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The Six Dimensions of Wellness and Cognition in Aging Adults

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Objective: Examine how wellness in six dimensions (occupational, social, intellectual, physical, emotional, and spiritual) protects cognition in aging adults. **Background:** cognitive impairment increases with age. Baby boomers represent a significant percent of the population at risk for cognitive impairment. Cognitive impairment has a negative impact on nursing resources, health care finances, patient mortality, and quality of life. Wellness and prevention is one focus of Institute of Medicine's vision for the future of nursing. **Method:** Literature was retrieved from Cumulative Index to Nursing and Allied Health Literature and MEDLINE. Research that examined the affect of wellness in each of the six dimensions on cognition in older adults was included. **Results:** One or more of the following may protect cognition in aging: midlife occupation complexity, marriage, social networks, formal education, intellectual activities, physical activity, healthy nutrition, motivational ability, purpose in life, and spirituality. **Conclusion:** Wellness in one or more of the six dimensions may protect cognition in aging. The cognitive protective benefits may increase when wellness in more than one dimension is demonstrated. High wellness in one dimension may protect cognition by compensating for low wellness in another dimension. The interconnectedness of each of the dimensions signifies the importance of evaluating older adults holistically. Wellness throughout the life span may result in improved cognition in aging. **Application:** Future research is needed to examine the relationship between the six dimensions of wellness and cognition, and to determine if one dimension of wellness is a significant predictor of cognitive health in aging adults.

Keywords: *aging; gerontologic nursing; health; health promotion; holistic care; holistic health; holistic nursing; memory; nursing knowledge; nutrition*

Cognitive decline is one of the most feared consequences of aging (Phelan, Anderson, LaCroix, Larson, 2004). This problem presents as decline in one or more cognitive abilities: mental processing, learning, intuition, judgment, language, and memory (Centers for Disease Control and Prevention [CDC], n.d.). Cognitive decline diagnoses range from mild cognitive impairment (MCI) to severe forms of dementia, and Alzheimer's disease (AD), a common form of dementia (Alzheimer's Association, n.d.). Older adults experiencing MCI exhibit memory,

language, or other cognitive deficits noticeable by others but not severe enough to interfere with daily life or meet the criteria for dementia (Alzheimer's Association, 2011). The development of dementia is greater in older adults diagnosed with MCI. Those diagnosed with dementia exhibit decline from a

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previously higher level of cognitive function in more than one of four cognitive domains: recent memory, language, visual-spatial ability, or executive function (Alzheimer's Association, n.d.). AD is the most common type of dementia and is currently the fifth leading cause of death among adults 65 years and older (Alzheimer's Association, n.d.).

The risk of cognitive decline increases substantially with age. In 2002, the approximate number of Americans 71 years and older living some form of cognitive decline was 13.7% and for those 90 years and older this percentage increased to 37.4 (Plassman et al., 2007). The aging American demographic commonly referred to as "the baby boomers," (those born between 1946 and 1964) represent 20% of the U.S. population; they are the largest cohort in American history and started turning 65 in 2011 (Federal Interagency Forum on Aging-Related Statistics, 2010; Hartman-Stein & Potkanowicz, 2003).

The aging demographic will make a considerable impact on the percentage living with cognitive decline, which will present economic challenges to society and the American health care system (Alzheimer's Association, n.d.; Loge & Sorrell, 2010). Older adults with cognitive decline are at greater risk for losing their ability to perform instrumental activities of daily living and relying on paid or unpaid caregivers (CDC, n.d.). Those diagnosed with AD and other dementias use more long-term care, skilled nursing, hospital care, and home health care compared with other older adults (Alzheimer's Association, 2011). Informal caregivers provide care at an estimated cost of \$18 billion per year and unpaid caregivers provide more than 17 billion hours of care estimated at \$202 billion (Alzheimer's Association, 2011; Langa et al., 2001). The total future cost of health care for AD and other forms of dementia is projected at \$1.1 trillion as the baby boomers age (Alzheimer's Association, 2011).

