CHILDHOOD ADVERSITY AND SUCCESSFUL AGING


A Dissertation
Submitted to the Graduate Faculty
of the
North Dakota State University
of Agriculture and Applied Science


By

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In Partial Fulfillment of the Requirements
for the Degree of
DOCTOR OF PHILOSOPHY


Major Program:
Human Development
Option: Applied Gerontology


November 2017


Fargo, North Dakota

# North Dakota State University
## Graduate School

**Title**

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The Supervisory Committee certifies that this ***disquisition*** complies with North Dakota

State University's regulations and meets the accepted standards for the degree of

**DOCTOR OF PHILOSOPHY**

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**ABSTRACT**

Extant literature offers consensus regarding the long-term impacts of childhood adversity (CA) but its impact on successful aging is not well understood. The Midlife in the United States (MIDUS) study – a nationally representative sample including 1,017 adults 55-76 (Ryff et al., 2016) – did not include a measure of CA exposure for use in analyses. Two papers were developed for this dissertation. The first paper, *An effective measure of childhood adversity for use with older adults*, explored whether a cumulative CA measure that is effective for older adults could be developed using existing MIDUS questions. It provided a rationale for operationalization of CA for researchers and for creating a cumulative score of eight CA types. Distributions of individual items and the *CA score* were consistent with past studies using similar CA measures. The overall factor structure of the scale was consistent with previous research: 1) household dynamics (did not live with both biological parents until age 16, substance abuse in the home, financial distress, moved three or more times) and 2) child abuse and neglect (sexual assault, emotional abuse, physical abuse, emotional neglect). Consistent with the literature, *CA score* showed a significant negative association with life satisfaction and positive association with number of chronic conditions, and dose-response relationships with cumulative CA. This study demonstrated that *CA score,* created using existing MIDUS data, was an effective measure for use with older adults.

The second paper, *The impact of childhood adversity on successful aging for older adults*, examined the impact of *CA score* on successful aging for older adults, operationalized using eight dimensions of wellness. Results showed that CA affected successful aging decades later. Controlling for *age* and *gender*, hierarchical multiple regression showed a significant negative association between *CA score* and *emotional*, *physical*, *social*, *financial*, *environmental*,

and *spiritual* wellness as well as the cumulative *wellness index*, and no significant association with *intellectual* or *occupational* wellness. Prevention is the best way to address public health implications of CA. However, the present study provided insight into successful aging and can inform interventions that target adults for whom prevention of CA is not possible.

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# INTRODUCTION

The population of adults 65 and older in the United States is expected to double over the next four decades (from 46 million in 2014 to 98 million by 2060), or nearly one-fourth of the population (Mather, Jacobsen, & Pollard, 2015). Compared to previous generations, older adults today are becoming more racially and ethnically diverse, are working longer, and have lower rates of poverty (10% in 2014 compared to almost 30% in 1966; Mather et al., 2015). However, population trends can mask individual differences; older women who live alone are more likely to be experiencing poverty, as are Latina/o and African American older adults (Mather et al., 2015).

Increases in life expectancy are a major contributor to projections for tremendous growth in the number of adults 65 and older in the United States and across the globe (He, Goodkind, & Kowal, 2016; Strout & Howard, 2012). While life expectancy overall has been increasing (79 years in 2013, compared to 68 years in 1950) and the gap between men and women's life expectancy has narrowed, not all groups are seeing the same positive trends in life expectancy (Mather et al., 2015). Sasson (2016) found that education level had become a better predictor of life expectancy than gender or race. Whites with college-level education experienced gains in life expectancy from 1990-2010, but low-educated whites saw decreases of 0.6 years for men and 3.1 years for women (Sasson, 2016). Another major contributor to projections for population growth among older adults is that the Baby Boomers – the massive population cohort born between 1946 and 1964 in the United States and Europe due to increased birth rates after World War II – began to turn 65 in 2011 (Strout & Howard, 2012). Concerns about how to help adults experience healthy equity and good quality of life amidst aging-related changes are even more important on

the cusp of the largest population of older adults in human history (Bielderman, de Greef, Krijnen, & van der Schans, 2015; Tovel & Carmel, 2014).

It is important that we look beyond problems associated with aging and toward exploring pathways to successful aging (see Bülow & Söderqvist, 2014; Martin et al., 2015). However, the study of this topic is new and much is unknown about what leads to successful aging. A public health approach to successful aging seeks to advance health equity, in which all people are able to achieve the highest level of health (CDC, 2013). In circumstances where health equity exists, successful aging would be equally possible for every person. However, the reality is that the playing field of aging is not even for all adults, and subgroups of the population experience different determinants of health and health outcomes (CDC, 2013). The variations in these determinants result in a wide spectrum of risks, health, and quality-of-life outcomes (CDC, 2013; Commission on Social Determinants of Health, 2008).

A growing body of literature shows that traumatic experiences early in life influence our health as adults, contributing to the incidence of chronic disease, our aging experience, and health disparities (Alwin, 2012). Adverse experiences in childhood have long-lasting, negative repercussions across the life span and are significant contributors to disparate health outcomes (Anda et al., 2006; Lerner, Lewin-Bizan, & Warren, 2011). However, there is not a strong understanding of what impact experiences of childhood adversity have on successful aging or how to promote successful aging among those who have experienced childhood trauma. Given the powerful impact that traumatic experiences in early life have across the life span, it is critical that we develop a better understanding of the impact of childhood adversity on successful aging.

In my literature review, I first examined the literature about the negative impacts of childhood adversity (CA) across the life span. Second, I reviewed literature regarding successful

aging and wellness. Finally, I identified gaps in our understanding of how experiences of CA affect successful aging as an adult. In my research, I aimed to create a meaningful cumulative measure of CA for older adults using the secondary dataset known as MIDUS. Then, I used wellness theory to operationalize successful aging and explored the effects of CA on successful aging among older adults.

## LITERATURE REVIEW

### Childhood Adversity

The types of experiences that represent adversity in childhood are varied, and include parental psychopathology, abuse and neglect, and other negative life events (Cuijpers et al., 2011). Kalmakis and Chandler (2014) outlined a common conceptual meaning in their review of research about early traumatic experiences. Experiences of childhood adversity (CA): 1) had varying degrees of severity, 2) were more often chronic than isolated events, 3) occurred in a child's environment (family or social), 4) were harmful or caused distress, and 5) led to disruption of a child's development and physical or psychological health (Kalmakis & Chandler, 2014). Extant literature provides compelling evidence of the connections between early traumatic life experiences and outcomes in mid- and late-adulthood including morbidity and mortality (e.g., Anda et al., 2006; Braveman & Barclay, 2009) and quality-of-life indicators such as life satisfaction (Hughes, Lowey, Quigg, & Bellis, 2016; Krause, 2004; Nurius, Logan-Greene, & Green, 2012; Seery, Holman, & Silver., 2010) and well-being (e.g., Schafer, Ferraro, & Mustillo, 2011).

In various studies, experiences of CA have been associated with greater risk decades down the line for a wide variety of outcomes, including: diseases (e.g., cancer, lung disease, sexually transmitted diseases, autoimmune disease, respiratory issues, cardiovascular disease), risk factors for poor health (e.g., smoking, alcohol abuse, promiscuity, somatic symptoms, higher use of prescription drugs), mental health issues (e.g., depression, anxiety, poor anger control), sexual and reproductive health issues (e.g., early initiation of sex, unintended pregnancy), and social problems (e.g., relationship problems, risk of being a perpetrator or victim of domestic

violence) (see Anda et al., 2006; Corso, Edwards, Fang, & Mercy, 2008; Dube et al., 2009; Ducci et al., 2009; Tomasdottir et al., 2015; Wegman & Stetler, 2009).

In Anda et al.'s (2006) seminal longitudinal Adverse Childhood Experiences (ACE) study that began in 1995, the researchers found that negative early life experiences were prevalent in their study population and correlated strongly with negative health effects in adulthood. The ACE study assessed exposure to 10 adverse experiences among 17,337 adults 18 and older with health insurance in San Diego, CA (approximately 1/3 were age 65 and older): emotional, physical, and sexual abuse and physical and emotional neglect as well as household dysfunctions including alcohol or substance abuse, mental illness of a household member, domestic violence, criminal behavior of a household member, and parental separation or divorce (Anda et al., 2006; Felitti et al., 1998). The study found that ACEs were common; 64% experienced at least one and 13% experienced four or more (Anda et al., 2006; CDC & Kaiser, 2016). Physical abuse was most common (28%), followed by substance abuse in the household (27%) (Anda et al., 2006; CDC & Kaiser, 2016). Anda et al. (2006) created a cumulative score of the 10 ACEs they studied, and then assessed the relationship between this score and 18 different health outcomes representing multiple domains. Although their list included only a small number of the possible types of adversity that children experience, the researchers found a strong, graded relationship between the ACE score and negative repercussions across the life span (Anda et al., 2006). As the cumulative ACE score increased, disease prevalence and comorbidity increased as well (Anda et al., 2006).

Studies using other measures of CA found results consistent with the original ACE study. In a rare study assessing CA among youth, Finkelhor, Shattuck, Turner, and Hamby (2015) used National Survey of Children's Exposure to Violence 2014 data from children 10-17 and their

caregivers to explore measures of CA not included in the original ACE study (CDC & Kaiser, 2016). They found that peer victimization, peer rejection or isolation, and exposure to community violence were predictive of mental health issues and low socioeconomic status was a significant predictor of physical health issues for youth (Finkelhor et al., 2015). In their study of Philadelphia adults 18-97, Wade et al. (2016) explored the traditional stressors used in the original ACE study as well as a second set of stressors selected for their relevance to their urban community including racism, being a witness to violence, bullying, being in foster care, and unsafe neighborhoods. The traditional ACEs showed dose-response relationships for several outcomes as adults relating to health risk behaviors, mental health, and physical health (Wade et al., 2016). The expanded community-level stressors were associated only with two of the outcomes studied (substance abuse and sexually transmitted infections; Wade et al., 2016). The researchers posited that their study results reinforce the importance of family-level dynamics during childhood represented by the conventional ACEs, and of cumulative exposure (Wade et al., 2016).

Friedman, Montez, Sheehan, Guenewald, and Seeman (2015) used MIDUS data of adults 25-74 to explore whether the type of adverse childhood event, timing of event, or quantity of events was most strongly associated with cardiometabolic health as an adult. Their research confirmed the original ACE study's findings (Anda et al., 2006) that the dose-response relationship shown by a cumulative index of adverse experiences in childhood provided the most predictive value (Friedman et al., 2015). Chartier, Walker, and Naimark's (2010) analysis of Ontario Health Study data from respondents 15-98 found that the odds of multiple health problems, disability, poor self-rated health, and use of health professional and emergency room use increased with each additional adverse childhood experience reported.

**Mechanisms Explaining the Long-Term Impacts of Childhood Adversity**

Emerging areas of research contribute to our understanding of how childhood adversity produces lifelong impacts. Epigenetics provides insight into how traumatic experiences in childhood intersect with our genetic features (e.g., Buss & Greiling, 1999; Miller, Chen, & Parker, 2011). Neuroscience provides insight into how childhood adversity becomes embedded physiologically. The circuitry in our brains can be altered by stressful experiences, which can affect cognitive function as well as emotional regulation (McEwen & Morrison, 2013; Puterman & Epel, 2012). Teicher et al. (2003) studied the neurobiological manifestations that early stressful experiences have on the developing hippocampus, amygdala, corpus callosum and integration of the brain's hemispheres, the cerebellar vermis, and the cerebral cortex. These changes comprise "an alternative pathway of development" that can be considered adaptive to a malevolent environment (Teicher et al., 2003, p. 39). However, in a more benign environment, this altered development puts the individual at risk for serious physical and mental health disorders across the lifespan (Teicher et al., 2003).

Childhood adversity can disrupt the social, emotional, and cognitive competencies that lay the foundation for learning and productive economic participation (Corso et al., 2008). In the Netherlands, Cuijpers et al. (2011) analyzed a representative dataset of 7,076 adults ages 18-65 and used an algorithm to calculate a person's disability weight, or the severity of disease burden they carried, by assessing the presence of 31 mental and general medical disorders. Using measures of CA similar to the original ACE study, the researchers found that these adversities were associated with increased disease burden and accounted for a loss of 20.7 years of good health due to disability per 1,000 people (Cuijpers et al., 2011).

The mechanisms through which early adverse experiences exert a lifelong influence can operate indirectly, such as through less than optimal environments or coping mechanisms with negative health outcomes, but also can operate directly, such as through altered brain development and physiological changes created by toxic stress (Corso et al., 2008; Schafer & Ferraro, 2012; Schore, 2001). Research has shown that people with exposure to a modest level of adversity experience tolerable stress and have greater well-being (compared to those with high exposure and those with no exposure), and may be more resilient to life stressors as adults (Center on the Developing Child, 2007; Fossion et al., 2014; Seery et al., 2010). In contrast, with toxic stress, the body's stress response system remains activated, disrupting brain development and the development of other systems, and contributing to a greater risk of cognitive impairment and stress-related diseases into adulthood (Center on the Developing Child, 2007). Toxic stress can result in increased threat vigilance, mistrust of others, and poor self-regulation and people with high levels of adversity are at risk for more negative health, behavioral, and social outcomes (Brown et al., 2009; Center on the Developing Child, 2007; Miller et al., 2011; Seery et al., 2010). Toxic stress in childhood is more likely to result from high levels of adversity that are frequent, of longer duration, or of greater impact and that occur in the absence of support from a sufficiently caring adult (Center on the Developing Child, 2017).

The Biological Embedding of Childhood Adversity Model (Miller et al., 2011) posits that toxic stress occurring during critical developmental periods can result in chronic inflammation in the body that contributes to many aging-related diseases. Allostatic load refers to the body's physiological ability to maintain integrity in the face of cumulative strain over time (Tomasdottir et al., 2015). The physiological wear and tear on a body as it repeatedly experiences stressful experiences can eventually result in allostatic overload, when the body

loses its physiological adaptability and flexibility prematurely, and a body's ability to regulate may be overcome (Juster, McEwen, & Lupien, 2010; Tomasdottir et al., 2015). Allostatic overload is seen to be one of the mechanisms by which early adversity is embedded biologically (Tomasdottir et al., 2015).

In response to traumatic experiences, people differ substantially in who has pathological responses, how long symptoms persist, the intensity of symptoms, and how they try to pursue relief (Harvey, 2007). The differences reflect the complexity of the type of traumatic event (e.g., nature, chronicity, timing), social determinants of health (e.g., race, socioeconomic status), neurobiological factors, and various ecological factors (e.g., social networks, cultural and political contexts; Harvey, 2007). Relationships are considered a core determinant in how early life experiences, such as chaotic environments, physical threat, or persistent fear, are translated into neurobiology (Perry, 1997; Schore, 2001). Previous exposure to traumatic stress may cause additional stressful experiences to become overwhelming, sometimes disproportionately to the actual threat (Fossion et al., 2014). This underscores that people can be impacted differently by exposure to real-time stressors as a result of past experiences and that people with high levels of CA are more vulnerable to even greater negative effects (Puterman & Epel, 2012).

Unfortunately, early adversity has been shown to be associated with reduced life satisfaction over time and greater difficulty in achieving one's expectations for the future (Schafer et al., 2011). The effects of early adversity can be difficult to eradicate, demonstrating limitations of the power of human agency (Schafer et al., 2011). People may show resilience in some arenas of functioning in their lives and not others (Fossion et al., 2014). Acknowledging that trauma and its effects are multidimensional allows us to see that trauma survivors may be

both surviving and suffering, and that their level of functioning may look different depending on which aspect of their lives is being examined (Harvey, 2007).

**Research with Older Adults**

Much of the research with large, national samples included older adults. However, studies did not always include in-depth analyses for different ages. While the literature has been consistent on the lifespan impacts of CA, some studies of older adults have provided additional insight.

Li et al.'s (2015) analysis of data from the International Mobility in Aging Study of Canadian and Latin American adults ages 65-74 explores the relationship between CA and chronic inflammation (C-reactive protein). Inflammation can lead to cognitive and physical decline, and can be associated with an array of chronic conditions including cardiovascular disease, diabetes, arthritis, and autoimmune diseases (Li et al., 2015). The researchers found that childhood social adversity (substance abuse by a parent, witnessing domestic violence, experiencing physical abuse) was a predictor of chronic inflammation among Canadian older adults (Li et al., 2015). They posit that the lack of a similar association with Latin American samples could be an issue of selective survival (Li et al., 2015).

High ACE scores are associated with premature mortality (Anda, Butchart, Felitti, & Brown, 2010). Researchers followed the original ACE participants from 1995-1997 longitudinally through 2006 and subsequent mortality records showed that people with 6 or more ACEs died an average of nearly 20 years earlier than those without any ACEs (Anda et al., 2006; Brown et al., 2009). Corso et al.'s (2008) analysis of ACE study data found that personal assessments of health-related quality of life (HRQoL) among people who had experienced maltreatment in childhood showed a curvilinear pattern by age. The greatest losses in perceived

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HRQoL were among the youngest age group (ages 19-39) with smaller perceived losses for ages 40-49, 50-59, and 60-69, and an increase again in perceived losses for those ages 70 and older (Corso et al., 2008).

Studies focused on specific outcomes among older adults have found CA to be a significant predictor. For example. O'Rand and Hamil-Luker (2005) examined Health and Retirement Study data of respondents in their 60s and 70s for associations between childhood disadvantage and risk for heart attack as an older adult. The researchers found that childhood hardship was positively associated with increased risk for heart attack compared to other respondents (O'Rand & Hamil-Luker, 2005). In Poon and Knight's (2011) analysis of MIDUS data for respondents 60 and older, emotional abuse by parents during childhood was significantly associated with sleep issues in late adulthood. In Schafer and Ferraro's (2012) analysis of MIDUS data for respondents 25-74, greater childhood misfortune reduced the likelihood of avoiding disease in adulthood. While the researchers expected to find strong effects on disease prevalence among younger adults, they also found that the effect of childhood misfortune on disease prevalence was prevalent into later life (Schafer & Ferraro, 2012).

The wide-reaching effects of childhood trauma across the lifespan may be challenging for older adults as they handle the unique stressors that can accompany aging. Gerontologists use lifespan and life-course perspectives to understand the multidimensional, lifelong process known as aging (Fuller-Iglesias, Smith, & Antonucci, 2009). The lifespan perspective can be applied to look at the dynamic interactions between stressors and the allostatic load our bodies experience from conception through death (Puterman & Epel, 2012). The life-course perspective illuminates how our experiences shift according to age-related roles and are situated within the structural features of a society that impact an individual's outcomes (Dannefer, 2012). Together, the two

perspectives provide a framework for understanding the cumulative effects of early experiences and the direct links between early childhood and our experience of aging (Alwin, 2012; Braveman & Barclay, 2009).

## Successful Aging

Aging is multidirectional, involving gains and losses throughout life. Although individual aging trajectories are quite variable, observations of population trends can be illuminating. Normal changes associated with aging, or primary aging, occur in many different domains (Palgi, Shrira, & Zaslavsky, 2015). Changes occur at varying degrees and ages in: vision (e.g., diminished acuity, difficulty adapting to the dark), hearing (e.g., decreased sensitivity, more difficulty tuning out background noises), attention span (e.g., reduced), short-term memory (e.g., reduced), episodic long-term memory (e.g., poorer performance in retrieving specific events or contexts), and psychomotor skills (e.g., reductions in reaction time, ease of learning) (Hoyer & Verhaeghen, 2006; Kroemer, 2006; Mason, 2011). Some changes people may associate with primary aging, such as significant cognitive decline or development of cataracts, actually indicate a pathological condition and are better classified as secondary aging (Mason, 2011; Palgi et al., 2015). For the majority of older adults, it is not whether they will experience primary and secondary aging-related declines, but how much and for how long. Gerontologists continue to study how to achieve compression of morbidity, with the goal that aging adults can experience better health and delay the onset of disability or comorbidity of chronic health issues until increasingly older ages (Fries, Bruce, & Chakravarty, 2011).

Gerontologists also recognize aspects of aging that reflect stability or improvement, not just decline. Semantic long-term memory, which relates to general knowledge about the world accumulated over a lifetime, remains relatively stable with age (Hoyer & Verhaeghen, 2006).

Although fluid intelligence (our abstract reasoning skills) shows a decline, crystallized

intelligence (what we have learned through education and experience) continues to increase into

late adulthood (Mason, 2011). Many older adults see decreases in emotional reactivity, due to

changes such as improved conflict strategies and emotional processing (Birditt, Fingerman, &

Almeida, 2005). An overall shift among older adults away from maladaptive emotion regulation

techniques (e.g., thought avoidance, worry/rumination, self-criticism) also reflects a focus by

older adults toward more positive experiences (Schirda, Valentine, Aldao, & Prakash, 2016).

Much of the early research into aging focused on personal losses and declines in

functioning (Cárdenas & López, 2010). The concept of *successful aging*, first described by Rowe

and Kahn (1987), provided a welcome contrast to the study of aging in a negative light (Bülow &

Söderqvist, 2014). Though the concept has been around for a number of years, what constitutes

successful aging is still being studied and debated (Martin et al., 2015). Other articles provide an

excellent review of the history of the concept and of the work of scholars who have contributed

to our understanding of the topic (see Bülow & Söderqvist, 2014; Martin et al., 2015). I will

highlight some key aspects of the concept's evolution.

