



Varieties of Resilience in MIDUS

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Abstract

Population-based studies of health typically focus on psychosocial contributors to illness and disease. We examine findings from a national longitudinal study of American adults, known as MIDUS (Midlife in the U.S.) to examine the role of psychosocial factors in promoting resilience, defined as the maintenance, recovery, or improvement in health following challenge. Classic studies of resilience are briefly noted, followed by a look at three categories of resilience in MIDUS. The first pertains to having good health and well-being in the face of low socioeconomic standing. The second pertains to maintaining good health and well-being despite the challenges that accompany aging. The third pertains to resilience in the face of targeted life challenges such as abuse in childhood, loss of spouse in adulthood, or having cancer. Across each area, we summarize evidence of positive health, and where possible, highlight protective influences that account for such salubrious outcomes. We conclude with opportunities for future research in MIDUS such as examining cultural and genetic influences on resilience as well as utilizing laboratory challenge data to illuminate underlying mechanisms.

This article provides an overview of research on resilience conducted with a national study of American adults, known as MIDUS (Midlife in the U.S.). We first offer a brief summary of prior research on the topic, going back to classic studies, while also noting recent endeavors. Amidst diverse formulations of what constitutes resilience, we offer a provisional definition, which underscores the key components of evidence needed to demonstrate resilience has occurred and perhaps clarify why.

Three categories of illustrative studies from MIDUS are then described. The first involves evidence of resilience in the context of social inequalities. Although growing research documents that individuals with lower socioeconomic status (SES) have poorer health and well-being, such work neglects the marked variability within SES groups, particularly at the low end. We show numerous examples of resilience among socioeconomically disadvantaged individuals and identify some of the relevant protective factors. The second category of studies pertains to resilience vis-à-vis the challenges of aging. Growing old brings increased risk for decline in numerous areas (e.g., cognitive capacities, physical health, well-being), but not all aging individuals show such patterns. Indeed, variability is a major feature of those who make it to later life; hence, another opportunity to identify who does well in the context of the losses and biological changes that accompany aging. Our final category of examples pertains to resilience in the face of targeted life challenges such as experiencing child abuse, losing a spouse, or having cancer. Where possible, we highlight the protective influences that account for the above positive outcomes.

MIDUS is the forum for considering all of the above questions. Its key domains of content are illustrated in Figure 1. The study was begun in 1995/96 with a national sample of over 7,000 adults, aged 25 to 74 (MIDUS I), with funding from the John D. and

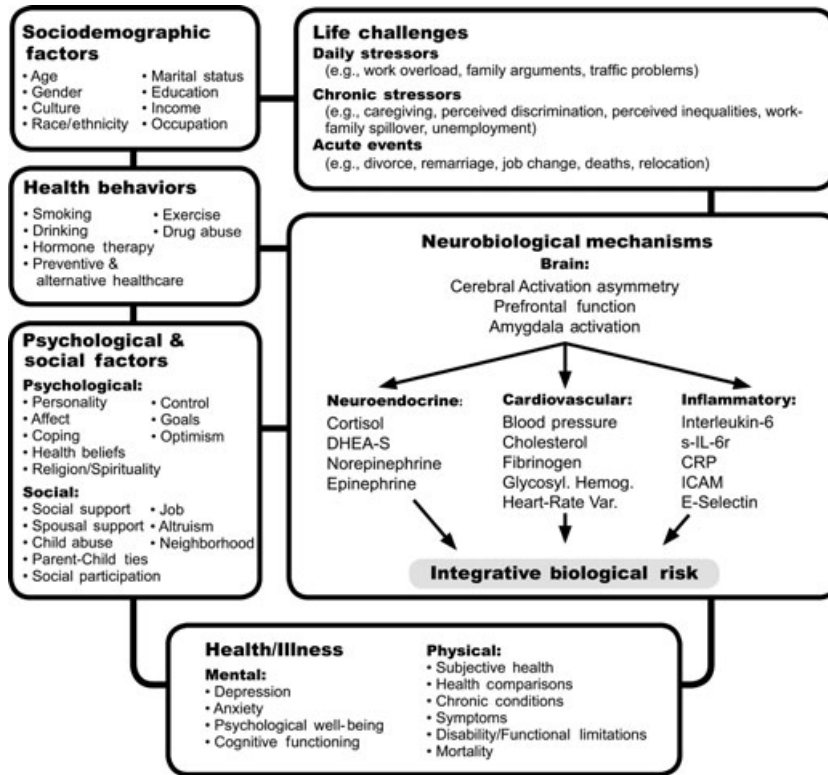


Figure 1 Primary domains of content in MIDUS.

Catherine T. MacArthur Foundation. Its primary objectives were to investigate the roles of psychological and social factors in understanding variation in how people age across the decades of adult life. Based on the enthusiastic response to the study, gauged in scientific products, a longitudinal follow-up was begun in 2004/05 (MIDUS II, funded by the National Institute on Aging). The new wave of data collection expanded the content of the study to include cognitive assessments as well as biological and neuroscience measures, both obtained on subsamples of MIDUS respondents. To date, more than 400 publications have been generated from the publicly available data (see <http://www.midus.wisc.edu>). Of relevance to resilience, MIDUS is unique among population-based studies for the depth and breadth it affords in assessing the psychological and social strengths needed to investigate why some individuals manage to do well in the face of significant life adversity.

What is Resilience?

Research on resilience began in the 1970s and 1980s with several classic studies of children living under adverse conditions. Rutter (1985, 1987) found that many children of mentally ill parents did not themselves become mentally ill or exhibit maladaptive behaviors. He formulated resilience as the positive component of an individual's response to stress and adversity (Rutter, 1990). Garmezy studied thriving children of schizophrenic mothers (Garmezy, 1974; Garmezy & Streitman, 1974; Masten, Best, & Garmezy, 1990) as well as children of low socioeconomic status living in negative family environments

(Garmezy, 1991, 1993; Garmezy, Masten, & Tellegen, 1984). Again, some were judged by the teachers and peers to be competent and not have behavior problems. Their studies formulated resilience as the positive side of adaptation after extenuating circumstances (Masten, 1989), or the capacity for recovery and maintenance of adaptive functioning following incapacity (Garmezy, 1991). Finally, Werner followed a cohort of children born into poverty and troubled family environments, one third of whom grew up to be competent, confident, caring adults (Werner, 1993, 1995; Werner & Smith, 1977, 1992). Werner's conception of resilience emphasized sustained competence under stress.

Subsequent work elaborated meanings of resilience in childhood and adolescence (Glantz & Sloboda, 1999; Luthar, 1991; Masten, 1991; Robins, John, Caspi, Moffitt, & Stouthamer-Loeber, 1996). Studies of resilient aging then came to the fore. Staudinger, Marsiske, and Baltes (1995) emphasized reserve capacity and continued growth throughout life, despite the challenges aging brings. Klohnen (1996) framed resilience in adulthood as a personality characteristic that allows individuals to adaptively encounter and shape their life circumstances. Our own prior studies of resilience examined those who functioned well in response to diverse life challenges, such as living with an alcoholic (parent or spouse), parenting a child with developmental disabilities, having caregiving responsibilities, experiencing community relocation, facing increased chronic health conditions with aging, or being socioeconomically disadvantaged (Ryff, Singer, Love, & Essex, 1998; Ryff & Singer, 2003).

Distinctions between resilience and thriving gained attention along the way (Carver, 1998; Epel, McEwen, & Ickovics, 1998) as did interest in growth through crisis and suffering (Emmons, Colby, & Kaiser, 1998; Park, 1998; Tedeschi & Calhoun, 1995; Tedeschi, Park, & Calhoun, 1998). Recently, the first formal handbook of resilience (Reich, Zautra, & Hall, 2010) was generated. It acknowledged the debate over how to define and operationalize resilience (e.g., Luthar, Cicchetti, & Becker, 2000), with the conclusion that resilience is best formulated as the successful adaptation to adversity, with emphasis given to recovery (how people bounce back from challenge) and sustainability (the capacity to continue forward in the face of adversity).

Resources thought to facilitate resilience in these recent formulations include positive emotions (Lyubomirsky & Della Porta, 2010; Moskowitz, 2010; Ong, Fuller-Rowell, & Bonanno, 2010), personal intelligence (Mayer & Faber, 2010), self-complexity (Rafaeli & Hiller, 2010), religion and faith (Pargament & Cummings, 2010), and social support (Helgeson & Lopez, 2010). Many parallel those identified in the earlier studies of resilient children wherein high IQ, social support, outgoing personality characteristics, family cohesion and warmth, and positive self-concepts were identified as key protective resources.