In response to the unprecedented societal, health, and economic implications associated with cognitive decline, the CDC and the Alzheimer's Association rank prevention and cognitive health protection as one of their top priorities (CDC, n.d.). The Institute of Medicine (IOM) envisions a future health care system where nurses intentionally promote wellness and disease prevention across the life span (National Academy of Sciences (NAS), 2010).

Nurses care for cognitively impaired patients and their families in a variety of health care settings:

community, long-term care, acute care, and primary care. The nursing profession is well recognized for the role of disease prevention and wellness (Donaldson & Crowley, 1978; (NAS, 2010). Preventing cognitive decline among older adults would serve to maintain their independence and reduce the economic burdens associated with cognitive impairment. To meet the mission of the IOM, nurses need to intentionally promote wellness to prevent cognitive impairment. An understanding of how wellness contributes to cognition in older age is necessary before nurses can achieve this goal.

The National Wellness Institute (NWI, n.d.) offers a definition and framework to examine wellness. Wellness, according to NWI (n.d.), is a multidimensional and holistic state of being that is conscious, self-directed, and constantly evolving to achieve one's full potential. Wellness is an ever-changing process that encompasses six dimensions: occupational, social, intellectual, physical, emotional, and spiritual (Hettler, 1976). The "six dimensions of wellness" interconnect with one another to represent a person. Wellness aligns with holism philosophy; nurses cannot understand a patient's wellness without assessing the whole patient in multiple dimensions (Godfrey-Smith, 2003). An overview of each of the six dimensions of wellness is listed in Table 1.

The six-dimensional model provides a framework to examine how wellness may contribute to cognition and prevent decline as people age. Applying current research to the six-dimensional model provides preliminary evidence that wellness may protect against cognitive decline as adults age.

Method

Literature was retrieved from Cumulative Index to Nursing and Allied Health Literature and MEDLINE. The review contains research from 2003 to 2011 including both noninstitutionalized males and females. Research with dependent variables of cognition and cognitive disease states were included. Research with independent variables aligned with William Hettler's Six Dimensions of Wellness theoretical framework were included (Hettler, 1976). Key terms are spirituality; physical activity; healthy eating; emotional states; marital status; social engagement with friends, family, and the community; occupation; spirituality; purpose in life; and religiosity.

Table 1. Overview of the Six Dimensions of Wellness

Dimension of Wellness	Definition
Occupational wellness	Ability to contribute unique skills to personally meaningful and rewarding paid or unpaid work
Social wellness	Ability to form and maintain positive personal and community relationships
Intellectual wellness	Commitment to lifelong learning through continual acquisition of skills and knowledge
Physical wellness	Commitment to self-care through regular participation in physical activity, healthy eating, and appropriate health care utilization
Emotional wellness	Ability to acknowledge personal responsibility for life decisions and their outcomes with emotional stability and positivity
Spiritual wellness	Acquiring purpose in life and a value system

Source: Adapted from "The Six Dimensions of Wellness Model," by W. Hettler (1976). Copyright 2004 by the National Wellness Institute.

Occupational Wellness

Occupational wellness is reflected in the contribution of unique skills and talents to personally meaningful and rewarding work expressed through paid or non-paid activities that benefit the well-being of the community (Hettler, 1976). Karp et al. (2009) evaluated midlife occupation complexity, education level, and cognition in a population-based longitudinal study of 931 adults 75 years and older without cognitive impairment at baseline. Participants completed two yearly examinations by physicians, neuropsychologists, psychologists, and nurses over a 6-year period. The *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., *DSM-III*, American Psychiatric Association, 1980) defined dementia and AD was diagnosed using the National Institute of Neurological and Communicative Disorders and Stroke–Alzheimer's Disease–Related Disorders Association (NINCDS-ADRDA) criteria. Nurses interviewed knowledgeable informants to obtain the participant's longest job, or main occupation. Karp et al. (2009) found that adults working in complex occupations involving data and people had stronger cognitive performance in older age compared with adults working in occupations involving things. Work with things required setting up, operating-controlling, driving, or handling. The adults working in complex occupations had more years of formal education and had worked in occupations involving data and people more than adults with fewer years of formal education. However, among adults with fewer years of formal education, those who worked in a complex occupation involving self-direction had less risk for cognitive impairment compared with adults working in low-complexity occupations.

