated with the operationalization of latent psychological constructs (Amedeo, Golledge, & Stimson, 2009). Similar challenges have been encountered in the operationalization of other latent constructs such as mindfulness (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) and body awareness (Mehling et al., 2009).

Aside from some of the methodological challenges associated with the measurement of latent constructs, there are some noteworthy conceptual challenges that are particular to resilience. Early studies of resilience sought to understand how children faced with chronic adversity such as poverty (Garmezy, 1991) were able to positively adapt and develop into functioning (and in some cases thriving) adults despite their challenging rearing environments (Masten, Coatsworth, & Coatsworth, 1998; Werner, 1986). This early body of research was almost entirely directed at children (Rutter, 1979; Werner & Smith, 2001) who continued to function normally despite exposure to systemic stressors. Thus, one drawback of early resilience research is that conclusions drawn from these studies may not generalize outside of developmental settings (Bonanno & Diminich, 2013). We note three conceptual challenges related to this point, which have implications for the way resilience is measured.

First, earlier studies examined resilience only in the context of chronic stressors (e.g., Werner & Smith, 2001). Chronic stressors are relatively long-term, systemic stressors, such as poverty, or ongoing abuse, which tend to have a higher risk of negative outcomes (Masten, 2001; Masten & Narayan, 2012). However, not all adversities are chronic and so generalizing findings from these studies to adult settings may not always be appropriate. This is because the nature of stressors in developmental studies may not be comparable to those typically encountered by adults. For example, recently, research into adult resilience demonstrates that the adversities facing adults are typically, but not restricted to, isolated events such as loss or other potentially traumatic events, which are best described as acute stressors (Bonanno & Diminich, 2013). These events are often isolated from an otherwise normal environment. Drawing a distinction between chronic and acute stressors is therefore important, since positive adjustment (resilience) is likely to covary with the type and duration of a given stressor (Masten & Narayan, 2012). Acute stressors, being isolated adverse experiences, are likely to have a smaller disruptive effect on functioning, compared with chronic stressors (Bonanno & Diminich, 2013).

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Second, the resources required to achieve a resilient outcome and criteria used to determine that outcome is likely to differ depending on the nature of the situation. Roisman (2005) cautioned that outcomes associated with resilience can only be inferred if the stressor that triggered the adverse situation would result in a negative outcome for a *majority* of individuals. For example, a natural disaster or terrorist attack would most likely have a negative impact on *most* people. The implication for resilience measurement is that, currently, we do not know very much about those properties of situations that are most influential in resilient outcomes. Therefore, it is difficult to draw conclusions as to what combination of factors may influence or attenuate resilient functioning. Endler (1983), a proponent of interactionism, suggested that the answer lies in the development of systematic taxonomies of situations. Such taxonomies would outline defining features of a situation to provide a structural framework within which to examine individual behavior. Third, resilient outcomes have been described in three different ways in the literature including, a return to normal functioning (Wagnild & Young, 1993), positive adaptation (Luthar et al., 2000) and posttraumatic growth (Linley & Joseph, 2011; Polk, 1997). Given the emphasis on chronic adversity in developmental studies, it could be argued that findings from these studies may not be directly comparable (or relevant) to adult resilience outcomes in personal or workplace settings. Moreover, the measures required to assess resilience would be expected to differ depending on the outcome of interest. For instance, in earlier studies where children had survived significant abuse, measures that assess the absence of psychopathology would determine whether a resilient outcome had been achieved (Bonanno, 2004). However, in the context of adult resilience, it could be argued that measurement of psychopathology is not a suitable index of resilience in relation to isolated stressors, such as divorce.

Inconsistencies associated with the definition, operationalization, and measurement of resilience indicate that further theoretical delineation is needed (Gillespie, Chaboyer, & Wallis, 2007). Indeed, Windle (2011) attempted to do so through the methods of systematic review, concept analysis, and stakeholder consultation and arrived at the following working definition of resilience:

> the process of effectively negotiating, adapting to, or managing significant sources of stress or trauma. Assets and resources within the individual, their life and environment facilitate this capacity for adaptation and "bouncing back" in the face of adversity. Across the life course, the experience of resilience will vary. (Windle, 2011, p. 152)

There are three conceptual components of this definition worthy of note: (a) the presence of *significant* stress that carries substantial threat of a negative outcome (antecedent), (b) individual *and* environmental *resources* that facilitate *positive* adaptation, and (c) positive adaptation or adjustment relative to developmental life stage (consequence). These three components infer that resilience culminates from an individual's interaction with their environment, which, in turn, is influenced by developmental factors, situational constraints, and sociocultural processes (Luthar et al., 2000; Vanderbilt-Adriance & Shaw, 2008). We adopt this definition of resilience as it is conceptually consistent with interactionism (e.g., Ekehammar, 1974; Endler & Parker, 1992) and explains resilience as a dynamic person-environment phenomenon. This approach is useful in broadening our understanding of resilience for two main reasons. First, interactionism attempts to explain more than individual characteristics thought to influence resilience (trait resilience), which conceal the dynamic nature of resilience over an individual's course of development (Kaplan, 1999; Lepore & Revenson, 2006). Further, trait resilience explanations do not account for within person variation, which explain why some people are resilient in some situations and not others (Gillespie et al., 2007). Second, recent empirical studies (Bonanno & Diminich, 2013; Masten & Narayan, 2012) have identified different outcome trajectories and different pathways to resilience associated with a range of adversities, highlighting the need for measures capable of predicting variations in resilient outcomes.

For these reasons, interactionism is an appealing framework with which to study resilience, as it provides an articulate theoretical framework capable of explaining how individual characteristics (e.g., positive emotions) interact with situational factors (e.g., available social support), which are moderated by previous experience such as exposure to similar stressors in the past. Relatedly, an interactionist framework may help researchers determine how resilience pathways influence resilience in a cumulative and interactive manner (McFarlane & Yehuda, 1996).

The Case for Interactionism

To advance understanding of how best to assess resilience across different situations, Funder (2009) claimed there is a real need to refocus resilience measurement from between person variance to a closer examination of within-person variance. Proponents of interactionism argue that this is why traditional trait approaches to psychological assessment are limited (Endler, 1983; Magnusson, 1976; Mischel, 1977). Interactionists aim to understand and evaluate the way individuals interact with their environments, and it could therefore be argued that this approach to the assessment of resilience may provide a suitable theoretical framework with which to guide the operationalization of resilience. For instance, there is little agreement as to how best to define resilience (Shaikh & Kauppi, 2010), resulting in variations in how adversities and adaptive outcomes have been operationalized (Masten, 2001; Masten, Best, & Garmezy, 1990; Werner & Smith, 1982). Without a means of establishing what might constitute a resilient outcome (Kaplan, 1999), it becomes difficult to compare adversities across studies (Schoon, 2006) as it is not clear to what extent one individual experiences adversity compared with another (Silver & Wortman, 1980). Interactionist approaches reflect ecosystemic assumptions that life is not experienced in a vacuum but in the wider sociocultural domain (Germain & Gitterman, 1987; Ungar, 2011). This epistemological stance is well suited to the assessment of resilience as it explains adversity, adaptation, and resilience in relative, situational, and attributional terms (Shaikh & Kauppi, 2010).

Interactionists make a further distinction between mechanistic and dynamic interactionism (Endler & Magnusson, 1977): Mechanistic interactionism proposes that both person and situation variables must be considered to predict behavior but treats person and situation as distinct, static entities. Dynamic interactionism, which is more suited to the assessment of resilience, rejects the distinction between person and situation and focuses on how individuals and situations mutually influence one another. Two widely accepted principles of the dynamic interactionist approach

are that (a) individuals are not randomly assigned to the environments in which they live but select and create their own experiences, and (b) environments can maintain personality characteristics that initially developed in response to earlier socialization experiences (Zuroff, 1992).

Despite the differences between dynamic and mechanistic interactionism, both theories oppose the global assessment of individual differences in favor of contextualized individual assessment. The person-environment assessment approach captures the essence of mechanistic interactionism but does not explain dynamic influences such as developmental or sociocultural factors. Proponents of dynamic interactionism (e.g., Roberts & Caspi, 2003) acknowledge this limitation and include the possible impact of new experiences (e.g., relocating abroad), social processes, and identity development (drives, abilities, and beliefs). The focus of dynamic interactionism is on the issue of behavioral consistency (traits) as well as change, which adopts a lifespan perspective of personality where individuals are seen as active agents in their environment (Reynolds et al., 2010). Understanding behavioral consistency may therefore shed light on different pathways to resilience by examining the factors that foster resilience in the context of different adverse situations (Bonanno, 2004; Brewin, Andrews, & Valentine, 2000). Behavioral consistency across situations (e.g., trait resilience) is not simply due to personal attributes rather through the influence of the "corresponsive principle"; individuals seek out experiences that align with their preferences and dispositions promoting behavioral consistency (Roberts & Caspi, 2003, p. 470). This view also acknowledges that life experiences (e.g., parenthood or bereavement) have the potential to change an individual's sense of self and ultimately influence their core attributes (Reynolds et al., 2010, p. 465). It is for this reason we propose that a dynamic interactionist framework may well advance our conceptual understanding of resilience for the purposes of measurement.

Systematic Review

The aims of the present systematic review were twofold: (a) to further understanding of how resilience is operationalized and (b) to evaluate the psychometric properties of resilience measures using a validity evidence framework proposed by Skinner (1981), a method that emphasizes the interplay between theory development and empirical analysis of latent constructs. As pointed out by one reviewer, the framework proposed by Hunsley and Mash (2008) would also serve as a suitable framework for the evaluation of psychological measurement instruments. We chose Skinner's (1981) construct validation framework, as it provides a framework for the evaluation of theoretical models. Emphasis in this article was on the operationalization of resilience, rather than clinical utility of measures; thus, we believed a framework for the evaluation of theoretical models would provide added value.

This study is a timely update to the literature since only two previous systematic resilience reviews have been conducted with a different focus to the present review (Ahern, Kiehl, Sole, & Byers, 2006; Windle, Bennett, & Noyes, 2011). The most recent of these reviews identified measures with an upper time limit of 2008. Since the findings of this publication are over 5 years old, a reexamination of measures may lead to new developments in the assessment of resilience. The first of the two reviews (Ahern et al., 2006) gave a detailed review of resilience instruments but only reviewed six measures that would be suitable for use in adolescent populations, consistent with the aims of the study. In addition, the authors did not include a detailed assessment framework to assess the qualitative differences among the instruments reviewed. The second review by Windle et al. (2011) used such stringent assessment criteria that no one measure suitably met 50% of the quality assessment criteria. Yet the authors concluded that low ratings were not indicative of poor quality measures but, rather, were due to a lack of information about scale development. Interestingly, both of the previous reviews omitted any thematic review of evidence based on test content resulting in limited information about the way resilience is operationalized. This is an important omission, as the manner in which a construct is operationalized is critical to its subsequent measurement; we have therefore included a review of the dimensions and corresponding items of each measurement scale in our study.

Part 1: Systematic Review of Resilience Measures

The purpose of Part 1 was to conduct a systematic review of resilience measurement scales developed for use in adults. Identified measurement scales were subsequently content reviewed to further understanding of how resilience is currently being operationalized.

Method

Procedure. A literature search was conducted using the following databases: EBSCOHost (CINAHL Plus, E-journals, Health and Psychosocial Instruments, MEDLINE, PsycARTICLES, Psychology and Behavioral Sciences Collection, PsycINFO) and Scopus (Health Sciences). A Google Scholar search using the same search parameters resulted in duplications. Search parameters included the following: (resilien* = TI) AND (questionnaire OR assess* OR scale* OR instrument OR measure* = TI) NOT (youth OR child* OR adolesc*). Results were restricted to English AND human AND adult AND peer reviewed publications and were subject to specific exclusion and inclusion criteria (see Figure 1). Inclusion criterion six included conceptually related cases. Thus, constructs that may not contain *all* of the defining attributes of resilience (Walker & Avant, 2005) but are conceptually related to resilience were included in the search. For example, hardiness is a concept often confused with resilience; what distinguishes hardiness from resilience is that hardiness is a stable personality trait, whereas resilience is a dynamic construct (Windle, 2011). The study population parameters and time of study were unrestricted to maximize the scope of results. However, we did exclude measures that were specifically designed for particular occupations to increase the generalizability of our findings (e.g., military risk and resilience inventories). Scale refinements were also included since scale development is an iterative process and can result in the development of revised scales (McHorney, 1996).

Data extraction. The initial literature search yielded 263 potential articles. After reviewing abstracts, 149 articles were rejected either as they were duplicates, satisfied the exclusion criteria, or failed to meet any of the inclusion criteria. Examples include language adaptations of existing resilience scales, bodily toughness inventories, and military deployment risk and resilience inventories.

Inclusion criteria	Exclusion criteria
1. Study population: adults (18+)	1. Study did not contain original data
2. Study settings: Unrestricted	2. Study did not describe or validate an assessment of adult resilience
3. Time period: Unrestricted	3. Qualitative studies
4. Publication criteria: English; peer reviewed	4. Measures relative to specific occupations
5. Admissible criteria: Original study of scale development; scale revisions; validation studies	
6. Conceptually related cases	

Figure 1. Inclusion and exclusion criteria for literature search. Note that conceptually related constructs include borderline and related cases, which have emerged from the concept analyses approach described by Walker and Avant (2005). Borderline cases are often mistaken for resilience but differ substantially on one defining characteristic. Related cases are related to resilience but do not contain all of the defining attributes.

Of the remaining 114 articles, 15 articles were excluded, as they were studies describing psychological constructs but were contrary cases (see Walker & Avant, 2005). Contrary cases refer to constructs that are not examples of resilience. That is, measures that do not refer to significant adversity/risk, the presence of assets or resources to offset the effects of the adversity, or positive adaptation. Examples include a measure of anxiety, a measure examining solution focused thinking, a coping competence assessment, or studies that did not report a measure of adult resilience (see table of criteria).

A further 82 studies were removed from further analysis as they reported findings from applications of existing measures. For example, studies included the use of scales (e.g., Connor-Davidson Resilience Scale [CD-RISC]) in psychopharmacological trials however this was not for the purpose of scale development. Other studies examined invariance between specific cultures, and positive and negative affect. Some scales were used to examine resilience in Chinese earthquake survivors, yet did not actually discuss measurement refinement or scale validation. The remaining 17 articles comprised:

- Eight resilience scales consistent with findings from Ahern et al. (2006) and Windle et al. (2011),
- One scale revision, Revised Ego-Resiliency Scale (ER-89-R; Alessandri, Vecchio, Steca, Caprara, & Caprara, 2007) not previously identified,
- Two short versions of existing scales: abbreviated Connor-Davidson Resilience Scale (CD-RISC2; Vaishnavi, Connor, & Davidson, 2007) and abridged Multidimensional Trauma Recovery and Resiliency Instrument (MTRR-99; Liang, Tummala-Narra, Bradley, & Harvey, 2007) not identified in earlier reviews,
- Six scales that had not been identified in earlier reviews: Multidimensional Trauma Recovery and Resiliency Scale (Harvey et al., 2003); Personal Views Survey III—Revised (PVS-III-R; Maddi et al., 2006);[1] Psychological Capital Questionnaire (PCQ; Luthans, Youssef, & Avolio, 2007); Resilience in Midlife Scale (RIM Scale; Ryan & Caltabiano, 2009); Sense of Coherence Scale (SOC; Antonovsky, 1993); Trauma Resilience Scale (TRS; Madsen & Abell, 2010).

Table 1 provides a brief summary of the identified measures.

Characteristics of identified resilience measures. All the measures reviewed conceptualized resilience as either a: process, trait, state, or outcome. Proponents of process models (Campbell-Sills & Stein, 2007; Friborg, Hjemdal, Rosenvinge, & Martinussen, 2003) focus on the internal and external resources used to foster positive adaptation to adversity (Kumpfer, 1999; Polk, 1997). Adopters of trait models (Block & Kremen, 1996; Maddi et al., 2006) operationalize resilience as a set of internal characteristics. Proponents of state approaches have argued that resilience is a lower order construct of *Psychological Capital* (Luthans, Vogelgesang, & Lester, 2006) and propose that positive psychology constructs (hope, optimism, and self-efficacy) are pathways to resilience, which together form a state-like construct. Finally, resilience as an outcome variable refers to the ability to "bounce back" from physical and psychological stressors (Sinclair & Wallston, 2004; Smith et al., 2008). In addition, these four approaches could be further divided into two groups; those that operationalize resilience as multidimensional (Connor & Davidson, 2003; Friborg et al., 2003; Harvey et al., 2003; Madsen & Abell, 2010) and those that operationalize resilience as one dimension (Block & Kremen, 1996; Campbell-Sills & Stein, 2007; Smith et al., 2008). Despite the range of different conceptual approaches used, there was very little variation apparent in the scope of the assessment. Most measures comprised items assessing person variables (traits or state-like characteristics associated with resilience). Five measures (Baruth Protective Factors Inventory [BPFI], CD-RISC, RIM, MTRR,[2] Resilience Scale for Adults [RSA], TRS) also included situational variables querying the existence or perception of social support. We found evidence of one measure (MTRR[3]) that explicitly conceptualized resilience as a phenomenon consistent with dynamic interactionism.