Our working formulation of resilience, not notably different from those described above, is *the maintenance, recovery, or improvement in mental or physical health following challenge*. With regard to outcomes, we cast a wide net to include multiple aspects of psychological functioning (emotional distress, well-being, cognitive capacities, etc.) as well as multiple aspects of physical health (subjective health, chronic conditions, functional capacities, biological risk factors). Similarly, we see life challenges as coming in many varieties, although in this review our focus is on socioeconomic adversity (low educational or economic standing), risk of mental or physical health decline with aging, and targeted experiences such as having been abused as a child, losing a spouse, or having cancer.

Some, but not all, MIDUS studies described below include explicit assessment of protective resources to account for the positive mental or physical health profile vis-à-vis challenge. These vary considerably, ranging from sense of control, well-being, and positive

affect to maternal nurturance, physical fitness, and volunteering. The diversity among them underscores the rich array of human strengths assessed in MIDUS.

Finally, we acknowledge having no fixed formulation as to whether particular variables belong exclusively in the outcome or protective category of influence. Instead, our overarching perspective is fluid and flexible, recognizing what constitutes a buffering influence in one investigation may be usefully employed as an outcome in another. Stated otherwise, the collection described below offers not a formal theoretical model of what resilience is and how it comes about, but instead showcases, in the context of a single national study, multiple ways in which individuals demonstrate positive functioning in the face of adversity. Our theme, in short, is varieties of resilience.

Challenges of Inequality

Low SES is a well established risk factor for poor health. This relationship is graded, such that a lower position predicts unfavorable outcomes at nearly every level of SES (Adler & Stewart, 2010). However, not all disadvantaged individuals succumb to poor health and growing interest has been shown in those who do not fit the predicted gradient. Characterizing these resilient individuals offers insights into environments, psychological profiles, and behaviors that confer benefits. Examples within MIDUS are described below.

Lachman and Weaver (1998) provided early evidence that low SES individuals who possessed psychosocial strengths did not show the expected decrements in health. They showed that sense of control, specifically personal mastery, mitigated income gradients in self-rated health – those with higher incomes had better self-rated health than those with less income, but individuals with low income *and* high mastery had comparable self-rated health to higher-earning individuals. Morozink, Friedman, Coe, and Ryff (2010) extended these findings using different SES and psychosocial variables, and an objective indicator of health, the inflammatory marker interleukin-6 (IL-6). After documenting an inverse relationship between educational status and IL-6, they showed that it was moderated by positive affect and several aspects of psychological well-being (purpose in life, environmental mastery, self-acceptance, positive relations with others). The pattern of effects revealed that greater well-being predicted lower IL-6 among the less educated, with discernible educational gradients in IL-6 absent among individuals with high well-being. These studies implicate psychological resources as a buffer against the adverse effects of low SES on health.

Qualitative research in MIDUS sharpened understanding of what constitute psychosocial strengths among disadvantaged constituents. A subset of MIDUS respondents ($N = 83$), representing comparable groups of males and females with either a college education or a high school diploma, respectively, provided open ended responses on the meaning of well-being and positive life events and life domains in the Everyday Well-being Study (Markus, Ryff, Curhan, & Palmersheim, 2004). The importance of social relationships was a critical feature for all, though well-being among the less educated was also defined by being a good person, performing duties and upholding responsibilities, as well as caring for others, with less focus on accomplishments or enjoyment as key to the good life compared to college degree earners. This work clarified qualities that define high well-being among those faced with social inequalities, some of which (e.g., upholding responsibilities, caring for others) are neglected in typical assessments of positive psychological functioning.

Racial minorities in the U.S. experiencing social inequalities and discrimination provide an additional lens on resilience. Paradoxically, but consistent with previous findings,

minority respondents in MIDUS I reported higher psychological well-being than Whites, independent of educational differences (Ryff, Keyes, & Hughes, 2003). The minority advantage was even greater, after controlling for perceived discrimination. Focusing on Black–White differences in mental health, Keyes (2009) showed that Blacks reported significantly higher lifetime discrimination (e.g., being denied housing or a job) and everyday discrimination (e.g., people acting as if you are not smart) than Whites, and race was perceived as a primary reason for the discrimination. Again, however, Blacks also scored higher than Whites in 12 of 13 aspects of mental flourishing, including six dimensions of psychological well-being as well as social coherence, social growth, social integration, social contribution, social acceptance and life satisfaction.

Using data on diurnal cortisol collected at MIDUS II, Fuller-Rowell, Doan, and Eccles (2012) found that African Americans reporting more discrimination showed healthier diurnal cortisol patterns (steeper slope) compared to Whites. These findings suggest that when discrimination is pervasive, as is known to be the case for African Americans in the U.S., acknowledging it may serve to protect against the harmful consequences of being part of a stigmatized group. Further, the benefit was more strongly evident among lower than higher SES minority respondents.

Socioeconomic adversity in early life is known to predict poor health in adulthood (Cohen, Janicki-Deverts, Chen, & Matthews, 2010). However, many individuals do not exhibit health problems despite growing up in impoverished environments. Miller et al. (2011) identified maternal nurturance as a protective influence. Low childhood SES predicted increased prevalence of metabolic syndrome (MetS) at middle age, with MetS defined as a cluster of central adiposity, high fasting glucose, high blood pressure, and dysregulated lipid profiles. Having a warm and nurturing mother offset the biological sequelae of childhood disadvantage such that the prevalence of MetS was comparable to those from high SES households. Another protective factor involves adopting a “shift and persist” approach, defined as engaging in cognitive and emotion regulation strategies to adapt to life’s stressors (“shift”), while maintaining strength through focusing on the future (“persist”). Chen, Miller, Lachman, Gruenewald, and Seeman (2012) found that adults from low childhood SES environments who engaged in both shift and persist strategies did not exhibit elevated allostatic load, a composite of dysregulated physiological markers reflecting wear and tear on multiple biological systems.

Finally, engaging in cognitive activities, such as reading, writing, or doing word games, is another protective resource in the face of inequality. Generally, greater educational attainment predicts better cognitive functioning and performance in areas like memory and executive function (Albert et al., 1995). Lachman, Agrigoroaei, Murphy, and Tun (2010), however, demonstrated that the disadvantages for episodic memory associated with lower education were attenuated by frequent cognitive activity across adulthood and old age, providing a behavioral pathway by which those with less education become resilient to the deleterious effects of low status on cognitive functioning.

In sum, MIDUS has elucidated social, psychological, and behavioral components that promote resilience among disadvantaged constituents. Such studies bring to light a variety of factors having salubrious mental and physical health effects. Much work remains to be done. For example, the experience of discrimination is a challenge disproportionately affecting minority groups and lower social classes, but its chronicity, severity, and domain specificity differs widely. How such differences bear on resilience is unknown. MIDUS is uniquely suited to explore disadvantage, broadly defined, across the life course, in racial and ethnic groups, and examine social, psychological, and biological correlates and consequences thereof.

Challenges of Aging

The aging process provides another lens on resilience. Older people (e.g., aged 65+) are at a higher risk for morbidities due to normative changes in biological functioning at multiple levels – cells, tissues, and organs – along with changes in social roles that accompany aging. Incidence of type 2 diabetes, Alzheimer's disease, cancer, and cardiovascular diseases, for example, increase greatly with aging (Centers for Disease Control and Prevention [CDC], 2011; Berry et al., 2012; Reitz, Brayne, & Mayeux, 2011; Yancik & Ries, 2000). Further, psychological well-being shows sharp downward trajectories from midlife to old age (Keyes, Shmotkin, & Ryff, 2002; Ryff, 1989; Ryff & Keyes, 1995) and older adults have an increased risk of depression and cognitive decline (Pratt & Brody, 2008). However, there is considerable variability among adults in when and why age-associated morbidity occurs. Many older adults consider themselves to be aging well, even as they report significant declines in physical health (McLaughlin, Connell, Heeringa, Li, & Roberts, 2010; Strawbridge, Wallhagen, & Cohen, 2002). The ability to delay or compensate for age-related declines in biological functioning and mental health is a form of resilience where the adversity faced is both endogenous and expected. We consider studies from MIDUS focused on processes that contribute to the maintenance of subjective health, functional abilities, and psychological well-being in aging adults.

Cotter and Lachman (2010) examined psychosocial and behavioral factors associated with physical health in adulthood. They found that while on average self-rated health worsened, important individual differences in change existed. Participants who reported better social relations and a higher sense of control at MIDUS 1 had better self-rated health and less physical disability at MIDUS 2. Lachman and Agrigoroaei (2010) used a composite of three protective variables (control beliefs, social support, physical exercise) to predict change in functional health over time. They found that health decline was significantly reduced with an increased number of protective factors. Friedman and Ryff (forthcoming) extended this line of inquiry to biological markers of disease risk. It is common for older adults to have multiple chronic medical conditions. Among MIDUS respondents, increased chronic conditions were associated with significant declines in multiple aspects of well-being and higher levels of the inflammatory proteins interleukin-6 and C-reactive protein. However, older adults who reported a greater sense of purpose in life and stronger social relationships showed a significantly weaker relationship between chronic conditions and inflammation. That is, among older adults facing the challenge of multiple chronic conditions, well-being may reduce risk of future disability and mortality by protecting against elevated levels of inflammation. Taken together, these studies suggest that interventions seeking to sustain functional health might benefit from including a focus on promoting well-being.

A number of studies have shown that behavioral factors promote psychological well-being. Choi and Kim (2011) found that volunteering and charitable donations in later life had a positive effect on psychological well-being among individuals age 55 and above, with effects possibly attributable to the participants' sense of self-efficacy, altruism, or a desire to do good deeds. Similarly, Greenfield and Marks (2004) found that altruism promotes psychological well-being and positive affect. Formal volunteering was associated with more positive affect among older adults and also buffered against declines in purpose in life associated with the age-related loss of major social roles.

Greenfield (2009) also examined felt obligation to help others in two domains (close others and society) as protective factors against losses in psychological well-being following declines in functional abilities. Greater felt obligation to help close others protected

against declining personal growth and self-acceptance among adults aged 35–74. Further, greater felt obligation to help close others and society protected against increasing depressive symptoms at younger ages in adulthood. Age differences were noted in these associations. Felt obligation to help close others and/or society served as stronger protective factors against increasing negative affect following functional decline among younger adults (<age 40), while a weaker protective effect was documented with increasing age (>age 59). Taken together, these findings suggest that altruism promotes psychological well-being in aging adults and may confer greater resilience in the face of declining functional abilities.

Finally, Seeman et al. (2011) examined whether social contacts and support were related to cognitive abilities in middle-aged and older adults. They documented significant positive associations between greater social contact and support and both executive function and episodic memory, whereas declines in social contact were negatively associated with both outcomes, particularly among younger adults

In summary, while aging is normatively associated with declines in physical health, mental well-being, and cognitive functioning, findings from MIDUS have documented that multiple psychosocial factors – purpose in life, social relationships, mastery– and prosocial behaviors, such as volunteering, predict better self-rated health, less disability, healthier profiles of biological risk, greater well-being, and better cognitive function in aging adults, even in the context of disability and chronic illness. These findings suggest that resilience in the face of age-related challenges may involve not only better quality of life, but also reduced risk of future disability and death. Although much work is cross-sectional, with additional waves from MIDUS, it will be increasingly possible to examine these associations longitudinally.

Targeted Life Challenges

Specific life challenges or acute events are another important context for the study of resilience. Examples of such events measured in the MIDUS study include the experience of abuse in childhood, the death of a loved one, or the onset of a serious illness. Several important studies related to these challenges have been conducted using the MIDUS data.

Two studies provide examples of how retrospective reports of childhood experiences can be considered within a resilience framework. Using data from MIDUS I, Pitzer and Fingerman (2010) considered resilience to severe physical abuse experienced during childhood. Specifically, three types of psychosocial resources (emotional support, instrumental support, and personal control), measured concurrently, were tested as moderators of the impact of self-reports of physical abuse on physical health and negative affect in adulthood. Consistent with existing research and theory on sense of control, results indicated that the effects of childhood abuse on both outcomes were less severe for individuals with a greater adult sense of agency over their lives.

Also using MIDUS I data, Greenfield and Marks (2010) considered physical and psychological abuse in childhood as predictors of psychological distress in adulthood. Additionally, the authors examined sense of community as a moderator of these effects and hypothesized that a sense of community would mitigate the deleterious consequences of abuse. As predicted, findings showed that community support was protective against the impact of childhood abuse on psychological distress. Together, these studies suggest that both sense of control and community support are important influences on resilience for individuals who have experienced childhood abuse.

Two studies have considered resilience in the context of dealing with a major illness, namely cancer. Costanzo, Ryff, and Singer (2009) considered the psychological, social, emotional, and spiritual adjustment of individuals with a cancer diagnosis, relative to a demographically-matched comparison group of individuals without a major-illness diagnosis. Findings from this study indicated that although mental health (e.g., depression) worsened over time among cancer survivors compared to matched controls, cancer survivors were resilient in several other ways. Specifically, they showed comparable changes over time in mood, psychological well-being, social well-being and spirituality. Additional analyses also revealed that the impact of cancer diagnosis on depression, positive affect, and social actualization was more severe at younger ages, suggesting that older adults may be more resilient to the life challenge of dealing with a serious illness.

In a related study, Pudrovská (2010) examined changes in personal growth over time among cancer survivors and individuals without cancer, and considered differences between older and younger cohorts in these effects. Findings indicated that among the younger cohorts (early adulthood to middle age) cancer diagnosis resulted in relative increases in personal growth, as compared to individuals without cancer. However, among the older cohort (56–65 years at MIDUS I), changes in personal growth over time were no different than among controls, and among the oldest cohort (66–75 years at MIDUS I), personal growth showed greater decreases for cancer survivors than controls. These findings thus contrasted with the aforementioned finding reported by Costanzo et al. (2009) showing that older individuals are more resilient. Specifically, Pudrovská's findings suggest that at least with respect to changes in personal growth, it is younger individuals who fare better when faced with a cancer diagnosis. Pudrovská (2010) suggests that this may be because older individuals place less of an emphasis on personal growth and instead are more focused on maintaining continuity and stability.

Two recent papers have also considered resilience in the context of spousal loss. Ong et al. (2010) compared a sample of bereaved individuals, who had lost a spouse between waves I and II of MIDUS, to a demographically matched comparison group of continuously married individuals on levels of positive emotionality following loss. The authors also considered positive reappraisal – measured at baseline – as a moderator. As hypothesized, while spousal loss generally lead to decreases in positive emotions between MIDUS I and MIDUS II, individuals who reported higher levels of positive reappraisal in MIDUS I (conceptualized as a resilience factor) showed less of a decrease in positive emotions following the death of a spouse. Addressing conflicting theoretical perspectives, the authors considered whether loss of a spouse is more or less detrimental in a strained marital relationship. Findings on this point suggested that individuals reporting a more troubled spousal relationship at baseline were less adversely influenced by subsequent spousal loss. In a more recent analysis, Ong, Fuller-Rowell, Bonanno, and Almeida (2011) also found that spousal loss was predictive of subsequent diurnal cortisol dysregulation (a biomarker of hypothalamic pituitary adrenal (HPA) axis functioning), and that the effects of loss on positive emotion partially explained these effects. These findings support current theory and research on the link between emotional resilience and physical health.

Taken together, the studies in this section contribute to a wider literature on resilience in the context of specific life challenges, but they represent the mere beginnings of what is possible in MIDUS. For example, the impact of a wide range of other events which occurred between waves I and II of the MIDUS study could be considered, such as the death of a parent or child, separation or divorce from a spouse, or the loss of a job or home. Furthermore, a large number of other outcome measures and protective factors measured in the MIDUS study have not yet been considered. With respect to methodol-

ogy, the studies of cancer diagnosis and spousal loss illustrate longitudinal approaches to the study of resilience, which measure changes in outcomes between MIDUS I and MIDUS II as a function of exposure to specific stressors, while considering key variables measured prior to the onset of a given stressor as moderators of adjustment over time. The large nationally representative sample further allows these studies to select specific, demographically-matched comparison groups of individuals who were not exposed to the stressor under investigation. Given these strengths, it may be fruitful for future research to consider similar methodologies in relation to the various other possible stressors, outcomes, and protective factors measured in the MIDUS study.

Innovative Opportunities for Resilience Research in MIDUS

In considering the road ahead, we draw on unique strengths of the MIDUS samples and design to describe promising new directions. One opportunity pertains to the parallel study that has been conducted with a probability sample from Tokyo, Japan. Known as MIDJA (Midlife in Japan), this investigation affords a look at whether there are cultural differences in what facilitates resilience in the face of challenge. Our preceding summary has shown that sense of control and environmental mastery are among factors that contribute to resilience in the U.S. Such qualities reflect an independent construal of self, whereas Japan reflects interdependent construal of self and other relationships (Markus & Kitayama, 1991; Triandis, 1989). In the interdependent cultural context, social support and flexible adjustment of the self may have more protective effects (Morling, Kitayama, & Miyamoto, 2002; Weisz, Rothbaum, & Blackburn, 1984).