Andel et al. (2005) examined midlife occupation complexity, dementia, and AD in a dual design population-based case control and co-twin control study including 2,622 complete twin pairs. The twin participants were 65 years and older and randomly selected from the Swedish Twin Registry established in 1960. Participants without cognition data or informant reports were excluded. The study examined work complexities in three domains: people, data, and things. The participant, or a reliable informant, completed main lifetime occupation information. Occupational complexity scores were applied to each occupation category based on the Dictionary of Occupational Titles. The results indicate that independent of age, gender, and education, higher complexity of work with people was associated with reduced risk of dementia and AD. In the co-twin analysis, twins with higher complexity of work with people were at lower risk of AD compared with their twin. Finally, higher complexity of work with things or innate objects, increased risk for dementia in older age.

Social Wellness

Social wellness reflects positive personal and community relationships built on mutual respect, cooperation, and interdependence. Social wellness is reflected in effective communication and a healthy environment (Hettler, 1976). Positive personal relationships demonstrating cohabitation and sustained marriage may protect cognition in aging (Håkansson et al., 2009). Håkansson et al. (2009) examined the relationship between midlife marital status and cognition in older age in a population-based longitudinal study. The

sample included adults aged 65 to 79 years from a previous population-based sample from 1972 to 1998. Marital status was measured at midlife and again in older age. Participants completed self-administered questionnaires on health behavior, health status, depression, medical history, and biometrics. Dementia was diagnosed using a three-step protocol beginning with the Mini-Mental Status Examination (MMSE). Neurologists, cardiologists, and neuropsychologists examined participants with low-MMSE scores. Dementia was diagnosed using magnetic resonance imaging results, *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., *DSM-IV*, American Psychiatric Association, 1994), and NINCDS-ADRDA criteria. Outcomes from this work revealed that adults who lived without a partner at midlife had nearly twice the risk of cognitive impairment in older age compared with adults living with a partner. Adults who lived without a partner at midlife AND older age had 3 times the risk for cognitive impairment compared with those cohabiting in midlife and older age. Older adult widows presented with the highest percentage of cognitive impairment among participants living without a partner (Håkansson et al., 2009).

Adolescent involvement in school-related, community activities may protect cognition in older age (Fritsch et al., 2005). Thomas Fritsch et al. (2005) used archived student records to investigate adolescent extracurricular activity involvement and cognitive impairment in older age. The retrospective cohort study of 396 participants with a mean age of 75 years was generated from part of the Cleveland Longitudinal Aging Studies of Students. The participants graduated from the same high school. Participants with missing activity data and whose cognitive impairment was a consequence of depression or multiple sclerosis were excluded. Participants completed the Modified Telephone Interview for Cognitive Status. Proxy respondents completed the Informant Questionnaire and Cognitive Decline in the Elderly Questionnaire. When either assessment indicated impairment, the participants answered the Dementia Questionnaire. Physical and mental health was examined with the Short Form 36 Health Survey. Extracurricular activity involvement was obtained from the school's yearbook. The results indicate that when compared with those who participated in less than two extracurricular activities, adolescents who participated in two or more extracurricular activities had one third less risk of cognitive impairment in older age (Fritsch et al., 2005).

Social networks may protect against cognitive impairment in older age (Bennett, Schneider, Tang, Arnold, & Wilson, 2006). Researchers from the Rush Memory and Aging Project examined the effect of social networks on cognitive impairment in older age (Bennett et al., 2006). The longitudinal, epidemiological clinical-pathological study included 89 older adults without known dementia at baseline. Participants with brain biopsy results were included. Each participant completed baseline questions about social network size and uniform structured clinical assessments including the following: medical history, neurological examination, and neuropsychological performance. AD and conditions affecting cognition were classified according to the NINCDS-ADRDA. Covariates included cognitively stimulating activities, physical activities, social activities, and seven common chronic diseases. Participants completed 21 cognitive performance tests yearly and brain autopsy at death. The dependent outcome variable was global cognition. The results indicate that even when participants demonstrated severe levels of global disease pathology, cognitive performance remained higher for participants with larger network sizes even after controlling for covariates (Bennett et al., 2006).