Rowe and Kahn (1997) focused on three components of successful aging: low risk of

disease, good functioning cognitively and physically, and active engagement with life (Rowe &

Kahn, 1997). A better label of Rowe and Kahn's (1998) definition may be "exceptional," in

contrast to "usual" aging (Martin et al., 2015). For someone living with a disease or a chronic

disability, Rowe and Kahn's (1998) conceptualization would preclude that person from being

able to age successfully. McLaughlin, Connell, Herringa, Li, and Roberts (2010) used the Health

and Retirement Study to examine prevalence of successful aging among adults 65 and older

using Rowe and Kahn's (1998) definition. In looking for respondents with no major disease, no

disability, strong cognitive functioning, and being actively engaged, McLaughlin et al. (2010) found that less than 12% of older adults could be identified as aging successfully, and that the odds of aging successfully were lower for males, people with low socioeconomic status, and people with advanced age.

However, many researchers acknowledge that pathology would not be an automatic disqualifier for high quality of life; death is inevitable and not in and of itself a failure to age successfully (Bülow & Söderqvist, 2014; Goodwin, 1991). Though geriatric and biogerontological inquiries into successful aging still emphasize good functioning, debate about what constitutes successful aging has continued. As the concept of successful aging continues to evolve, Martin et al. (2015) described more recent trends as seeking to integrate physical and psychosocial aspects of aging. Additional definitions of successful aging include considerations of physical and cognitive functioning, social functioning, and life satisfaction (Depp & Jeste, 2006; Pruchno, Wilson-Genderson, Rose, & Cartwright, 2010) and Selective Optimization with Compensation (Baltes & Baltes, 1990).

Baltes and Baltes' (1990) theory of Selective Optimization with Compensation (SOC) outlines a lifespan model of how successful aging can be achieved (Baltes & Dickson, 2001; Martin et al., 2015). People have finite amounts of resources and must reallocate resources when opportunities or losses occur (Baltes & Dickson, 2001). To do so, people use three primary strategies to navigate changes they face (Baltes & Dickson, 2001). In *selection*, people create and modify goals, as well as eliminate goals that are not attainable (Burnett-Wolle & Godbey, 2007). Sometimes the selection is elective and based on choice and other times it is based on losses, such as reductions in physical ability or financial resources (Baltes & Dickson, 2001; Burnett-Wolle & Godbey, 2007). In *optimization*, people build on and maximize the internal and external

resources available to them to achieve their goals more effectively (Baltes & Dickson, 2001; Burnett-Wolle & Godbey, 2007). Techniques to achieve optimization can include focus, timing, persistence, learning of new skills, and modeling after others (Burnett-Wolle & Godbey, 2007). In *compensation*, people adapt in order to find new ways to maintain the current level of functionality (Baltes & Dickson, 2001). This can be done externally, such as through hiring an assistant or adopting technology, or internally, such as through impression management (Baltes & Dickson, 2001; Burnett-Wolle & Godbey, 2007). Socioemotional selectivity theory (Carstensen, Fung, & Charles, 2003) is consistent with principles of SOC theory; prioritizing emotional goals and maximizing positive experiences can be seen as successful aging in action (Martin et al., 2015).

Social and psychological perspectives have focused their inquiries on how adults faced with major health challenges may still consider themselves to be aging successfully, and how people use strategies to help them deal with aging-related changes and achieve life satisfaction (Bülow & Söderqvist, 2014). Strawbridge et al.'s (2002) analysis of Alameda County Study data of adults ages 65-99 found that 50% of adults rated themselves as aging successfully compared to only 19% that met Rowe and Kahn's criteria; those self-identifying as aging successfully included many older adults with functional difficulties and chronic conditions. Qualitative and quantitative studies have shown that older people put more emphasis on psychosocial factors like attitude and engagement than on the presence of disease or disability (Gooding, Hurst, Johnson, & Tarrier, 2012; Reichstadt, Sengupta, Depp, Palinkas, & Jeste, 2010; Strawbridge, Wallhagen, & Cohen, 2002). Tendencies among older adults toward decreased emotional reactivity and a focus on more positive experiences may play an important role in successful aging, and may allow an older adult to self-assess as aging successfully when another person may judge that

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same situation to be incongruous with successful aging. Socioemotional selectivity theory (Carstensen et al., 2003) helps explain a positivity effect seen among older adults, in which our realization of time "running out" as we get older pushes our focus toward more immediate goals and increased preference for processing of positive emotions (Lynchard & Radvansky, 2012).

Studies have explored other multifaceted but hard-to-define concepts related to successful aging, such as quality of life (Bielderman et al., 2015). Like successful aging, quality of life looks beyond physical health to include mental health, affect, cognitive health, use of time, independence level, social relationships, and environmental characteristics (Bielderman et al., 2015; Hattie, Myers, & Sweeney, 2004; Lawton, 1991; Pavot & Diener, 1993). The preventive and corrective proactivity model (Kahana & Kahana, 1996) examines how good quality of life can be achieved by older adults facing stressors of aging, such as illness, loss of social connections, and poor person-environment fit (Martin et al., 2015). This model recognizes that older adults can leverage internal and external resources, which can in turn translate into adaptations that can help ameliorate challenges faced later in life and allow them to age successfully (Martin et al., 2015).

Another concept that interrelates with successful aging is life satisfaction. A person living with a disease or chronic illness would not meet Rowe and Kahn's (1997) original definition of successful aging, which includes good physical functioning. Measurements of life satisfaction, however, have shown that a person living with an illness may still show positive self-ratings and a strong sense of life satisfaction, further reinforcing definitions of successful aging that are not dependent on absence of disease (Bülow & Söderqvist, 2014). While everyone experiences physical and cognitive changes as they age, many are able to adapt to these changes, age successfully, and experience feelings of life satisfaction. Although agreement about what

constitutes successful aging is still being sought, the search to understand how to help people live

and age well continues. Wellness theory provides a framework by which to conceptualize

successful aging that is multidimensional and uses a strength-based lens.

**Wellness Theory**

Like aging, the study of wellness has transformed over time. In 1959, Dunn (as cited in

Kirkland, 2014) introduced the term wellness to reflect an approach to health that focused on

more than just not being ill (Swarbrick, 2006). A wellness approach to health is strength-based,

holistic, and seeks to capture the multidimensionality of aspects comprising well-being (Roscoe,

2009). These various individual dimensions are seen to operate synergistically and to be stronger

as a whole in equilibrium than when considered separately (Roscoe, 2009). Wellness is seen to

operate on a continuum, where greater wellness reflects movement toward optimal functioning,

as it relates to whatever optimal looks like for that particular individual (Roscoe, 2009). Some of

the more high profile applications of wellness theory have been in public health, on college

campuses, and in worksite wellness programs (Kirkland, 2014).

Although there is broad agreement that wellness is multifaceted, there is variability

regarding which dimensions are articulated and how each is described. In 1976, Dr. Bill Hettler

co-founded the National Wellness Institute and articulated a holistic approach to wellness

comprising six interconnected wellness dimensions: emotional, intellectual, occupational,

physical, social, and spiritual (National Wellness Institute, n.d.). Strout and Howard (2012) used

these six dimensions in their research with older adults about cognition. In the field of public

mental health practice, Swarbrick (2006) articulated a model using six dimensions that excluded

Hettler's occupational wellness and included environmental health. In its guide to wellness, the

Substance Abuse and Mental Health Services Administration (SAMHSA, 2016) kept

environmental health from Swarbrick's model (2006), kept Hettler's occupational dimension (Strout & Howard, 2012), and added an eighth dimension, financial wellness. The eight dimensions of wellness utilized by SAMHSA (2016) are: emotional, environmental, financial, intellectual, occupational, physical, social, and spiritual (see Figure 1).



*Figure 1.*  Eight Dimensions of Wellness (SAMHSA, 2016).

Another holistic approach to wellness is the Wheel of Wellness theoretical model that assesses healthy functioning across 16 dimensions (Myers, Sweeney, & Witmer, 2000). Although the model seems dissimilar from SAMHSA's (2016) wellness model at first glance, Hattie et al. (2004) analyzed the factor structure of the 16 dimensions and identified five factors: creative self, coping self, social self, essential self, and physical self. There is a degree of

consistency in what constitutes core dimensions of wellness despite different names for the dimensions. Based on SAMHSA's (2016) descriptions of its eight wellness dimensions, coping self relates well to emotional wellness, social self to social wellness, essential self to spiritual wellness, and physical self to physical wellness (Hattie et al., 2004). The remaining dimension, creative self, is described in terms that appear to encompass the intellectual and emotional wellness components (Hattie et al., 2004; SAMHSA, 2016).

There is evidence that an accumulation of a variety of different possible protective factors can improve outcomes. In research with adolescents regarding 40 developmental assets and a variety of risk-taking behaviors, Leffert et al. (1998) found that a greater number of developmental assets was predictive of fewer risk behaviors. Research by Pashak, Hagen, Allen, and Selley (2014) shows that a framework relating level of developmental assets to thriving behaviors is predictive for young adults as well. In research on cognitive impairment among aging adults, multidimensional wellness was seen to be more protective than wellness in a single area (Strout & Howard, 2012). Wellness dimensions are seen to operate synergistically and reflect a continuum of movement toward an individual's perception of optimal functioning (Roscoe, 2009).

**Wellness as a Holistic Representation of Successful Aging**

When reviewing the literature about successful aging and related concepts like life satisfaction and quality-of-life, several core elements are articulated that map well to the eight SAMHSA (2016) dimensions. Researchers continue to explore and refine the concept of successful aging and articulate aspects of well-being that in turn correspond to wellness dimensions. Crowther, Parker, Achenbaum, Larimore, and Koenig (2002) expanded Rowe and Kahn's model to include positive spirituality. A multidimensional model developed by Iwamasa

and Iwasaki (2011) through an ethnographic grounded-theory approach found five areas of functioning necessary for successful aging: physical, psychological, cognitive, social, spiritual, and financial.

Thus, the literature provides evidence of the importance of each of these dimensions to successful aging and related concepts, even though the researchers are not explicitly referencing this framework (SAMHSA, 2016). For example, research shows positive correlations between life satisfaction and the domains of health, job, income, and leisure time, as well as with demographics (such as education, age, and income), subjective health, physical activity, positive affect (such as happiness and general mood and absence of anxiety or depression), psychological flourishing (eudemonic well-being including social relationships, sense of meaning, and feelings of competence), presence of family support and other close personal relationships, religious beliefs, and involvement in one's community (Beutel, Glaesmer, Wiltink, Marian, & Brähler, 2010; Cheung & Lucas, 2014; Inaba, Wada, Ichida, & Nishikawa, 2015; Kim & Sok, 2012; Krause, 2004; Moody & Sasser, 2012; Skarupski, Fitchett, Evans, & Mendes de Leon, 2013; Wagnild, 2003).

The concept of wellness provides a fascinating lens with which to look at successful aging and related concepts such as quality of life, well-being, life satisfaction, and resiliency. Table 1 provides examples of how aspects of extant literature about successful aging and related concepts crosswalk with the eight dimensions of wellness framework. Although there is not consistency in terms of what concepts are called, important patterns emerge regarding aspects that are associated with "doing well" as an aging adult. Wellness theory provides a compelling framework by which to organize these common aspects.

Table 1

*Summary of Literature on Successful Aging Organized by Wellness Dimensions*

| Wellness Dimension (SAMHSA, 2016) | Description (SAMHSA, 2016) | Reference in the literature re. successful aging (SA) and related concepts [quality of life (QoL), well-being (WB), life satisfaction (LS), resiliency (R)] |
|---|---|---|
| Emotional | Effective coping skills and ability to create satisfying relationships | SA: personal strategies, positive emotion regulation strategies, intrapersonal reserves such as optimism and self-esteem, strong coping skills, psychological health (Bennett, Buchanan, Jones, & Spertus, 2015; Birditt & Fingerman, 2005; Bülow & Söderqvist, 2014; Iwamasa & Iwasaki, 2011; Mayordomo, Viguer, Sales, Satorres, & Meléndez, 2016; Puterman & Epel, 2012; Reichstadt, Sengupta, Depp, Palinkas, & Jeste, 2010); QoL: psychological well-being, mental health, positive/negative affect (Bielderman et al., 2015; Lawton, 1991); WB: psychological concept, affective component (Hattie et al., 2004; Pavot & Diener, 1993); LS: positive affect, eudemonic well-being/feelings of competence, personality traits (Cheung & Lucas, 2014); R: dealing with stress, resolving own problems, psychological factors, disposition, personality traits, optimism (Chaitin et al., 2013; Nishi et al., 2013; Puterman & Epel, 2012; Schure, Odden, & Goins, 2013; Smith & Hollinger-Smith, 2015; Smith-Osborne & Bolton, 2013; Thomas, 2012; Wagnild, 2003; Wiles, Wild, Kerse, & Allen, 2012) |
| Environmental | Good health involves having pleasant environments that are stimulating and support well-being | SA: housing fit (Martin-Matthews, 2011); QoL: environmental characteristics, objective environment (Bielderman et al., 2015; Lawton, 1991; Wahl, Iwarsson, & Oswald, 2012); R: ecological constructs (e.g., a supportive environment; Smith-Osborne & Bolton, 2013; Wiles et al., 2012); LS: housing, living conditions, neighborhood domain (Beutel et al., 2010; Cheung & Lucas, 2014) |
| Financial | Satisfaction with financial situation, current and future | SA: tangible reserves such as money and a vehicle, wealth and class, financial security (Bennett et al., 2015; Iwamasa & Iwasaki, 2011; Martin-Matthews, 2011); WB: adequate financial resources (Moody & Sasser, 2012; Wagnild, 2003); LS: income (Cheung & Lucas, 2014) |
| Intellectual | Utilizing creativity and looking for ways to expand knowledge and abilities | SA: good cognitive functioning, actively engaged with life, sense of personal growth, learning (Chen, 2016; Fisher, 1995; Iwamasa & Iwasaki, 2011; Menec, 2003; Rowe & Kahn, 1997); WB: adequate educational resources (Fernández-Ballesteros et al., 2012; Moody & Sasser, 2012; Wagnild, 2003); LS: leisure time (Beutel et al., 2010; Cheung & Lucas, 2014) |
| Occupational | Sense of satisfaction and enrichment from work | QoL: involves use of time (Lawton, 1991); WB: unemployment risk factor (Beutel et al., 2010); LS: work domain, occupational status and prestige (Boehm, Chen, Williams, Ryff, & Kubzansky, 2015; Cheung & Lucas, 2014) |

Table 1. *Summary of Literature on Successful Aging Organized by Wellness Dimensions* (continued)

| Wellness Dimension (SAMHSA, 2016) | Description (SAMHSA, 2016) | Reference in the literature re. successful aging (SA) and related concepts [quality of life (QoL), well-being (WB), life satisfaction (LS), resiliency (R)] |
|---|---|---|
| Physical | Understanding the importance of physical activity, eating well, and adequate sleep | SA: low risk of disease, good functioning physically, physical exercise (Iwamasa & Iwasaki, 2011; Rowe & Kahn, 1997; Wagnild, 2003); QoL: physical mobility, independence level (Bielderman et al., 2015); LS: health domain (Cheung & Lucas, 2014); R: biological plasticity, health (Smith & Hollinger-Smith, 2015; Wagnild, 2003) |
| Social | Developing a sense of connectedness and belonging and having a strong support system | SA: close personal relationships, involved in community, social support, socialization (Bennett et al., 2015; Iwamasa & Iwasaki, 2011; Martin-Matthews, 2011; Wagnild, 2003); QoL: social relationships, dimensions, interaction (Bielderman et al., 2015; Garre-Olmo et al., 2012; Lawton, 1991); WB: adequate social resources, lack of social integration (Beutel et al., 2010; Moody & Sasser, 2012; Seeman, 2000; Wagnild, 2003); LS: family support, other close relationships, involvement in and support from community (Inaba et al., 2015; Kim & Sok, 2012; Krause, 2004); R: social factors, relational patterns, social competence, strong family and social networks, social resources (Nishi et al., 2013; Puterman & Epel, 2012; Smith & Hollinger-Smith, 2015; Smith-Osborne & Bolton, 2013; Wagnild, 2003; Wiles et al., 2012) |
| Spiritual | Experiencing a strong sense of life purpose and meaning | SA: sense of purpose (Fisher, 1995); WB: religious beliefs, positive spirituality (Crowther et al., 2002; Hayward, Owen, Koenig, Steffens, & Payne, 2012; Jung, 2017; Moody & Sasser, 2012); LS: eudemonic well-being (e.g., sense of meaning), religious beliefs (Cheung & Lucas, 2014; Skarupski et al., 2013); R: how one faces the world, personal beliefs and values, spiritual influences (Smith-Osborne & Bolton, 2013; Wagnild, 2003; Wiles et al., 2012) |

## Summary

Extant literature shows the significance of early traumatic experiences across the lifespan. The literature provides rich illustrations of the critical contributions of successful aging research to the field of gerontology, but also shows that it is not yet conceptually well-integrated. Extant literature reinforces that wellness theory can capture the multidimensionality and interconnectedness of successful aging. However, while we know CA impacts health and well-being into adulthood, little has been done to explore the impact of CA on successful aging as operationalized by a multidimensional framework like wellness theory. As the population lives longer, successful aging would ideally be equally achievable by everyone. However, the research

on CA provides particular insight into how the path to successful aging can be disrupted very early in our development, making the path to successful aging more difficult to achieve for some than for others.

The nationally representative Midlife in the United States Survey (MIDUS) includes variables that can be used to operationalize CA as well as successful aging. Although various publications using MIDUS data included variables that represent CA in their analysis (e.g., Ferraro, Schafer, & Wilkinson, 2016; Friedman et al., 2015; Gruenewald et al., 2012; Jung, 2017; Savla et al., 2013; Schafer et al., 2011; Turiano, Silva, McDonald, & Hill, 2017), there has not been consistency on which or how many measures should be included or whether a cumulative measure of CA, in keeping with the original ACE study, should be created and used. Research has shown that a cumulative measure of multiple ACEs is predictive of many negative outcomes, and is not limited to the specific adversities included in the original ACE study (CDC & Kaiser, 2016; Institute on Aging, 2011; Schafer et al., 2011; Schilling, Aseltine Jr., & Gore, 2007).

My research addressed a gap in the literature regarding how to create a meaningful measure of cumulative CA for older adults using the secondary MIDUS dataset as well as a gap in our understanding of how CA affects the multidimensional concept of successful aging. This research addressed two research questions. First, can I create an effective cumulative childhood adversity (CA) score for use with older adults (55-76) using nationally representative MIDUS Refresher survey data? Second, what is the impact of childhood adversity on successful aging for older adults?

# ARTICLE 1: AN EFFECTIVE MEASURE OF CHILDHOOD ADVERSITY FOR USE WITH OLDER ADULTS

## Abstract

The present study aimed to demonstrate that a cumulative measure of childhood adversity (CA) that is effective for older adults could be created using retrospective data from the Midlife in the United States (MIDUS) study (Ryff et al., 2016). The MIDUS data were collected from 2011 through 2014 using telephone interviews and follow-up mail questionnaires from 1,017 adults 55-76. The present study provided a rationale for creating a measure of CA representing the cumulative number of types of CA experienced during their childhood. The distribution of the individual items selected in this study and the cumulative *CA score* created by summing the eight types of CA were consistent with findings from past studies using similar measures of CA. The factor structure of the cumulative CA measure, which operated similarly to the original ACE study, included two factors comprising four items each: household dynamics and child abuse/neglect. The cumulative measure of CA was consistent with literature predicting a negative association with life satisfaction and a positive association with number of chronic conditions. MIDUS does not currently offer a concise measure of CA exposure although the literature has provided compelling evidence that experiences of CA have affects across the life span. This study demonstrated that an effective *CA measure* could be created that would be of value to other studies using MIDUS data.

## Introduction

A growing body of literature provides compelling evidence of how early traumatic experiences have long-lasting repercussions across the life span, influencing our health as adults, the incidence of chronic disease, and quality-of-life indicators such as life satisfaction and well-

being (e.g., Alwin, 2012; Anda et al., 2006; Braveman & Barclay, 2009; Schafer, Ferraro, & Mustillo, 2011). Understanding early traumatic experiences has become instrumental to public health efforts to address the root causes of health disparities (Braveman & Barclay, 2009; CDC, 2013). Childhood adversities include abuse and neglect, parental psychopathology, and other stressful life events (Cuijpers et al., 2011). In research across numerous study populations, measures of greater childhood adversity (CA) have been associated with a wide variety of outcomes, including: diseases (e.g., cancer, autoimmune disease, respiratory issues), mental health challenges (e.g., depression, anxiety, emotion regulation, poor life satisfaction), and comorbidity of various physical and mental health conditions; behavioral health risk factors (e.g., smoking, alcohol abuse, promiscuity); sexual and reproductive health issues (e.g., unintended pregnancy); and social problems (e.g., being a perpetrator or victim of domestic violence) (e.g., Anda et al., 2006; Corso, Edwards, Fang, & Mercy, 2008; Dube et al., 2009; Ducci et al., 2009; Hughes, Lowey, Quigg, & Bellis, 2016; Tomasdottir et al., 2015; Wegman & Stetler, 2009).

The seminal Adverse Childhood Experiences (ACE) study conducted from 1995 to 1997 examined adverse experiences in childhood reported retrospectively by 17,337 adults 18 and older (approximately 1/3 were 65 and older) with health insurance in San Diego, CA (Anda et al., 2006; CDC & Kaiser, 2016; Felitti et al., 1998). These 10 ACEs were emotional, physical, and sexual abuse and emotional and physical neglect as well as household dynamics including alcohol or substance abuse in the home, mental illness of a household member, domestic violence, criminal behavior of a household member, and parental separation or divorce (Anda et al., 2006; CDC & Kaiser, 2016; Dong et al., 2004). The study found that ACEs were common; 64% experienced at least one and 13% experienced four or more (Anda et al., 2006; CDC & Kaiser, 2016). The researchers created a cumulative score of the 10 ACEs and found a strong,

graded relationship between the ACE score and 18 different health outcomes representing multiple domains (Anda et al., 2006; CDC & Kaiser, 2016). As the cumulative ACE score increased, disease prevalence and comorbidity increased as well (Anda et al., 2006). High ACE scores have also been associated with premature mortality (Anda, Butchart, Felitti, & Brown, 2010). Longitudinal analysis through 2006 of mortality records of the original ACE participants from 1995-1997 found that people with six or more ACEs died an average of nearly 20 years earlier than those without any ACEs (Brown et al., 2009).

Friedman, Montez, Sheehan, Guenewald, and Seeman (2015) used the nationally representative MIDUS dataset to explore whether the type of adverse childhood event, timing of event, or quantity of events was most strongly associated with cardiometabolic health as an adult. Their research replicated the dose-response relationship seen with the original ACE study cumulative score (Anda et al., 2006; CDC & Kaiser, 2016) provided the most predictive value (Friedman et al., 2015). In their study of Philadelphia respondents ages 18-97 years, Wade et al. (2016) used the original 10 ACEs (Anda et al., 2006; CDC & Kaiser, 2016) and added experiences including racism, being a witness to violence, bullying, being in foster care, and unsafe neighborhoods. For the original 10 ACEs, the researchers found dose-response relationships consistent with the original ACE study (Anda et al., 2006; CDC & Kaiser, 2016). The additional factors, which they labeled community-level stressors, were not as strongly associated with health outcomes, which the researchers concluded reinforced the importance of family-level dynamics during childhood (Wade et al., 2016). Finkelhor, Shattuck, Turner, and Hamby's (2015) analysis of National Survey of Children's Exposure to Violence data also explored additional measures of CA. They found that bullying, isolation from peers, and

exposure to community violence predicted mental health issues while low socioeconomic status predicted physical health issues (Finkelhor et al., 2015).

The nationally representative MIDUS Refresher study is a rich dataset providing opportunities for researchers to explore a broad array of issues of importance to adults. Using this secondary dataset, researchers interested in the long-reaching impacts of CA, however, must use existing questions to operationalize CA rather than designing a questionnaire to their own specifications. Researchers have selected a variety of existing MIDUS Refresher measures to operationalize experiences of CA, which have been used independently or as a cumulative score in various publications using MIDUS data to represent CA in their analyses (e.g., Ferraro, Schafer, & Wilkinson, 2016; Friedman et al., 2015; Gruenewald et al., 2012; Jung, 2017; Savla et al., 2013; Schafer et al., 2011; Turiano, Silva, McDonald, & Hill, 2017). Extant literature has shown that a cumulative measure of CA is an important research variable because it is predictive of negative outcomes; furthermore, these results occur even when variables other than those in the original ACE study are used (CDC & Kaiser, 2016; Institute on Aging, 2011; Schafer et al., 2011; Schilling, Aseltine Jr., & Gore, 2007). The literature does not show, however, a consistent rationale regarding which or how many measures to use, or for creating a cumulative measure (Anda et al., 2006; CDC & Kaiser, 2016). The literature does not offer a consistent rationale of how variables were chosen, how a cumulative index was created, and how the index should function. Although the long-reaching impact of CA has been documented (e.g., Alwin, 2012; Anda et al., 2006; Braveman & Barclay, 2009; Schafer et al., 2011), the literature offers fewer examples of the use of a cumulative CA score specifically among older adults.

**Present Study**

The research question for this study addressed this gap in the literature, and explored how to create a cumulative measure of CA that is effective for older adults using the secondary MIDUS Refresher dataset. The present study had two primary objectives to address this question. The first was to create a cumulative *CA score* for older adults (ages 55-76) using MIDUS data and to explore its factor structure. The second was to further establish convergent construct validity of the scale by demonstrating consistency with the ACEs literature regarding previous findings that *CA score* is an effective measure in predicting life satisfaction and experience of chronic conditions (e.g., Anda et al., 2006; Hughes et al., 2016; Tomasdottir et al., 2015). In these studies, cumulative *CA score* was inversely related to *life satisfaction*. In addition, cumulative *CA score* was positively related to number of *chronic conditions*.

## Methods

**Sample and Design**

The sample for this study comes from the National Survey of Midlife Development in the United States (MIDUS) Refresher collected from 2011-2014 (Lein, 2015). Two independent national probability samples of non-institutionalized, English-speaking adults ages 25-54 and 55-75 in the United States were conducted utilizing a landline random digit dialing sample, a random cell phone sample, and an age-targeted sample with the goal of recruiting participants evenly distributed by gender and age groups (Lein, 2015). A small number of participants who slightly exceeded the target age range (slightly younger and slightly older) for the study were included in the dataset (Ryff et al., 2015a). A total of 3,577 adults completed the initial telephone interview, and 2,600 completed the follow-up mail questionnaire (Lein, 2015). Data were analyzed using a weight variable calculated by the Inter-university Consortium for Political and

Social Research as a combination of a sample-design weight and a post-stratification weight to align with distributions from the U.S. Census Bureau's Current Population Survey (Palit, Radler, & Lein, 2016). With the weight and filter applied, the valid N for analysis of all participants who completed the phone and mail questionnaires was 2,542. Because extant literature shows early mortality among adults with the highest ACE scores (Brown et al., 2009), the definition of "older adults" in the present study was determined to be ages 55-76. In the sample, 1,017 (40%) were older adults ages 55-76.

**Independent Variables**

*Childhood adversity (CA)*

The MIDUS Refresher survey (Ryff et al., n.d.-a, n.d.-b, 2015b) did not include a section designed as a questionnaire for identifying adverse childhood experiences. However, many variables were available from the phone and self-administered questionnaires that captured traumatic experiences in childhood. In selecting variables for the present study, the original 10 ACE items served as a point of departure (CDC & Kaiser, 2016). Another reference point was other studies using MIDUS data (i.e., from the Refresher study or one of the previous MIDUS studies) to explore childhood adversities. Extant literature using other operationalizations of CA was also consulted. Some researchers used school-related variables (i.e., dropping out, being suspended or expelled, or flunking out) or being sent away from home because of doing something wrong (e.g., Friedman et al., 2015; Schilling et al., 2007). These variables were not included in the present study to capture CA because these issues could be causes of CA as well as outcomes of CA (e.g., as the result of altered physiology, brain development, and coping mechanisms; Hébert, Langevin, & Oussaïd, in press) related to behaviors that traumatized children display. Another example was research that included a respondent having had poor

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physical or mental health at age 16 as a measure of CA (e.g., Turiano et al., 2017). Health issues

in childhood and adolescence can also be associated with traumatic experiences and exposure to

toxic stress (e.g., Buske-Kirschbaum et al., 2013; Goldsmith, Chesney, Heath, & Barlow, 2013;

Shapiro & Nguyen, 2010), and could be confounding variables as they may represent causes of

childhood adversity as well as potential symptoms or outcomes of traumatic experiences.

Table 2 presents the variables selected to capture CA in the present study. The various

MIDUS variables were recoded to create eight dichotomous CA domains (with a "1" indicating

the presence of this CA for the individual). The variables are described as representing a standard

ACE variable, an adapted version of a standard ACE variable, or a non-standard ACE variable.

The variables are categorized according to the factors described within the original ACE study:

household challenges, child abuse, and child neglect (CDC & Kaiser, 2016).

There were existing MIDUS variables that could closely capture several of the standard

ACEs (CDC & Kaiser, 2016; Dong et al., 2004). For example, the standard ACE item for

emotional abuse was, "How often did a parent, stepparent, or adult living in your home ever

swear at you, insult you, or put you down?" and "How often did a parent, stepparent, or adult

living in your home act in a way that made you afraid that you might be physically hurt?" (Dong

et al., 2004). Participants who responded "often" or "very often" to either question were marked

positive for emotional abuse in childhood (Dong et al, 2004). In the present study, the MIDUS

Refresher variables used to capture emotional abuse described similar experiences (Ryff et al.,

n.d.-b) and responses of "often" were marked as a positive for this CA. Other researchers using

MIDUS data included some of the same CA variables in their analyses but treated them

differently. For example, some researchers (e.g., Jung, 2017; Savla et al., 2013; Schafer et al.,

2011) included physical abuse or emotional abuse during childhood perpetrated by a sibling. In

order to maintain consistency with the standard ACE questions, abuse by parents or parental figures was the focus for capturing physical and emotional abuse and emotional neglect and sibling data were not utilized. Through these processes, four of the standard ACE variables were operationalized very similarly for the present study (i.e., substance abuse in the home, emotional abuse by an adult in the home, physical abuse by an adult in the home, and emotional neglect by an adult in the home). There were no variables available to represent the standard ACE domains of domestic violence in the home, mental illness in the home, having a parent who was incarcerated, or physical neglect.

For two additional ACEs (i.e., parents separated or divorced, sexual abuse; CDC & Kaiser, 2016; Dong et al., 2004), adapted versions were creating using MIDUS variables that captured the intent of the standard ACEs (i.e., did not live with both biological parents until age 16, sexual assault). Other researchers used MIDUS variables representing parental divorce, death of a parent, or lacking a male head of household (e.g., Ferraro et al., 2016; Schafer et al., 2011; Turiano et al., 2017). However, in the present study, the variable *did not live with both biological parents until age 16* was selected to represent a CA because it reflected considerations of disrupted child-adult relationships and strain in the household that could contribute to toxic stress. Additionally, this variable comprises the other circumstances (i.e., death of a parent, separation, divorce, adoption, and other factors) and is thus a more comprehensive measure (Ryff et al., n.d.-b). For the other adapted standard ACE, the MIDUS variable capturing whether a respondent experienced *sexual assault* before the age of 18 was selected. This CA was included even though its more narrow definition compared to the standard ACE variable of childhood sexual abuse (Ryff et al., n.d.-b) provided a smaller prevalence of this type of CA for the present study.

Though the original ACE questionnaire continues to serve as a reference point for research, the CDC's (2016a) ongoing Behavioral Risk Factor Surveillance System (BRFSS) developed slightly modified questions and included nine ACEs for their ACE module (i.e., removal of emotional and physical neglect, separation of alcohol abuse from drug abuse). Many studies in the two decades since the original ACE study have used different operationalizations of CA and have shown that the power of the ACE study was in its use of a cumulative measure of CA rather than in exactly which measures were selected (e.g., Anda et al., 2006; Friedman et al., 2015; Wade et al., 2016). For the selection of additional childhood adversities not included in the standard ACE questionnaire, MIDUS variables were utilized that captured other experiences that could contribute to toxic stress in a household (Corso et al., 2008; Schore, 2001). Financial distress (e.g., Gruenewald et al., 2011; Schafer & Ferraro, 2012; Schilling et al., 2007) and frequent moves (e.g., Institute on Aging, 2011; Oishi & Schimmack, 2010) can cause or reflect significant stress in the household. Though other researchers using MIDUS data included some of the same financial distress variables in their analyses, they treated them differently. For example, Schafer et al. (2011) looked at receipt of welfare and being worse off financially separately, and gave each a count of one in their cumulative CA score. In the present study, these two experiences were combined with that of having a parent who was unemployed but wanted to be working as a collective measure of financial distress. The financial distress measure in the present study was a single measure where a person who experienced one, two, or all three of these aspects of financial distress was coded positively for this CA.

Furthermore, some non-standard CA operationalizations used in other studies were not selected for the present study. One key example was parental low education as a measure of family strain (Schafer et al., 2011). Education levels have consistently risen over the past several

decades, so educational achievement compared to one's peers would be a more appropriate

measure of strain for a household when the sample crosses many cohorts (National Research

Council, 2004). However, because the MIDUS questionnaire captured an individual's absolute

level of education it did not serve as a meaningful measure of CA for this study of older adults

and was excluded. The resulting list of eight types of CA is summarized in Table 2.

Table 2

*MIDUS Refresher Questionnaire Items Selected to Represent Childhood Adversities*

| ACE Study Area | Type of ACE Question | Childhood Adversity (CA) Type | Items (Ryff et al., n.d.-a, n.d.-b, 2015b) |
|---|---|---|---|
| Household dynamics | Adapted standard ACE | Not bio parents until 16 | "Did you live with both of your biological parents up until you were 16?" Response: Yes, **No**[a] |
| Household dynamics | Standard ACE | Substance abuse in home | "Experiences you have had as a child or teenager: One or both parents drank so often it caused problems." Response: Checked box - and it happened **<18 years of age** <br> OR <br> "Experiences you have had as a child or teenager: One or both parents used drugs so often it regularly caused problems." Response: Checked box - and it happened **<18 years of age** <br> OR <br> "When you were growing up, that is during your first 16 years, did you live with anyone who was a problem drinker or alcoholic?" Response: **Yes**, No |
| Household dynamics | Non-standard ACE | Financial distress | "Experiences you have had as a child or teenager: Father or mother did not have a job when they wanted to be working." Response: Checked box - and it happened **<18 years of age** <br> OR <br> "During your childhood and adolescence, was there ever a period of six months or more when your family was on welfare or ADC?" Response: **Yes**, No <br> OR <br> "Thinking back to your family's financial situation when you were growing up, was your family better off or worse off financially than the average family was at that time?" Response: A lot better off, Somewhat better off, A little better off, Same as average family, A little worse off, **Somewhat worse off, A lot worse off** |
| Household dynamics | Non-standard ACE | Moved frequently | "When you were growing up, how many times did you move to a totally new neighborhood or town?" Response: numerical range from 0 to 96; scores of **3 or more times** |

Table 2. *MIDUS Refresher Questionnaire Items Selected to Represent Childhood Adversities* (continued)

| ACE Study Area | Type of ACE Question | Childhood Adversity (CA) Type | Items (Ryff et al., n.d.-a, n.d.-b, 2015b) |
|---|---|---|---|
| Child abuse | Adapted standard ACE | Sexual assault | "Experiences you have had as a child or teenager: Sexually assaulted (e.g., forced sexual intercourse or other unwanted sexual contact)." Response: Checked box - and it happened **<18 years of age** |
| Child abuse | Standard ACE | Emotional abuse | "When you were growing up, how often did your mother, or the woman who raised you, insulted you or swore at you; sulked or refused to talk to you; stomped out of the room; did or said something to spite you; threatened to hit you; smashed or kicked something out of anger?" Response: **Often**, Sometimes, Rarely, Never OR "When you were growing up, how often did your father, or the man who raised you, insulted you or swore at you; sulked or refused to talk to you; stomped out of the room; did or said something to spite you; threatened to hit you; smashed or kicked something out of anger?" Response: **Often**, Sometimes, Rarely, Never |
| Child abuse | Standard ACE | Physical abuse | Physical abuse: "When you were growing up, how often did your mother, or the woman who raised you, pushed, grabbed, or shoved you; slapped you; threw something at you?" Response: **Often**, Sometimes, Rarely, Never OR Physical abuse: "When you were growing up, how often did your father, or the man who raised you, pushed, grabbed, or shoved you; slapped you; threw something at you?" Response: **Often**, Sometimes, Rarely, Never OR Severe physical abuse: "When you were growing up, how often did your mother, or the woman who raised you, kicked, bit, or hit you with a fist; hit or tried to hit you with something; beat you up; choked you; burned or scalded you?" Response: **Often**, **Sometimes**, **Rarely**, Never OR Severe physical abuse: "When you were growing up, how often did your father, or the man who raised you, kicked, bit, or hit you with a fist; hit or tried to hit you with something; beat you up; choked you; burned or scalded you?" Response: **Often**, **Sometimes**, **Rarely**, Never |
| Child neglect | Adapted standard ACE | Emotional neglect | Parental Affection Scale - calculated by MIDUS Refresher researchers (Ryff, et al., 2015b), comprising means of 7 items with a range of .75 to 4 from a maternal affection scale and means of 7 items with a range of .75 to 4 from a paternal affection scale, coded so that higher scores reflected greater levels of affect received during childhood (i.e., rating of your relationship, understood problems and worries, could confide in about things that were bothering you, gave you love and affection, gave you time and attention, put effort into watching over you and making sure you had a good upbringing, taught you about life). Response: numerical range from 0.96 to 4.00; scores of **2.00 or less** |

Note: Bolded text describes which responses were treated as a childhood adversity.

[a] Reasons for No responses include mother or father died, parents separated/divorced, parents never lived together or never knew biological mother/father, and adoption Reasons for No responses include mother or father died, parents separated/divorced, parents never lived together or never knew biological mother/father, and adoption.

**Dependent Variables**

The present study included two dependent variables that the literature shows are negatively impacted by CA: *life satisfaction* (e.g., Hughes et al., 2016) and comorbidity of *chronic conditions* (e.g., Anda et al., 2006; Tomasdottir et al., 2015). These variables represented outcomes commonly presented as being associated with childhood adversity that were also available in the MIDUS Refresher dataset. *Life satisfaction* was represented by several subjectively rated variables combined into a single index. The experience of comorbid *chronic conditions* was a count of conditions the respondent has experienced and served as a more objective outcome that included aspects of pathology.

*Life satisfaction*

Measures of life satisfaction allow respondents to use their own evaluations to judge their lives on a general level rather than in specific domains (Pavot & Diener, 1993). Life satisfaction is a common outcome of interest in research about successful aging (Banjare, Dwivedi, & Pradhan, 2015; Beutel, Glaesmer, Wiltink, Marian, & Brähler, 2010; Bourque, Pushkar, Bonneville, & Béland, 2005; Douglass & Duffy, 2015; Fisher, 1995; Hsu, 2010; Jung, Muntaner, & Choi, 2010; Kim & Sok, 2012; Krause, 2016; Roh et al., 2015; Skarupski, Fitchett, Evans, & Mendes de Leon, 2013; Wiest, Schuz, & Wurm, 2013; Zlatar et al., 2015).

Life satisfaction is a good outcome to study for older adults because it involves an assessment of how well desired goals and actual outcomes have matched (Krause, 2004). Assessing life satisfaction is consistent with the final stage of Erickson's (1959) theory of aging. The eighth and final stage involves the crisis of integrity versus despair, in which deep introspection helps a person consider the kind of person they have become and whether they have accomplished their goals in life (Erickson, 1959).

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Previous studies have established the effect of cumulative adversity, which included childhood experiences as well as adult adverse experiences, on life satisfaction (Krause, 2004; Seery, Holman, & Silver, 2010). Krause's (2004) national study of adults 65 and older showed an inverse relationship with trauma exposure and a four-item index measure of life satisfaction. Seery et al.'s (2010) national study of adults 18-101 years old found that high levels of cumulative life adversity were inversely associated with a five-item index measure of life satisfaction.

Additional studies have established a connection specifically between early traumatic life experiences and life satisfaction (Hughes et al., 2016; Nurius, Logan-Greene, & Green, 2012). Hughes et al.'s (2016) study of adults ages 18-69 years in England showed an inverse relationship, consistent across age groups, of greater experiences of CA with lower life satisfaction, measured using a 10-point Likert scale. Nurius et al.'s (2012) study of a statewide sample of adults in Washington state (17% were ages 65 years and older) showed that higher CA was inversely rated with how satisfied adults were with their lives (measured using a 1-4 Likert scale).

Extant literature has shown that life satisfaction is negatively associated with early adversity (e.g., Hughes et al., 2016; Nurius et al., 2012). Thus, demonstrating the expected relationship of the CA score with life satisfaction was an additional way to validate that the measure of cumulative CA created in this study. For the present study, an index measure of *life satisfaction* provided in the MIDUS Refresher dataset was selected in order to provide greater variance for analyses (Ryff et al., 2015b). The index combined six variables from the self-administered questionnaire in which respondents used a scale from 0 being "the worst possible" and 10 being "the best possible" to rate their current: life overall, work, financial situation,

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health, relationship with a spouse/partner, and relationship with children (Ryff et al., 2015b). The index measure was an average of the six items (with spouse/partner and children combined into one item) and had strong reliability ($\alpha = 0.717$) (Ryff et al., 2015b).

### *Chronic conditions*

Extant literature has shown that cumulative CA influences a variety of health outcomes across the lifespan. Analyses of data from the original ACE study showed that the ACE score increased – in a strong and graded manner – the risk for adults of autoimmune disease such as arthritis and myocarditis (Dube, Felitti, Dong, Giles, & Anda, 2003); health problems, including depression and alcoholism (Anda et al., 2006; Dube et al., 2009); and problems with sleep and obesity (Anda et al., 2006). These patterns have been found across four birth cohorts, showing that these changes are not likely to be simple cohort effects (Dube et al., 2003). Furthermore, studies using other datasets have reinforced the understanding of a strong relationship between difficult childhoods and experiences of co-occurring problems, or multimorbidity (Anda et al., 2006; Schafer & Ferraro, 2012; Tomasdottir et al., 2015). Thus, examining the number of *chronic conditions* experienced by the respondent in the previous 12 months was a way to validate that the cumulative *CA score* identified in the present study showed the expected relationship.

The present study combined different variables to assess 42 chronic conditions. A calculated variable available in the MIDUS Refresher dataset comprised a count of Yes responses to any of 39 chronic conditions that the respondent had experienced in the past 12 months (Ryff et al., 2015b; Ryff et al., n.d.-b). The conditions included: asthma, bronchitis, or emphysema; tuberculosis; other lung problems; arthritis, rheumatism, or other bone or joint diseases; sciatica, lumbago, or recurring backache; persistent skin trouble (e.g., eczema); thyroid

disease; hay fever; recurring stomach trouble, indigestion, or diarrhea; urinary or bladder problems; being constipated all or most of the time; gall bladder trouble; persistent foot trouble (e.g., bunions, ingrown toenails); trouble with varicose veins requiring medical treatment; AIDS or HIV infection; lupus or other autoimmune disorders; persistent trouble with gums or mouth; persistent trouble with teeth; high blood pressure or hypertension; anxiety, depression, or some other emotional disorder; alcohol or drug problems; migraine headaches; chronic sleeping problems; diabetes or high blood sugar; multiple sclerosis, epilepsy, or other neurological disorders; stroke; ulcer; hernia or rupture; piles or hemorrhoids; swallowing problems; itch; dry and sore skin; scaly skin; hand rash; pimples, acne; face rash; warts; sweating; or hair loss. In addition to these 39 conditions, three more conditions were included – ever experiencing cancer, ever having heart trouble suspected or confirmed by a doctor, and currently being obese (i.e., calculated BMI based on height and weight of 30.0 or greater; CDC, 2016b). The composite variable, *chronic conditions*, comprised answers to any of these 42 conditions.

**Control Variables**

*Age*

Life satisfaction is a subjective assessment. Positivity effects and more positive emotion regulation techniques are associated with increased age (Lynchard & Radvansky, 2012; Schirda, Valentine, Aldao, & Prakash, 2016). Adults who experienced maltreatment in childhood show a curvilinear pattern by age in their personal assessments of health-related quality of life (HRQoL; Corso et al., 2008). Age is also associated with increased comorbidity of disease (Calland, Xin, & Stukenborg, 2013). *Age* of participant was included in this study as a control variable in the hierarchical regression in order to remove variance in the dependent variables associated with age among older adults (ages 55-76).

**Statistical Analyses**

Analyses were conducted using IBM SPSS Statistics software (version 24). Analysis for creating a cumulative score from the CA variables included descriptive statistics, bivariate correlations, and factor analysis. The two hypotheses were tested using hierarchical multiple regression (controlling for *age* in Model 1 and examining additional variance attributed to cumulative *CA score* in Model 2; DV = *life satisfaction*, number of *chronic conditions*).

Older adults who had a missing response for any of the CA variables were included in the analysis and coded as not having the CA, which provided a more conservative estimate of prevalence (Reiser, McMillan, Wright, & Asmundson, 2014). No data were missing in the index for *life satisfaction* and missing data for number of *chronic conditions* (1.6%) was low. Correlation analyses were run using listwise deletion. Assumptions of regression for the dataset were examined: normality, linearity, homoscedasticity, and tolerance/absence of multicollinearity. The sample size of older adults 55-76 in the present study was large enough to be comfortable using regression for analysis (Ghasemi & Zahediasl, 2012). To test for normality, skewness and kurtosis were run on the independent and dependent variables; *CA score* (skew = 1.35, kurtosis = 1.81) and *chronic conditions* (skew = 1.23, kurtosis = 1.85) did not have sufficiently normal distributions to run regression. A square root transformation was performed on each variable. After transformation, the distributions of the two transformed variables were sufficiently normal for the large sample size: transformed *CA score* (skew = 0.09, kurtosis = -1.09) and transformed *chronic conditions* (skew = -0.14, kurtosis = -0.02). Using the transformed variables, scatterplots between the predictor and outcomes showed distributions that were sufficiently uniform to indicate linearity. Scatterplots of the distribution of regression residuals showed that the dataset had homoscedasticity. The tolerance values showed that multicollinearity

was not an issue for the study variables. After transformation of *CA score* and *chronic conditions*, the necessary assumptions for regression were satisfied.

Factor analysis identified two factors within *CA score*. A cumulative variable for each was created. To test for normality, skewness and kurtosis were run on each factor; *CA Factor 1* (skew = 1.00, kurtosis = 0.38) and *CA Factor 2* (skew = 2.00, kurtosis = 3.54) did not have sufficiently normal distributions to be included in regression analyses for hypothesis testing. A square root transformation was performed on each variable. After transformation, the distributions of the two transformed variables were sufficiently normal for the large sample size: transformed *CA Factor 1* (skew = 0.11, kurtosis = -1.46) and transformed *CA Factor 2* (skew = 1.22, kurtosis = -0.04). Scatterplots and tolerance values showed that the other assumptions for regression were met.

## Results

### Descriptive Statistics

Descriptive statistics are provided in Table 3. The average age among older adults in the sample was 64.5 years. The gender distribution for older adults responding to the survey was 48.0% male. Two-thirds (68.0%) of older adults were in a committed relationship (married and a small proportion that were cohabiting). The vast majority of older adults in this sample were non-Hispanic (97.5%); the primary racial identification (i.e., first race identified) for older adults in this study was 87.7% white. Nearly half of older adults were retired (45.6%), while 34.2% were working and 7.2% were self-employed. Educational background for older adults in this study included 5.9% with less than a high school diploma, 35.4% with a high school diploma/GED, 25.5% with some college or a 2-year degree, and 33.1% with a 4-year degree or

higher. The average pre-tax annual income was $46,074; 14.1% of older adults had incomes of

$10,000 or less.

For older adults, their average overall life satisfaction was 7.4 (where 10 was the best

possible); 11.4% had low life satisfaction (defined as more than 1 SD below the mean; Hughes et

al., 2016). The scores for older adults ranged from 1.5 to 10.0. Of the 42 individual chronic

conditions included in the index (Ryff et al., 2015b), the average number of conditions for older

adults was 4.3. The actual composite scores ranged from having 0-21 of these conditions; 21.8%

of older adults had 7 or more conditions.

Table 3

*Characteristics of Older Adults in MIDUS Refresher Dataset*

| Demographic Variables | Older adults (Ages 55-76) M (SD) / % (N) | Total MIDUS Refresher (Ages 23-76) M (SD) / % (N) |
|---|---|---|
| Age | 64.5 (5.7) | 50.6 (13.6) |
| Proportion of overall sample | 40.0% (1,017) | 100.0% (2,542) |
| Gender | | |
| Male | 48.0% (488) | 45.7% (1,163) |
| Female | 52.0% (529) | 54.3% (1,379) |
| Marital Status | | |
| Currently married or cohabiting | 68.0% (692) | 68.8% (1,749) |
| Employment Status | | |
| Working now | 34.2% (328) | 56.7% (1,316) |
| Self-employed | 7.2% (69) | 8.5% (197) |
| Unemployed | 2.3% (22) | 3.7% (87) |
| Retired | 45.6% (437) | 19.4% (451) |
| Homemaker | 4.2% (41) | 5.9% (137) |
| Other (laid off, student, disabled, no answer) | 6.4% (61) | 5.8% (136) |
| Ethnicity | | |
| Not Hispanic | 97.5% (991) | 96.1% (2,436) |
| Hispanic | 2.5% (25) | 3.9% (100) |
| Primary Racial Identification | | |
| White | 87.7% (889) | 83.5% (2,114) |
| Black and/or African American | 7.1% (72) | 9.1% (231) |
| Native American or Alaska Native | 0.8% (8) | 1.0% (25) |
| Asian | 0.3% (3) | 0.8% (19) |
| Other | 4.1% (42) | 5.6% (142) |
| Educational Background | | |
| Less than a high school diploma | 5.9% (60) | 7.4% (187) |
| High school diploma/GED | 35.4% (360) | 31.0% (787) |
| Some college or 2-year degree | 25.5% (259) | 26.5% (672) |
| 4-year degree or higher | 33.1% (337) | 35.2% (893) |

Table 3. *Characteristics of Older Adults in MIDUS Refresher Dataset* (continued)

| Demographic Variables | Older adults (Ages 55-76) M (SD) / % (N) | Total MIDUS Refresher (Ages 23-76) M (SD) / % (N) |
|---|---|---|
| Annual Pretax Income[a] | $46,074 ($45,495) | $45,663 ($45,791) |
| $10,000 or less | 14.1% (144) | 17.4% (442) |
| $10,001 through $35,000 | 28.1% (286) | 26.2% (666) |
| $35,001 through $60,000 | 22.6% (230) | 21.0% (533) |
| $60,001 and higher | 35.1% (357) | 35.4% (900) |
| Life Satisfaction[b] | 7.4 (1.5) | 7.1 (1.6) |
| Low life satisfaction (>1 SD below mean) | 11.4% (116) | 15.7% (400) |
| Chronic Conditions[c] | 4.3 (3.4) | 3.6 (3.6) |
| No conditions | 8.4% (84) | 15.1% (375) |
| 1-2 conditions | 28.9% (289) | 31.9% (791) |
| 3-4 conditions | 23.6% (237) | 23.3% (577) |
| 5-6 conditions | 17.3% (173) | 13.2% (328) |
| 7+ conditions | 21.8% (218) | 16.4% (408) |

[a] Variable represents pre-tax income for the previous calendar year, with top category capped at $300,000 or more. Because the distribution was skewed, the variable was transformed (square root) to achieve a more normal distribution for further analysis. [b] Rating on a 10-point scale, life satisfaction, after reverse coding: 0 = Worst possible to 10 = Best possible; the response range was 1.5-10.0 for older adults and 0.5-10.0 for the full sample. [c] Out of 42 possible chronic conditions comprising the composite index, the response range was 0-21 for older adults and 0-27 for the full sample. Because the distribution was skewed, the variable was transformed (square root) to achieve a more normal distribution for further analysis.

With respect to prevalence of individual adverse experiences in childhood, the most common types of CA for older adults were *moving frequently during childhood* (29.7%), followed by *substance abuse in the home* (24.6%), *financial distress* (21.9%), *physical abuse* (20.3%), and *not living with both biological parents until age 16* (17.2%). *Emotional abuse* was the second most reported experience of child abuse and neglect among older adults (12.4%), followed by *emotional neglect* (8.4%) and *sexual assault* (5.4%).

The distributions of individual CAs were comparable to other studies using these variables as indicators of CA (see Table 4). A larger proportion of older adults lived with both biological parents until age 16 compared to the total study sample; the study sample distribution was similar to the ACE study distribution of having parents divorced or separated (CDC & Kaiser, 2016). The distribution of substance abuse in the home was consistent between older

adults and the total sample, and compared closely to the ACE study (CDC & Kaiser, 2016). A

smaller proportion of older adults had financial distress in their childhood compared to the total

sample, and both were higher than the ACE study; the present study used a broader definition of

financial distress than the comparison study (Schilling et al., 2007). Other studies in the literature

that used measures of financial distress as an indicator of childhood adversity did not report

prevalence (Appleyard, Egeland, van Dulmen, & Sroufe, 2005; Krause, 2004). The Institute on

Aging (2011) used MIDUS study data to report on frequent moves (i.e., 3 or more times) as a

measure of negative childhood experiences; the present study – using more recent MIDUS data

from the Refresher study – showed a higher prevalence of frequent moving in the total study

sample, with older adults being similar to the overall study sample.

The proportion of older adults who experienced sexual assault as a child was slightly less

than that of the overall study sample. However, both were notably smaller than the original ACE

study; the operationalization of sexual assault was narrower than the original ACE study

definition of sexual abuse (CDC & Kaiser, 2016). Emotional abuse during childhood among

older adults was similar to the overall study, and slightly higher than the comparison data from

the original ACE study (CDC & Kaiser, 2016). Physical abuse during childhood among older

adults was very similar to the overall study; prevalence for both was smaller than the original

ACE study. Emotional neglect among older adults was similar to the overall study; prevalence

for both was smaller than the original ACE study (CDC & Kaiser, 2016). Overall, prevalence

among individual CAs was fairly consistent with the literature. Additionally, the distribution by

number of CAs was strikingly similar to the original ACE study (CDC & Kaiser, 2016).

Although the *CA score* in the present study did not have a measure of domestic violence,

parental mental illness, incarceration of a parent, or physical neglect, and instead included a

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measure of moving frequently and of financial distress, the similarity in the pattern of accumulation points to the tendency for CA to co-occur (e.g., Appleyard et al., 2005; Dong et al., 2004). Additionally, despite being a different set of CA types, the *CA score* in the present study could be used for analyses similar to other studies that have established (e.g., Anda et al., 2006) and confirmed (e.g., Friedman et al., 2015; Wade et al., 2016) the importance of the dose-response relationship between cumulative CA and negative outcomes.

Table 4

*Childhood Adversities Experienced by Older Adults, Compared to the Total MIDUS Sample and Previous Study Data*

| Childhood Adversity (CA) Variables | Present Study Using MIDUS Refresher Data % (N) | | Comparison Data | |
|---|---|---|---|---|
| | Older adults (ages 55-76) | Total (ages 23-76) | % | Source |
| Did not live with both biological parents until 16 | 17.2% (175) | 26.3% (667) | 23.3% | "Parents divorced or separated" – ACE Study* (CDC & Kaiser, 2016) |
| Substance abuse in home | 24.6% (250) | 26.1% (662) | 26.9% | ACE Study* (CDC & Kaiser, 2016) |
| Financial distress | 21.9% (223) | 25.7% (653) | 17.6% | "Unemployed parent" – study of HS seniors in Boston CMSA (Schilling et al., 2007)** |
| Moved 3+ times | 29.7% (302) | 31.1% (790) | 27% | MIDUS study of adults 25-74 (Institute on Aging, 2011) |
| Sexual assault | 5.4% (55) | 7.2% (182) | 20.7% | Defined as "sexual abuse" – ACE Study* (CDC & Kaiser, 2016) |
| Emotional abuse | 12.4% (126) | 13.3% (339) | 10.6% | ACE Study* (CDC & Kaiser, 2016) |
| Physical abuse | 20.3% (207) | 20.7% (527) | 28.3% | ACE Study* (CDC & Kaiser, 2016) |
| Emotional neglect | 8.4% (86) | 9.4% (239) | 14.8% | ACE Study* (CDC & Kaiser, 2016) |
| Cumulative CA score[a] | 1.4 (1.5) | 1.6 (1.6) | - | - |
| 0 childhood adversities | 35.0% (356) | 31.2% (793) | 36.1% | ACE Study* (CDC & Kaiser, 2016) |
| 1-3 childhood adversities | 54.0% (550) | 54.9% (1,396) | 51.4% | ACE Study* (CDC & Kaiser, 2016) |
| 4+ childhood adversities | 11.0% (112) | 13.9% (353) | 12.5% | ACE Study* (CDC & Kaiser, 2016) |

[a] Out of 8 possible childhood adversities (CA) comprising the *CA score*, the range was 0-8. Because the distribution was skewed, the variable was transformed (squared) to achieve a more normal distribution for further analysis. *ACE Study of adults ages 18 and older in San Diego, CA; approximately 1/3 of participants were ages 65 and older when the study began (Felitti et al., 1998). **Other studies supporting use of financial distress did not report prevalence within study population: "mother or father out of work for a long time" - Study of older adults ages 65 and older (Krause, 2004); "socioeconomic index" and "occupational status rubric" – Study of at-risk urban children selected based on poverty status (Appleyard et al., 2005).

**Creating an Effective *CA Score***

Negative experiences often co-occur, and it can be difficult to determine the impact of any single event over the life course (Seery et al., 2010). One approach by researchers of early traumatic experiences has been to explore the relationship between the total number of different adversities a child has experienced and various outcomes (Seery et al., 2010). Studies using composite scales of CA have found strong, graded relationships such that an increase in the total number of adversities has been predictive of worse outcomes in mental and physical health (e.g., Anda et al., 2006; Friedman et al., 2015; Seery et al., 2010; Wade et al., 2016).

In the present study, CA was operationalized using available MIDUS variables in eight areas. Since each area was not dichotomous initially, each area was recoded as a binary variable (a "1" represented that the individual had experienced that CA area). To look at correlations between dichotomous items for older adults, Phi coefficients ($\Phi$) were examined for significant associations between the individual measures of CA (see Table 5). Among older adults, the CA variables were significantly associated with all of the other areas, with the exception of being sexually assaulted under the age of 18, which was significantly associated with five of the other seven CA measures.

Strength of association among the binary CA variables ranged from $\Phi = 0.04$ to 0.51 (see Table 5). Using conventions for interpreting effect size offered by Rea and Parker (1992, p. 203), some CA variables have "negligible" associations with one another ($\Phi = $ less than 0.10) or have "weak" associations ($\Phi = 0.10$ and under 0.20), and some of the CA variables have "moderate associations" ($\Phi = 0.20$ and under 0.40). The strength of the association between physical abuse and emotional abuse was "relatively strong" ($\Phi = 0.51$) (Rea & Parker, 1992, p. 203).

Table 5

*Bivariate Associations Between Individual Childhood Adversity Variables for Older Adults*

| Childhood Adversity | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. Not both bio parents until 16 | - | - | - | - | - | - | - | - |
| 2. Substance abuse in home | 0.14** | - | - | - | - | - | - | - |
| 3. Financial distress | 0.19** | 0.22** | | - | - | - | - | - |
| 4. Moved frequently | 0.12** | 0.11** | 0.22** | - | - | - | - | - |
| 5. Sexually assaulted | 0.11** | 0.04 | 0.10** | 0.05 | - | - | - | - |
| 6. Emotional abuse by parent(s) | 0.12** | 0.11** | 0.18** | 0.14** | 0.15** | - | - | - |
| 7. Physical abuse by parent(s) | 0.08* | 0.10** | 0.13** | 0.12** | 0.13** | 0.51** | - | - |
| 8. Emotional neglect by parent(s) | 0.22** | 0.14** | 0.23** | 0.17** | 0.20** | 0.34** | 0.31** | - |

*p < .05; **p < .01; Significant associations were examined using Phi coefficients; strength of associations: 0.00 and under 0.10 = negligible, 0.10 and under 0.20 = weak association, 0.20 and under 0.40 = moderate association, 0.40 and under 0.60 = relatively strong association (Rea & Parker, 1992, p. 203).

To create a cumulative *CA score*, each individual's responses to the eight items were summed, so the score represented a count of eight adverse experiences in childhood. Skewness was addressed through transformation (i.e., squared). As an additive variable, a measure of reliability was not calculated because types of CA need not be related; an individual may have experienced one type of CA without having experienced any other types (Howell & Miller-Graff, 2014).

Extant literature regarding CA shows that, within an additive variable or an index capturing a latent construct, the items may cluster into fewer constructs, or factors. The original ACE study results have sometimes been labeled using three categories – abuse, neglect, and household dysfunction – but have not been accompanied by analytical evidence for the use of the three categories (CDC & Kaiser, 2016; Dong et al., 2004). Furthermore, the CDC's (2016a) BRFSS ACE module adapted the original ACE study to being a telephone survey but did not retain the emotional or physical neglect questions, instead using a version of the ACE study that included 9 different types of CA instead of 10 (separating alcohol abuse and drug abuse into two different types). An analysis of 2009-2010 BRFSS ACEs data by Ford et al. (2014) using factor

loadings of 0.40 or greater generated a three-factor solution comprising household dysfunction, physical/emotional abuse, and sexual abuse that was consistent for gender and across age groups (18-34 years, 35-49 years, 50-64 years, >65 years).

Although previous studies of CA provided insight into how the variables might cluster, exploratory factor analysis (EFA) was conducted for the present study of older adults to explore the pattern of relationships between the eight binary CAs and identify subcomponents (Lam & Lee, 2014). According to Comrey and Lee (1992), the sample size of 1,017 was good for performing EFA. Controversy exists regarding EFA on binary data, due to questions of "difficulty factors" that lack face validity; however, alternatives such as tetrachoric coefficients can overestimate association (Atkinson, 1988). Subinterval data can be appropriate for factor analysis, and the factor structure that emerged from the *CA score* in the present study was consistent with past research and had face validity, so the choice of analytical tool for the present study was appropriate (Atkinson, 1988).

In the present study, I used principal components analysis to examine the factor structure for older adults of the eight factors comprising the *CA score*. Unrotated factor analysis was first conducted; two components had an Eigenvalue greater than 1, which the scree plot confirmed. Varimax rotated factor analysis was then conducted using two factors, and factor loadings of 0.40 or greater were considered as a departure point for inclusion of an item within a factor (Ford et al., 2014). An analysis of the factor loadings suggested that a 2-factor model would best fit the data (see Table 6, Figure 2). The descriptions of the variables were analyzed to determine the interpretability of the factors identified through loadings. *CA Factor 1*, which included *not living with biological parents until 16*, *substance abuse in the home*, *financial distress in the home*, and *moving 3 or more times*, was labeled "household dynamics." *CA Factor 2*, which included *sexual*

*assault*, *emotional abuse*, *physical abuse*, and *emotional neglect*, was labeled "child abuse and neglect." Sexual assault was included in Factor 2 because the sample size in the present study was sufficiently large to allow for smaller factor loadings, because it was close to 0.40, and because the variable made interpretive sense to include in that factor (Yong & Pearce, 2013). When examining the factor structure of *CA score* for other age groups in the MIDUS Refresher sample, the same two factors (household dynamics and child abuse/neglect) emerged, but *sexual assault* became a clear outlier. These results are consistent with Ford et al.'s (2014) analysis of BRFSS data showing three factors. However, as operationalized in the present study, for older adults *sexual assault* was not a strong outlier so was included in the child abuse and neglect factor.

Table 6

*Rotated Exploratory Factor Analysis Loadings of Childhood Adversity Items for Older Adults*

| Item | Factor 1 | Factor 2 |
|---|---|---|
| Did not live with both biological parents until 16 | **0.570** | 0.097 |
| Substance abuse in home | **0.598** | 0.019 |
| Financial distress | **0.694** | 0.131 |
| Moved 3+ times | **0.518** | 0.128 |
| Sexual assault | 0.092 | **0.389** |
| Emotional abuse | 0.075 | **0.808** |
| Physical abuse | -0.006 | **0.812** |
| Emotional neglect | 0.345 | **0.590** |

Note: Bolded factor loadings in each column correspond to that factor.

Factor 1: Household dynamics

Factor 2: Child abuse and neglect
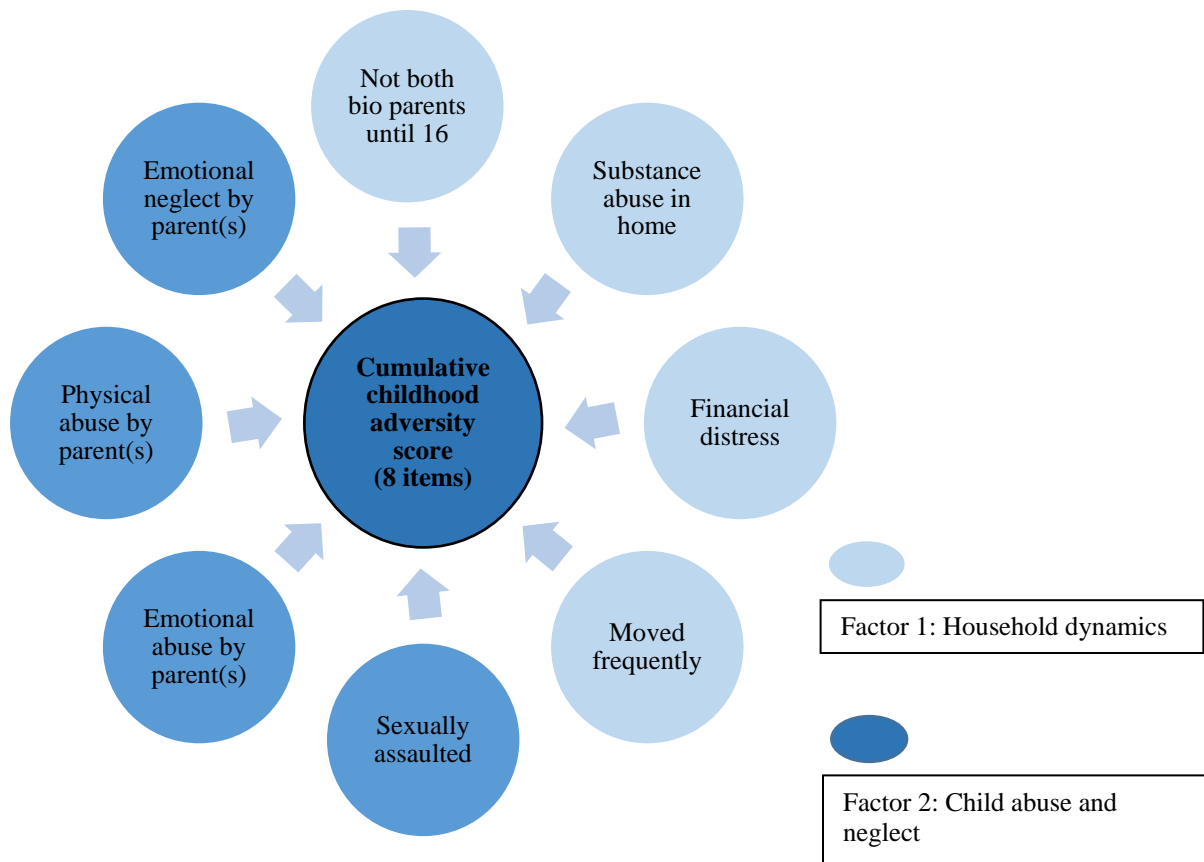
*Figure 2.* Items Comprising Childhood Adversity (CA) Score, with Factor Structure, for Older Adults.

**Confirming Predictive Value of *CA Score***

After establishing a *CA score* variable that showed consistency in terms of prevalence of cumulative CA and a factor structure consistent with the standard ACE study, I then sought to determine if the *CA score* operated with outcomes shown by the literature to be impacted by CA. See Table 7 for regression coefficients and significance levels for the analysis of the impact of *CA score* on *life satisfaction* and *chronic conditions*. As discussed in Methods above, these two variables represent variables that are of particular relevance to older adults and discussions of successful aging, and have both shown to have associations with CA as adults.

To establish convergent construct validity for *CA score*, the relationship between *CA score* and *life satisfaction*, adjusted for *age*, was examined first. To be consistent with the literature, *CA score* would need to show an inverse relationship to life satisfaction. Because the *CA score* had two factors, the analysis of *life satisfaction* was run with the overall score and each factor separately.

For all three predictors, results of the hierarchical linear regression showed that among older adults ages 55-76, *age* as the sole predictor in Model 1 was significant and accounted for 4.5% of the variance in *life satisfaction*, $F(1, 1015) = 49.44$, $p = .000$. Older ages were associated with better life satisfaction ($\beta = .215$, $p = .000$).

In Model 2, when cumulative childhood adversity (*CA score*) was added, the model was significant, $F(1, 1014) = 37.91$, $p = .000$, and explained a larger amount of variance (7.0%). In this model, *age* was still significant (showing a positive relationship, $\beta = .215$, $p = .000$) and *CA score* showed an inverse relationship with *life satisfaction* ($\beta = -.152$, $p = .000$). These results are consistent with previous literature showing a negative effect of CA on life satisfaction (Hughes et al., 2016; Nurius, Logan-Greene, & Green, 2012).

When *CA Factor 1* (household dynamics) was added in Model 2, the model was significant, $F(1, 1014) = 28.46$, $p = .000$, and explained a significantly larger amount of variance (5.3%). Higher levels of *CA Factor 1* were associated with lower *life satisfaction* ($\beta = -.082$, $p = .008$). When *CA Factor 2* (child abuse and neglect) was added in Model 2, the model was significant, $F(1, 1014) = 28.46$, $p = .000$, and explained a significantly larger amount of variance (6.8%). Higher levels of *CA Factor 2* were associated with lower *life satisfaction* ($\beta = -0.147$, $p = .000$). *CA Factor 1* (household dynamics) explained a small, but significant, amount of additional variance in *life satisfaction* (0.07%). In comparison to Model 2 using *CA Factor 1*,

Model 2 with *CA Factor 2* (child abuse and neglect) explained a larger amount of additional

variance (2.2%). However, the two factors separately did not reach the same level of variance

explained by the overall *CA score* (7.0%). These results demonstrate construct validity by

showing that the factors did operate differently, but overall were not as predictive as the overall

*CA score*. The greater power associated with the overall *CA score* in analyses was consistent

with the use of the full cumulative score in extant research (e.g., Anda et al., 2006; Friedman et

al., 2015; Wade et al., 2016).

Table 7

*Summary of Hierarchical Regression Analysis Predicting Life Satisfaction and Chronic*
*Conditions Among Older Adults*

| Outcome | Model 1 | Comparison of Total CA to CA Factor 1 and 2 | | |
| --- | --- | --- | --- | --- |
| | | Model 2 – Total CA | Model 2 – CA Factor 1 | Model 2 – CA Factor 2 |
| Life Satisfaction | | | | |
| $R^2$ | 0.046 | 0.070 | 0.053 | 0.068 |
| $\Delta R^2$ | 0.046*** | 0.023*** | 0.007** | 0.022*** |
| F (df) | 49.439 | 37.908 | 28.458 | 37.006 |
| | (1, 1,015)*** | (2, 1,014)*** | (2, 1,014)*** | (2, 1,014)*** |
| β for Age | 0.215*** | 0.215*** | 0.217*** | 0.209*** |
| β for CA measure | na | -0.152*** | -0.082** | -0.147*** |
| Chronic Conditions | | | | |
| $R^2$ | 0.002 | 0.018 | 0.013 | 0.006 |
| $\Delta R^2$ | 0.002 | 0.016*** | 0.011** | 0.004* |
| F (df) | 1.828 | 8.946 | 6.720 | 2.943 |
| | (1, 999) | (2, 998)*** | (2, 998)** | (2, 998) |
| β for Age | 0.043 | 0.043 | 0.041 | 0.045 |
| β for CA measure | na | 0.126*** | 0.107** | 0.064* |

*p < .05; **p < .01; ***p < .001; Notes: for chronic conditions Model 2, with CA Factor 2, the
change in R2 was significant at p=.044 but the model itself was not significant; na = not
applicable.

The measure of cumulative CA was a significant predictor of poorer life satisfaction as

expected from the literature, but the amount of variance explained (7.0%) was small. Another

way to explore whether the *CA score* in the present study performed as expected was to examine

the dose-response relationship of *life satisfaction* with different amounts of CA (e.g., Anda et al.,

2006). Low life satisfaction, as defined by scores less than 1 SD from the mean for each age

group, showed a consistent dose-response relationship with increasing amounts of CA within the age group (see Figure 3). Among older adults, those with a high CA score (i.e., 4 or more) were more than three times as likely to have low life satisfaction compared to older adults with a score of 0 (38.5% and 12.4%, respectively). Thus, the analysis of *life satisfaction* demonstrated construct validity for *CA score*.
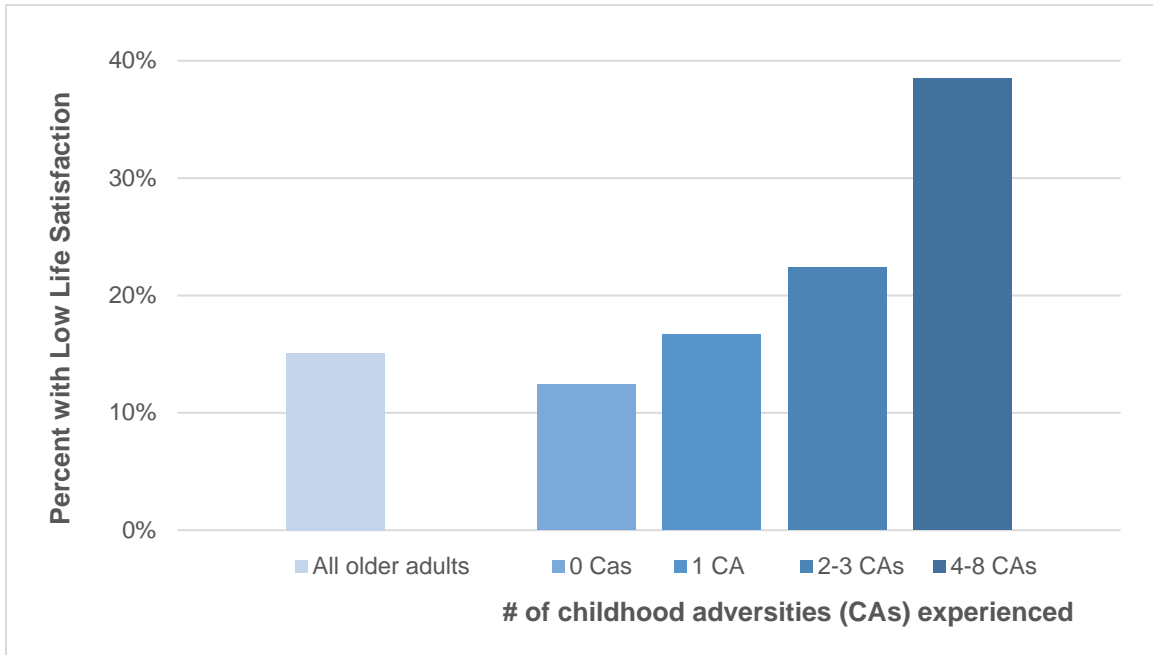


*Figure 3.* Low Life Satisfaction for Older Adults with Different Levels of Childhood Adversity.

Note: Average life satisfaction for older adults = 7.4 and for all = 7.1 (on scale from 0 was "the worst possible" and 10 was "the best possible"). This pattern of higher life satisfaction among older adults was consistent with socioemotional selectivity theory and a tendency toward positivity among older adults (Carstensen, Fung, & Charles, 2003; Lynchard & Radvansky, 2012). To examine levels of life satisfaction relative to one's cohort, "low life satisfaction" was calculated as scores > 1 SD below the mean for each respective age group.

As discussed in Methods above, extant literature has shown a relationship between CA and many physical and emotional health outcomes across the lifespan, as well as the tendency for these health outcomes to co-occur (Anda et al., 2006; Schafer & Ferraro, 2012; Tomasdottir et al., 2015). To establish convergent construct validity, the relationship between *CA score* and

*chronic conditions*, adjusted for *age*, was also examined. To be consistent with the literature, *CA score* would need to show a positive association with number of *chronic conditions* among older adults. Because the *CA score* had two factors, the analysis of *chronic conditions* was run with the overall score and each factor separately.

For all three predictors, results of the hierarchical linear regression showed that among older adults ages 55-76, *age* as the sole predictor in Model 1 did not account for a significant amount of the variance in *chronic conditions*, $F(1, 999) = 1.828$, $p = .177$. These results underscored the heterogeneity that exists in health status among older adults, and the general ineffectiveness of chronological age as a measure of biological aging (Mitnitski, Howlett, & Rockwood, 2017).

In Model 2, when cumulative childhood adversity (*CA score*) was added, the model became significant, $F(2,998) = 8.946$, $p = .000$, and accounted for 1.8% of the variance in number of *chronic conditions* older adults identified as having. In this model, *CA score* contributed significantly to predicting variance in *chronic conditions*, with higher levels of childhood adversity associated with a greater number of chronic conditions ($\beta = .126$, $p = .000$). These findings supported construct validity for *CA score* by demonstrating consistency with the literature about childhood adversity predicting greater comorbidity (Anda et al., 2006; Schafer & Ferraro, 2012; Tomasdottir et al., 2015).

When *CA Factor 1* (household dynamics) was added in Model 2, the model was significant, $F(2, 998) = 6.720$, $p = .001$, and explained a significant, although small, amount of variance in *chronic conditions* (1.3%). Higher levels of CAs relating to household dynamics were associated with a higher number of chronic conditions ($\beta = .107$, $p = .001$). When *CA Factor 2* (child abuse and neglect) was added in Model 2, the model was still not significant, F(2,

998) = 2.943, p = .053. *CA Factor 1* (household dynamics) explained a significant amount of variance in the number of *chronic conditions* (1.5%), and accounted for nearly all of the variance explained by the total model (1.7%). In comparison to Model 2 using *CA Factor 1*, Model 2 with *CA Factor 2* (child abuse and neglect) was not a significant predictor of variance in the number of *chronic conditions*. These results demonstrated that the positive association between *CA score* and *chronic conditions* was mostly attributable to the influence of *CA Factor 1* (household conditions, which included financial distress), and extended research by Finkelhor et al. (2015) which found that low socioeconomic status was predictive of physical health issues among youth. These results confirmed that distinguishing between the CA factors might be useful depending on the outcome being examined.

The measure of cumulative CA was a significant predictor of higher numbers of chronic conditions among older adults as expected from the literature. While the addition of CA made Model 2 significant, the amount of variance explained (1.8%) was quite small. Within the older adults' age group, age was not a predictor of chronic conditions, reflecting heterogeneity of biological aging (Mitnitski et al., 2017). Another way to explore whether the *CA score* in the present study performed as expected was to examine the dose-response relationship of *chronic conditions* with different amounts of CA (e.g., Anda et al., 2006). Average number of chronic conditions showed a consistent dose-response relationship with increasing amounts of CA for this older sample (see Figure 4). Among older adults, those with a high CA score had a 33% higher average number of chronic conditions compared to older adults with a score of 0 (mean = 4.81 and mean = 3.61, respectively). Thus, the analysis of *chronic conditions* showed greater comorbidity with greater levels of cumulative CA, which demonstrated construct validity for *CA score*.
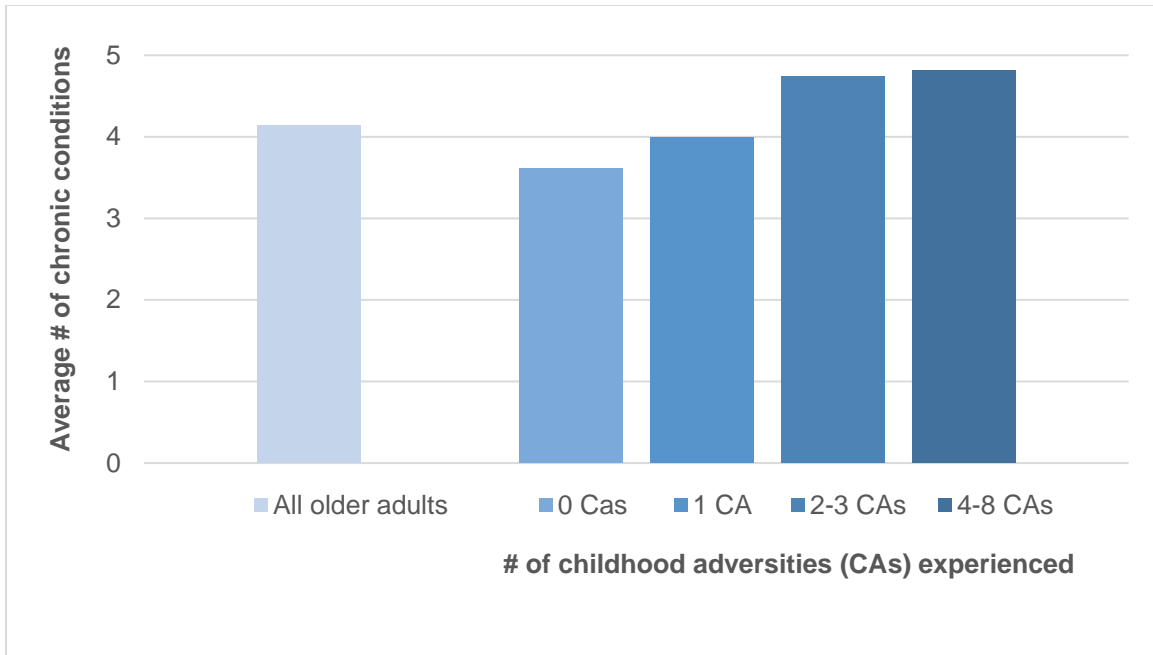
*Figure 4.* Average Number of Chronic Conditions for Older Adults with Different Levels of Childhood Adversity.

## Discussion

This study builds on previous research demonstrating the value of a cumulative score representing exposure to different types of adverse experiences in childhood (e.g., Friedman et al., 2015; Seery et al., 2010; Wade et al., 2016). The nationally representative MIDUS Refresher dataset is a rich resource being utilized by researchers across the United States for analyses covering a wide array of topics important to gerontology, including cognitive function (e.g., Hahn & Lachman, 2015; Lewis, Turiano, Payne, & Hill, 2016), health behaviors (e.g., Cotter & Lachman, 2010; Lee, Tsenkova, & Carr, 2014), occupation and employment (e.g., Graham, Mroczek, & Elleman, 2015; Hill & Turiano, 2014); physical health (e.g., Birditt, Nevitt, & Almeida, 2015; Ferraro et al., 2016), psychological well-being (e.g., Boehm, Chen, Williams, Ryff, & Kubzansky, 2016; Schafer et al., 2011), social inequalities (e.g., Gruenewald et al., 2012; Schafer et al., 2011), and social relationships (e.g., Lyu & Agrigoroaei, 2016; Savla et al.,

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2013). The dataset did not offer a concise measure of CA exposure that could be utilized for analysis. This study provided a rationale for the creation of the CA measure and built a case for construct validity.

Variables in the nationally representative MIDUS Refresher dataset can be used to operationalize CA, and this study provided a rationale for which variables can be selected and how they can be operationalized to create a cumulative *CA score*. The distribution of the individual items selected in this study and the cumulative *CA score* created by adding the eight types of CA were consistent with comparison data (see Table 4). This study also examined the factor structure of the cumulative measure, which operated similarly to the original ACE study (CDC & Kaiser, 2016).

Furthermore, this study demonstrated the convergent construct validity of this cumulative measure of CA in understanding variance in two outcomes previously shown to be related to CA – life satisfaction and chronic conditions. Other outcomes could also be assessed to establish convergent validity of the construct, including patterns for specific conditions like depression and autoimmune disease (Anda et al., 2006; Dube et al., 2009). The efficacy of the *CA score* was supported by hierarchical regression results, demonstrating that the present study's cumulative *CA score* meaningfully predicts outcomes that the literature shows can be impacted by traumatic experiences in childhood (i.e., life satisfaction, number of chronic conditions).

Additionally, an examination of the two factors comprising *CA score* demonstrated that each factor differs in its impact on the dependent variables. *CA Factor 1* (household dynamics) was a significant, although small, predictor of *life satisfaction* and a significant predictor of *chronic conditions*. *CA Factor 2* (child abuse and neglect) was a significant predictor of l*ife satisfaction*, but was not a significant predictor of *chronic conditions*. While patterns of

predictive value in outcomes were consistent with the full *CA score*, neither factor independently explained as much variance. This provided evidence that the total *CA score* could serve as a meaningful index for analysis. However, though the overall predictive value was not large for either of the outcomes, the expected dose-response relationship was evident and striking. The results also provided evidence that exploration of the factors separately may offer important insights into understanding how each of the two CA factors may affect outcomes differently.

The present study established a scale and provided a summary of the steps that show how the eight CA areas hold together as a scale. The cumulative CA measure reflects a variety of types of childhood adversity that showed consistency in factor structure with the original ACE study (CDC & Kaiser, 2016), had similar prevalence in terms of cumulative CA, and elicited comparable results in terms of life satisfaction and chronic conditions.

A *CA score* could provide important predictive value to studies that have been published using MIDUS data. Graham et al. (2015) used MIDUS data to study the relationship between personality traits and earnings lost due to poor mental and physical health. The implications of their study included a consideration of personality when looking at occupational and financial outcomes for an individual, and the costs of untreated physical and mental health issues (Graham et al., 2015). However, greater accumulation of CA has also been associated with physical and mental health problems as adults, and with loss of workdays. Inclusion of the individual's *CA score* could provide important predictive value to this study.

Birditt et al. (2015) used the National Study of Daily Experiences, a substudy of MIDUS, to explore interpersonal conflict coping strategies, well-being, and cortisol levels among adults ages 33-84. Their results showed that how individuals coped with daily interpersonal tensions was associated with well-being; having an argument showed greater same day effects on well-

being, while avoidance coping strategies showed delayed effects on well-being. Research has shown that cumulative CA impacts self-rated well-being in adulthood and that toxic stress is a mechanism through which CA impacts outcomes. Thus, inclusion of the individual's *CA score* could provide additional insight into understanding experiences of stress and well-being as adults.

Studies by Birditt et al. (2015); Chartier, Walker, & Naimark (2010); and Schafer et al. (2011) included older adults, and while each study noted significant results related to age, they did not explicate. Extant literature showed that positive coping strategies are associated with age, and have been given as an example of successful aging (Baltes & Dickson, 2001; Lynchard & Radvansky, 2012; Martin et al., 2015; Schirda et al., 2016). Inclusion of a *CA score* as part of a more in-depth analysis of the impact of age on coping strategies and well-being could provide valuable insight into understanding successful aging among older adults with varying amounts of CA exposure.

There are limitations to the data used in the present study of older adults. Relying on retrospective reports and self-categorization of trauma and disadvantage in childhood was a potential limitation of the research. Studies of the retrospective approach to learning about CA have suggested that underestimation (i.e., reporting fewer adversities than really happened) is more likely than overestimation, resulting in studies that may be more conservative than the actual reality (Alwin, 2007; Dube et al., 2003).

Another important limitation was the study sample. People with the highest ACE scores were shown to die nearly 20 years earlier than those with a score of 0 (Brown et al., 2009). Premature mortality among people suffering the greatest disadvantages can result in less inequality and more homogeneity with age, which is of particular concern to researchers focused

on older adults (Ferraro & Shippee, 2009). This previous research demonstrating early mortality among people most strongly affected by cumulative CA contributed to the decision in the present study to include adults ages 55-64 among "older adults."

Underrepresentation of people with experiences of several different types of CA may be possible as a function of sampling bias. Sampling techniques can inadvertently contribute to bias by excluding those of greatest misfortune or marginalization (Bennett, Buchanan, Jones, & Spertus, 2015). Among older adults, people who self-select to be part of research tend to be biased toward being healthier, having better education, and young-old (Homan, 2016). People with a high number of types of CA may be more vulnerable and less reachable for a study, and may be less likely to self-select for a study. This would mean that the prevalence of CA found in the present study may be lower than might be found in the actual population, and that there may also be differences between the people with a high *CA score* who were reachable in the MIDUS Refresher study and those who were not. Additional study methods that more directly reach vulnerable people, such as prison inmates, homeless individuals, or older adults receiving care in institutionalized settings, that are well vetted by an Institutional Review Board could explore what differences may exist.

# ARTICLE 2: THE IMPACT OF CHILDHOOD ADVERSITY ON SUCCESSFUL AGING FOR OLDER ADULTS

## Abstract

The present study examined the impact of childhood adversity (CA) on successful aging using retrospective data from the Midlife in the United States (MIDUS) study (Ryff et al., 2016). Data were collected from 1,017 adults ages 55-76. A cumulative measure of CA, developed in article 1, was created using available MIDUS data. Successful aging was measured using eight dimensions of wellness. Hierarchical multiple regression revealed that the cumulative CA measure was significantly associated with lower levels of *emotional*, *physical*, *social*, *financial*, *environmental*, and *physical* wellness, but not with *intellectual* or *occupational* wellness, after controlling for *age* and *gender*. The *CA score* was significantly and negatively associated with the cumulative *wellness index*, in a magnitude similar in size to the positive effect associated with *age*. The results show that people reporting more traumatic childhoods had, on average, lower levels of successful aging than people with less CA did. The results are relevant to interventions targeting individual areas of wellness, and potentially achieving incremental progress toward successful aging.

## Introduction

By 2060, nearly one in four people in the United States will be ages 65 and older, and the number of adults 65 and older is expected to more than double from 46 million in 2014 (Mather, Jacobsen, & Pollard, 2015). One major contributor to this growth is that Baby Boomers (born between 1946 and 1964) began turning 65 in 2011 (Strout & Howard, 2012). Another major contributor to projected population growth among adults 65 and older is increases in life expectancy (He, Goodkind, & Kowal, 2016; Strout & Howard, 2012). Life expectancy, which

was 68 years in 1950, reached 79 years in the United States in 2013 (Mather et al., 2015). Sasson's study (2016) found that education had become a stronger predictor of life expectancy than race or gender. While college-educated white people experienced gains in life expectancy from 1990-2010, low-educated whites saw decreases in life expectancy of 0.6 years for men and 3.1 years for women (Sasson, 2016). Helping adults of different races and education levels experience good quality of life in the face of social determinants of health and aging-related changes is increasingly being seen as a question of how to promote successful aging (Bielderman, de Greef, Krijnen, & van der Schans, 2014; Bülow & Söderqvist, 2014; Garg, Boynton-Jarrett, & Dworkin, 2016; Martin et al., 2015; Tovel & Carmel, 2014).

**Childhood Adversity (CA)**

If true health equity existed, successful aging would be equally possible for every adult (CDC, 2013). Realistically, the playing field is not even. A growing body of research shows that adverse experiences in childhood have consequences across the life span and are significant contributors to chronic disease, our aging experience, and disparate health outcomes (Alwin, 2012; Anda et al., 2006; Lerner, Lewin-Bizan, & Warren, 2011).

Beginning in 1995, the groundbreaking Adverse Childhood Experiences (ACE) study (Anda et al., 2006) assessed exposure to 10 ACEs prior to age 18 among 17,337 adults, including 1/3 that were ages 65 and older. These ACEs included emotional, physical, and sexual abuse; physical and emotional neglect; and household dysfunctions including alcohol or substance abuse, mental illness of someone in the household, domestic violence, incarceration by a member of the household, and parental separation or divorce (Anda et al., 2006; Felitti et al., 1998). ACEs were common; 64% had experienced at least one ACE and 13% had experienced four or more (Anda et al., 2006; CDC & Kaiser, 2016). To capture the experience of cumulative

exposure to ACEs, the researcher created a score that counted each of the 10 separate ACEs to which the individual had been exposed (Anda et al., 2006; CDC & Kaiser, 2016). This score showed strong, graded relationships with 18 different health outcomes across multiple domains. Additionally, as the ACE score increased, comorbidity was shown to increase as well (Anda et al., 2006). The 10 ACEs in the original ACE Study were not treated as a comprehensive list of possible types of CA; other studies found other measures of CA to be predictive of poor outcomes in adulthood as well (e.g., Wade et al., 2016). However, cumulative CA has persistently shown a significant, dose-response relationship to negative outcomes across the life span (e.g., Chartier, Walker, & Naimark, 2010; Friedman, Montez, Sheehan, Guenewald, & Seeman, 2015; Wade et al., 2016).

The effects of early adversity can be difficult to eradicate (Schafer, Ferraro, & Mustillo, 2011). The lifelong influence of CA can happen indirectly, such as through exposure to poor environments or development of risky coping mechanisms, and directly, such as through altered brain development, epigenetics, and physiological changes created by toxic stress (Brown et al., 2009; Buss & Grieling, 1999; Corso, Edwards, Fang, & Mercy, 2008; Miller, Chen, & Parker, 2011; Schafer & Ferraro, 2012; Schore, 2001). People may be able to show stronger resilience in some arenas of their lives than others, demonstrating that the level of functioning for individuals coping with CA and other traumas may look different depending on which aspect of their lives is being examined (Fossion et al., 2014; Harvey, 2007).

Each of us experiences aging in our own way, but studies of population trends show that normal changes associated with aging occur in many domains: vision, hearing, attention span, short-term memory, episodic long-term memory, and psychomotor skills (Hoyer & Verhaeghen, 2006; Kroemer, 2006; Mason, 2011; Palgi, Shrira, & Zaslavsky, 2015). For most adults, the

question is how many of these effects they will experience, to what degree, and for how long. Much of the early research into aging was centered on these personal losses and declines (Cárdenas & López, 2010). However, gerontology has seen a shift toward more positive aspects of aging. Many gerontologists are studying compression of morbidity, to understand how to delay the onset of disability or comorbidity as long as possible and to reduce the duration of disability and comorbidity before death (Fries, Bruce, & Chakravarty, 2011). Other researchers are showing that some aspects of functioning are stable or even improve with age, such as semantic long-term memory, crystallized intelligence, emotional reactivity, and conflict strategies (Birditt, Fingerman, & Almeida, 2005; Hoyer & Verhaeghen, 2006; Mason, 2011; Schirda, Valentine, Aldao, & Prakash, 2016).

**Successful Aging**

When Rowe and Kahn (1987) first introduced the concept of *successful aging*, their definition included three components: having a low risk of disease, having good cognitive and physical functionality, and being actively engaged with life. The concept has been studied and continues to evolve, and does not consider pathology an immediate failure to age successfully (Bülow & Söderqvist, 2014; Goodwin, 1991; Martin et al., 2015). Research has found objective and subjective components to successful aging (Pruchno, Wilson-Genderson, Rose, & Cartwright, 2010). Qualitative and quantitative studies have found that older people put greater emphasis on psychosocial factors, such as attitude and engagement, than they do on the experience of disease or disability (Gooding, Hurst, Johnson, & Tarrier, 2012; Reichstadt, Sengupta, Depp, Palinkas, & Jeste, 2010). Many older adults with significant health challenges still feel they are aging successfully, and achieve this success through selection, optimization, and compensation strategies (Baltes & Dickson, 2001; Bülow & Söderqvist, 2014; Martin et al.,

2015). Agreement on an exact definition of successful aging is still being sought, and the search to understand how to help people live and age well continues. Wellness theory provided a multidimensional, strength-based framework by which to conceptualize successful aging.

**Wellness Theory**

A wellness approach to health seeks to capture the multidimensionality of factors comprising well-being that operate synergistically and in equilibrium; they are described as being stronger as a whole than being considered separately (Roscoe, 2009). Wellness has been described as a continuum, where greater wellness reflects movement toward optimal functioning, which may look different depending on the individual (Roscoe, 2009). The present study used the eight dimensions of wellness model presented by SAMHSA (2016), which included emotional, environmental, financial, intellectual, occupational, physical, social, and spiritual aspects of wellness.

Extant literature about successful aging and related concepts such as quality-of-life, well-being, life satisfaction, and resiliency provide a vast array of factors that are associated with "doing well" as an aging adult. Important patterns emerge when looking at these factors, and wellness theory provided a compelling framework by which to organize these concepts. Well-being related literature discussed factors that related to emotional wellness including psychological stress resilience (Puterman & Epel, 2012), emotional regulation with age (Birditt et al., 2005), and problem-focused coping skills (Mayordomo, Viguer, Sales, Satorres, & Meléndez, 2016). Concepts in the literature that relate to environmental wellness include housing and neighborhood support for aging adults (Martin-Matthews, 2011), environmental factors when looking at resilience (Wiles, Wild, Kerse, & Allen, 2012), and person-environment interchange in understanding successful aging (Wahl, Iwarsson, & Oswald, 2012). Financial

wellness concepts are evidenced by literature exploring mental health status among people in poverty (Bennett, Buchanan, Jones, & Spertus, 2015), connections between life satisfaction and income (Cheung & Lucas, 2014), and financial security as a component of successful aging (Iwamasa & Iwasaki, 2011).

Well-being related literature discussed factors that related to intellectual wellness such as the positive association between years of education and cognitive performance among older adults (Fernández-Ballesteros et al., 2012) and the connection between learning through volunteering and self-defined successful aging among older adults (Chen, 2016). Occupational wellness concepts are seen in literature referencing the relationship between previous unemployment and decreased life satisfaction (Beutel, Glaesmer, Wiltink, Marian, & Brähler, 2010) and positive association between higher occupational class/prestige and improved levels of optimism and life satisfaction (Boehm, Chen, Williams, Ryff, & Kubzansky, 2015). Physical wellness concepts are included in literature about the connection between successful aging and continued physical activity (Wagnild, 2003) and good physical functioning (Iwamasa & Iwasaki, 2011). Social wellness concepts are found in literature about the importance of adequate social resources for life satisfaction (Beutel et al., 2010) and the protective effects of social integration on mortality risk for older adults (Seeman, 2000). Spiritual wellness concepts are found in literature in the importance of a sense of purpose in successful aging (Fisher, 1995) and connections between religious beliefs and having a sense of purpose (Wiles et al., 2012).

**Present Study**

Literature shows the powerful impact that early traumatic experiences have across the lifespan, and reinforced that wellness theory can capture the multidimensionality and interconnectedness of successful aging, but there has not been a strong understanding of what

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impact childhood adversity has on successful aging. The present study aimed to address this gap in the literature by developing a better understanding of the impact of childhood adversity on successful aging for older adults.

## Methods

### Sample and Design

The data for the present study come from the National Survey of Midlife Development in the United States (MIDUS) Refresher (Lein, 2015). The study was conducted with an age-targeted sample (ages 25-54 and 55-75) of English-speaking, noninstitutionalized adults utilizing random digit dialing for landlines and random cell phone sampling with the goal of recruiting participants evenly distributed by gender and age groups from 2011-2014 (Lein, 2015). A small number of participants who slightly exceeded the target age range (slightly younger and slightly older) for the study were included in the dataset (Ryff et al., 2015a). A total of 3,577 respondents completed the initial telephone interview, and 2,600 completed the follow-up mail questionnaire (Lein, 2015). Analysis used a sample-design weight and a post-stratification weight to align with distributions from the U.S. Census Bureau's Current Population Survey (Palit, Radler, & Lein, 2016). The valid N for analysis of all participants who completed the phone and mail questionnaires was 2,542. The focus of the present study was successful aging among older adults. Extant literature shows early mortality among adults with the highest ACE scores (Brown et al., 2009); thus, the definition of "older adults" was widened to include adults ages 55-64. In the sample, 1,017 participants were older adults ages 55-76.

**Independent Variables**

*Childhood adversity (CA)*

The MIDUS Refresher survey (Ryff et al., n.d.-a, n.d.-b, 2015b) included variables that captured traumatic childhood experiences. My first article described the process of developing a cumulative childhood adversity (CA) score for use in analysis of older adults in the MIDUS sample. To select variables for the *CA score*, I used the original Adverse Childhood Experiences (ACEs) study as a point of departure (CDC & Kaiser, 2016), drew on literature by other researchers using MIDUS data to represent childhood adversities (e.g., Ferraro, Schafer, & Wilkinson, 2016; Friedman et al., 2015; Gruenewald et al., 2012; Jung, 2017; Savla et al., 2013; Schafer et al., 2011; Turiano, Silva, McDonald, & Hill, 2017), and consulted the wider body of research to see how other researchers had operationalized CA (e.g., Braveman & Barclay, 2009; Cuijpers et al., 2010; Ducci et al., 2009; Kazeem, 2015; Krause, 2004; Lee, Tsenkova, & Carr, 2014; Schilling, Aseltine Jr., & Gore, 2007; Seery, Holman, & Silver, 2010).

Table 8 describes the MIDUS variables used as measures of CA. The selected variables were manipulated to create eight dichotomous types of CA (with a "1" indicating the presence of this CA for the individual). The eight types of CA can be described as closely capturing a standard ACE variable (i.e., substance abuse in the home, emotional abuse by an adult in the home, physical abuse by an adult in the home, and emotional neglect by an adult in the home) or an adapted version of a standard ACE variable (i.e., did not live with both biological parents until age 16, sexual assault). There were no variables available to represent the standard ACE domains of domestic violence in the home, mental illness in the home, having a parent who was incarcerated, or physical neglect. Additionally, two non-standard ACE variables were included (i.e., financial distress, frequent moves) (CDC & Kaiser, 2016; Dong et al., 2004). Other studies

since the original ACE study have used different operationalizations of CA and have shown that

the cumulative measure of CA comprising adversities experienced in the home environment was

of more predictive value than specifically which measures were selected (e.g., Friedman et al.,

2015; Wade et al., 2016).

Of CAs associated with *CA Factor 1* (household challenges), *moving frequently* was most

common (29.7%), followed by *substance abuse by an adult in the home* (24.6%), and *financial*

*distress* (22.0%). *Not living with both biological parents until the age of 16* was indicated as a

CA for 17.2%. Of CAs associated with *CA Factor 2* (child abuse and neglect), *physical abuse*

was most common (20.3%), followed by *emotional abuse* (12.4%), *emotional neglect* (8.4%),

and *sexual assault* (5.4%).

Some gender differences in prevalence of CA were evident. A significantly larger

proportion (calculated using Chi Square) of women compared to men indicated they experienced

*financial distress* (24.8% and 18.9%, respectively), *emotional neglect* (10.6% and 6.1%,

respectively), and *sexual assault* (8.5% and 2.0%, respectively). The reasons for these gender

differences could be a factor of underreporting by men or also of selective mortality.

Table 8

*Childhood Adversities Experienced by Older Adults*

| Childhood adversity type | Total % (N) | MIDUS Refresher Questionnaire Items Selected to Represent Childhood Adversities (Ryff et al., n.d.-a, n.d.-b, 2015b) |
|---|---|---|
| Not live with both bio parents until 16 | 17.2% (175) | "Did you live with both of your biological parents up until you were 16?" Response: Yes, **No** (Reasons for No responses include mother or father died, parents separated/divorced, parents never lived together or never knew biological mother/father, adoption) |
| Substance abuse in home | 24.6% (250) | "Experiences you have had as a child or teenager: One or both parents drank so often it caused problems." Response: Checked box - and it happened **<18 years of age** OR "Experiences you have had as a child or teenager: One or both parents used drugs so often it regularly caused problems." Response: Checked box - and it happened **<18 years of age** OR "When you were growing up, that is during your first 16 years, did you live with anyone who was a problem drinker or alcoholic?" Response: **Yes**, No |

Table 8. *Childhood Adversities Experienced by Older Adults* (continued)

| Childhood adversity type | Total % (N) | MIDUS Refresher Questionnaire Items Selected to Represent Childhood Adversities (Ryff et al., n.d.-a, n.d.-b, 2015b) |
|---|---|---|
| Financial distress* | 22.0% (223) | "Experiences you have had as a child or teenager: Father or mother did not have a job when they wanted to be working." Response: Checked box - and it happened **<18 years of age** OR "During your childhood and adolescence, was there ever a period of six months or more when your family was on welfare or ADC?" Response: **Yes**, No OR "Thinking back to your family's financial situation when you were growing up, was your family better off or worse off financially than the average family was at that time?" Response: A lot better off, Somewhat better off, A little better off, Same as average family, A little worse off, **Somewhat worse off**, **A lot worse off** |
| Moved frequently | 29.7% (302) | "When you were growing up, how many times did you move to a totally new neighborhood or town?" Response: numerical range from 0 to 96; scores of **3 or more moves** |
| Sexual assault | 5.4% (55) | "Experiences you have had as a child or teenager: Sexually assaulted (e.g., forced sexual intercourse or other unwanted sexual contact)." Response: Checked box - and it happened **<18 years of age** |
| Emotional abuse | 12.4% (126) | "When you were growing up, how often did your mother, or the woman who raised you, insulted you or swore at you; sulked or refused to talk to you; stomped out of the room; did or said something to spite you; threatened to hit you; smashed or kicked something out of anger?" Response: **Often**, Sometimes, Rarely, Never OR "When you were growing up, how often did your father, or the man who raised you, insulted you or swore at you; sulked or refused to talk to you; stomped out of the room; did or said something to spite you; threatened to hit you; smashed or kicked something out of anger?" Response: **Often**, Sometimes, Rarely, Never |
| Physical abuse | 20.3% (207) | Physical abuse: "When you were growing up, how often did your mother, or the woman who raised you, pushed, grabbed, or shoved you; slapped you; threw something at you?" Response: **Often**, Sometimes, Rarely, Never OR Physical abuse: "When you were growing up, how often did your father, or the man who raised you, pushed, grabbed, or shoved you; slapped you; threw something at you?" Response: **Often**, Sometimes, Rarely, Never OR Severe physical abuse: "When you were growing up, how often did your mother, or the woman who raised you, kicked, bit, or hit you with a fist; hit or tried to hit you with something; beat you up; choked you; burned or scalded you?" Response: **Often**, **Sometimes**, **Rarely**, Never OR Severe physical abuse: "When you were growing up, how often did your father, or the man who raised you, kicked, bit, or hit you with a fist; hit or tried to hit you with something; beat you up; choked you; burned or scalded you?" Response: **Often**, **Sometimes**, **Rarely**, Never |
| Emotional neglect | 8.4% (86) | Parental Affection Scale - calculated by MIDUS Refresher researchers (Ryff, et al., 2015b), comprising means of 7 items with a range of .75 to 4 from a maternal affection scale and means of 7 items with a range of .75 to 4 from a paternal affection scale, coded so that higher scores reflected greater levels of affect received during childhood (i.e., rating of your relationship, understood problems and worries, could confide in about things that were bothering you, gave you love and affection, gave you time and attention, put effort into watching over you and making sure you had a good upbringing, taught you about life"). Response: numerical range from 0.96 to 4.00; scores of **2.00 or less** |

Note: Bolded text describes which responses were treated as a childhood adversity.

**Dependent Variables**

Successful aging was the outcome variable in this study. Successful aging was operationalized using multidimensional wellness theory, specifically the eight dimensions of wellness framework provided by SAMHSA (2016). Examples of how concepts relating to each of the eight dimensions used in literature about successful aging are included in the introduction to this article, and are provided in more detail in Table 1 in the literature review.

*Wellness dimensions*

Variables available in the MIDUS Refresher study were selected to correspond to the each of the eight wellness dimensions. SAMHSA's (2016) description of each wellness dimension is included in Table 9, along with a description of the MIDUS variable used to represent that wellness dimension.

*Cumulative wellness index*

Extant literature shows evidence that an accumulation of protective factors can be predictive of positive outcomes (Leffert et al., 1998; Pashak, Hagen, Allen, & Selley, 2014; Strout & Howard, 2012). Additionally, higher wellness in one area may be able to compensate for lower wellness in another area (Strout & Howard, 2012). In order to create a cumulative *wellness index* from the eight individual dimensions of wellness used in the study (see Figure 5), each dimension was standardized and then added together to create one measure. The resulting variable ranged in value from -1.21 standard deviations below the mean of 0 to 2.54 standard deviations above the mean. The reliability of this eight-item index was strong ($\alpha = 0.78$), and did not improve with deletion of any item.

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Table 9

*MIDUS Refresher Questionnaire Items Selected to Represent Wellness Dimensions*

| Wellness Dimension | Description (SAMHSA, 2016) | Items (Ryff et al., n.d.-a, n.d.-b) |
|---|---|---|
| Emotional | Effective coping skills and ability to create satisfying relationships | "Would you say your mental or emotional health is excellent, very good, good, fair, or poor?" Response: 1=Poor to 5=Excellent (has been reverse coded) |
| Environmental | Good health involves having pleasant environments that are stimulating and support well-being | "I have been able to build a living environment and a lifestyle for myself that is much to my liking." Response: 1=Disagree strongly to 7=Agree strongly (has been reverse coded) |
| Financial | Satisfaction with financial situation, current and future | "How would you rate your financial situation these days?" Response: 0=Worst possible financial situation to 10=Best possible financial situation |
| Intellectual | Utilizing creativity and looking for ways to expand knowledge and abilities | "For me, life has been a continuous process of learning, changing, and growth." Response: 1=Disagree strongly to 7=Agree strongly (has been reverse coded) |
| Occupational | Sense of satisfaction and enrichment from work | "Please think of the work situation you are in now, whether part-time or full-time, paid or unpaid, at home or at a job. How would you rate your work situation these days?" Response: 0=Worst possible work situation to 10=Best possible work situation |
| Physical | Understanding the importance of physical activity, eating well, and adequate sleep | "Would you say your physical health is excellent, very good, good, fair, or poor?" Response: 1=Poor to 5=Excellent (has been reverse coded) |
| Social | Developing a sense of connectedness and belonging and having a strong support system | "During the past 30 days, how much of the time did you feel like you belong?" Response: 1=None of the time to 5=All of the time (has been reverse coded) |
| Spiritual | Experiencing a strong sense of life purpose and meaning | "I have a sense of direction and purpose in life." Response: 1=Disagree strongly to 7=Agree strongly (has been reverse coded) |

**Control Variables**

Many personal characteristics that could be considered as covariates in the hierarchical regression analyses would also have been potentially confounding variables (e.g., education level could confound intellectual wellness, current socioeconomic status could confound financial wellness, marital status could confound social wellness).

Race and ethnicity were not selected as covariates because the distributions were very uneven, with the MIDUS Refresher sample being largely white and overwhelmingly non-Hispanic (see Table 10). Additionally, the effects of race on successful aging are interwoven

with socioeconomic status, which was not controlled for as indicated above. For example, McLaughlin, Connell, Heeringa, Li, and Roberts (2010) found that age and gender did not explain lower rates of successful aging among non-whites in their study, but socioeconomic status significantly diminished the effects of race. Nurius, Logan-Greene, and Green (2012) found that race and ethnicity were not significant predictors in their study of ACEs and adult mental health.



*Figure 5.* Items Comprising Cumulative Wellness Index for Older Adults.

*Age*

Age of participant was used as a control variable in the hierarchical regression, in order to remove variance associated with age among older adults (ages 55-76). Extant literature points to age as important to one's sense of life satisfaction and to different dimensions of wellness (e.g., Birditt et al., 2005).

**Gender**

*Gender* of participant was used as a control variable in the hierarchical regression. The gap in life expectancy in which women outlive men has been narrowing, and among white people with low education, life expectancy for women has declined at a much faster rate than it has for men (Sasson, 2016). The literature was not clear on the impact of gender on successful aging. Bourque, Pushkar, Bonneville, and Béland's (2005) analysis of Aging in the Community study data for older Canadian francophone adults found that there are similarities in predictors of life satisfaction for men and women, but also important differences. In McLaughlin et al.'s (2010) analysis of Health and Retirement Study data for adults 65 and older, the researchers expected to find sizeable differences by gender in older adults who met Rowe and Kahn's (1987) definition of successful aging, with a smaller proportion of men meeting the successful aging criteria or self-rate themselves as flourishing (e.g., Strawbridge, Wallhagen, & Cohen, 2002), but did not find strong evidence of this difference. In studies of concepts of well-being, such as flourishing among older Malaysian adults, men were more likely to subjectively rate themselves as flourishing (Momtaz, Hamid, Haron, & Bagat, 2016).

Because *gender* was a binary variable, *gender* was weight effect coded for inclusion in the hierarchical regression model (Smith Bynum, Thomaseo Burton, & Best, 2007). Males were

coded as a negative value of the percentage of females (i.e., -0.52) and females were coded as a positive value of the percentage of males in the sample (i.e., 0.48).

**Statistical Analyses**

Analyses of MIDUS Refresher data were conducted using IBM SPSS Statistics software (version 24). Analyses included descriptive statistics, significance testing for differences by gender using Chi Square tests and Independent Samples t-tests, bivariate correlations, and Cronbach's α. The hypothesis was tested using hierarchical multiple regression (controlling for *age* and *gender* in Model 1 and running Model 2 three times with the addition of the predictors *CA score*, *CA Factor 1*, and *CA Factor 2* individually; DV = *emotional wellness*, *environmental wellness*, *financial wellness*, *intellectual wellness*, *occupational wellness*, *physical wellness*, *social wellness*, *spiritual wellness*, cumulative *wellness index*).

No data were missing in the predictor variables, because respondents who had a missing response for any CA variable were coded as not having the CA, thus providing a more conservative estimate of CA prevalence (Reiser, McMillan, Wright, & Asmundson, 2014). The largest amount of missing data was for *occupational wellness* (2.0%), which was sufficiently low for running analyses on a large sample using listwise deletion (Cheema, 2014).

Assumptions of regression were examined for the study variables. The sample size of older adults ages 55-76 in the present study was large enough to run regression analyses (Ghasemi & Zahediasl, 2012). To test for normality, skewness and kurtosis were run on the independent and dependent variables; of the eight wellness dimensions and the cumulative *wellness index*, four variables – *environmental wellness* (skew = -1.491, kurtosis = 1.88), *intellectual wellness* (skew = -1.60, kurtosis = 2.83), *occupational wellness* (skew = -1.13, kurtosis = 0.75), and *spiritual wellness* (skew = -1.22, kurtosis = 1.03) – did not have sufficiently

normal distributions to run regression. Transformation was performed on each of the four skewed variables (squaring). After transformation, the distributions of the four wellness dimensions were sufficiently normal for the large sample size: transformed *environmental wellness* (skew = -0.88, kurtosis = -0.08), transformed *intellectual wellness* (skew = -0.93, kurtosis = 0.08), transformed *occupational wellness* (skew = -0.34, kurtosis = -0.94), and transformed *spiritual wellness* (skew = -0.64, kurtosis = 0.56). All three of the predictors lacked sufficient normality – *CA score* (skew = 1.00, kurtosis = 0.38), *CA Factor 1* (skew = 2.00, kurtosis = 3.54), and *CA Factor 2* (skew = 1.35, kurtosis = 1.81) – and were transformed (square root). The resulting distributions were sufficiently normal for the large sample size to be able to use in regression analyses: transformed *CA score* (skew = 0.09, kurtosis = -1.09), transformed *CA Factor 1* (skew = 0.11, kurtosis = -1.46), and transformed *CA Factor 2* (skew = 1.22, kurtosis = -0.04). Using the transformed variables, scatterplots between the predictors and outcomes showed distributions that were sufficiently uniform to indicate linearity. Scatterplots of the distribution of regression residuals indicated homoscedasticity. The tolerance values showed that multicollinearity was not an issue for the study variables. After the transformations described above, the necessary assumptions for regression were satisfied.

<div align="center">**Results**</div>

**Descriptive Statistics**

Descriptive statistics are provided in Table 10. The average age among older adults in the sample was 64.5 years. The gender distribution for older adults responding to the survey was 48.0% male. Two-thirds (68.8%) of older adults were in a committed relationship (married and a small proportion that were cohabiting). The vast majority of older adults in this sample were

non-Hispanic (97.5%) and had a primary racial identification (i.e., first race identified) of 87.7% white.

Nearly half of older adults were retired (45.6%), while 34.2% were working and 7.2% were self-employed. Educational background for older adults in this study included 5.9% with less than a high school diploma, 35.4% with a high school diploma/GED, 25.4% with some college or a 2-year degree, and 33.1% with a 4-year degree or higher. The average pre-tax annual income was $46,074; 14.1% of older adults had incomes of $10,000 or less. The average cumulative *CA score* was 1.4.

There were some significant differences in demographic characteristics among men and women. Women were significantly less likely to be married or cohabiting (56.0%) compared to men (80.9%). A significantly larger proportion of women had a high school diploma or GED as their highest level of education attained (40.5% compared to 29.7% of men). Women had significantly lower average annual pretax incomes ($34,151) compared to men ($58,074). Fewer women reported no CAs (32.5% compared to 37.7% of men) and more reported 4 or more CAs (13.2% compared to 8.6%). The average cumulative *wellness index* did not show any significant differences by gender, but women averaged a lower score compared to men for *physical wellness*, and a higher average score for *intellectual wellness*. Significant differences for *income*, *CA score*, and each wellness dimension were calculated with Independent Samples t-test. Significant differences for categorical variables were calculated using Chi Square tests.

Table 10

*Characteristics of Older Adults in the MIDUS Refresher Dataset*

| Demographic Variables | Total older adults (ages 55-76) M (SD) / % (N) |
|---|---|
| Age | 64.5 (5.7) |
| Gender | |
|     Male | 48.0% (488) |
|     Female | 52.0% (529) |
| Ethnicity | |
|     Hispanic | 2.5% (25) |
| Primary Racial Identification | |
|     White | 87.7% (889) |
|     Black and/or African American | 7.1% (72) |
|     Native American or Alaska Native | 0.8% (8) |
|     Asian | 0.3% (3) |
|     Other | 4.1% (42) |
| Marital Status | |
|     Currently married or cohabiting | 68.0% (692) |
| Employment Status | |
|     Working now | 34.2% (328) |
|     Self-employed | 7.2% (69) |
|     Unemployed | 2.3% (22) |
|     Retired | 45.6% (437) |
|     Homemaker | 4.2% (41) |
|     Other (laid off, student, disabled, no answer) | 6.4% (61) |
| Educational Background | |
|     Less than a high school diploma | 5.9% (60) |
|     High school diploma/GED | 35.4% (360) |
|     Some college or 2-year degree | 25.4% (259) |
|     4-year degree or higher | 33.1% (337) |
| Annual Pretax Income[a] | $46,074 ($45,495) |
|     $10,000 or less | 14.1% (144) |
|     $10,001 through $35,000 | 28.1% (286) |
|     $35,001 through $60,000 | 22.6% (230) |
|     $60,001 and higher | 35.1% (357) |
| Cumulative CA score | 1.4 (1.5) |
|     0 childhood adversities | 35.0% (356) |
|     1-3 childhood adversities | 54.0% (550) |
|     4-8 childhood adversities | 11.0% (112) |
| Cumulative Wellness Index[b] | 0.03 (5.00) |
|     Emotional | 3.69 (0.97) |
|     Environmental[1] | 5.85 (1.35) |
|     Financial | 6.32 (2.43) |
|     Intellectual[1] | 6.05 (1.19) |
|     Occupational[1] | 7.31 (2.51) |
|     Physical | 3.42 (1.06) |
|     Social | 3.69 (0.99) |
|     Spiritual[1] | 5.70 (1.38) |

[a] Variable represents pre-tax income for the previous calendar year, with top category capped at $300,000 or more. Because the distribution was skewed, the variable was transformed (square root) to achieve a more normal distribution for further analysis. [b] Cumulative *wellness index* was

calculated as the sum of standardized versions of the eight individual wellness dimensions. Values ranged from -15.61 to 9.50. [1] Because the distribution was skewed, the variable was transformed (squared) to achieve a more normal distribution for further analysis.

In the present study, successful aging was operationalized using wellness theory. Specifically, eight MIDUS variables were identified to represent each of eight dimensions of wellness (SAMHSA, 2016).

**Hypothesis: Among older adults (55-76), cumulative childhood adversity is inversely related to successful aging, after adjusting for *age* and *gender***

My hypothesis was that *CA score* had an inverse relationship with the level of wellness for each of the eight dimensions of wellness (i.e., *emotional*, *environmental*, *financial*, *intellectual*, *occupational*, *physical*, *social*, *spiritual wellness)* and the overall *wellness index*, after accounting for variance associated with *age* and *gender*. Hierarchical regression analyses were also run with *CA Factor 1* (household dynamics) and *CA Factor 2* (child abuse and neglect) to determine if the factors differed in their predictive value for wellness.

*Model 1*

Model 1 of the hierarchical linear regression controlled for *age* and *gender* for each of the predictors – *CA score*, *CA Factor 1*, *CA Factor 2*. Model 1, which was the same for all three predictors, explained a small, but significant, amount of the variance in the value of six of the eight dimensions of wellness among older adults ages 55-76 (see Table 11): 1.4% of the variance of *emotional wellness*, $F(2, 1,014) = 7.161$, $p = .001$; 1.5% of *environmental wellness*, $F(2, 1,004) = 7.524$, $p = .001$; 3.9% of *financial wellness*, $F(2, 996) = 20.221$, $p = .000$; 0.9% of *intellectual wellness*, $F(2, 1,009) = 4.736$, $p = .009$; 5.7% of *occupational wellness*, $F(2, 994)=30.246$, $p=.000$; and 1.4% of *social wellness*, $F(2, 1,000) = 6.930$, $p = .001$. Model 1 was not a significant predictor for *physical* or *spiritual wellness*. Model 1 predicted 3.3% of variance

in the overall *wellness index*, F(2, 952) = 16.157, p = .000. *Age* showed positive associations, and

*gender* showed no significant associations, for *emotional*, *environmental*, *financial*, *intellectual*,

*occupational*, and *social wellness*, and the overall *wellness index*; age did not have a significant

association with *physical* or *spiritual wellness*. *Gender* showed significance only with

*intellectual wellness*. Gender had a significant association with *physical wellness*, but Model 1

itself was not significant.

### *Model 2*

Model 2 of the hierarchical linear regression controlled for *age* and *gender* and was run

three times, with *CA score*, *CA Factor 1* (household dynamics), and *CA Factor 2* (child abuse

and neglect) each included as the predictor. For *CA score*, and for both factors, Model 2 showed

small but significant increases in the predictive value for all eight dimensions of wellness and the

*wellness index* (see Table 11).

With the overall *CA score* as the predictor, Model 2 accounted for 4.4% of the variance

of *emotional wellness*, F(4, 1,012) = 11.703, p = .000; 2.8% of the variance of *environmental*

*wellness*, F(4, 1,002) = 7.150, p = .000; 5.7% of the variance of *financial wellness*, F(4, 994) =

15.050, p = .000; 2.9% of the variance of *physical wellness*, F(4, 1,012) = 7.680, p = .000; and

1.4% of the variance of *social wellness*, F(4, 998) = 9.888, p = .000. For *spiritual wellness*,

Model 2 became significant, with *CA score* as the only predictive variable, accounting for 1.5%

of the variance, F(4, 1,010) = 3.740, p = .005. For the cumulative *wellness index*, Model 2

accounted for 6.7% of the variance, F(4, 950) = 17.104, p = .000. For each of area of wellness in

which *CA score* had significant predictive value, *CA score* contributed negatively to the

variance. These findings supported my hypothesis.

Model 2 accounted for 1.0% of the variance of *intellectual wellness*, $F(4, 1,007) = 2.556$, $p = .042$, and 5.7% of the variance of *occupational wellness*, $F(4, 992) = 15.865$, $p = .000$. *CA score* was not a significant contributor to the variance in either area, These findings did not support my hypothesis.

*CA Factor 1* and *CA Factor 2* showed a pattern similar to the overall *CA score* for *emotional*, *environmental*, *physical*, and *spiritual wellness*. For *financial* and *social wellness*, as well as the overall *wellness index*, the pattern was consistent, but *CA Factor 2* was a somewhat stronger predictor than *CA Factor 1*. Neither factor was predictive of *intellectual* or *occupational wellness*. These findings indicate that *CA Factor 1* and *CA Factor 2* differed in predictive strength for some areas of wellness, but showed overall patterns consistent with each another and the overall *CA score*.

Table 11

*Summary of Hierarchical Regression Analyses using Cumulative CA (CA Score, CA Factor 1, and CA Factor 2) to Predict Wellness (Eight Dimensions of Wellness and Overall Wellness Index), Controlling for Age and Gender*

| Wellness Variable | Model 1 | Model 2 – Total CA | Model 2 – CA Factor 1 | Model 2 – CA Factor 2 |
|---|---|---|---|---|
| Emotional | | | | |
| R2 | 0.014 | 0.043 | 0.033 | 0.034 |
| ΔR2 | 0.014** | 0.029*** | 0.019*** | 0.020*** |
| F (df) | 7.161 (2, 1,014)** | 11.703 (3, 1,013)*** | 11.362 (3, 1,013)*** | 11.839 (3, 1,013)*** |
| β for Age | 0.111*** | 0.110*** | 0.111*** | 0.104** |
| β for Gender | -0.040 | -0.028 | -0.031 | -0.032 |
| β for CA measure | na | -0.171*** | -0.137*** | -0.142*** |
| Environmental | | | | |
| R2 | 0.015 | 0.025 | 0.023 | 0.020 |
| ΔR2 | 0.015** | 0.010** | 0.009** | 0.005* |
| F (df) | 7.524 (2, 1,004)** | 8.231 (3, 1,003)*** | 7.813 (3, 1,003)*** | 6.704 (3, 1,003)*** |
| β for Age | 0.121*** | 0.121*** | 0.124*** | 0.118*** |
| β for Gender | 0.012 | 0.018 | 0.017 | 0.015 |
| β for CA measure | na | -0.099** | -0.093** | -0.072* |
| Financial | | | | |
| R2 | 0.039 | 0.057 | 0.043 | 0.056 |
| ΔR2 | 0.039*** | 0.018*** | 0.004* | 0.017 *** |
| F (df) | 20.221 (2, 996)*** | 20.086 (3, 995)*** | 15.023 (3, 995)*** | 19.595 (3, 995)*** |
| β for Age | 0.189*** | 0.188*** | 0.190*** | 0.183*** |
| β for Gender | -0.056 | -0.048 | -0.052 | -0.050 |
| β for CA measure | na | -0.135*** | -0.066* | -0.130*** |

Table 11. *Summary of Hierarchical Regression Analyses using Cumulative CA (CA Score, CA Factor 1, and CA Factor 2) to Predict Wellness (Eight Dimensions of Wellness and Overall Wellness Index), Controlling for Age and Gender* (continued)

| Wellness Variable | Model 1 | Model 2 – Total CA | Model 2 – CA Factor 1 | Model 2 – CA Factor 2 |
|---|---|---|---|---|
| **Intellectual** | | | | |
| $R^2$ | 0.009 | 0.009 | 0.010 | 0.010 |
| $\Delta R^2$ | 0.009** | 0.000 | 0.000 | 0.001 |
| F (df) | 4.736 (2, 1,009)** | 3.157 (3, 1,008)* | 3.240 (3, 1,008)* | 3.352 (3, 1,008)* |
| β for Age | 0.064* | 0.064* | 0.064* | 0.063* |
| β for Gender | 0.073* | 0.073* | 0.072* | 0.074* |
| β for CA measure | na | -0.003 | 0.016 | -0.024 |
| **Occupational** | | | | |
| $R^2$ | 0.057 | 0.060 | 0.058 | 0.060 |
| $\Delta R^2$ | 0.057*** | 0.002 | 0.000 | 0.003 |
| F (df) | 30.246 (2, 994)*** | 20.988 (3, 993)*** | 20.274 (3, 993)*** | 21.094 (3, 993)*** |
| β for Age | 0.240*** | 0.240*** | 0.240*** | 0.237*** |
| β for Gender | 0.005 | 0.008 | 0.006 | 0.007 |
| β for CA measure | na | -0.048 | -0.019 | -0.051 |
| **Physical** | | | | |
| $R^2$ | 0.005 | 0.029 | 0.020 | 0.019 |
| $\Delta R^2$ | 0.005 | 0.024*** | 0.014*** | 0.014*** |
| F (df) | 2.698 (2, 1,014) | 10.249 (3, 1,013)*** | 6.819 (3, 1,013)*** | 6.568 (3, 1,013)*** |
| β for Age | 0.011 | 0.010 | 0.014 | 0.005 |
| β for Gender | -0.072* | -0.061* | -0.064* | -0.066* |
| β for CA measure | na | -0.156*** | -0.121*** | -0.118*** |
| **Social** | | | | |
| $R^2$ | 0.014 | 0.034 | 0.023 | 0.035 |
| $\Delta R^2$ | 0.014** | .020*** | 0.010** | 0.021*** |
| F (df) | 6.930 (2, 1,000)** | 11.782 (3, 999)*** | 8.003 (3, 999)*** | 12.044 (3, 999)*** |
| β for Age | 0.116*** | 0.115*** | 0.118*** | 0.109** |
| β for Gender | -0.014 | -0.004 | -0.007 | -0.006 |
| β for CA measure | na | -0.143*** | -0.099** | -0.146*** |
| **Spiritual** | | | | |
| $R^2$ | 0.003 | 0.012 | 0.009 | 0.007 |
| $\Delta R^2$ | 0.003 | 0.009** | 0.006* | 0.004* |
| F (df) | 1.448 (2, 1,012) | 3.943 (3, 1,011)** | 2.936 (3, 1,011)* | 2.445 (3, 1,011) |
| β for Age | 0.053 | 0.052 | 0.055 | 0.050 |
| β for Gender | 0.01 | 0.016 | 0.014 | 0.013 |
| β for CA measure | na | -0.094** | -0.076* | -0.066* |
| **Cumulative Wellness** | | | | |
| $R^2$ | 0.033 | 0.065 | 0.049 | 0.057 |
| $\Delta R^2$ | 0.033*** | 0.032*** | 0.016*** | 0.024*** |
| F (df) | 16.157 (2, 952)*** | 22.108 (3, 951)*** | 16.365 (3, 951)*** | 19.113 (3, 951)*** |
| β for Age | 0.181*** | 0.182*** | 0.186*** | 0.175*** |
| β for Gender | -0.012 | -0.003 | -0.006 | -0.005 |
| β for CA measure | na | -0.180*** | -0.128*** | -0.155*** |

*p < .05; **p < .01; ***p < .001.

## Discussion

The present study contributed to the literature by deepening our understanding of the impact of CA on successful aging for older adults. Previous research has shown that CA, and particularly cumulative exposure to different kinds of CA, has been associated with negative

outcomes as adults (e.g., Friedman et al., 2015; Seery et al., 2010; Wade et al., 2016). The

present study builds on CA literature (e.g., Alwin, 2012; Anda et al., 2006; Braveman & Barclay,

2009; Schafer et al., 2011) by showing that increases in *CA score* were significantly associated

with lower levels of successful aging after controlling for *age* and *gender*.

The relationship of *CA score* and the control variables (*age*, *gender*) to wellness differed

according to which area of wellness was being explored. Model 1, which looked at the

association of *age* and *gender* with wellness, significantly predicted variance for all but two of

the wellness dimensions, with *age* being a common positive contributor to wellness and *gender*

being a rare contributor to the significant differences. These results showed that gender can play

a part in some aspects of successful aging, which is consistent with the literature (Bourque et al.,

2005; McLaughlin et al., 2010; Strawbridge et al., 2002). However, *gender* was not as important

as *age* in predicting overall wellness and was not uniformly positive or negative for either

gender. The present study showed that *intellectual wellness* was positively associated with

women ages 55-74, while *physical wellness* was positively associated with men ages 55-74.

Model 2, which added *CA score*, significantly predicted an amount of variance for all

eight of the wellness dimensions. CA score was a significant contributor for six of the wellness

dimensions, which provided partial support to my hypothesis, as well as the *wellness index*,

which supported my hypothesis. The largest association predicted by Model 2, which included

*CA score*, was with *emotional wellness* followed by *physical wellness*, *social wellness*, *financial*

*wellness*, *environmental wellness*, and *spiritual wellness*. *Spiritual wellness* was different from

the other measures in that *age* and *gender* did not explain a significant amount of the variance,

while *CA score* did contribute significantly. *CA score* did not contribute significantly to the

variance in *intellectual* or *occupational wellness*. Age was a significant predictor in several areas

of wellness, while gender effects were not common; variance associated with these two characteristics were controlled for where necessary. The impact of CA score, which was significant for all but two dimensions, had a lowering effect on wellness.

The present study found that older adults' ability to age successfully was associated with the amount of childhood adversity they experienced. As reported in the present study, decades later among older adults, adverse experiences in childhood explained a significant amount of variance in experiences of successful aging. *CA score* was significantly, and negatively, associated with the cumulative *wellness index*; this impact was greater for the cumulative measure of wellness than for the individual measures. The negative effect associated with *CA score* was similar in size to the positive effect associated with *age* among adults 55-76.

Researchers have focused on the factor structure of CA and have identified that the cumulative CA measure has been more predictive than each factor individually (e.g., Anda et al., 2006; Wade et al., 2016). The present study contributes to an understanding of the two factors comprising *CA score* by demonstrating that the two factors showed patterns and effect magnitudes similar to one another. While some differences existed in the magnitude of effect associated with *CA Factor 1* compared to *CA Factor 2*, each was a significant predictor for the same outcome measures as the other and as *CA score*. There were not any aspects of wellness where an individual factor was shown to account for a vastly greater amount of variance than the other. On their own, each factor contributed a significant amount of variance to the cumulative *wellness index*. However, the amount of variance explained by including only those CAs related to household dynamics (*CA Factor 1*; 4.9%) compared to including only those CAs related to child abuse and neglect (*CA Factor 2*; 5.7%) did not account for as much variance in the overall *wellness index* as the cumulative *CA score* did (6.5%). Thus, while there was evidence that two

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factors are present within the cumulative *CA score*, the present study did not provide reason to believe that it was necessary or beneficial to distinguish the experiences of CA related to household dynamics from CA experienced as child abuse and neglect in looking at successful aging outcomes. Thus, the findings of the present study were consistent with the literature emphasizing the importance of cumulative CA over individual types when looking at outcomes (e.g., Anda et al., 2006; Wade et al., 2016).

Implications of these results are relevant to interventions designed to boost individual areas of wellness, and create incremental progress toward successful aging broadly. The present study showed that people with more traumatic childhoods were having, on average, a more difficult time achieving wellness than their peers with less CA. Efforts that realize the far-reaching impacts of trauma, recognize the symptoms of trauma in individuals, and respond by incorporating new strategies that actively resist further traumatization can lead to interventions that will truly help all older adults benefit from efforts across many domains designed to improve their capacity to age successfully (SAMHSA, 2014). Trauma-informed care may serve as an important lens through which to design and implement successful aging programs and interventions (SAMHSA, 2014).

The present study found that CA was negatively associated with successful aging. Implications for practice can be described in two broad categories: prevention of CA and promotion of protective factors to mitigate the effects of CA. Prevention does not help adults who have already experienced early adversity, and not enough is known about how to promote successful aging among adults impacted by CA. Porter's (2015) research demonstrates the compounding effect of adult adversity, where major stresses for adults with high CA (including homelessness, severe depression, separation or divorce, incarceration, chronic illness, or a work-

related illness) were predictive of how many days each month the person reported being disrupted by disability. Cumulative advantage/disadvantage (CAD) theory provides a lens through which to look at experiences in adulthood as a continuation of the advantages and disadvantages experienced in childhood and may provide a better understanding of root causes and possible interventions (Braveman & Barclay, 2009). Future research into the application of theoretical constructs like the life-course perspective and CAD theory to real world situations could lead to the creation of trauma-informed treatment and policies that promote successful aging.

Protective factors in adulthood, such as access to concrete support in times of need, could mean the difference between a poor aging experience and aging successfully, and may be even more important for people with high amounts of CA (Porter, 2015). Future research into protective factors that may be able to ameliorate the negative influences of CA on wellness and successful aging may help vulnerable adults for whom prevention of early adversity is no longer an option. The present study treats wellness as an outcome, but wellness could itself be explored as a protective factor. Future research can explore whether wellness buffers the effects of early childhood adversity on other long-term outcomes. Further research into how wellness and successful aging are continuums may lead to recognition that incremental change in respective wellness factors, rather than an all-or-nothing approach, may contribute to successful aging. The ways in which stronger wellness in one area can compensate for lower wellness in a different area (Strout & Howard, 2012) could have implications for practice as well, as interventions could help people determine which wellness factors they can most effectively impact to reach a higher overall level of successful aging.

Differences in life expectancy are frequently framed in terms of race/ethnicity, age, and social class (Hudson, 2010); the impact of CA on life expectancy has not been commonly included. Proposed policy changes to address projected Social Security shortfalls by further raising the age of full retirement beyond 67 years have been criticized as further disadvantaging the most vulnerable older adults (Hudson, 2010). Research into the impact of proposed solutions and policy suggestions would benefit from including exposure to CA along with factors like race and poverty in their determinations of impact and equity.

Limitations to the present study of older adults include using a retrospective, self-reported method for capturing experiences of CA. People who have more optimistic tendencies as adults may be more likely to remember their childhoods more positively, whereas people who are more pessimistic may have a more pessimistic evaluation of their childhoods. The difference in current levels of optimism may also impact respondents' ratings of current wellness (e.g., Dumitrache, Windle, & Rubio Herrera, 2015). Future research can explore the impact of experiences of CA on current optimism, differences in recollection of CA based on current optimism, and the association between optimism, CA, and current wellness.

Self-report bias may also reflect gender differences in how the past is recollected; the smaller proportion of men who experienced financial distress as a CA in the present study may have been a function of this dynamic. Studies have found that retrospective methods are likely to produce more conservative estimates, as people tend to underestimate the amount of CA they experiences (Alwin, 2007; Dube, Felitti, Dong, Giles, & Anda, 2003). Additionally, because variables were drawn from a secondary dataset, the selected CA measures may not be as predictive as the measures used in the original ACE study.

Another limitation was that people with higher experiences of CA have premature mortality, so samples of older adults may result in greater homogeneity due to survival bias (Brown et al., 2009; Ferraro & Shippee, 2009). Underrepresentation of people with higher CA scores may be a factor of sampling bias, as people who self-select to participate in research tend to be healthier and better educated (Homan, 2016) and that marginalized people may be less likely to be part of the sampling frame to begin with (Bennett et al., 2015). This sampling bias may result in lower estimates of predictive value, such as in the small, but significant, amount of variance in chronic conditions predicted by *CA score* in the present study. Thus, while the prevalence of CA using MIDUS Refresher data may be lower than the actual population, the significant impacts identified in the present study likely reflect conservative results. Targeted sampling of marginalized groups could be especially insightful into understanding their experience of successful aging.

The MIDUS Refresher variables used to represent the eight dimensions of wellness were selected based on the definitions of wellness provided by SAMHSA (2016). Each area of wellness was operationalized using a single variable. Other variables from the MIDUS dataset could be tested in future research to see if other operationalizations of wellness were also predictive or could be combined to create an index for each area of wellness. Future research using primary datasets could operationalize wellness to their specifications and see if they are able to contribute further to our understanding of the value of wellness in understanding successful aging.

The present study found that CA was negatively associated with successful aging. Implications for practice can be described in two broad categories: prevention of CA and promotion of protective factors to mitigate the effects of CA. Prevention does not help adults

who have already experienced early adversity, and not enough is known about how to promote successful aging among adults impacted by CA. Porter's (2015) research demonstrates the compounding effect of adult adversity, where major stresses for adults with high CA (including homelessness, severe depression, separation or divorce, incarceration, chronic illness, or a work-related illness) were predictive of how many days each month the person reported being disrupted by disability. Cumulative advantage/disadvantage (CAD) theory provides a lens through which to look at experiences in adulthood as a continuation of the advantages and disadvantages experienced in childhood and may provide a better understanding of root causes and possible interventions (Braveman & Barclay, 2009). Future research into the application of theoretical constructs like the life-course perspective and CAD theory to real world situations could lead to the creation of trauma-informed treatment and policies that promote successful aging.

Protective factors in adulthood, such as access to concrete support in times of need, could mean the difference between a poor aging experience and aging successfully, and may be even more important for people with high amounts of CA (Porter, 2015). Future research into protective factors that may be able to ameliorate the negative influences of CA on wellness and successful aging may help vulnerable adults for whom prevention of early adversity is no longer an option. The present study treats wellness as an outcome, but wellness could itself be explored as a protective factor. Future research can explore whether wellness buffers the effects of early childhood adversity on other long-term outcomes. Further research into how wellness and successful aging are continuums may lead to recognition that incremental change in respective wellness factors, rather than an all-or-nothing approach, may contribute to successful aging. The ways in which stronger wellness in one area can compensate for lower wellness in a different

area (Strout & Howard, 2012) could have implications for practice as well, as interventions could help people determine which wellness factors they can most effectively impact to reach a higher overall level of successful aging.

Differences in life expectancy are frequently framed in terms of race/ethnicity, age, and social class (Hudson, 2010); the impact of CA on life expectancy has not been commonly included. Proposed policy changes to address projected Social Security shortfalls by further raising the age of full retirement beyond 67 years have been criticized as further disadvantaging the most vulnerable older adults (Hudson, 2010). Research into the impact of proposed solutions and policy suggestions would benefit from including exposure to CA along with factors like race and poverty in their determinations of impact and equity.

**CONCLUSIONS**

The MIDUS Refresher dataset offers a valuable opportunity to study questions of importance to the field of gerontology using a nationally representative sample of adults. The present study had two main components. In the first part of this study, I developed and analyzed a cumulative measure of CA for use with older adults using existing MIDUS questions. The factor structure of this measure, the *CA score*, was consistent with past research, demonstrating a factor related to household dynamics and one related to child abuse and neglect. *CA score* performed as expected in predicting an inverse relationship with *life satisfaction* and a positive relationship with number of *chronic conditions*. In the second part of this study, this measure of CA, and the two factors comprising the overall score, were used to explore the hypothesis that an increase in the number of types of CA a person experienced would be associated with a decrease in levels of wellness. Using wellness theory to operationalize successful aging, *CA score* predicted a significant reduction in *emotional*, *environmental*, *financial*, *physical*, *social*, and *spiritual wellness*, but not *intellectual* or *occupational wellness*. *CA score* also significantly predicted a decrease in the cumulative *wellness index*, after controlling for *age* and *gender*. These results confirmed the hypothesis that experiences of childhood adversity impact successful aging decades down the road.

Implications for practice can be described in two broad categories: prevention of CA and promotion of protective factors to mitigate the effects of CA. The best solution for addressing the public health problem posed by the negative consequences of early traumatic life experiences and to increase the ability to age successfully in the future would be to prevent an individual from being exposed to trauma and toxic stress as a child. Known risk factors for child maltreatment include limited knowledge of parenting and child development; a parent who

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experienced maltreatment; a parent with mental health or substance abuse issues; factors such as being young, lack of education, or low income; social isolation; and neighborhood disadvantages such as high poverty (Anda et al., 2006; Brown et al., 2009; CDC, 2017). Further research can bolster intergenerational approaches into interventions aimed at primary prevention, such as evidence-based home visiting programs with parents (Casillas, Fauchier, Derkash, & Garrido, 2016) which seek to improve outcomes for their children across the life course.

However, prevention does not help adults who already are living with the burden of early adversity. Protective factors in adulthood, such as access to concrete support in times of need, represent circumstances that contribute to successful aging. Protective factors could mean the difference between a poor aging experience and aging successfully (Porter, 2015). Not enough is known about how to promote successful aging among adults impacted by CA. For adults with many types of childhood traumatic experiences, protective factors may be even more important in promoting successful aging than for people with less traumatic childhoods. Future research into protective factors that may be able to ameliorate the negative influences of CA on wellness and successful aging may help vulnerable adults for whom prevention of early adversity is no longer an option.

As an operationalization of successful aging, the present study treats wellness as an outcome. Wellness may also operate as a protective factor that can buffer the effects of early adversity on other outcomes as adults. Future research can explore whether wellness – individually and as a collective construct – may function as a moderator between early childhood adversity and specific long-term outcomes such as life satisfaction and number of chronic illnesses. Better understanding of the role of wellness in helping adults achieve better life satisfaction and fewer chronic illnesses may provide opportunities to target interventions related

to promoting successful aging, especially for adults struggling with the long-reaching impacts of experiences of CA.

Future research into how wellness dimensions are interconnected, and the extent to which stronger wellness in one area can compensate for lower wellness in a different area (Strout & Howard, 2012) could have implications for practice as well. Use of strategies such as selection, optimization, and compensation (SOC; e.g., Burnett-Wolle & Godbey, 2007; Hahn & Lachman, 2015) may help people determine which wellness factors they can most effectively impact by promoting stronger wellness in some areas to balance deficits or declines in other areas. Further research into how wellness and successful aging are continuums may lead to recognition that incremental change in respective wellness factors, rather than an all-or-nothing approach, may contribute to successful aging.

The present study determined that cumulative CA affected the ability of adults to age successfully. Cumulative advantage/disadvantage (CAD) theory provides a lens through which to look at experiences in adulthood as a continuation of the advantages and disadvantages experienced in childhood and may provide a better understanding of root causes and possible interventions (Braveman & Barclay, 2009). Porter's (2015) research demonstrates the compounding effect of adult adversity; among adults with three or more ACEs, major stresses as an adult (including homelessness, severe depression, separation or divorce, incarceration, chronic illness, or a work-related illness) were predictive of how many days each month the person reported being disrupted by disability.

As a mechanism, cumulative disadvantage operates via a lifelong process. CAD theory examines how inequalities become stacked over an individual's life course, connecting the individual's experiences to the social structures that influence access to resources and

opportunities early in life (Dannefer, 2012; Hudson, 2010). CAD theory also explains the cycle where disadvantage results in health damages while advantage results in health benefits (Alwin, 2012; Braveman & Barclay, 2009). However, there is the potential to overcome some health risks that began early in life (e.g., Karatoreos & McEwen, 2013), which illustrates the plasticity of human development and underscores the role of human agency in influencing developmental trajectories. Future research into the application of theoretical constructs like the life-course perspective, CAD theory, and SOC to real world situations that harness individual agency and plasticity and lead to the development of trauma-informed treatment and policies to promote successful aging.

Further research on successful aging among different racial and ethnic groups and adults older than 75 would be illuminating. There has been evidence that certain aspects of wellness may operate differently depending on cultural context. For example, researchers found that, at higher levels of daily spiritual experiences, older African Americans and whites had similar levels of life satisfaction (Skarupski et al., 2013). However, lower levels of daily spiritual experiences were associated with lower life satisfaction for older African Americans but not for whites (Skarupski et al., 2013). Additionally, the influence of certain wellness dimensions may shift with increasing age. In a study of older adults who had experienced traumatic events in their lifetime, emotional support was found to be a particularly helpful stress buffer for the oldest-old adults (ages 85 and older) compared to the young-old adults (ages 65-74; Krause, 2004).

Differences in life expectancy are frequently framed in terms of race/ethnicity, age, and social class (Hudson, 2010); the impact of CA on life expectancy has not been commonly included. Proposed policy changes to address projected Social Security shortfalls by further raising the age of full retirement beyond age 67 have been criticized as further disadvantaging

the most vulnerable older adults (Hudson, 2010). Research into the impact of proposed solutions and policy suggestions would benefit from including exposure to CA along with factors like race and poverty in their determinations of impact and equity.

The present study found that CA was negatively associated with successful aging. As noted above, it could be extremely insightful to explore CA, successful aging, and protective factors among underserved and vulnerable populations, such as people who are homeless or addicted to drugs or alcohol. Another area of exploration would be to look at the factor structure of the cumulative wellness score, to see if there are factors within the overall measure that could provide additional insight into how the eight dimensions of wellness operate. Another area of interest would be to look at measures of adult adversity and to explore the relationships between CA score, adult adversity, and successful aging. Further research into CA and successful aging is important because of its implications for prevention, treatment, and policy.

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