In addition, culture may influence how positive and negative emotions comprise resilience. In Eastern cultures, where dialectical beliefs about emotions are prevalent, a balance between moderate amounts of positive and negative emotion may be conducive to better health (Miyamoto & Ryff, 2011). Western resilience, in contrast, likely involves high levels of positive emotion combined with low levels of negative emotion. Finally, what is construed as significant life challenges may vary by culture. Philosophical traditions of Buddhism, Confucianism, and Taoism frame aging more positively in Eastern cultural contexts, such that the construction of it as a challenge to the individual may be more prominent in Western, independence-oriented contexts (Karasawa et al., 2011).

A further novelty of MIDUS is that it includes a national sample of twins of comparable age to the main sample respondents. The presence of twins affords unique opportunities to probe whether resilience reflects heritable characteristics. In addition, not included in our preceding examples, but open for future inquiry are investigations that wed the longitudinal survey data with laboratory studies of reactivity and recovery to experimental challenge. The MIDUS biomarker project included psychophysiological measures (heart-rate variability, heart-rate reactivity, beat-to-beat blood pressure, cortisol before and after challenge) collected during experimental challenges. Similarly, the affective neuroscience project included various measures of emotion regulation (task-related EEG, eyeblink startle response, *corrugator supercilli* EMG activity) during presentation of positive, neutral and negative emotional stimuli as well as task-related fMRI on a subsample of respondents. All such measures, along with data from the daily diary protocol (which includes four days of salivary cortisol, measured four times a day) afford unprecedented opportunities to investigate resilience in the context of real-time challenges. The longitudinal survey data can thus be linked to mechanistic processes involving reactivity and recovery in the brain and physiological systems in the body. MIDUS is thus uniquely positioned to illuminate both the larger picture of resilience (i.e., how it matters for health over time and for

whom, how it may vary by culture) as well as probe its underlying components (i.e., what neurobiological processes explain why some are able to withstand adversity better than others).

Returning to our guiding definition of resilience – namely, the maintenance, recovery of improvement in mental or physical health following challenge – we note that much of what was summarized above has not exploited the MIDUS longitudinal design to discern whether maintenance, recovery, or improvement are most strongly supported by the data. Fortunately the MIDUS data are publicly available, making opportunities to answer these questions as well as those noted above, open to all interested members of the scientific community. In discerning hands, MIDUS has the depth and breadth to contribute important advances to the science of human resilience.

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Short Biographies

Carol D. Ryff is Director of the Institute on Aging and Marie Jahoda Professor of Psychology at the University of Wisconsin-Madison. She received her Ph.D. in human development from the Pennsylvania State University. Her research has examined how psychological well-being varies by age, gender, socioeconomic status, ethnic/minority status, and cultural context as well as by the experiences, challenges, and transitions individuals confront as they age. Whether psychological well-being is protective of good physical health is a major interest, with ongoing longitudinal work linking well-being to biomarkers (neuroendocrine, inflammatory, cardiovascular) as well as neural circuitry. A guiding theme is human resilience – how some sustain well-being despite challenge or adversity. She has generated over 160 publications and her model of well-being has been translated to more than 30 different languages. She directs the MIDUS (Midlife in the U.S.) national study, which has become a major forum for studying health as an integrated biopsychosocial process. She is also Principal Investigator of MIDJA (Midlife in Japan), a parallel study to MIDUS, for which she received an NIH Merit Award.

Elliot Friedman earned his PhD in Behavioral Neuroscience from the University of Wisconsin-Madison, completed postdoctoral training in Neuroimmunology at the University of California, San Diego, and was recently a Robert Wood Johnson Health & Society Scholar at the University of Wisconsin. He will join the faculty of the Department of Human Development and Family Studies at Purdue University in the fall of 2012. Dr. Friedman is interested in the biological impact of social and psychological experiences, particularly the extent to which positive psychosocial functioning is linked to healthy profiles of biological processes in aging adults. He has published his research in the journals *Proceeding of the National Academy of Sciences*, *American Journal of Epidemiology*, *Journals of Gerontology*; *Psychological Sciences*, *Psychosomatic Medicine*, and *Health Psychology*.

Thomas Fuller-Rowell is Robert Wood Johnson Foundation Health & Society Scholar at the University of Wisconsin-Madison (2011–2013). He received his B.A. in biochemistry and psychology from the University of Colorado in 2003 with summa cum laude

honors, and his PhD from the Department of Human Development at Cornell University in 2010. He then worked as a postdoctoral researcher in the Institute for Social Research at the University of Michigan before starting his current position. His research focuses on the impact of social stress and discrimination on health and health disparities, and on identity development and resilience in the lives of negatively stigmatized adolescents and adults. His recent work has been published in a range of psychological and medical journals including *Psychological Science*, *Child Development*, *Developmental Psychology*, *Journal of Personality and Social Psychology*, *Psychoneuroendocrinology*, and the *Journal of Behavioral Medicine*. Dr. Fuller-Rowell worked for a civil rights organization in Buffalo, NY to address housing discrimination (2003–2004) and has implemented multi-site action research projects in New York City (2004–2006).

Gayle Love earned a Masters in Biology and a Ph.D. in Sociology from Texas A& M University and completed postdoctoral training in Mental Health at the University of Wisconsin–Madison. She has worked as a Researcher at the Institute on Aging at the University of Wisconsin for nearly 20 years. With training in both biology and sociology, she is able to cross disciplinary boundaries in helping to design and implement research that brings an integrative approach to community based studies of health and aging. Recent work includes comparative analysis of biomarker data in MIDUS and MIDJA, in particular markers of proinflammatory biology and glucoregulation and has appeared in *Brain, Behavior, and Immunity*, *Journal of Aging and Health*, *Health Psychology*, *Psychosomatic Medicine*.

Yuri Miyamoto is currently an Assistant Professor of Psychology at the University of Wisconsin–Madison. She received her Ph.D. from the University of Michigan and joined the faculty at the University of Wisconsin–Madison in 2006. Her research focuses on the interplay between cultural contexts and psychological processes by illuminating cultural differences in cognition and emotion and by elucidating proximal processes through which cultural contexts shape them. Her recent publications include work showing cultural differences in dialectical emotion regulation and their health correlates. Dr. Miyamoto's work has appeared in a variety of psychological journals, such as *Psychological Science*, *Journal of Personality and Social Psychology*, *Personality and Social Psychology Bulletin*, and *Emotion*.

Jennifer Morozink is currently a graduate student in the department of Psychology at the University of Wisconsin–Madison. She holds a BA in Psychology from Illinois Wesleyan University with *summa cum laude* honors and a MS in Psychology from the University of Wisconsin–Madison. A PhD in Biological Psychology from the University of Wisconsin–Madison is expected in May 2013. Her research interests involve socioeconomic inequalities in health, focusing on biological consequences and psychosocial factors that exacerbate or mitigate the adverse health effects associated with low socioeconomic status. Psychological well-being and anger have emerged as protective and detrimental, respectively, for the health of individuals with low socioeconomic status. She recently received a dissertation grant award from the Robert Wood Johnson Foundation to investigate mediating pathways underlying socioeconomic gradients in health, focusing on dysregulation of neuroendocrine axes and emotion regulation in particular.

Barry Radler received his B.S. in psychology and communications from the University of Wisconsin–Stevens Point, his M.A. in consumer psychology at Cleveland State University, and completed his Ph.D. in Mass Communication at the University of Wisconsin–Madison in 2000. With 20 years of experience in the behavioral sciences, Dr. Radler has a practical understanding of the realities involved in observation, measurement and analysis of behavioral phenomena. Dr. Radler possesses a wealth of experience in applying new technology to the survey research process. Prior to joining the UW–Madison

Institute on Aging, Dr. Radler implemented an Optical Character Recognition scanning system to automate data entry for a publishing company's readership surveys, and developed an online survey methodology for the UW Division of Information Technology by conducting a series of mode comparisons between mail and web surveys. Dr. Radler currently manages survey data collection for the MIDUS study (<http://www.midus.wisc.edu>) and is employing an XML metadata standard to develop web-based documentation for the study.

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Endnote

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