Intellectual Wellness

Intellectual wellness reflects a commitment to life-long learning through self-directed behavior that promotes continuous acquisition and creative application of new skills and abilities (Hettler, 1976). Intellectual wellness demonstrated by years of formal education may protect cognition in older age. Specifically, 12 or more years of formal education compared with fewer than 12 years of education correlates with stronger cognitive performance in older age (Koster et al., 2005; Lièvre, Alley, & Crimmins, 2008; Plassman et al., 2007).

Intellectually stimulating activities such as computer games, crossword puzzles, and reading may reduce the risk of cognitive impairment for people with fewer years of formal education (Gilhooly et al., 2007). Gilhooly et al. (2007) examined older adults' cognition, educational level, and participation in mental, physical, and social activities. The correlational cohort study included 145 participants aged 70 to 91 years from various health status and social economic backgrounds. Participants completed a battery of neuropsychological tests and semistructured

interviews to determine the frequency of engagement in physical, mental, and social activities. Participants were asked, "Is there anything you deliberately do to maintain your cognition?" The results revealed a significant correlation between intellectual activities and stronger cognitive function in older age. Sixty-five percent of older adults reported deliberate engagement in intellectual activities to maintain cognition or prevent cognitive impairment. Older adults who reported deliberate engagement demonstrated significantly lower levels of cognitive impairment compared with those who did not deliberately engage. Compared with social and physical activities, older adults perceived intellectual activities most beneficial to maintaining cognition (Gilhooly et al., 2007).

Lachman, Agrigoroaei, Murphy, and Tun (2010) investigated years of education and intellectually stimulating activities to determine if cognitive activities can moderate the affect of limited education on cognition in older age. The cross-sectional national analysis included a random sample of 3,343 adults aged 32 to 84 years. Participants who reported stroke, Parkinson's disease, or other neurologic disorders affecting cognitive performance were excluded. Participants were asked the frequency of engagement in four cognitive stimulating activities (reading books, reading magazines or newspapers, playing word games, or writing). They reported completed years of formal education. Cognition was measured using the Brief Test of Adult Cognition by telephone. Covariates included demographics, self-rated health, and physical activity. The results indicate that those with more than 12 years of formal education participated in intellectually stimulating activities more often than those with fewer than 12 years of education and therefore demonstrated stronger cognitive performance. However, people with fewer years of formal education who engaged in intellectually stimulating activities at least one or more times per week demonstrated stronger cognitive performance compared with those with fewer years of formal education who did not engage in intellectually stimulating activities.

Newson and Kemps (2006) examined the benefit of intellectual and physical activity on the affect of simple and complex task performance in adults. This correlational analysis included a sample of 24 adults without cognitive impairment from each age group: 18 to 27 years, 65 to 74 years, 75 to 84 years, and 85 to 92 years. Baseline screening included the Clox task (an executive clock drawing task) and the

National Adult Reading Test—Revised. Participants recorded the amount of time and effort they spent engaging in 10 different physically and cognitively stimulating tasks. Simple and complex cognitive tasks were measured using two versions of the Visual Imagery Task. Participants reported years of formal education and completed the General Well-Being Scale. The results indicate that as age increased, energy and time spent engaging in physical and intellectual activities decreased. Engagement in both physical and intellectual activities improved cognitive performance; however, increased time and energy in intellectual activities improved cognitive performance on complex tasks regardless of physical activity (Newson & Kemps, 2006).

Physical Wellness

Physical wellness reflects investing in self-care: regular participation in physical activity, and recognition of the relationship between healthy nutrition and physical body functioning (Hettler, 1976). Middleton, Barnes, Lui, and Yaffe (2010) examined physical activity throughout various stages of life and the onset of cognitive impairment. The prospective cross-sectional study included 9,704 women 65 years and older. Women unable to walk without help or who had a bilateral hip replacement were excluded. Participants completed reports about their physical activity throughout various stages in their lives: teenage years, 30 years, 50 years, and current age (older age). Cognition was measured with the MMSE. Covariates included smoking, years of education, living arrangement, diabetes, Parkinson's disease, hypertension, body mass index, and depression. The results indicate that physical activity during teenage years demonstrated the lowest odds of cognitive impairment in older age. Women who reported physical inactivity as teenagers and became active at 30 and 50 demonstrated significantly lower odds of impaired cognition compared with those who remained physically inactive (Middleton et al., 2010).

Dik, Deeg, Visser, and Jonker (2003) evaluated the relationship between physical activity and delayed onset of cognitive impairment or maintained cognition in older age. The prospective population-based correlational study included 1,241 subjects aged 62 to 65 years. Participants with an MMSE score less than 24 were excluded. Participants reported time and energy spent participating in early-life physical

activity involving sweat, sports, or exhaustion between the ages of 15 and 25 years. Cognition was measured using the MMSE and information-processing speed was measured using the Alphabet Coding Task-15. Covariates included age, sex, socioeconomic status, lifestyle, current physical activity level, smoking status, alcohol consumption, diabetes, cardiovascular disease, depression, and verbal intelligence. The results indicate that 65% of the elderly were physically inactive early in life. Males reported more time and energy spent engaging in physical activity in early life compared with females and consequently males demonstrated stronger processing speed on cognitive performance scales compared with females.

Larson et al. (2006) investigated the relationship between regular exercise and the incidence of dementia in older adults. The prospective population-based 6.2-year longitudinal cohort study included 1,704 randomly selected adults 65 years and older without cognitive impairment at baseline. Participants were excluded for the following reasons: dementia, potential MCI, impending dementia, residing in a nursing home, or participating in another study. Participants completed the Cognitive Ability Screening Instrument every 2 years. Those demonstrating low-cognitive performance underwent clinical and neuropsychological examinations to determine diagnosis consensus. *DSM-IV* and (NINCDS-ADRDA) criteria were used for diagnosis. Participants reported number of days per week that they participated in physical activity for at least 15 minutes. Covariates included physical function, cognitive function, depression, health conditions, and lifestyle. The results indicate that among older adults who exercised 3 or more times per week the incidence rate of dementia was 13 1,000 person-years compared with 19.7 per 1,000 person-years for those who exercised less than 3 times per week (Larson et al., 2006).

Laitinen et al. (2006) investigated the association between dietary fat intake, dementia, and AD. The sample of 1,449 randomly selected adults aged 65 to 79 years was generated from a population-based 21-year longitudinal data set. Participants completed a 135-item questionnaire at baseline and follow-up that investigated their health behavior, dietary habits, alcohol consumption, smoking, exercise, medical history, blood pressure, body mass index, and serum cholesterol. Cognition was measured using the MMSE. Dementia and AD were diagnosed with *DSM-IV* and the NINCD/SADA criteria. The results indicate that people who

consumed moderate amounts of polyunsaturated and monounsaturated fats in midlife demonstrated decreased risk for dementia and AD in older age. Little to no fat intake and moderate amounts of saturated fat intake increased the risk for dementia and AD (Laitinen et al., 2006).

Scarmeas et al. (2009) investigated the affect of healthy eating habits on MCI. The longitudinal, multiethnic, community-based study with an average follow-up ranging from 1.0 to 13.8 years included 1,393 adults. Baseline assessments included medical and neurological examination, computed tomography, magnetic resonance imaging, health assessment, neurological battery, and the clinical dementia rating assignment. Neurologists and neuropsychologists used *DSM-IV* and NINCD/SADA criteria to diagnose dementia. Participants completed a 61-item version of the Semi-Quantitative Food Frequency Questionnaire. Foods were measured as healthy and detrimental according to daily gram per food intake. Healthy foods included fruits, vegetables, legumes, cereals, and fish. Detrimental foods included meat, dairy, no alcohol, heavy alcohol, and saturated fat consumption. Results indicate that participants who consumed a higher number of healthy foods demonstrated less risk of cognitive decline in older age. Compared with those with low consumption of healthy foods, those with moderate consumption of healthy foods demonstrated 17% less risk for cognitive decline, and those with the highest consumption of healthy foods demonstrated 28% less risk for cognitive decline in older age.

Emotional Wellness

Emotional wellness reflects a positive approach to life. Emotional wellness is the ability to manage and accept feelings and behavior. Emotional wellness is reflected through taking responsibility to manage one's life in personally fulfilling ways and recognizing limitations and seeking support when necessary. Emotionally well people form interdependent relationships built on mutual trust, respect, and commitment. They accept challenges, take risks, and acknowledge conflict as part of growth (Hettler, 1976).

Neuroticism is a personality type that reflects emotional instability, negative emotions, depressive symptoms, and anxiety. Wilson et al. (2007) investigated the relationship between higher levels of

emotional distress and the risk of cognitive impairment in older age. The 12-year longitudinal cohort study included a sample of 1,256 older adults (mean age 76.8 years). Participants with dementia, or MCI at baseline were excluded. The participants completed an average of 6.3 evaluations that included 19 cognitive tests. Neuroticism was measured at baseline using 6 items from the 12-item neuroticism scale of the NEO Five-Factor Inventory. Covariates included age, sex, and education. The results indicate that adults with high neuroticism or emotional distress were 42% more likely to develop impaired cognition than adults with low neuroticism. The risk of MCI increased 6% for each depressive symptom.

Wang et al. (2009) examined extraversion and neurotic personalities. The longitudinal correlational study included data from 506 older adults from a larger cohort study. Participants were excluded if they met the criteria for probably dementia, or demonstrated physical or cognitive impairment at baseline. Cognition was measured using the MMSE. Personality traits, neuroticism, and extraversion were measured using the Eysenck Personality Inventory. Trained nurses assessed social networks and leisure activities. Covariates included age, sex, depressive symptoms, cardiovascular disease, stroke, diabetes mellitus, genomic DNA, and APOE (apolipoprotein E) genotyping. Participants completed three follow-up assessments over a 6-year period. The results indicate that adults with low neuroticism and high extraversion had the lowest incidence of dementia. Social isolation and inactive lifestyles increased dementia incidence. Adults who possessed low neurotic personality traits and lived inactive and socially isolated lifestyles, however, demonstrated decreased risk for dementia (Wang et al., 2009).

An individual's motivation is the ability to choose among alternative goals and work and strive toward achieving the chosen goal (Forstmeier & Maercker, 2008). This is a characteristic of strong emotional wellness. Forstmeier and Maercker (2008) determined the affect of lifetime motivational and cognitive abilities on predicting cognitive health in older age. The sample included 147 community-dwelling adults aged 60 to 94 years. Older adults with visual impairment were excluded. Participants' cognitive and motivational abilities were estimated using the Occupational Information Network (ONET). Motivational abilities were measured with the Volitional Components Questionnaire and the General Self-Efficacy Scale. Psychological well-being

was measured using the Satisfaction With Life Scale, Geriatric Depression Scale, Brief Symptom Inventory, and the Perceived Stress Scale. Cognition was measured using a battery of neuropsychological assessments. The results indicate that lifetime motivational reserve protects cognition in older age. After controlling for age, sex, education, and intelligence, people who demonstrated stronger cognitive performance in older age had high psychological well-being and high lifetime motivational abilities.

Spiritual Wellness

Spiritual wellness reflects the ability to rise above and go beyond oneself to find meaning and purpose in life (Hettler, 1976). People possessing spiritual wellness accept the unknown in life and find harmony with social and physical forces from outside (Hettler, 1976). They can formulate a personal value system that gives unity, purpose, and goals to their hopes, thoughts, and action (Hettler, 1976).

Boyle, Buchman, Barnes, and Bennett (2010) examined the relationship between purpose in life and AD and MCI. The longitudinal study included a sample of 900 community-dwelling older adults. Participants with dementia at baseline or lack of follow-up data were excluded. Participants underwent a battery of 21 cognitive assessments. Dementia, MCI, and AD were diagnosed using NINCDS-ADRDA criteria. Participants completed the Ryff's Scale of the Psychological Well-Being Scale. Covariates included sex, education, depression symptoms, social network size, and self-reported medical conditions (stroke, cancer, diabetes, cardiovascular disease, hypertension, thyroid disease, and head injury). During the 7-year follow-up, adults who developed AD were older and had less purpose in life. An older adult with a high purpose in life was approximately 2.4 times more likely to remain free of AD compared with a person with a low score. An older adult with high purpose in life was 1.5 times more likely to remain free of MCI compared with a person with a low score. Older adults with greater purpose in life maintained cognition compared with those with low purpose in life, and they declined less rapidly (Boyle et al., 2010).

Coin et al. (2010) examined the relationship between religiosity and the development of cognitive impairment in adults with mild-to-moderate AD. The correlational, longitudinal study included 64

older adults with a mean age of 77.8 years. Participants without probable diagnosis of AD according to the NINCDS-ADRDA criteria were excluded. Patients living alone were also excluded. Cognition was measured using the MMSE. Informants provided information on the participant's usual cognitive, functional, and behavioral state. Religiosity was measured using the Behavioral Religiosity Scale and the Francis Short Scale. The results indicate that significant differences between low and high religiosity did not exist at baseline. One year later, however, the high-religiosity group maintained cognition; the low-religiosity group declined significantly in cognitive performance and behavioral disturbance. Additionally, the high-religiosity group did not deteriorate in any items on the neuropsychiatric inventory; the low-religiosity group demonstrated significant increase in aberrant motor behaviors, irritability, apathy, depression, aggression, hallucinations, and delusions (Coin et al., 2010).

Discussion

Research examining cognition through the six dimensions of wellness contains limitations. Some studies included in this literature review use correlational and cross-sectional design; therefore, cause and effect for each dimension of wellness and the contribution to cognition in older adults is not identified (Dik et al., 2003; Forstmeier & Maercker, 2008; Gilhooly et al., 2007; Lachman et al., 2010; Middleton et al., 2010; Newson & Kemps, 2006). Cross-sectional and correlational designs used to examine cognition in aging, limit research findings because it is impossible to know if impaired cognition influenced the independent variables, or if the independent variable influenced cognition. Longitudinal designs that include cognitively healthy participants at baseline and examine the affect of independent variables on cognition over time yield stronger research findings. Although randomized controlled trials yield the strongest evidence, ethical limitations make this design less feasible in research examining wellness and prevention. For example, withholding health-promoting behaviors and education from a control group may be unethical. Research in this review did not examine several variables related to each dimension of wellness. For example, the relationship between cognition and participants' perception of their occupation, participation in unpaid volunteer activities, social networks early in life or quality of

social relationships, and continuous acquisition and creative application of new skills and abilities were not examined. Many studies included in this review used large sample sizes, longitudinal designs, and rigorous criteria for diagnosing cognitive impairment.

One or more dimensions of wellness may protect cognition in aging even for those with familial or genetic risk factors (Andel et al., 2005). Twins have similar familial and genetic risk factors, and twins with higher scores for complexity of work with people and data demonstrated lower risk for dementia and AD compared with their twin who worked in occupations with less complexity (Andel et al., 2005). Wellness in one dimension may enhance wellness in other dimensions (Karp et al., 2006; Lachman et al., 2010). For example, intellectual wellness may improve occupational wellness. Adults with more years of formal education are more likely to secure complex occupations and participate in intellectually stimulating activities throughout their lives (Karp et al., 2006; Lachman et al., 2010). Wellness in two or more dimensions may protect cognition more than wellness in one dimension (Fratiglioni, Paillard-Borg, & Winblad, 2004; Hartman-Stein & Potkanowicz, 2003; Hendrie et al., 2006; Lee et al., 2010). Wellness in one dimension may compensate for wellness lacking in another dimension. For example, occupational wellness may compensate for intellectual wellness. Occupations requiring high self-direction protected cognition in adults with fewer years of education (Karp et al., 2006). