

Resilience in Adult Cancer Care: An Integrative Literature Review

Manuela Eicher, MScN, PhD, Martin Matzka, Mag., Catherine Dubey, MScN,
and Kate White, RN, PhD

The concept of resilience may fundamentally be understood as describing the individual process of facing significant adversity or the adaptation to it (Fletcher & Sarkar, 2013; Herrman et al., 2011). Assisting the individual in the dynamic, ongoing process of adaptation to adversity is an essential tenet of nursing practice that has been recognized by nursing theorists (Szanton & Gill, 2010). Resilience may be a crucial concept for cancer nursing, integrating physical as well as psychosocial care (Grafton, Gillespie, & Henderson, 2010).

The study of resilience within nursing began in the mid- to late 1980s and primarily centered on children and adolescents (Haase, 2009). This concept developed concurrently across several fields, including epidemiology, trauma studies, social work (Atkinson, Martin, & Rankin, 2009), psychology, and psychiatry (Bonanno, 2004; Bonanno, Westphal, & Mancini, 2011; Herrman et al., 2011; Masten, 2001, 2007; Masten & Obradovic, 2006; Rutter, 2006, 2012). Early studies on resilience focused on response behavior of children/adolescents indicating adaptation (e.g., academic achievement, cultural age expectations, adaptive behavior) in the face of developmental threats (e.g., maltreatment, low socioeconomic status, and parental mental illness). This early work conceived resilience as an individual trait attributed to an extraordinary inner strength and limited to some remarkable individuals (Masten, 2001). Today, resilience is understood as a commonly encountered phenomenon among individuals facing adversity (Bonanno, 2004; Masten, 2001; Rutter, 2006) resulting from basic human adaptational systems (Masten, 2001).

Within pediatrics, a developmental perspective (Masten, 2001, 2007; Masten & Obradovic, 2006) was readily adopted to promote resilience and well-being among survivors and their families (Landier, Leonard, & Rucione, 2013). This led to the development of elaborate

Problem Identification: In cancer care, empirical research and theory development on resilience has primarily been the domain of pediatric settings. This article aims to (a) describe current scientific perspectives on the concept of resilience, (b) summarize quantitative research on resilience in adult cancer care, and (c) identify implications for cancer nursing.

Literature Search: An integrative literature review using PubMed, CINAHL®, and PsycINFO databases was performed and full-text, peer-reviewed articles published since 2003 were included.

Data Evaluation: To summarize quantitative research, 252 articles were retrieved yielding 29 eligible studies, of which 11 articles were evaluated and synthesized. Appropriate articles were reviewed and data were extracted and tabulated for synthesis.

Synthesis: Resilience is a dynamic process of facing adversity related to a cancer experience. It may be facilitated through nursing interventions after people affected by cancer have been confronted with the significant adversity posed by diagnosis, treatment, (long-term) symptoms, and distress.

Conclusions: Resilience in adult cancer care is an under-researched area. Studies confirm the association with improved health outcomes (e.g., psychological well-being, mental and physical health).

Implications for Research: Resilience is an important issue for adult cancer care. Researchers must carefully define a conceptual framework for developing nursing interventions aimed at furthering resilience in adult cancer care.

Key Words: resilience; supportive care; integrative review; oncology nursing

ONF, 42(1), E3–E16. doi: 10.1188/15.ONF.E3-E16

models of resilience for pediatric oncology nursing, such as the Adolescent Resilience Model, to guide interventions and help adolescents face their cancer experiences (Haase, 2004; Haase, Kintner, Monahan, & Robb, 2013). Resilience in pediatric cancer research

evolved into a concept with a much broader scope. Two separate concept analyses conducted by nursing scientists indicated that resilience may be a life-long process (Gillespie, Chaboyer, & Wallis, 2007) relevant for adults (Earvolino-Ramirez, 2007). Pediatric cancer research on resilience may, therefore, be seen as the vanguard for research on adult patients with cancer and adult survivors (Rowland & Baker, 2005).

Research on resilience across disciplines and in different age groups has led to differing descriptions or definitions of resilience and inconsistencies in how the terminology is used. It is not surprising that multiple definitions of resilience have been proposed (Atkinson et al., 2009; Haase, 2009; Herrman et al., 2011), leading to the operational definition of resilience being debated (Bonanno, 2012). Some authors advocate the inference (retrospective) of resilience based on observed outcome trajectories (Bonanno, 2012; Bonanno et al., 2011). Following this approach, researchers in cancer care have inferred resilience from a stable trajectory of low psychological distress or high psychological functioning following a cancer diagnosis (Hou, Law, Yin, & Fu, 2010; Lam et al., 2010). In contrast, others

posit that resilience is the capacity to face adversity or adapt to it and that it is a directly measurable variable. This approach has predominantly been adopted in adult cancer care with several instruments developed to measure resilience (Windle, Bennett, & Noyes, 2011) (see Table 1).

Importantly, much of the empirical research and theory development on resilience in cancer care is limited to pediatric patients with cancer (Haase, 2004; Haase et al., 2013; Landier et al., 2013). Resilience in adult survivors has not been examined in detail. Survivorship includes all living individuals who have been diagnosed with cancer, regardless of when that diagnosis was received (Morgan, 2009). Available literature instead focuses mainly on the role of resilience in managing workplace stress among nursing staff (Grafton et al., 2010). This article aims to bridge this gap in the field by (a) describing current scientific perspectives on the definition and study of resilience, which may form a basis for adult cancer nursing; (b) summarizing empirical evidence on resilience in adult survivors; and (c) synthesizing results to identify implications for adult oncology nursing research and practice.

Table 1. Measurement of Resilience in Adults

Instrument	Study	Items	Assessment Targets	Psychometric Quality Rating ^a
Brief Resilience Scale	Smith et al., 2008	6	Ability to recover from stress: Outcome measure	Maximum score on internal consistency and construct validity
Connor-Davidson Resilience Scale	Connor & Davidson, 2003 Campbell-Sills & Stein, 2007	25 10	Stress coping ability: Personal competence, trust/tolerance/strengthening effects of stress, acceptance of change, secure relationships, control, spiritual influences	Maximum score on internal consistency (10 items) and construct validity (10 + 25 items).
Dispositional Resilience Scale	Bartone et al., 1989 Bartone, 1991 Bartone, 1995	45 30 15	Psychological hardiness: Commitment, control, challenge	Operationalization does not fit well with the conception of resilience as a dynamic process. Maximum score on internal consistency (15 items)
Psychological Resilience	Windle et al., 2008	19	Psychological resilience: Self-esteem, personal competence, interpersonal control	Maximum score on internal consistency and construct validity
Resilience Scale	Wagnild & Young, 1993	25	Individual resilience: Personal competence, acceptance of self and life	Maximum score on content validity and construct validity
Resilience Scale for Adults	Friborg et al., 2003 Friborg et al., 2005	37 33	Protective factors for adaptation: Personal strength, social competence, structured style, family cohesion, social resources	Maximum score on internal consistency (33 items), construct validity, and reproducibility reliability (33 + 37 items)

^a Scores from 0 (no information available or unsatisfactory results) to 2 (adequate information available) were awarded to each of the following psychometric quality criteria: content validity, internal consistency, criterion validity, construct validity, reproducibility (absolute and relative measurement error), responsiveness, floor and ceiling effects, and interpretability. The rating was hampered mainly by the lack of available psychometric information on the scales.

Note. Based on information from Windle et al., 2001.

Methods

The electronic databases PubMed, CINAHL®, and PsycINFO were searched in November 2013 using the key words *cancer*, *oncology*, *nurse*, and *resilience* as well as Boolean operators. To include recent articles that may have been indexed incorrectly, key terms were searched in all fields with publication date (2003–2013) as the sole limitation. This strategy was adapted for PsycINFO because of the large number of unspecific results (i.e., more than 3,800 results for *cancer* and *resilience*). Search results were limited to articles in English, French, or German published in peer-reviewed journals since 2003. In addition, articles were identified via hand searches of reference lists from identified key articles. Initially, qualitative and quantitative studies not measuring resilience with a specific scale (e.g., indirectly via sense of coherence) were included in the search strategy and for data extraction. However, the absence of conceptual consistency of resilience in these studies made analysis and conclusion of findings impossible, and the decision was made reluctantly to exclude them.

After removing duplicate records, the abstracts of 252 articles were screened independently by two investigators and 223 were excluded for not meeting inclusion criteria. The rationale for exclusion was primarily based on patient population (non-oncologic or pediatric oncology samples [younger than age 18 years]) or study design (qualitative). Full-text articles for the remaining 29 key articles were obtained. Review of the reference lists failed to yield additional relevant articles. Of the 29 articles, 11 were relevant to adult patients with cancer and survivors. Three of the cross-sectional studies report findings on the same research sample. Two studies including a majority of patients with cancer, but non-oncologic patient populations also were included as they were deemed relevant for the research questions. Key study information and results were extracted and tabulated for data comparison, drawing of conclusions, and identifying future directions.

Results

The concept analyses and reviews on resilience reveal the variation in definitions used to describe this phenomenon (Atkinson et al., 2009; Earvolino-Ramirez, 2007; Fletcher & Sarkar, 2013; Gillespie et al., 2007; Herman et al., 2011; Windle, 2011). A recurring discussion point is whether the phenomenon of resilience can be attributed to a general, stable personality trait associated with psychological functioning or if it depicts an individual's dynamic process of adaptation to significant adversity. The former conceptualization has been termed *resiliency* (Luthar, Cicchetti, & Becker, 2000) or

trait resilience (Ong, Bergeman, Bisconti, & Wallace, 2006) and has been linked to the concept of ego resiliency, reflecting a general resourcefulness, flexibility, and strength of character (Block & Kremen, 1996; Fletcher & Sarkar, 2013; Luthar et al., 2000; Prince-Embury, 2013). Such a general, stable trait may constitute a psychological resource by itself and could be implicated in an individual's adaptation process to adversity (Luthar et al., 2000). This static trait conceptualization is in contrast to current and more prevalent notions of resilience as an interactive and dynamic process (Prince-Embury, 2013). This view posits that people may exhibit resilience as a continuous, fluid, context- and time-specific process in the face of adversity, resulting in relative resistance (i.e., comparatively good psychological outcome) to environmental risks (Rutter, 2006). Haase (2009) described resilience specifically as the process of identifying or developing resources and strengths that enable the individual to flexibly manage adversity, leading to positive health outcomes such as a sense of confidence/mastery, self-transcendence, self-esteem, and ultimately enhanced quality of life (conceptualized as well-being). Similarly, Windle (2011) defined resilience as the process of and capacity for negotiating, managing, and adapting to significant adversity (i.e., stress or trauma), facilitated by assets and resources within the individual as well as by life and environmental contexts. Resilience may be understood as a process and a capacity (Haase, 2009; Richardson, 2002; Szanton & Gill, 2010; Windle, 2011). Given its salutogenetic nature and the broad range of factors associated with resilience, theoretical and empirical overlaps exist with related concepts such as sense of coherence, hardiness, purpose in life, and self-transcendence (Lundman et al., 2010). In addition to a process of adaptation, resilience may be used as a broad conceptual umbrella, encompassing multiple facets (i.e., problem solving, self-efficacy, close relationships, emotional regulation, and spirituality) and processes involved in adaptation to adversity (Masten & Obradovic, 2006).

More specifically, in adult cancer care research, comparative analysis is hindered by the variety of ways that resilience has been studied that do not capture certain aspects of the concept. For example, resilience has been simultaneously inferred by comparison of outcomes in oncologic populations with healthy population samples (Costanzo, Ryff, & Singer, 2009), defined by the absence of clinical pathology (Deshields, Tibbs, Fan, & Taylor, 2006) and equated with a sense of coherence (Mizuno, Asano, Sumi, & Inoue, 2011)—all of which are different parameters.

Based on this integrative review, the authors propose to define resilience in adult patients with cancer and survivors as a dynamic process of facing adversity related to the cancer experience. Resilience can be facilitated

after survivors have been confronted with the significant adversity posed by diagnosis, treatment, (long-term) symptoms, and cancer-related distress. Based on individual context, multiple factors and processes serve protective functions, enabling individuals to enact effective strategies and attain improved outcomes, such as health-related quality of life.

Adversity

The experience of adversity is inherent to the definition of resilience (Haase, 2009). This has alternately been termed as *risk experiences* (Rutter, 2012), *risk factors*, or *stressors* (Masten, 2001). Drawing on different perspectives within resilience research, Earvolino-Ramirez (2007) defined adversity as the antecedent to resilience. In contrast, Gillespie et al. (2007) identified multiple antecedents in addition to adversity or trauma, including the cognitive ability to interpret the situation, perceiving the situation as traumatic, and having a realistic world view. Others propose that resilience may occur because of adversity rather than despite it (Richardson, 2002; Rutter, 2006, 2012). For example, cancer may be a traumatic experience for the patient (Cordova et al., 2007; Mehnert, Lehmann, Graefen, Huland, & Koch, 2010) because adversity may result from one of the many significant cancer-related threats, including diagnosis of a potentially life-threatening disease, complex treatment regimens, and resulting side effects (Carver, 2005).

Factors Associated With Resilience

In an effort to explicate the concept of resilience, Rutter (1987) described it as mechanisms that protect people against the psychological risks associated with adversity that relates to four main processes: reduction of risk impact, reduction of negative chain reactions, establishment and maintenance of self-esteem and self-efficacy, and opening up of opportunities. Existing literature points to a number of interconnected and remarkably consistent elements contributing to resilience (Atkinson et al., 2009; Herrman et al., 2011; Masten & Obradovic, 2006; Richardson, 2002) (see Figure 1). These factors encompass biologic factors (e.g., brain structure/function, neurobiologic systems), individual factors (e.g., coping strategies, cognitive appraisal, positive emotions), and environmental systemic factors (e.g., social support, community resources). These are dynamic, interacting facets of resilience and the interplay between them are increasingly acknowledged in the literature (Herrman et al., 2011). Szanton and Gill (2010) proposed that nursing interventions targeting multiple dimensions of these interacting factors may foster resilience. However, caution against oversimplification of resilience should be noted. For instance, Bonanno (2012) warned that the predictive power of in-

dividual variables (i.e., personality) often is overstated in resilience research. In addition, systemic factors are challenging for their complexity. Indeed, such groundbreaking science on biologic and genetic factors faces translational roadblocks. As such, some have proposed that, given limited resources, research priority should focus on factors more amenable to intervention (Luthar, Sawyer, & Brown, 2006).

The complexity of resilience may not be adequately explained by a simple balance of protective and risk factors. Protection is highly dependent on individual context and may derive from factors that are neutral or even risky in the absence of adversity (Rutter, 2006). One example is repressive coping. Under normal circumstances, this could be considered maladaptive, but it can facilitate resilience when an individual is faced with extremely adverse events (Bonanno, 2004; Bonanno et al., 2011; Mancini & Bonanno, 2006).

Gillespie et al. (2007) emphasized the importance of coping strategies (particularly problem-focused coping) in mitigating risk factors, evaluating risk, and adaptation. A sense of hope and self-efficacy (i.e., belief that desired outcomes will occur and confidence in one's ability to perform a specific task in a particular situation, respectively) are considered defining attributes of resilience. Earvolino-Ramirez (2007) cited additional related attributes of resilience, including a sense of purpose/achievement in life (i.e., high expectancy); self-determination (i.e., confidence in overcoming barriers); social support/positive, meaningful relationships; flexibility in adapting to change; sense of humor (about situations and one's self); self-esteem; and the readiness to reintegrate changes into one's life in a positive way. Such diverse conceptualizations of resilience reflect similarities and overlaps and suggest that multiple pathways lead to resilience (Bonanno, 2004; Masten & Obradovic, 2006; Szanton & Gill, 2010).

Outcomes of the Resilience Process

According to Rutter (2006, 2012), the outcome of resilience process can only be measured by comparing individuals who are all exposed to the same level of stress but who demonstrate different levels of functioning. Resilience does not necessarily require superior levels of functioning; therefore, distinguishing it from the discrete concept of thriving (Carver, 1998). However, improved functioning also has been considered a possible, but not presupposed, outcome of resilience (Szanton & Gill, 2010). Resilience has been hypothesized to increase resistance (a so-called steeling effect) to subsequent stressors (Rutter, 2006). However, transferability is not guaranteed, such that individuals exhibiting resilience in one domain of life may be vulnerable to stressors in other domains (Earvolino-Ramirez, 2007; Luthar et al., 2000). Those aspects pose challenges for

measurement and are reflected in varying descriptions of outcomes. Functional outcomes of resilience are typically described as effective coping (i.e., effectively managing adversity to function optimally), mastery (i.e., great skill or knowledge), and positive adaptation (Earvolino-Ramirez, 2007). Outcomes have conversely been described as physical and/or psychological integration, personal control, psychological adaptation, and personal growth (Gillespie et al., 2007). These discordant views on outcomes reflect diverse conceptualizations of resilience in nursing science and other fields despite general consensus regarding its association with positive health outcomes (Haase, 2009). Given the complexity of resilience, it follows that the inclusion of multiple outcome criteria (as well as protective factors) is essential for studying resilience and its underlying processes (Luthar et al., 2000). Although personal growth may come as a consequence of resilience, it may be considered distinct from posttraumatic growth because resilience may mitigate the impact of trauma (Levine, Laufer, Stein, Hamama-Raz, & Solomon, 2009).

Study and Measurement of Resilience

Of note, no gold standard exists for measuring resilience (Windle et al., 2011). Two major quantitative study approaches have been employed: person-focused and variable-focused. The person-focused approach concentrates on individual factors and processes associated with resilience that are typically identified by comparing outcome criteria between groups (e.g., low levels of distress). Variable-focused research aims to identify linkages and associations between degree of adversity, outcome criteria, and variables associated with adaptation (Masten, 2001; Masten & Obradovic, 2006).

Personal factors

Hope, optimism, active coping, repressive coping, self-esteem, cognitive appraisal (e.g., positive reinterpretation of events), self-efficacy, self-determination, internal locus of control, mastery, spirituality, ability to bounce back, sense of coherence, positive emotions, flexibility, sense of humor, and confidence

Environmental systemic factors

Social support systems (e.g., peers, family, supportive significant others), feelings of connectedness with one's environment, and community factors (e.g., community service, cultural factors, spirituality)

Biologic factors

Developmental changes of brain structure, function and neurobiologic systems; variations in adrenal steroid hormone levels; alterations in the hypothalamic-pituitary-adrenal axis; and gene-environment interactions

Figure 1. Protective Factors Associated With Resilience

Note. Based on information from Atkinson et al., 2009; Earvolino-Ramirez, 2007; Gillespie et al., 2007; Herrman et al., 2011; Rutter, 2012; Szanton & Gill, 2010.

Knowledge Translation

Resilience is a dynamic process of facing adversity related to a cancer experience.

Resilience may be facilitated through nursing interventions after people affected by cancer have been confronted with the significant adversity posed by diagnosis, treatment, (long-term) symptoms, and distress.

Resilience in adult cancer care is an under-researched area.

Several self-report instruments have been developed to assess the capacity for adapting to adversity. These scales largely measure resilience on an individual level and reflect the availability of assets and resources facilitating resilience. Most of them do not capture social protective factors and, therefore, do not fully capture the complexity of resilience. Although some authors dismiss the idea of measuring resilience in this way (Bonanno, 2012; Rutter, 2012), considering the aforementioned constraints, such scales could be employed in both research and clinical settings (Windle et al., 2011).

In relation to adult cancer care research, two instruments have been used as either a predictive factor for patient outcomes or as a measure assessing an intervention to enhance resilience. The Resilience Scale, developed by Wagnild and Young (1993), evaluates several criteria: an individual's perspective on life experiences, perseverance despite adversity, self-reliance, meaningfulness in life, and existential aloneness (i.e., recognition that some experiences must be faced alone). The Connor-Davidson Resilience Scale is a measure of modifiable stress-coping ability. It assesses characteristics of resilient people, reflecting concepts of personal competence, high standards, tenacity, trust in one's instincts, tolerance of negative affect, strengthening effects of stress, positive acceptance of change, secure relationships, control, and spiritual influences (Connor & Davidson, 2003).

Empirical Evidence on Resilience in Adult Patients and Survivors

A summary table of the 11 identified studies is depicted in Appendix A. One interventional, four longitudinal, and six cross-sectional studies were included. The existing literature on resilience in adult survivors supports the notion that, regardless of cancer diagnosis, resilience is associated with important health-related outcomes such as effective coping, psychological well-being, and quality of life. Association studies have examined ratings of resilience as a correlate of various outcomes. Gotay et al. (2007) found that resilience was associated with better coping with a second cancer diagnosis. Similarly, resilience is positively associated with physical, emotional,

cognitive, and social functioning as well as self-efficacy and quality of life (Schumacher et al., 2013). In addition, resilience is negatively associated with anxiety (Min et al., 2013; Schumacher et al., 2013) and depression (Min et al., 2013; Schumacher et al., 2013; Sharpley, Wootten, Bitsika, & Christie, 2013), and those with higher resilience scores are less likely to be in need of psychosocial support (Brix et al., 2008) or to have a psychiatric diagnosis (Scali et al., 2012).

Some investigators have used resilience as a predictor to identify links with health-related outcomes. Gotay, Isaacs, and Pagano (2004) found resilience to be a predictor of physical functioning and quality of life among survivors. Subsequently, they found resilience to be a positive predictor of vitality, existential well-being, and sexual adjustment (Gotay et al., 2007). Consistently, resilience was a negative predictor of depression and distress (Gotay et al., 2007). The link with depression was reiterated in the findings of Sharpley et al. (2013) who reported that a single resilience question (confidence to cope with change) was a predictor of depression. In addition, lower levels of resilience not only predict impaired psychological functioning, but also predict fatigue among patients with cancer (Brix, Schleussner, Fuller, Rohrig, & Strauss, 2009; Tian & Hong, 2013).

Beyond correlates and predictions, resilience appears to be a modifiable aspect related to adult cancer care. After completing a resilience intervention program for breast cancer survivors, resilience significantly increased while perceived stress and anxiety significantly decreased concomitant with improved quality of life. The study intervention consisted of two small-group, 90-minute sessions, one brief individual session, and three follow-up telephone calls. The group sessions were based on the approach of the Attention and Interpretation Therapy developed at the authors' institution. It comprises exercises to help patients direct their interpretations away from fixed prejudices toward a more flexible disposition while cultivating skills such as gratitude, compassion, acceptance, forgiveness, and higher meaning (Loprinzi, Prasad, Schroeder, & Sood, 2011). Collectively, these findings indicate that resilience is relevant and applicable to adult survivors.

Discussion

Resilience is a promising concept for adult oncology nursing. Resilience in the wake of significant adversity is neither the result of exceptional inner strength (Masten, 2001) nor an expression of denial (Bonanno, 2004). Rather, it is a dynamic process of facing the cancer experience after patients with cancer and survivors have been confronted with the significant adversity posed

by diagnosis, treatment, (long-term) symptoms, and distress. However, resilience in adult oncology care has not been widely investigated, either conceptually or empirically, as evidenced by the limited number of publications identified in the review of the literature. Existing empirical research on resilience in adult oncology populations confirms the links with improved health outcomes. Resilience is strongly associated with indicators of psychological well-being as well as factors closely linked to mental and physical health. More specifically, patients expressing high resilience experience less fatigue, have less depression, and have higher quality of life. Of note, resilience may have an inoculating effect for stressors as some evidence suggests an association between resilience and having experienced a previous trauma (Scali et al., 2012) and enhanced resistance to subsequent similar stressors (Gotay et al., 2007). Therefore, the concept of resilience seems relevant for nursing science and practice in adult oncologic populations.

Although the Resilience Scale was developed by Wagnild and Young (1993), only one article authored by a nursing scientist and measuring resilience with a specific scale was identified in the literature search (Kokufu, 2012) and was excluded as the employed scale was intended for use in adolescents and only available in Japanese (Oshio, Kaneko, Nagamine, & Nakaya, 2003). As such, nursing studies of resilience in adult survivors are in their infancy. The studies of resilience in adult oncologic populations have only used two instruments: the Resilience Scale and the Connor-Davidson Resilience Scale. The overall scores for their psychometric quality assessment (Windle et al., 2011) ranges from 5–7 (scale 0–18), indicating the need for additional scale development. The ability of these available instruments to measure elements delineating the dynamic process of resilience remains unclear. In addition, the evaluated studies include diverse geographic and cultural contexts, which raise concerns of cultural bias (Atkinson et al., 2009; Ungar, 2012) and questions regarding applicability and validity of these instruments for these specific populations. Because of design limitations, few causal relationships between resilience and patient outcomes can be inferred from the available data. Of note, one pilot study providing initial evidence for the feasibility and efficacy of an intervention program in survivors was identified (Loprinzi et al., 2011). Therefore, an opportunity exists for nursing scientists to either tailor existing instruments or develop new instruments to effectively measure a coherent conceptualization of resilience as it relates to adult oncologic populations. This will be critical for advancing beyond prior association studies and launching novel interventional studies aimed at supporting adult survivors to develop resilience.

Limitations

Several limitations exist for the current review. First, to enhance conceptual clarity, the authors focused on resilience in individuals rather than its applicability in systems such as families (Masten, 2007). Second, the inclusion criteria could be considered overly constraining because it excludes evidence not using resilience assessment scales. As noted, qualitative studies and quantitative studies not explicitly measuring resilience were excluded even if they were valuable for uncovering novel factors and processes associated with resilience in cancer care. However, merging research with different conceptual frameworks of resilience poses significant challenges for aligning the study findings and introduces additional sources of bias. Finally, an exhaustive account of the historic development, as well as the corresponding multitude of conceptual definitions and differential use of the term resilience across disciplines was beyond the scope of this article and may be found elsewhere (Atkinson et al., 2009; Fletcher & Sarkar, 2013; Haase, 2009; Prince-Embury & Saklofske, 2012; Reich, Zautra, & Hall, 2010; Tusaie & Dyer, 2004).

Implications for Research and Practice

Researchers in adult oncology nursing have yet to establish themselves in the field of resilience research. Importantly, conceptualization of resilience is a critical point and a coherent, consistent definition should be employed. Specifically, a theoretic nursing framework could be used as a foundation to ground the operational definition. Future directions should include work on refining existing instruments or developing new nursing-sensitive instruments to assess resilience. In light of the constraints of available scales, the measurement of resilience as a capacity at a given moment in time may be informative both for nursing research and practice. However, these results must be contextually

and theoretically grounded and linked with appropriate health-related patient outcomes (e.g., well-being) and account for contextual protective factors such as social support systems.

Conclusions

The concept of resilience is promising for its potential application in research and practice in cancer care. It may offer unique insights on factors and dynamic processes facilitating adult survivors to face the significant adversity associated with cancer. Although the capacity for resilience in current cancer care research is largely assessed on an individual level, biologic, genetic, environmental, and systemic factors likely contribute to this dynamic process. Therefore, complex nursing interventions to facilitate resilience should address multiple interacting factors across several domains. Resilience has received considerable attention in pediatric oncology nursing; however, this has not readily been transferred to adult oncology nursing research. Although limited, initial empirical evidence on resilience in survivors warrants further empirical research, theory development, and testing on the phenomenon from the perspective of adult oncology nursing.

Manuela Eicher, MScN, PhD, is the dean of Research, Development, and Services in the School of Health Sciences at the University of Applied Sciences and Arts Western Switzerland in Fribourg; Martin Matzka, Mag., is a research associate in the Department of Nursing Science at the University of Vienna in Austria; Catherine Dubey, MScN, is a lecturer in the School of Health Sciences at the University of Applied Sciences and Arts Western Switzerland; and Kate White, PhD, RN, is a professor of cancer nursing in the Cancer Nursing Research Unit and Sydney Nursing School at the University of Sydney in New South Wales, Australia. This study was supported, in part, by the European Oncology Nursing Society Major Research Grant, 2012, and a Swiss Cancer Research grant (No. KFS-3269-08-2013). Eicher can be reached at manuela.eicher@hefr.ch, with copy to editor at ONFEditor@ons.org. (Submitted May 2014. Accepted for publication August 20, 2014.)

References

- Atkinson, P.A., Martin, C.R., & Rankin, J. (2009). Resilience revisited. *Journal of Psychiatric and Mental Health Nursing*, 16, 137–145. doi:10.1111/j.1365-2850.2008.01341.x
- Bartone, P. (1991). Development and validation of a short hardiness measure. Paper presented at the annual convention of the American Psychological Society, Washington DC.
- Bartone, P. (2007). Test-retest reliability of the dispositional resilience scale-15, a brief hardiness scale. *Psychological Reports*, 101, 943–944. doi:10.2466/pr0.101.3.943-944
- Bartone, P.T. (1995). A short hardiness scale. Paper presented at the annual convention of the American Psychological Society, New York.
- Bartone, R.T., Ursano R.J., Wright K.M., & Ingraham L.H. (1989). The impact of a military air disaster on the health of assistance workers: A prospective study. *Journal of Nervous and Mental Disease*, 177, 317–328.
- Block, J., & Kremen, A.M. (1996). IQ and ego-resiliency: Conceptual and empirical connections and separateness. *Journal of Personality and Social Psychology*, 70, 349–361. doi:10.1037/0022-3514.70.2.349
- Bonanno, G.A. (2004). Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? *American Psychologist*, 59, 20–28. doi:10.1037/0003-066x.59.1.20
- Bonanno, G.A. (2012). Uses and abuses of the resilience construct: Loss, trauma, and health-related adversities. *Social Science and Medicine*, 74, 753–756. doi:10.1016/j.socscimed.2011.11.022
- Bonanno, G.A., Westphal, M., & Mancini, A.D. (2011). Resilience to loss and potential trauma. *Annual Review of Clinical Psychology*, 7, 511–535. doi:10.1146/annurev-clinpsy-032210-104526
- Brix, C., Schleussner, C., Fuller, J., Rohrig, B., & Strauss, B. (2009). [Fatigue and its determinants in radio-oncology]. *Psychotherapie, Psychosomatik, Medizinische Psychologie*, 59, 42–49. doi:10.1055/s-2008-1067341

- Brix, C., Schlessner, C., Fuller, J., Roehrig, B., Wendt, T.G., & Strauss, B. (2008). The need for psychosocial support and its determinants in a sample of patients undergoing radiooncological treatment of cancer. *Journal of Psychosomatic Research, 65*, 541–548. doi:10.1016/j.jpsychores.2008.05.010
- Campbell-Sills, L., & Stein, M.B. (2007). Psychometric analysis and refinement of the Connor-Davidson Resilience Scale (CD-RISC): Validation of a 10-item measure of resilience. *Journal of Traumatic Stress, 20*, 1019–1028.
- Carver, C.S. (1998). Resilience and thriving: Issues, models, and linkages. *Journal of Social Issues, 54*, 245–266.
- Carver, C.S. (2005). Enhancing adaptation during treatment and the role of individual differences. *Cancer, 104*(Suppl. 11), 2602–2607. doi:10.1002/cncr.21247
- Connor, K.M., & Davidson, J.R. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety, 18*, 76–82. doi:10.1002/da.10113
- Cordova, M.J., Giese-Davis, J., Golant, M., Kronenwetter, C., Chang, V., & Spiegel, D. (2007). Breast cancer as trauma: Posttraumatic stress and posttraumatic growth. *Journal of Clinical Psychology in Medical Settings, 14*, 308–319. doi:10.1007/s10880-007-9083-6
- Costanzo, E.S., Ryff, C.D., & Singer, B.H. (2009). Psychosocial adjustment among cancer survivors: Findings from a national survey of health and well-being. *Health Psychology, 28*, 147–156. doi:10.1037/a0013221
- Deshields, T., Tibbs, T., Fan, M.Y., & Taylor, M. (2006). Differences in patterns of depression after treatment for breast cancer. *Psycho-Oncology, 15*, 398–406. doi:10.1002/pon.962
- Earvolino-Ramirez, M. (2007). Resilience: A concept analysis. *Nursing Forum, 42*, 73–82. doi:10.1111/j.1744-6198.2007.00070.x
- Fletcher, D., & Sarkar, M. (2013). Psychological resilience. *European Psychologist, 18*, 12–23. doi:10.1027/1016-9040/a000124
- Friborg, O., Barlaug, D., Martinussen, M., Rosenvinge, J.H., & Hjemdal, O. (2005). Resilience in relation to personality and intelligence. *International Journal of Methods in Psychiatric Research, 14*, 29–42.
- Friborg, O., Hjemdal, O., Rosenvinge, J.H., & Martinussen, M. (2003). A new rating scale for adult resilience: What are the central protective resources behind healthy adjustment? *International Journal of Methods in Psychiatric Research, 12*, 65–76.
- Gillespie, B.M., Chaboyer, W., & Wallis, M. (2007). Development of a theoretically derived model of resilience through concept analysis. *Contemporary Nurse, 25*, 124–135. doi:10.5555/conu.2007.25.1-2.124
- Gotay, C.C., Isaacs, P., & Pagano, I. (2004). Quality of life in patients who survive a dire prognosis compared to control cancer survivors. *Psycho-Oncology, 13*, 882–892. doi:10.1002/pon.808
- Gotay, C.C., Ransom, S., & Pagano, I.S. (2007). Quality of life in survivors of multiple primary cancers compared with cancer survivor controls. *Cancer, 110*, 2101–2109. doi:10.1002/cncr.23005
- Grafton, E., Gillespie, B., & Henderson, S. (2010). Resilience: The power within. *Oncology Nursing Forum, 37*, 698–705. doi:10.1188/10.ONF.698-705
- Haase, J.E. (2004). The Adolescent Resilience Model as a guide to interventions. *Journal of Pediatric Oncology Nursing, 21*, 289–299. doi:10.1177/1043454204267922
- Haase, J.E. (2009). Resilience. In S.J. Peterson & T.S. Bredow (Eds.), *Middle range theories: Application to nursing research* (pp. 326–362). New York, NY: Wolters Kluwer Health/Lippincott Williams and Wilkins.
- Haase, J.E., Kintner, E.K., Monahan, P.O., & Robb, S.L. (2013). The Resilience in illness model, Part 1: Exploratory evaluation in adolescents and young adults with cancer. *Cancer Nursing, 20*, 20.
- Herrman, H., Stewart, D.E., Diaz-Granados, N., Berger, E.L., Jackson, B., & Yuen, T. (2011). What is resilience? *Canadian Journal of Psychiatry, 56*, 258–265.
- Hou, W.K., Law, C.C., Yin, J., & Fu, Y.T. (2010). Resource loss, resource gain, and psychological resilience and dysfunction following cancer diagnosis: A growth mixture modeling approach. *Health Psychology, 29*, 484–495. doi:10.1037/a0020809
- Kokufu, H. (2012). Conflict accompanying the choice of initial treatment in breast cancer patients. *Japan Journal of Nursing Science, 9*, 177–184. doi:10.1111/j.1742-7924.2011.00200.x
- Lam, W.W., Bonanno, G.A., Mancini, A.D., Ho, S., Chan, M., Hung, W.K., . . . Fielding, R. (2010). Trajectories of psychological distress among Chinese women diagnosed with breast cancer. *Psycho-Oncology, 19*, 1044–1051. doi:10.1002/pon.1658
- Landier, W., Leonard, M., & Ruccione, K.S. (2013). Children's Oncology Group's 2013 blueprint for research: Nursing discipline. *Pediatric Blood and Cancer, 60*, 1031–1036. doi:10.1002/pbc.24415
- Levine, S.Z., Laufer, A., Stein, E., Hamama-Raz, Y., & Solomon, Z. (2009). Examining the relationship between resilience and posttraumatic growth. *Journal of Traumatic Stress, 22*, 282–286. doi:10.1002/jts.20409
- Loprinzi, C.E., Prasad, K., Schroeder, D.R., & Sood, A. (2011). Stress Management and Resilience Training (SMART) program to decrease stress and enhance resilience among breast cancer survivors: A pilot randomized clinical trial. *Clinical Breast Cancer, 11*, 364–368. doi:10.1016/j.clbc.2011.06.008
- Lundman, B., Alex, L., Jonsen, E., Norberg, A., Nygren, B., Santamaki Fischer, R., & Strandberg, G. (2010). Inner strength—A theoretical analysis of salutogenic concepts. *International Journal of Nursing Studies, 47*, 251–260. doi:10.1016/j.ijnurstu.2009.05.020
- Luthar, S.S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development, 71*, 543–562. doi:10.1111/1467-8624.00164
- Luthar, S.S., Sawyer, J.A., & Brown, P.J. (2006). Conceptual issues in studies of resilience: Past, present, and future research. *Annals of the New York Academy of Sciences, 1094*, 105–115. doi:10.1196/annals.1376.009
- Mancini, A.D., & Bonanno, G.A. (2006). Resilience in the face of potential trauma: Clinical practices and illustrations. *Journal of Clinical Psychology, 62*, 971–985. doi:10.1002/jclp.20283
- Masten, A.S. (2001). Ordinary magic. Resilience processes in development. *American Psychologist, 56*, 227–238. doi:10.1037/0003-066X.56.3.227
- Masten, A.S. (2007). Resilience in developing systems: Progress and promise as the fourth wave rises. *Development and Psychopathology, 19*, 921–930. doi:10.1017/s0954579407000442
- Masten, A.S., & Obradovic, J. (2006). Competence and resilience in development. *Annals of the New York Academy of Sciences, 1094*, 13–27. doi:10.1196/annals.1376.003
- Mehnert, A., Lehmann, C., Graefen, M., Huland, H., & Koch, U. (2010). Depression, anxiety, post-traumatic stress disorder and health-related quality of life and its association with social support in ambulatory prostate cancer patients. *European Journal of Cancer Care, 19*, 736–745. doi:10.1111/j.1365-2354.2009.01117.x
- Min, J.A., Yoon, S., Lee, C.U., Chae, J.H., Lee, C., Song, K.Y., & Kim, T.S. (2013). Psychological resilience contributes to low emotional distress in cancer patients. *Supportive Care in Cancer, 21*, 2469–2476. doi:10.1007/s00520-013-1807-6
- Mizuno, M., Asano, Y., Sumi, T., & Inoue, Y. (2011). Adaptation status and related factors at 2 time points after surgery in patients with gastrointestinal tract cancer. *Cancer Nursing, 34*, 41–48. doi:10.1097/NCC.0b013e3181ef69c3
- Morgan, M.A. (2009). Cancer survivorship: History, quality-of-life issues, and the evolving multidisciplinary approach to implementation of cancer survivorship care plans. *Oncology Nursing Forum, 36*, 429–436. doi:10.1188/09.ONF.429-436
- Ong, A.D., Bergeman, C.S., Bisconti, T.L., & Wallace, K.A. (2006). Psychological resilience, positive emotions, and successful adaptation to stress in later life. *Journal of Personality and Social Psychology, 91*, 730–749. doi:10.1037/0022-3514.91.4.730
- Oshio, A., Kaneko, H., Nagamine, S., & Nakaya, M. (2003). Construct validity of the Adolescent Resilience Scale. *Psychological Reports, 93*, 1217–1222. doi:10.2466/pr0.2003.93.3f.1217
- Prince-Embury, S. (2013). The Ego-Resiliency Scale by Block and Kremen and trait ego-resiliency. In S. Prince-Embury & D.H. Saklofske (Eds.), *Resilience in children, adolescents, and adults* (pp. 135–138). New York, NY: Springer.

- Prince-Embury, S., & Saklofske, D.H. (2012). *Resilience in children, adolescents, and adults: Translating research into practice*. New York, NY: Springer.
- Reich, J.W., Zautra, A.J., & Hall, J.S. (2010). *Handbook of adult resilience*. New York, NY: Guilford Publications.
- Richardson, G.E. (2002). The metatheory of resilience and resiliency. *Journal of Clinical Psychology, 58*, 307–321. doi:10.1002/jclp.10020
- Rowland, J.H., & Baker, F. (2005). Introduction: Resilience of cancer survivors across the lifespan. *Cancer, 104*, 2543–2548. doi:10.1002/cncr.21487
- Rutter, M. (1987). Psychosocial resilience and protective mechanisms. *American Journal of Orthopsychiatry, 57*, 316–331.
- Rutter, M. (2006). Implications of resilience concepts for scientific understanding. *Annals of the New York Academy of Sciences, 1094*, 1–12. doi:10.1196/annals.1376.002
- Rutter, M. (2012). Resilience as a dynamic concept. *Development and Psychopathology, 24*, 335–344. doi:10.1017/S0954579412000028
- Scali, J., Gandubert, C., Ritchie, K., Soulier, M., Ancelin, M.L., & Chaudieu, I. (2012). Measuring resilience in adult women using the 10-items Connor-Davidson Resilience Scale (CD-RISC). Role of trauma exposure and anxiety disorders. *PLoS ONE, 7*, e39879. doi:10.1371/journal.pone.0039879
- Schumacher, A., Sauerland, C., Silling, G., Berdel, W.E., & Steljes, M. (2013). Resilience in patients after allogeneic stem cell transplantation. *Supportive Care in Cancer, 22*, 487–493. doi:10.1007/s00520-013-2001-6
- Sharpley, C.F., Wootten, A.C., Bitsika, V., & Christie, D.R. (2013). Variability over time-since-diagnosis in the protective effect of psychological resilience against depression in Australian prostate cancer patients: Implications for patient treatment models. *American Journal of Men's Health, 7*, 414–422. doi:10.1177/1557988313477126
- Smith, B.W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: Assessing the ability to bounce back. *International Journal of Behavioural Medicine, 15*, 194–200. doi:10.1080/10705500802222972
- Strauss, B., Brix, C., Fischer, S., Leppert, K., Fuller, J., Roehrig, B., . . . Wendt, T.G. (2007). The influence of resilience on fatigue in cancer patients undergoing radiation therapy (RT). *Journal of Cancer Research and Clinical Oncology, 133*, 511–518. doi:10.1007/s00432-007-0195-z
- Szanton, S.L., & Gill, J.M. (2010). Facilitating resilience using a society-to-cells framework: A theory of nursing essentials applied to research and practice. *Advances in Nursing Science, 33*, 329–343. doi:10.1097/ANS.0b013e3181fb2ea2
- Tian, J., & Hong, J.S. (2013). Application of the Chinese version of the MFI-20 in detecting the severe fatigue in cancer patients. *Supportive Care in Cancer, 21*, 2217–2223. doi:10.1007/s00520-013-1783-x
- Tusaie, K., & Dyer, J. (2004). Resilience: A historical review of the construct. *Holistic Nursing Practice, 18*, 3–8.
- Ungar, M. (2012). Researching and theorizing resilience across cultures and contexts. *Preventive Medicine, 55*, 387–389. doi:10.1016/j.ypmed.2012.07.021
- Wagnild, G.M., & Young, H.M. (1993). Development and psychometric evaluation of the Resilience Scale. *Journal of Nursing Measurement, 1*, 165–178.
- Windle, G. (2011). What is resilience? A review and concept analysis. *Reviews in Clinical Gerontology, 21*, 152–169. doi:10.1017/S0959259810000420
- Windle, G., Bennett, K.M., & Noyes, J. (2011). A methodological review of resilience measurement scales. *Health and Quality of Life Outcomes, 9*, 8. doi:10.1186/1477-7525-9-8
- Windle, G., Markland, D.A., & Woods, B. (2008). Examination of a theoretical model of psychological resilience in older age. *Aging and Mental Health, 12*, 285–292. doi:10.1080/13607860802120763

Appendix A. Quantitative Research on Resilience in Adult Cancer Care

Study	Country	Sample	Objectives	Metrics and Instrument	Result
Longitudinal Studies					
Brix et al., 2008	Germany	208 patients (77 male, 131 female) with various cancers (breast, gynecologic, gastrointestinal, prostate) pre- and post-RT	To examine the need for psychosocial support in patients undergoing RT. To identify parameters influencing fatigue before and during RT	Need for psychosocial support (HSI), fatigue (MFI), health-related quality of life (SF-12®), resilience (RS), and aspects of patients' coping behavior (one-dimensional scales for level of information, optimism, and desire for psychosocial support)	Resilience assessed at baseline as a predictor variable: Resilience scores were significantly ($p < 0.001$) higher in the sample, compared with normative cohort. Divided into groups of lower versus higher resilience scores (median split), significant differences in the need for psychosocial support at the beginning ($p = 0.003$) and end of RT ($p = 0.005$) were found. At both assessment points, a significant ($p < 0.001$) negative correlation of the need for psychosocial support and resilience was found. With an effect size of $d = 0.51$ and $d = 0.52$, resilience was an important predictor for need of psychosocial support in a regression model, but failed to show statistical significance (first assessment, $p = 0.319$; second assessment, $p = 0.171$).
Brix et al., 2009	Germany	208 patients (77 male, 131 female) with various cancers (breast, gynecologic, gastrointestinal, prostate) pre- and post-RT	To examine the need for psychosocial support in patients undergoing RT. To identify parameters influencing fatigue before and during RT	Fatigue (MFI), health-related quality of life (SF-12), and resilience (RS)	Resilience assessed at baseline as a predictor variable: Among all tested variables, resilience showed to be the most associated with fatigue at the beginning of RT ($r^2 = -0.38$, $p < 0.001$, $d = 0.8$).
Strauss et al., 2007	Germany	208 patients (77 male, 131 female) with various cancers (breast, gynecologic, gastrointestinal, prostate) pre- and post-RT	To examine the need for psychosocial support in patients undergoing RT. To identify parameters influencing fatigue before and during RT	Fatigue (MFI), health-related quality of life (SF-12), and resilience (RS)	Resilience assessed at baseline as a predictor variable: Resilience was significantly positively correlated ($p < 0.001$) with the psychological subscale of quality of life at both times. A significant negative correlation between resilience and fatigue scores was observed at baseline ($p < 0.001$) and at the end of RT ($p < 0.01$), with resilience being the strongest significant ($p < 0.001$) predictor of fatigue in a regression model at baseline. Resilience was not associated with changes of fatigue during RT.
Tian & Hong, 2013	China	715 patients (378 male, 337 female) with various cancers (digestive tract, lung, nasopharyngeal, cervical, breast, head and neck, other) before and after the first treatment cycle	To assess the prevalence of fatigue in patients with cancer postdiagnosis using the MFI scale. To analyze factors influencing fatigue after the first treatment cycle	Fatigue (MFI-20), treatment side effects (ordinal scales on seven aspects: gastrointestinal system, respiratory system, liver and kidney, heart, hair, skin and nervous system), quality of life (EORTC QLQ-C30), and resilience (RS, 14-item version)	Resilience assessed at baseline as a predictor variable: Establishing a cutoff score (> 60) to detect severe fatigue; in a regression model, lower resilience was a significant predictor of severe fatigue ($p < 0.01$) after the first treatment cycle, along with old age, advanced disease stage, having received RT, and being diagnosed with nasopharyngeal, lung, or digestive tract cancers (all $p \leq 0.03$).

(Continued on the next page)

CD-RISC—Connor-Davidson Resilience Scale; CES-D—Center for Epidemiologic Studies—Depression; EORTC QLQ-C30—European Organisation for the Research and Treatment of Cancer Quality of Life Core 30 Questionnaire; FSSQ—Duke-UNC Functional Social Support Questionnaire; GHQ—General Health Questionnaire; GSE—General Self-Efficacy Scale; HADS—Hospital Anxiety and Depression Scale; HSI—Hornheide Screening Instrument; IES-R—Revised Impact of Event Scale; LOT—Life Orientation Test; MFI—Multidimensional Fatigue Inventory; MINI—Mini International Neuropsychiatric Interview; MOS-MH—Medical Outcomes Short Form; MQOL—McGill Quality of Life Scale; PHQ9—Patient Health Questionnaire-9; PSS—Perceived Stress Scale; PTGI—Post-Traumatic Growth Index; RS—Resilience Scale; RT—radiation therapy; SAQ—Sexual Adjustment Questionnaire; VAS—Visual Analog Scale

Appendix A. Quantitative Research on Resilience in Adult Cancer Care (Continued)

Study	Country	Sample	Objectives	Metrics and Instrument	Result
Cross-Sectional Studies					
Gotay et al., 2004	United States	162 survivors in the cases group (83 male, 79 female) and 160 in control (83 male, 77 female) with various cancers (gastrointestinal, lung, breast, other) more than five years postdiagnosis	To describe well-being and correlates in long-term cancer survivors (more than five years) who had exceeded their life expectancies (cases) To identify ways in which cases differed from controls (cancer survivors with better prognoses)	Well-being (MOS-PF, MOS-MH), global quality of life (EORTC QLQ-C30), depression (CES-D), stress (IES-R), optimism-pessimism (LOT), sense of coherence (SOC), and resilience (RS)	Resilience assessed at baseline as a predictor variable: Both survivor groups scored significantly higher (both $p < 0.05$) on resilience than the normative population. In a regression model (including both groups), psychological variables (resilience, sense of coherence, optimism) alongside demographic and clinical variables were significant predictors (all $p < 0.05$) of physical functioning, emotional functioning, depression, intrusive stress, and quality of life. In a separate regression model (including both groups), scoring higher on resilience was a significant ($p = 0.002$) individual predictor of better physical functioning, as well as a significant ($p = 0.007$) individual predictor of better quality of life.
Gotay et al., 2007	United States	487 survivors in the cases group (160 male, 327 female) with a mean of 13.6 years postdiagnosis of multiple cancers and 589 in the control group (176 male, 413 female) with a mean of 9.9 years postdiagnosis of single primary cancer	To assess quality of life and its correlates in patients with multiple primary cancer diagnoses (cases), in comparison to patients with a single primary cancer diagnosis (controls).	Global quality of life (single item from EORTC QLQ-C30), vitality (MOS-V), depression (CES-D), cancer-specific distress (IES-R), post-traumatic growth (PTGI), sexual adjustment (single item from SAQ), existential well-being (subscale of MQOL), personal and family coping (two questions rating how well the person/family coped with the diagnosis), optimism (LOT), and resilience (RS)	Resilience assessed at baseline as a predictor variable: In the final regression model, resilience was a significant individual predictor of global quality of life ($p < 0.001$), vitality ($p < 0.001$), depression ($p = 0.04$), total distress ($p = 0.005$), existential well-being ($p < 0.001$), and sexual adjustment ($p = 0.02$). Individuals with high resilience scores rated the second cancer diagnosis as significantly easier ($p = 0.01$) to cope with than the first diagnosis.

(Continued on the next page)

CD-RISC—Connor-Davidson Resilience Scale; CES-D—Center for Epidemiologic Studies—Depression; EORTC QLQ-C30—European Organisation for the Research and Treatment of Cancer Quality of Life Core 30 Questionnaire; FSSQ—Duke-UNC Functional Social Support Questionnaire; GHQ—General Health Questionnaire; GSE—General Self-Efficacy Scale; HADS—Hospital Anxiety and Depression Scale; HSI—Hornheide Screening Instrument; IES-R—Revised Impact of Event Scale; LOT—Life Orientation Test; MFI—Multidimensional Fatigue Inventory; MINI—Mini International Neuropsychiatric Interview; MOS-MH—Medical Outcomes Short Form; MQOL—McGill Quality of Life Scale; PHQ9—Patient Health Questionnaire-9; PSS—Perceived Stress Scale; PTGI—Post-Traumatic Growth Index; RS—Resilience Scale; RT—radiation therapy; SAQ—Sexual Adjustment Questionnaire; VAS—Visual Analog Scale

Appendix A. Quantitative Research on Resilience in Adult Cancer Care (Continued)

Study	Country	Sample	Objectives	Metrics and Instrument	Result
Min et al., 2013	South Korea	152 patients (85 male, 67 female) with various cancers (not specified) and hospitalized for treatment	To investigate the relationships between the levels of psychological resilience and emotional distress in patients with cancer	Depression and anxiety/clinical emotional distress (HADS), perceived social support (FSSQ), and resilience (CD-RISC)	Resilience assessed at baseline as a predictor variable: Patients were grouped into a distressed cancer group ($n = 83$, HADS score ≥ 13) and non-distressed cancer group ($n = 69$, HADS score < 13). In a univariate regression model, distressed participants scored significantly lower on resilience ($p < 0.001$), compared with the non-distressed subsample. In the final regression model, after adjusting for age, gender, metastasis, performance status, and perceived social support, higher levels of psychological resilience (divided in quartiles, lowest scores in first quartile) were significantly associated with lower risk of emotional distress (third versus first quartile, $p = 0.001$; fourth versus first quartile, $p < 0.001$). A significant linear trend in decreasing risks for emotional distress with higher resilience ($p < 0.001$) was noted. In a multivariate regression model, resilience scores (total) were significantly negatively associated with the level of emotional distress ($p < 0.001$), which did not change after adjusting for age and gender, as well as clinical characteristics and social support. In participants with metastatic cancer ($n = 81$), resilience scores were significantly negatively associated with emotional distress (third versus first quartile, $p = 0.02$; fourth versus first quartile, $p = 0.02$), after adjusting for age, gender, performance status, and perceived social support.
Scali et al., 2012	France	122 female breast cancer survivors post-RT or chemotherapy and 116 women with no history of breast cancer	To assess resilience in women undergoing mammography, taking into account lifetime history of trauma, sociodemographic characteristics, and lifetime mental health	Post-traumatic stress disorder, current and lifetime psychiatric disorders (MINI, GHQ-28), and resilience (CD-RISC, 10-item version)	Resilience assessed at baseline as a predictor variable: Participants scoring high on resilience (> 29) had a significantly lower risk of having a current anxiety disorder ($p = 0.02$) and a current generalized anxiety disorder ($p = 0.04$), and were significantly more likely to report a lifetime trauma ($p = 0.02$) compared to those scoring low on resilience (≤ 23). Participants scoring intermediate on resilience ($23 \leq 29$) had a significantly lower risk of having at least one current psychiatric diagnosis ($p = 0.02$), at least one current mood disorder ($p = 0.05$), and current generalized anxiety disorder ($p = 0.04$), and were significantly more likely to report a lifetime trauma ($p = 0.04$) and breast cancer diagnosis ($p = 0.02$) compared to those scoring low on resilience. In a separate regression model, participants with high resilience scores were significantly more likely to report a lifetime trauma ($p = 0.004$) and significantly less likely to report at least one current psychiatric disorder ($p = 0.03$) and current comorbid anxiety and mood disorder ($p = 0.01$) than those scoring low on resilience. Participants with intermediate resilience scores were significantly more likely to report a lifetime trauma ($p = 0.03$), history of breast cancer ($p = 0.05$), and significantly less likely to report at least one current psychiatric diagnosis ($p = 0.003$) than those scoring low on resilience.

(Continued on the next page)

CD-RISC—Connor-Davidson Resilience Scale; CES-D—Center for Epidemiologic Studies—Depression; EORTC QLQ-C30—European Organisation for the Research and Treatment of Cancer Quality of Life Core 30 Questionnaire; FSSQ—Duke-UNC Functional Social Support Questionnaire; GHQ—General Health Questionnaire; GSE—General Self-Efficacy Scale; HADS—Hospital Anxiety and Depression Scale; HSI—Hornheide Screening Instrument; IES-R—Revised Impact of Event Scale; LOT—Life Orientation Test; MFI—Multidimensional Fatigue Inventory; MINI—Mini International Neuropsychiatric Interview; MOS-MH—Medical Outcomes Short Form; MQOL—McGill Quality of Life Scale; PHQ9—Patient Health Questionnaire-9; PSS—Perceived Stress Scale; PTGI—Post-Traumatic Growth Index; RS—Resilience Scale; RT—radiation therapy; SAQ—Sexual Adjustment Questionnaire; VAS—Visual Analog Scale

Appendix A. Quantitative Research on Resilience in Adult Cancer Care (Continued)

Study	Country	Sample	Objectives	Metrics and Instrument	Result
Schumacher et al., 2013	Germany	75 survivors (44 male, 31 female) of leukemia, lymphoma, or myeloma after stem cell transplantation and 11 non-oncologic post-stem cell transplantation patients	To assess resilience and self-efficacy in adult patients after allogeneic stem cell transplantation To analyze the relationship between quality of life and resilience	Quality of life (EORTC QLQ-C30), anxiety and depression (HADS), general self-efficacy (GSE), and resilience (RS, 25-item version)	Resilience assessed at baseline as a predictor variable: Resilience was significantly positively correlated with self-efficacy ($p < 0.001$) and the EORTC QLQ-C30 subscales of physical functioning ($p < 0.01$), emotional functioning ($p < 0.001$), global quality of life ($p < 0.001$), cognitive functioning ($p < 0.01$), and social functioning ($p < 0.001$). Resilience was significantly negatively correlated with depression ($p < 0.001$) and anxiety ($p < 0.001$). Using a median split of resilience scores, scoring higher on resilience was significantly associated with better global quality of life ($p < 0.001$), physical functioning ($p = 0.041$), emotional functioning ($p = 0.03$), social functioning ($p = 0.003$), and higher self-efficacy ($p < 0.001$), as well as less anxiety ($p < 0.001$) and depression ($p < 0.001$) compared with those scoring lower on resilience. Grouped by time span since stem cell transplantation (1–2 years, 3–4 years, 5 or more years), significant differences between groups were found: Patients 3–4 years post-transplantation reported lower scores on resilience ($p = 0.006$), role functioning ($p = 0.028$), and self-efficacy ($p = 0.013$), as well as higher scores on anxiety ($p = 0.045$) and depression ($p = 0.001$).
Sharpley et al., 2013	Australia	255 male patients with prostate cancer more than five years postdiagnosis	To investigate the presence and timing of variability in the relationship between depression and resilience	Depression (PHQ9) and resilience (CD-RISC)	Resilience assessed at baseline as a predictor variable: Resilience was significantly negatively correlated with depression ($p < 0.01$). In a regression model, resilience significantly predicted depression ($p < 0.001$). Three factors of the resilience scale were analyzed separately: Confidence to cope with change (Factor 1), being able to take difficult actions (Factor 2), and trusting in a higher power (Factor 3). Each factor was significantly associated with depression (all $p < 0.001$), while only Factors 1 and 2 had an inverse relationship with depression. In a regression model, only Factor 1 significantly predicted depression ($p < 0.001$). Divided into 10 six-month cohorts by time since diagnosis (cohort 1: 1–5 months postdiagnosis to cohort 10: 54–60 months postdiagnosis), resilience was significantly correlated (all $p \leq 0.045$) with depression in cohorts 1–5, as well as cohorts 7, 8, and 10. Factor 1 (resilience) was significantly correlated (all $p \leq 0.038$) with depression in cohorts 1–8 and 10. Factor 2 was significantly correlated (all $p \leq 0.043$) with depression in cohorts 1, 4, 5, 7, 8, and 10. Factor 3 was significantly correlated with depression in cohort 7 ($p = 0.017$) and cohort 8 ($p = 0.006$).

(Continued on the next page)

CD-RISC—Connor-Davidson Resilience Scale; CES-D—Center for Epidemiologic Studies—Depression; EORTC QLQ-C30—European Organisation for the Research and Treatment of Cancer Quality of Life Core 30 Questionnaire; FSSQ—Duke-UNC Functional Social Support Questionnaire; GHQ—General Health Questionnaire; GSE—General Self-Efficacy Scale; HADS—Hospital Anxiety and Depression Scale; HSI—Hornheide Screening Instrument; IES-R—Revised Impact of Event Scale; LOT—Life Orientation Test; MFI—Multidimensional Fatigue Inventory; MINI—Mini International Neuropsychiatric Interview; MOS-MH—Medical Outcomes Short Form; MQOL—McGill Quality of Life Scale; PHQ9—Patient Health Questionnaire-9; PSS—Perceived Stress Scale; PTCI—Post-Traumatic Growth Index; RS—Resilience Scale; RT—radiation therapy; SAQ—Sexual Adjustment Questionnaire; VAS—Visual Analog Scale

Appendix A. Quantitative Research on Resilience in Adult Cancer Care (Continued)

Study	Country	Sample	Objectives	Metrics and Instrument	Result
Intervention Study					
Loprinzi et al., 2011	United States	12 patients in an active arm and 8 in a wait list control group (all female) with breast cancer and more than one year postdiagnosis	To assess the effect of the Stress Management and Resiliency Training program for increasing resilience and for decreasing stress and anxiety	Perceived stress (PSS), anxiety (SAS), overall quality of life and well-being, fatigue (VAS-Fatigue), and resilience (CD-RISC)	Resilience assessed at baseline and after 12 weeks as an outcome: Resilience increased significantly ($p = 0.01$) from baseline to after the end of the 12-week period in the active arm. Perceived stress decreased significantly ($p = 0.003$), as well as anxiety ($p = 0.002$), from baseline to after the end of the 12-week period in the active arm. Overall quality of life improved significantly ($p = 0.002$) in the active arm compared with the control group. No significant changes were noted in the control group.
<p>CD-RISC—Connor-Davidson Resilience Scale; CES-D—Center for Epidemiologic Studies–Depression; EORTC QLQ-C30—European Organisation for the Research and Treatment of Cancer Quality of Life Core 30 Questionnaire; FSSQ—Duke-UNC Functional Social Support Questionnaire; GHQ—General Health Questionnaire; GSE—General Self-Efficacy Scale; HADS—Hospital Anxiety and Depression Scale; HSI—Hornheide Screening Instrument; IES-R—Revised Impact of Event Scale; LOT—Life Orientation Test; MF—Multidimensional Fatigue Inventory; MINI—Mini International Neuropsychiatric Interview; MOS-MH—Medical Outcomes Short Form; MQOL—McGill Quality of Life Scale; PHQ9—Patient Health Questionnaire-9; PSS—Perceived Stress Scale; PTCI—Post-Traumatic Growth Index; RS—Resilience Scale; RT—radiation therapy; SAQ—Sexual Adjustment Questionnaire; VAS—Visual Analog Scale</p>					