Operationalization of resilience. The first aim of this study was to understand how resilience is currently operationalized using interactionism as a conceptual framework. A thematic analysis was conducted by one reviewer (AP), who first aggregated all self-report scale items[4] into a global anonymized list of items and subsequently iden-

[1] This is the most recent iteration of hardiness intended to supersede previous measures (e.g., Unabridged Hardiness Scale, Abridged Hardiness Scale; Revised Hardiness Scale). To aid clarity, the PVS-III-R is the only hardiness measure included in this study, despite it sharing the same format and item content as the Dispositional Resilience Scale (DRS).

[2] Includes short-form MTRR-99.

[3] Includes short-form MTRR-99.

[4] Four versions of existing scales (CD-RISC-2, CD-RISC-10, ER-89-R, MTRR-99) were not presented here to avoid redundancy, as their parent scales provided all relevant information.

Table 1
Summary Information of Resilience Self-Report Scales

No.	Measure	Conceptual foundation	Development sample(s)	Reliability of test scores	Evidence of validity
			Assessment of factors internal and external to the individual		
1	Baruth Protective Factors Inventory (BPFI; Baruth & Carroll, 2002)	Based on empirical findings (e.g. Masten, Best, & Garmezy, 1990) that delineate protective factors: adaptive personality, supportive environment, fewer stressors, and compensating experiences	Undergrad students (n = 98)	16 items Total scale (α = .83) Subscales: adaptive personality (α = .76), supportive environment (α = .98), fewer stressors (α = .55), compensating experiences (α = .83)	*Evidence based on test content*: expert evaluation of item pool drawn from literature. *Validity argument*: positive correlation BPFI fewer stressors subscale with Multidimensional Health Profile (MHP) life stress domain (r = .49), perceived stressfulness of events (r = .50), global stress (r = .41), BPFI supportive environment scale positive correlation with MHP informational support scale (r = .21); negative correlation between BPFI adaptive personality and MHP Psychological Distress scale (r = −.27).
2a	Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003)[b]	Stress-coping conceptualized as hardiness (Kobasa, 1979; Rutter, 1985), stress endurance (Lyons, 1991) and Shackleton's experiences of survival	General population (n = 577); primary care outpatients (n = 139); psychiatric outpatients (n = 43); generalized anxiety disorder study sample (n = 25); two PTSD clinical trial participants (n = 22; n = 22)	25 items Total scale (α = .89) *Subscales* (no α reported): (a) Personal competence, high standards, and tenacity, (b) trust in one's instincts, tolerance of negative affect, and strengthening effects of stress, (c) positive acceptance of change, and secure relationships, (d) control, (e) spiritual influences *Test–retest* (ICC) r = .87	*Evidence based on test content*: literature review. *Validity argument*: correlated with hardiness (sr = .83) and Social Support (sr = .36); negatively correlated (r = −.76) with Perceived Stress (PSS-10) Sheehan Stress Vulnerability Scale (SVS) (Spearman rho = −.32); CD-RISC had no significant relationship with the Arizona Sexual Experiences Scale—discriminant evidence.
2b	10-item Connor-Davidson Resilience Scale (CD-RISC-10; Campbell-Sills & Stein, 2007)[c]	Same as for parent scale	Three undergraduate student samples (n = 511; 512; 537)	10 items Unidimensional scale (α = .85)	*Evidence based on test content*: same as for parent scale. *Validity argument*: correlated with original CD-RISC (r = .92); scores on CD-RISC-10 moderated relationship between childhood maltreatment and current psychiatric symptoms (R = .56, R^2 = .31) measured by Brief Symptom Inventory and Childhood Trauma Questionnaire.

(*table continues*)

Table 1 (*continued*)

No.	Measure	Conceptual foundation	Development sample(s)	Reliability of test scores	Evidence of validity
3	Multidimensional Trauma Recovery and Resiliency Scale (MTRR; Harvey et al., 2003)[b]	Ecological perspective of community psychology (Harvey, 2007) focusing on interaction of person and environment in reactions to stress	Adults (86% female) in treatment for abuse (n = 181)	135 items + optional semi-structured interview Total scale (α = .97) *Subscales* (a) authority over memory (α = .85), (b) integration of memory and affect (α = .75), (c) affect tolerance (α = .88), (d) symptom mastery and positive coping (α = .80), (e) self-esteem (α = .88), (f) self-cohesion (α = .79), (g) safe attachment (α = .71), (h) meaning making (α = .83)	*Evidence based on test content*: items drawn from literature on trauma impact and recovery and clinical experience of research team. Items selection guided by in-depth interviews and pilot sample. *Validity argument*: clinician-estimated recovery status as predictor of MTRR subscales—significant main effects for composite scale and five of the eight subscales: integration of memory and affect, affect tolerance, symptom mastery and positive coping, safe attachment, and meaning making.
4	Resilience in Midlife Scale (RIM; Ryan & Caltabiano, 2009)	Measures attributes associated with mid-life changes (35 to 60 years), which is one of the longest stages in the lifespan and a time of major change (Ryff, Singer, Love, & Essex, 1998)	Australian university students (35–60 years) + community members (aged 35 to 60 years); N = 130	25 items Total scale (α = .87). *Subscales* (no α reported) (a) self-efficacy, (b) family/social networks, (c) perseverance, (d) internal locus of control, (e) coping + adaptation	*Evidence based on test content*: literature review. *Validity argument*: positive correlation with CD-RISC (r = .81), Rosenberg Self-Esteem Scale (RSES) (r = .71). Negative correlation with trait anxiety (STAI; r = −.68).
5	Resilience Scale for Adults (RSA; Friborg et al., 2003)	Theoretically consistent with findings of early developmental empirical studies (Garmezy, 1991; Rutter, 1979; Werner, 1986)	Applicants to a military college in Norway (n = 482)	33 items Total scale (α not reported) *6 subscales* Perception of self (α = .70), planned future (α = .66), social competence (α = .76), family cohesion (α = .78), social resources (α = .69), structured style (α = .69) *Test–retest*: $r > .70$ for all subscales	*Evidence based on test content*: literature review. *Validity argument*: RSA-social competence correlated with Agreeableness (r = .69), sociability subfacet of Extroversion (r = .60), and social intelligence (r = .88) measured by the TSIS-social skills instrument. RSA-social resources correlated with Agreeableness (r = .66). Conscientiousness correlated with RSA-structured style (r = .83). No significant relationship observed between RSA and Raven's Advanced Matrices—discriminant evidence.

(*table continues*)

Table 1 (*continued*)

No.	Measure	Conceptual foundation	Development sample(s)	Reliability of test scores	Evidence of validity
6	Trauma Resilience Scale (TRS; Madsen & Abell, 2010)	Protective factors associated with negative effects of violence (Hjemdal, 2007; Trickett, Kurtz, & Pizzigati, 2004; Werner & Smith, 2001)	University students (United States) and adult community education settings (n = 577). Age range—mean 22 years; violence experienced by 47.3% of sample	59 items Total scale (α = .93) *4 subscales* Problem solving (α = .85), relationships (α = .85), optimism (α = .85), spirituality (α = .98).	*Evidence based on test content*: content matter experts reviewed item pool. *Validity argument*: TRS-supportive relationship correlated with social subscale (r = .16) of Beckham Coping Strategies Scales. TRS spirituality significantly correlated with Spirituality and Spiritual Care Rating Scale (r = .28). Divergent evidence—all calculations with sexual orientation were *ns*. Global TRS not correlated with ethnicity.
			Assessment of factors internal to the individual		
7	Resilience Scale (Wagnild & Young, 1993)	Individual adaptation enhanced through: equanimity, perseverance, self-reliance, meaningfulness, and existential aloneness (Beardslee, 1989; Caplan, 1990; Rutter, 1987)	810 older adults (aged 53–95 years) from a community in Northwestern United States	25 items[b] Total scale (α = .91) *Subscales* (no α reported) (a) personal competence, (b) acceptance of self & life *Test–retest*: 18-month interval r = .67–.84 in pregnant and postpartum women	*Evidence based on test content*: items developed by (a) qualitative study of older women, (b) literature review, (c) expert panel. *Validity argument*: correlations with morale (r = .54, r = .43, and r = .28), life satisfaction (r = .59 and r = .30), health (r = .50, r = .40 and r = .26), and self-esteem (r = .57); negative correlations with perceived stress (r = −.67 and r = −.32), symptoms of stress (r = −.24), and depression (r = −.36).
8a	Ego Resiliency-89 (ER89; Block & Kremen, 1996)	Block, Block, & Morrison's (1981) psychodynamic theory of ego resiliency: absence of susceptibility to anxiety, engagement with world, manifested by positive affect and openness to experience	Young adults tested at age 18 (n = 106) and 23 (n = 104); usable data available for 95 subjects	14 items Total scale (α = .76) *Test–retest*: 5-year interval (r = .67 and r = .51) for women and men, respectively	*Evidence based on test content*: items drawn from the MMPI, California Psychological Inventory (CPI; Gough, 1956). *Validity argument*: ER self-report scores and ER observer scores highly correlated for women (r = .69) and men (r = .84).

(*table continues*)

Table 1 (*continued*)

No.	Measure	Conceptual foundation	Development sample(s)	Reliability of test scores	Evidence of validity
8b	Revised Ego-Resiliency 89 Scale (Alessandri, Vecchione, Caprara, & Letzring, 2012)[c]	Same as for parent scale	Italian young adults aged between 19 and 21 years (n = 754)	10 items Total scale (α = .75) *Subscales*: optimal regulation (OR; α = .85), openness (OL; α = .79) *Test–retest* 2-year interval r = .49 for OR, r = .54 for OL, r = .56 for total scale	*Evidence based on test content*: as for parent scale. *Validity argument*: correlated with Plasticity (Neuroticism, Conscientiousness, and Agreeableness) and Conformity (Energy, Openness). OR subscale correlated with Stability (sr = .35 for males, .36 for females) and Plasticity (sr = .19; .25). OL correlated with Plasticity (sr = .37; .41) and no correlation with Stability (sr = .03; −.04).
9	Personal Views Survey III-R (PVS-III-R; Maddi et al., 2006)	Measurement of hardiness (commitment, control, challenge) or existential courage and motivation to cope effectively with stressors (Kobasa, 1979)	College students and working adults (n = 1,239)	18 items Total scale (α = .80) *Subscales*: commitment (α = .69); control (α = .57); challenge (α = .73)	*Evidence based on test content*: items drawn from available scales relevant to commitment, control, and challenge. *Validity argument*: negative correlation with social desirability (r = −.41), anxiety (r = −.33), repressive coping (r = −.50), and right wing authoritarianism (r = −.21). Positive correlation with innovation (r = .24).
10	Psychological Capital (PCQ; Luthans et al., 2007)	Builds on psychological resource theory (Hobfoll, 1989) and broaden and build theory (Fredrickson & Branigan, 2005)	Samples 1 and 2 management students (n = 167, n = 404); Sample 3 = high-tech manufacturing (n = 115); Sample 4 = insurance sales (n = 144)	24 items Total scale (α = .88, α = .89, α = .89, α = .89) *Subscales*: efficacy (α = .75, α = .84, α = .85, α = .75); hope (α = .72, α = .75, α = .80, α = .76); resilience (α = .71, α = .71, α = .66, α = .72); optimism (α = .74, α = .69, α = .76, α = .79) *Test–retest* 4-week interval (r = .52)	*Evidence based on test content*: panel of experts adapted items from validated scales, for example, optimism (Carver, Scheier, & Segerstrom, 2010), hope (Snyder, 2000), resilience (Wagnild & Young, 1993), and efficacy/confidence (Parker, 1998). *Validity argument*: positive relationship with core self-evaluations (r = .12 to r = .46), job satisfaction (r = .39), affective organization commitment (r = .36), performance (r = .33) and satisfaction (r = .32) in manufacturing sample; in insurance sales sample, positively correlated with performance (r = .22) and job satisfaction (r = .53). Psychological Capital did not have a significant relationship with Agreeableness, or Openness—discriminant evidence.

(*table continues*)

Table 1 (*continued*)

No.	Measure	Conceptual foundation	Development sample(s)	Reliability of test scores	Evidence of validity
11	Sense of Coherence Scale (SOC: Antonovsky, 1993)[b]	Theory of salutogenesis (positive factors associated with health) described as "generalized resistance resources": comprehensibility, manageability, meaningfulness (Antonovsky, 1979)	Israeli retirees (n = 805) Kibbutz control group (n = 260)	29 items Total scale (α = .91)[a] *Test–retest* reliability after one year retirees (r = .52) controls (r = .56)	*Evidence based on test content*: systematic mapping of items, consultation with colleagues and piloting with Israeli adults. *Validity argument*: negative correlation with trait anxiety (r = −.61) and attitude to loss (r = −.39).
			Assessment of resilience as an outcome		
12	Brief Resilient Coping Scale (Sinclair & Wallston, 2004)	Dispositional resources identified in Polk's (1997) model (self-efficacy, optimism, self-reliance). Resilience conceptualized as cognitive appraisal skills to actively problem solve	Rheumatoid arthritis patients (Sample 1 = 90; Sample 2 = 140)	4 items Unidimensional (α = .69) *Test–retest* over 5- to 6-week period (r = .71)	*Evidence based on test content*: scale authors wrote items. *Validity argument*: correlated with optimism (r = .50), self-efficacy (r = .48), pain coping reappraisal (r = .60), active problem solving (r = .57), social support (r = .24), positive affect (r = .50), life satisfaction (r = .25). Negative correlation with negative affect (r = −.28), helplessness (r = −.32), and catastrophizing (r = −.38).
13	Brief Resilience Scale (BRS; Smith et al., 2008)	Focus on bounce back feature of resilience. Supports Carver's (1998) concept of resilience which includes the return to a previous level of functioning and/or "thriving"	Sample 1 = U.S. students (n = 128); Sample 2 = U.S. students (n = 64); Sample 3 = Cardiac patients (n = 144); Sample 4 = women (20 fibromyalgia + 30 controls)	6 items Unidimensional Total scale (Samples 1–4 α = .84, α = .87, α = .80, α = .91, respectively) *Test–retest* (ICC) of r = .69 after 1 month and r = .62 after 3 months in two separate samples	*Evidence based on test content*: items developed by scale authors and piloted with undergraduate students. *Validity argument*: correlated with ego resiliency (r = .49 to r = .51); CD-RISC (r = .59); optimism (r = .45 to r = .69); social support (r = .27 to r = .40); active coping (r = .31 to r = .41). BRS negatively correlated with pessimism (r = −.32 to r = −.56); perceived stress (r = −.60 to r = −.71); anxiety (r = −.46 to r = −.60); depression (r = −.41 to r = −.66). The BRS test scores had no significant relationship with religion or venting—discriminant evidence.

Note. PTSD = posttraumatic stress disorder; ICC = intraclass correlation coefficient; STAI = State–Trait Anxiety Inventory; MMPI = Minnesota Multiphasic Personality Inventory.
[a] Averaged over eight published studies. [b] Short form also exists. [c] Scale revisions proposed by different authors than original authors.

tified themes that were independently reviewed by a second (LZ) and third reviewer (CS). Using the Kappa coefficient of agreement (Cohen, 1968), the mean pairwise Kappa coefficient between the primary researcher (AP) and second reviewer (LZ) was determined to be $\kappa = .84$. After consultation, both reviewers (AP, LZ) agreed on 20 preliminary themes (including subthemes). A third reviewer (CS), who was unfamiliar with the themes and subject area, was also asked to review the item pool and thematic areas. The mean pairwise Kappa coefficient between the primary researchers (AP, LZ) and third reviewer (CS) was $\kappa = .81$. There were no major points of difference, however, based on the findings of our third reviewer (CS), we discussed whether a theme of hardiness would more accurately describe our original *perseverance* theme. After a further revision of items by all three reviewers (AP, LZ, CS), we agreed that *hardiness* was a more suitable higher order theme consisting of three subthemes: *control*, *commitment*, and *challenge*.

Results

Twenty-four final themes emerged from the data (including subthemes), which are presented in Table 2. Eight higher order themes and 16 subthemes were identified and organized into two categories: person (relating to the internal resources including competence and stable attributes) and situation (external resources within the immediate environment or wider community). The most common themes related to person variables in descending order were *adaptability*, *self-efficacy*, *active coping*, *positive emotions*, *mastery*, and *hardiness*. In the situation category, two themes were identified: *social support* and *structured environment*.

It was not possible to develop themes further in the situational category as items comprising this theme referred to global dimensions of support and structure. For example, the social support theme indicated whether social support was available to the individual but did not refer to the quality of that support such as the nature and frequency of contact. Similarly, structured environment referred to a global preference for planning and organizing however further information was not present as to the mechanisms behind these preferences. Taken together, this review revealed that there was a preponderance of items assessing global traits or individual characteristics associated with resilience. The exception to this was that used by authors of the MTRR, who included a clinically directed interview (MTRR-I); a Q-sort (MTRR-Q); and a 135-item, observer-rating scale. The PCQ also includes an observer rating form.

While themes that emerge from this analysis are consistent with characteristics associated with resilience (see Fletcher & Sarkar, 2013; Windle, 2011), there is a notable absence of sociocontextual and demographic predictors of resilience. Many of the measures identify putative resilience factors that elicit behaviors and attitudes associated with resilience. Independent predictors of resilience such as demographic and so-

Table 2
Resilience Themes Derived From Scale Items

Higher order theme	Subtheme	TRS	PCQ	RSA	RS	ER-89[a]	CD-RISC[a]	BRS	BRCS	PVS	RIM	MTRR[a]	SOC	BPFI	Total
						Internal resources									
Adaptability	(a) flexibility		✓		✓	✓	✓	✓			✓			✓	7
	(b) acceptance														
	(c) openness														
Self-efficacy	(a) positive self esteem		✓	✓			✓				✓		✓		5
Active coping	(a) acceptance						✓	✓	✓		✓	✓			5
Positive emotions	(a) optimism	✓	✓	✓			✓					✓			5
	(b) hope														
Mastery	(a) internal locus of control														
	(b) resourcefulness		✓	✓			✓						✓		4
Hardiness	(a) commitment			✓	✓					✓	✓				4
	(b) control														
	(c) challenge														
						External resources									
Supportive relationships	(a) social competence	✓		✓			✓				✓	✓		✓	6
	(b) family coherence														
Structured environment	(a) planning			✓						✓			✓		3
	(b) organizing														
Conceptual adequacy[a]		Part	Min	Part	Part	Min	Part	Min	Min	Min	Yes	Yes	Min	Part	

Note. TRS = Trauma Resilience Scale; PCQ = Psychological Capital Questionnaire; RSA = Resilience Scale for Adults; RS = Resilience Scale; ER-89 = Ego Resiliency Scale; CD-RISC = Connor-Davidson Resilience Scale; BRS = Brief Resilience Scale; BRCS = Brief Resilience Coping Scale; PVS = Personal Views Survey; RIM = Resilience in Midlife Scale; MTRR = Multidimensional Trauma Recovery and Resilience Scale; SOC = Sense of Coherence Scale; BPFI = Baruth Protective Factors Inventory. Conceptual adequacy: Yes = consistent with interactionism; Part = partially consistent; Min = minimally consistent. Adapted from "Assessing the Strengths of Mental Health Consumers: A Systematic Review," by V. J. Bird, C. Le Bourtillier, M. Leamy, J. G. Larsen, L. Oades, J. Williams, and M. Slade, 2012, *Psychological Assessment, 24*, Table 2, p. 1029. Copyright 2012 by the American Psychological Association.

[a] Only parent scales are represented.

ciocontextual variables are of particular significance as these variables may exert a cumulative influence on resilience. Evidence supporting this assertion was found in a study by Bonanno, Galea, Bucciarelli, and Vlahov (2007), who indicated that resilience was uniquely predicted by participant gender, age, race/ethnicity, education, level of trauma exposure, income change, social support, frequency of chronic disease, and recent and past life-stressors.

This finding supports the work of early longitudinal research examining resilience in children from adverse rearing environments (e.g., Garmezy, 1991; Rutter, 1999; Werner, 1995). Findings from this body of work and more recent research (e.g., Bonanno et al., 2007) suggest that resilience results from a cumulative mix of person variables (e.g., disposition), demographic variables such as education (Brewin et al., 2000), and sociocontextual variables such as social supports (Atkinson, Martin, & Rankin, 2009).

The next step in our item review consisted of two raters (AP, LZ) comparing the dimensions of each measure to examine whether resilience was operationalized in a manner consistent with our working definition of resilience: (a) Measures that included items relating to the interaction of internal and external resources and changes over time were rated as having conceptual adequacy; (b) measures that included items relating to the interaction of internal and external resources without accounting for developmental influences through either item content or measurement method were classified as having partial adequacy; (c) measures that included items only related to person characteristics were classified as having minimum conceptual adequacy.

Results are displayed in the final row of Table 2. Two measures (RIM, MTRR) conceptualized resilience as a combination of internal and external factors and accounted for developmental influences either through item content or measurement methodology and were therefore classified as having conceptual adequacy. Five measures (BPFI, CD-RISC, Resilience Scale [RS], RSA, TRS) described resilience as a multidimensional process and identified factors both internal and external to the individual; however, there was no clear reference to changes over time in measurement methodology or content. Thus, these measures were categorized as having partial adequacy. The remaining six measures (Brief Resilient Coping Scale [BRCS], Brief Resilience Scale [BRS], ER-89, PCQ, PVS-III-R, SOC) were classified as having minimal conceptual adequacy as authors propose measures that assess intraindividual characteristics alone. No single measure included different situational taxonomies or assessed variance associated with situation-specific resilience. This is surprising, given that a great deal of work reveals the need to discern different outcomes associated with different adverse situations (e.g., Bonanno & Diminich, 2013; Furr, Comer, Edmunds, & Kendall, 2010). The clinically directed interview (MTRR-I) does however provide an opportunity for data of this kind to be collected consistent with interactionist measurement approaches. We therefore propose that the MTRR is the only measure that shows conceptual coherence with an interactionist approach to resilience measurement.

The first aim of this study was to examine the operationalization of resilience. Our review revealed that the dimensions queried by the items vary considerably across measures and appear to represent different aspects of the construct. We found no widely accepted unifying measurement of resilience but did note that there was a clear preference for measures to operationalize resilience as a trait-like characteristic.

Part Two: Psychometric Properties of Resilience Measures

For the second aim of our study, the psychometric assessment, 17 resilience measures were assessed using a construct validation approach (Cronbach & Meehl, 1955; Loevinger, 1957). The *construct validation* approach has been formulated into a three-stage framework by Skinner (1981) and is presented in Figure 2. The first stage of Skinner's framework is the theory formulation phase, which involves defining the content domain and theoretical foundations of the construct (evidence based on test content). Second, the internal validity evidence phase involves test stability, internal consistency, and replicability. The third stage of the framework, the external validity evidence phase, is concerned with convergent and discriminant evidence of test scores. Using Skinner's validity evidence framework in combination with established empirical guidelines to determine specific cutoff criteria (Fitzpatrick et al., 2006; Hu & Bentler, 1999; McDowell, 2006; Streiner & Norman, 2008), resilience measures were assessed against six criteria (see Table 3): evidence based on test content, stability, internal consistency, replicability, convergent evidence, and discriminant evidence. In addition to these six criteria, we added one criterion related to applicability, which has been observed in other systematic reviews of latent constructs (e.g., Bird et al., 2012; Mehling et al., 2009). This criterion provides information about the extent to which each measure has been validated in separate studies beyond the original development study.

Method

Procedure.

Applying the assessment framework. Each scale was assessed against the seven assessment criteria and awarded points using a 3-point rating scale (as adopted in other systematic reviews, e.g., Windle et al., 2011). Scales were allocated two points for fully satisfying the assessment criterion, one point for partially satisfying the assessment criterion, and zero for not satisfying the criterion. The assessment criteria for each point allocation across all framework categories are described in Table 3.

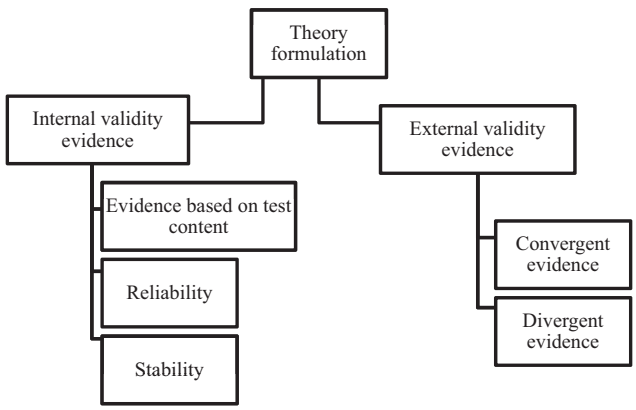

Figure 2. Visual representation of Skinner's validity evidence framework.

Table 3
Quality Assessment Criteria

Criterion	Definition	Score	Scoring criteria
		Theory formulation	
Evidence based on test content	The extent to which the construct is comprehensively sampled by scale items.	2	Clear description of item selection AND involvement of target population AND subject matter experts in item selection/development
		1	Either target population OR subject matter experts NOT involved in item development/selection
		0	Incomplete description of item development/selection
		Internal validity evidence	
Internal consistency	Extent to which (sub)scale items correlate to determine whether items are measuring the same construct.	2	Cronbach's alpha >.70 for total scale and/or subscales
		1	Cronbach's alpha values of <.70 for total scale and/or subscales
		0	Insufficient information
Stability	Scores on repeated administrations of same test highly correlated OR scores on similar version of same test highly correlated.	2	Values of >.70 for test re-test or parallel forms (>.75 if ICC reported)
		1	Test–retest or parallel forms <.70
		0	Insufficient information
Replicability	EFA followed by CFA to empirically support hypothesised factor structure.	2	CFA criteria for good model fit (TLI/CFI >.95, SRMR >.08, RMSEA <.08); OR EFA primary factor loadings >.60, absence of salient cross loadings with n >100 AND >3 items per factor
		1	EFA with n <100 AND <30-items per factor with loadings >.60 AND/OR cross loadings >.32; OR CFA does not meet good model fit and is NOT performed using separate sample from EFA
		0	Insufficient information
		External validity evidence[a]	
Discriminant evidence	Test scores showed negative correlations in theoretically expected directions with related measures.	2	Correlation of test scores >−.30 or more with theoretically distinct measure
		1	Test score correlations with theoretically distinct measure <−.30; OR correlation with theoretically ambiguous measure
		0	Insufficient information
Convergent evidence	Positive correlations of test scores in theoretically expected directions with related measures.	2	Correlation of test scores at >.30 with conceptually similar measure
		1	Correlation of test scores at <.30 with conceptually similar measure OR correlation with theoretically ambiguous measure
		0	Insufficient information
		Application	
Extent of measurement application (modified after McDowell, 2006)	Refers to the number of separate studies in which the instrument was used for empirical or validation studies.	2	Many: >12 published studies
		1	Several: 5–12 published studies
		0	Few/none: <5 published studies

Note. ICC = intraclass correlation coefficient; EFA = exploratory factor analysis; CFA = confirmatory factor analysis; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual; CFI = comparative fit index; TLI = Tucker–Lewis index.
[a] Can also be evidence of criterion related evidence in absence of criterion measure (Cronbach & Meehl, 1955).

Once each measure had been assessed, criterion scores across all four categories (theory formulation, internal validity evidence, external validity evidence, application) were summed to produce an aggregated criterion score, with a maximum possible score of 14. This method enables a systematic comparison of measures, highlighting the relative strengths and weaknesses of each. A cutoff score of 11 out of a possible 14 points (78% agreement with assessment criteria) was determined by our research team to be a measure possessing "acceptable" psychometric properties. The term "acceptable" is an arbitrarily determined descriptor, which is an extension of Windle et al.'s (2011) systematic review; measures that met less than half of the quality assessment criteria in the study were described as "moderate." We therefore concluded that measures reviewed in our study that met at least 78% of the assessment criteria showed acceptable psychometric properties.

Results

Results from the systematic assessment are presented in Table 4. The 17 resilience measures were evaluated against criteria outlined in Table 3. All of the measures received the highest score for at least one criterion. Note that a zero score is not necessarily indicative of poor quality, but rather insufficient evidence to evaluate the measure conclusively. Additionally, with the exception of

the ER-89-R, BPFI, CD-RISC-2, MTRR, MTRR-99, RIM, and TRS, all remaining scales have been widely used in the literature in separate studies. Findings from the review will be presented under three validity evidence categories (theory formulation, validity evidence [internal], and external validation). In addition, one further category was added to demonstrate each measure's validation in studies beyond the original scale development.

Theory formulation.

Measures awarded two points. The PCQ, MTRR, MTRR-99, SOC, RS, and TRS achieved the maximum score for evidence based on test content as item development and selection involved the use of subject matter experts and/or the target population.

Measures awarded one point. The remaining measures reviewed were awarded one point as they did not supply adequate information regarding evidence based on test content, nor were subject matter experts/target population involved during item selection and development.

Measures awarded zero points. No measures were awarded 0 points.

Internal validity evidence (internal stability).

Measures awarded two points. The RSA, RIM, and CD-RISC-2 reported test–retest correlations of above the minimum cutoff score of $r = .70$.

Measures awarded one point. The (RS had satisfactory test–retest correlations in a sample of postpartum women ($r = .67$ to $r = .84$), which was administered five times in a 12-month period; however, not all test administrations yielded correlations above $r = .70$. Hence, a score of one was awarded.

The ER-89 reported test retest correlations separately for males ($r = .51$) and females ($r = .67$), however the method used to conduct the analysis was not reported (e.g., intraclass correlation coefficients [ICC] or Pearson's r), which meant a score of one was allocated. The ER-89-R also achieved one point for this criterion as scale authors did not achieve test retest correlations above $r = .70$ for total scale ($r = .56$) or subscales (optimal regulation $r = .49$; openness to life experience $r = .54$). A possible explanation for this finding is that test administrations were separated by a 2-year time lapse, which may have influenced test stability due to random factors (e.g., changes in life circumstances) not associated with the measure itself.

The CD-RISC and BRS were both awarded one point. These two scales both reported ICC as evidence of test stability. Authors of the CD-RISC reported an ICC value of $r = .87$ indicating this measure had test stability well above the minimum ICC cutoff value ($r = .75$); however, a sample of 24 was used for the analysis, which may have compromised the power of this study. Similarly, authors of the BRS used two small samples to provide evidence of test stability ($r = .69$ in sample of 48 patients with fibromyalgia; $r = .62$ in sample of 61 undergraduate students). Both analyses did not reach the conventional minimum standard of $r = .75$ for test stability using ICC analyses.

The BRCS is designed to assess resilience with respect to pain management. As evidence of test stability, two samples of rheumatoid arthritis patients were included in test–retest analyses. The BRCS was administered to the first sample at baseline and 6 weeks later; findings showed acceptable stability ($r =$

Table 4
Quality Assessment Rankings of Resilience Scales

Scale	Theory formulation (evidence based on test content/2)	Internal validity evidence			External validity evidence		Application/2	Total score	
		Stability/2	Internal consistency/2	Replicability/2	Convergent evidence/2	Discriminant evidence/2		14	%
PCQ	2	1	2	2	2	2	2	13	92
RSA	1	2	1	2	2	2	2	12	85
BRS	1	1	2	1	2	2	2	11	78
CD-RISC	1	1	2	1	2	2	2	11	78
TRS	2	0	2	2	2	2	0	10	71
MTRR-99[b]	2[a]	0	2	0	2	2	1	9	64
CD-RISC-10	1[a]	0	2	2	2	0	2	9	64
SOC	2	1	2	0	2	0	2	9	64
RS	2	1	2	0	2	0	2	9	64
BRCS	1	1	1	1	2	0	2	8	57
ER-89	1	1	2	0	2	0	2	8	57
ER-89-R	1[a]	1	2	2	2	0	0	8	57
CD-RISC-2	1[a]	2	0	0	2	2	0	7	50
PVS-III-R	1	0	1	1	2	0	2	7	50
RIM	1	2	2	0	2	0	0	7	50
MTRR[b]	2	0	2	0	2	0	1	7	50
BPFI	1	0	2	0	2	0	0	5	35

Note. PCQ = Psychological Capital Questionnaire; RSA = Resilience Scale for Adults; BRS = Brief Resilience Scale; CD-RISC = Connor-Davidson Resilience Scale; TRS = Trauma Resilience Scale; MTRR-99 = Multidimensional Trauma Recovery and Resilience Scale abridged; MTRR = Multidimensional Trauma Recovery and Resiliency Scale; CD-RISC-10 = 10-item Connor-Davidson Resilience Scale; SOC = Sense of Coherence Scale; RS = Resilience Scale; BRCS = Brief Resilience Coping Scale; ER-89 = Ego Resiliency Scale; ER-89-R = Revised Ego Resiliency-89 Scale; CD-RISC-2 = 2-item Connor-Davidson Resilience Scale; PVS-III-R = Revised Personal Views Survey III; RIM = Resilience in Midlife Scale; BPFI = Baruth Protective Factors Inventory.
[a] Same as for parent scale. [b] Excludes Q-sort and clinically directed interview.

.71). In the second analysis, test stability was examined by correlating postinterventions scores on a cognitive behavioral intervention for adaptive coping and scores obtained 3 months later; however, the test–retest correlation ($r = .68$) was below the minimum conventional cutoff value. Hence, we awarded one point for this criterion.

Scale authors of the PCQ (Luthans et al., 2007) argued that their low test retest coefficient ($r = .52$) was evidence that Psychological Capital may be *state-like* and therefore likely to be lower than the standard cutoff of $r = .70$. It was therefore not possible to award maximum points for this criterion.

The author of the SOC reported evidence of test stability over a 2-year period among retirees; however, the test–retest value ($r = .54$) was below the cutoff value, resulting in an award of one point for this criterion.

Measures awarded zero points. The remaining measures (BPFI, CD-RISC-10, PVS-III-R, MTRR, MTRR-99, TRS) did not report analyses for test stability and therefore did not satisfy the minimum requirement for this criterion.

Internal validity evidence (internal consistency).

Measures awarded two points. Thirteen measures reported Cronbach's alpha values of above $r = .70$ for total scales and if applicable composite sub scales (BPFI, BRS, CD-RISC, CD-RISC-10, ER-89, ER-89-R, MTRR, MTRR-99, PCQ, RIM, RS, SOC, TRS), thus satisfying the full requirements for this criterion.

Measures awarded one point. The RSA reported values for each of the six sub scales but did not report Cronbach's alpha for the total scale. This could be explained by the authors' argument that in this iteration of the scale, scores should be interpreted at the dimension level and not as a total score (Friborg, Barlaug, Martinussen, Rosenvinge, & Hjemdal, 2005). Despite this, three subscales did not reach the minimum standard for evidence of acceptable internal consistency and therefore did not fully satisfy this assessment criterion, resulting in an allocation of one point for this criterion. The PVS-III-R demonstrated an acceptable Cronbach's alpha for the total measure ($r = .80$) but reported values below the minimum accepted alpha value for the *control* subscale ($r = .57$) and *commitment* subscale ($r = .69$) and did not fully satisfy the conditions for this criterion.

Of all the measures, the BRCS did not meet the minimum criterion for adequate internal consistency for the total scale ($r = .69$); however, analyses were adequately performed, and therefore one point was awarded on this criterion.

Measures awarded zero points. The CD-RISC-2 did not report on this criterion.

Internal validity evidence (replicability).

Measures awarded two points. Five measures achieved the maximum score for replicability (PCQ, RSA, CD-RISC-10, ER-89-R, TRS). These measures all used confirmatory factor analysis to confirm findings from initial exploratory factor analysis, which resulted in a factor structure consistent with authors' proposed theoretical rationale guiding scale development.

Measures awarded one point. A further four measures partially met the replicability criterion. The BRS, BRCS, CD-RISC, and PVS-III-R provided findings from exploratory factor analyses but did not confirm the factor structure using confirmatory factor analysis. The CD-RISC identified five factors however two of the items on the fourth factor cross-loaded onto factor five (composed of two loadings above .50).

Measures awarded zero points. The BPFI, CD-RISC-2, ER-89, MTRR, MTRR-99, RIM, RS, and SOC did not report details of replicability analyses in their scale development studies and therefore received no points for this criterion.

External validity evidence (convergent).

Measures awarded two points. All (scale) test scores reviewed met the full criteria for convergent evidence (see Table 1 for individual analyses).

Measures awarded one point. No scales were awarded 1 point.

Measures awarded zero points. No scales were awarded a score of zero.

External validity evidence (discriminant).

Measures awarded two points. Seven measures (PCQ, RSA, BRS, CD-RISC, CD-RISC-2, MTRR-99, TRS) presented evidence for acceptable discriminant evidence (of test scores), reporting no significant correlations with measures that were theoretically distinct from resilience (see Table 1 for individual analyses).

Measures awarded one point. No scales were awarded 1 point.

Measures awarded zero points. The remaining 10 measures did not report discriminant evidence analyses.

Application.

Measures awarded two points. Ten measures were used in more than 12 validation studies, showing an acceptable number of published validation studies beyond original scale development (McDowell, 2006).

Measures awarded one point. The MTRR and MTRR-99 were reasonably well validated in other studies but not as extensively as other measures.

Measures awarded zero points. The BPFI, CD-RISC-2, ER-89-R, RIM, and TRS were not extensively validated in the literature, with few studies published beyond their original development studies.

Summary of results of psychometric evaluation. Table 3 provides detailed information about the psychometric properties of each measure. In summary, four measures scored 11 or more points of out of a possible 14 (PCQ, RSA, BRS, CD-RISC), indicating measures with acceptable psychometric properties. With the exception of six measures (BPFI, CD-RISC-2, ER-89-R, MTRR, RIM, TRS), all instruments had been extensively validated in separate studies beyond their original development. Regarding dimensionality, the BRS, BRCS, CD-RISC-10, CD-RISC-2 conceptualize resilience as one dimension and exclude the role of external resources. Similarly, the PVS-III-R, ER-89, ER-89-R, RS, SOC, and PCQ exclude the role of supportive relationships and external support; however, these six measures have conceptualized resilience in terms of internal characteristics that infer resilience albeit differently from one another (with the exception of the ER-89 revised scale). Three measures (RSA, RIM, CD-RISC-2) fulfilled a high standard for test stability and five (CD-RISC-10, ER-89-R, PCQ, RSA, TRS) for replicability. All measures fully satisfied the convergent evidence criterion, but only half of the measures reported discriminant evidence analyses (PCQ, RSA, BRS, CD-RISC, MTRR-99, TRS, CD-RISC-2). Of particular note was that only five scales fully satisfied the criterion for evidence

based on test content (PCQ, SOC, RS, MTRR,[5] TRS), indicative of systematic construct development.

Discussion

This study presents findings from a systematic review of resilience measures. Our first aim was to examine the dimensions of resilience measures through an interactionist lens to gain an understanding of how resilience is operationalized. This has not been attempted before and adds to the findings of previous reviewers (Ahern et al., 2006; Windle et al., 2011). Similarly, we add to previous findings by extending our systematic review beyond 2008 to include six measures of resilience not previously identified. The second aim of our study was to examine the psychometric properties of resilience scale to examine the relative quality of existing measures. We use an validity evidence approach (Skinner, 1981) as an assessment framework that has also not been used by previous reviewers. What follows is an integrated discussion of findings including theoretical and practical implications, followed by study limitations and future research directions.

Our first study aim used an interactionist framework to understand how existing measures of resilience are currently being operationalized. Using an appropriate theoretical framework is an appropriate first step in understanding how resilience can be best measured, as it provides a blueprint for theoretical and empirical coherence. Despite the various conceptual approaches used to study resilience, it is commonly accepted that resilience is best defined as process characterized by a complex interaction of internal and external resources moderated by developmental influences (Masten et al., 1999; Rutter, 1985; Werner, 1993; Windle, 2011). However, most of the items reviewed in this study were designed to capture aspects of either trait or state resilience but not their interaction and thus do not explain (a) different resilience outcome trajectories (Bonanno & Diminich, 2013; Masten & Narayan, 2012); (b) the role of situational influences; and (c) the dynamic nature of the construct, such as the role of prior exposure and developmental influences (Grant, 2006). The exception to this was the Multidimensional Trauma Recovery and Resiliency (MTRR and MTRR-99) measure, which operationalized resilience as a dynamic interactionist phenomenon which used multimodal assessment methods (e.g., Q-sort, and clinical interview) to capture components of person-environmental interdependences. Despite its conceptually strong foundation, the MTRR is designed for those dealing specifically with childhood or prior abuse, which may limit its application to other settings. It has also not been well validated in other samples to date.

Taken together, the lack of a generally agreed definition of resilience meant that we were unable to identify a consensus-driven operationalization of resilience. The dimensions queried by the items vary considerably across instruments and represent different aspects of the construct. Further, 11 out of 17 measures did not fully meet the evidence based on test content criterion suggesting some limitations in terms of systematic item development. There was also undue emphasis on the assessment of trait resilience. This is problematic because resilience involves the capacity to manage external dimensions of stress as well as internal distress and threat appraisal (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). It is possible that observer ratings or objective ratings of individual responses to varied situations will assist in moving methods beyond explanations of resilient personalities toward objectively verified assessments of resilience in context.

For our second study aim, we reviewed the psychometric properties of measures using guidelines from Skinner's (1981) validity evidence framework. Four measures (BRS, CD-RISC, RSA, and PCQ) satisfied nearly 80% or more of the assessment criteria indicating that they had acceptable psychometric properties. Of these measures, the CD-RISC and RSA referred to the influence of resources external to the individual typical of mechanistic interactionism discussed in the introduction of this article. The PCQ received the highest psychometric ratings but showed minimal conceptual adequacy with interactionism. Authors do argue that the PCQ represents items that are closer to a state-like construct and are thus susceptible to change and open to development (Luthans et al., 2006); however, no items queried situational variation or variables external to the individual.

We reiterate that measures meeting less than approximately 80% of the assessment criteria are not necessarily measures of poor quality; rather, there is a lack of information reported, which allows us to draw conclusions about their relative quality. Based on findings from this systematic review, we also conclude that all measures with the exception of the BPFI met at least 50% of the assessment criteria. Also noteworthy, with the exception of the MTRR inventories, none of the measures reviewed included contextual information, such as asking participants how they would respond in specific adverse situations (e.g., victim of violence, natural disaster, terminal illness), nor were test administrations designed for use across more than one time point. The majority of measures (except MTRR and PCQ additional forms) used cross-sectional self-report items to assess how participants normally manage stressful situations. In some cases, participants were directed to think about the last few weeks when responding to items. Taken together, we concur that the measures reviewed may represent a combination of state-trait measures of resilience; however, at present these approaches remain independent of one another and do not assess dynamic person-situation interactions.

Implications

Three broad theoretical implications emerge from this systematic review. To begin with, developments in assessment methodologies may benefit from shifting emphasis from resilience as global entity to examining behavioral consistency associated with resilience across different situations (Rutter, 2012). We have emphasized that resilience is a temporal phenomenon, and as such, positive adaptation is likely to fluctuate according to circumstances and life stage. This presents an opportunity for researchers to employ longitudinal multimethod measurement approaches and analyze findings using latent growth models to further understanding about resilience in relation to specific, time-bound events under a range of circumstances.

Second, many of the measures reviewed operationalized resilience as a multidimensional construct. Nonetheless, there was a lack of agreement as to which dimensions best represent resilience. There may be scope to empirically examine measures together to determine areas of conceptual overlap, which is an approach other researchers have used to understand other latent constructs such as

[5] Includes MTRR-99.

mindfulness (Baer et al., 2006) and core self-evaluations (Judge, Erez, Bono, & Thoreson, 2003). Examining resilience scales in concert will allow an empirical investigation of resilience facets to determine areas of conceptual overlap and distinction.

A final theoretical implication highlights the debate about what it means to be a successfully adapted individual and, more specifically, about who gets to define successful adaptation (Schoon, 2006). Successful adaptation differs in relation to historical, cultural, and developmental contexts (Masten et al., 1998), and therefore there is a diversity of criteria used to identify positive adaptation. These varied criteria make it difficult to aggregate findings and draw coherent conclusions about resilience (Masten & Powell, 2003).

One practical implication that can be noted relates to the mechanism of social support. Six of the measures reviewed (BPFI, CD-RISC, MTRR, RIM, RSA, TRS) comprised items relating to external support, which is thought to influence individual responses to adversity (Cohen, 2004). However, the majority of these measures capture information relating to social support using Likert-type scale responses, which rather crudely indicate whether social support is either present or absent (or somewhere in between). The nature and quality of that support is omitted from the assessment, and therefore valuable information is lost. House, Kahn, McLeod, and Williams (1985) posited that in order to gain meaningful information about support functions, three distinctions can be made: (a) emotional (understanding, empathy and concern), (b) instrumental (concrete actions that network may perform such as physical assistance, financial assistance, or practical assistance), and (c) informational (guidance or advice). Distinctions need to be made with respect to the amount of support received but also the nature of support such as whether is emotional, instrumental, or informational (House et al., 1985). Thus, a more complex operationalization of social support is required.

One way of addressing the qualitative limits of self-report methods is by using alternative assessment methods such as the Situational Judgment Test (SJT). The SJT method is theoretically aligned with interactionism and is specifically designed to assess knowledge, skills, values, and attitudes toward scenarios that represent realistic events. SJTs have also been traditionally used in workplace settings to evaluate cognitive theories, tacit knowledge (Sternberg & Wagner, 1986) and work performance (Motowidlo, Dunnette, & Carter, 1990). SJTs may therefore offer a means of capturing interactive components of the resilience process. This type of assessment method is capable of capturing skills and procedural knowledge available to people confronting adversity, which may be effective strategies in dealing with future stressors (Aldwin, Sutton, & Lachman, 1996).

Other empirical research has found that SJTs may be assessing an adaptability construct (e.g., Schmitt & Chan, 2006), which may represent a combination of traits, previous experience, and contextual knowledge gained through life experiences. For example, SJTs have been developed as alternatives to self-report measures in the emotional intelligence domain (Sharma, Gangopadhyay, Austin, & Mandal, 2013). Authors noted that SJTs elicit response options representative of real-life situations, such as experience and the utilization of appropriate emotions in different situations. We believe SJTs may therefore provide an opportunity for assessment beyond self-report measures, which may explain variance associated with tacit knowledge and past experiences. We suggest that understanding context is a crucial dimension in measuring resilience. People with higher resilience will display higher context-appropriate or context-sensitive responses. Unlike self-report measures of resilience, SJT may measure some major aspects of resilience and elicit response options that are representative of real-life situations involving understanding, experience, and expression of responses in different situations.

SJT applications converge on consensus by simulating actual events that have an effective array of responses and can be objectively scored (Legree & Psotka, 2006). Consensus-based methods can establish an objective standard to score items and thus represent a blending of assessment methods, reflecting both formal and episodic knowledge. These micro-level approaches (Semmer, Grebner, & Elfering, 2003) may be used to assess person-environment interactions through the measurement of behaviors in response to specific scenarios (Motowidlo & Beier, 2010). Indeed, the success of this approach is evidenced in the United Kingdom, where SJTs have been used in addition to knowledge tests to enhance the predictive validity of general practitioner selection methods (Koczwara et al., 2012; Patterson et al., 2012; Patterson, Ferguson, Norfolk, & Lane, 2005).

Limitations and Recommendations for Further Research

We acknowledge that commercially developed resilience measures were excluded from this study, which may have limited the number of relevant measures identified. While this was a consideration, we chose to review only peer-reviewed, published measures to increase the rigor of the study. Future research may benefit from exploring both commercial and peer-reviewed measures.

A further limitation of this study was that we did not have a more diverse group to perform the sorting task to develop themes. We hoped to address this by agreeing on themes once interrater reliability had reached a mean pairwise Kappa coefficient of 80% agreement. We also recruited an individual who was not familiar with the resilience literature and found a high level of agreement. Future research would include a more diverse pool of reviewers in this phase of the study.

Future directions in resilience research could also benefit from clarifying the distinction between resilience in the context of chronic versus acute stressors (Bonanno & Diminich, 2013; Masten & Narayan, 2012). Resilience in response to stressors of varying intensity will undoubtedly have different outcome trajectories, allowing researchers to more accurately observe resilience in the context in which it occurs. It could be that measurement modalities such as SJTs may provide insights in this area. Relatedly, we believe that interactionism may be an interesting epistemological approach with which to develop future measures resilience. Along these lines, future research might also explore how assessment of situational demands activates behavior. In line with trait activation theory (Tett & Burnett, 2003), a moderator model might be expected where individuals high on neuroticism are more likely to display a lack of emotional stability in stressful situations as the situation "activates" behavior in line with situational cues.

Explanations of person-environment interactions using trait theory are limited to variance explained by person variables. Interactionist frameworks serve to enhance and increase the accuracy with which we predict behavioral responses to adversity (Endler &

Edwards, 1983; Reynolds et al., 2010). Other epistemological questions worthy of further investigation are concerned with how we define core antecedents (adversity) and consequences (positive adaptation) of resilience. Although these concerns are beyond the scope of this review, we do acknowledge that they may have a substantial influence in the way we currently operationalize and measure resilience.

Conclusion

This systematic review extended findings from two previous studies (Ahern et al., 2006; Windle et al., 2011). We provided a comprehensive review of resilience measures and evaluated the psychometric properties through a comprehensive review using Skinner's (1981) validity evidence framework. In parallel, we examined how resilience is currently operationalized using an interactionist framework. Four instruments demonstrate acceptable psychometric properties (BRS, CD-RISC, PCQ, RSA), two of which (RSA, CD-RISC) moved beyond the measurement of person variables to define resilience. The MTRR is perhaps the most conceptually consistent with interactionism; however, it lacks extensive validation outside of abuse victims. We acknowledge that there are too many ways to deal with life's adversity to be able to capture them all in one measure. Nonetheless, it is useful to assess a broad range of functions to provide a more detailed understanding of the interacting factors shaping positive adaptation to adversity over the life of an individual.

There is a real need to develop multimodal assessment methods such as SJTs to overcome the limitations associated with measuring resilience as a global entity. We predict that attention to the sort of interactionist theoretical framework we have outlined in this review will lead to the design of more precise measures of resilience.

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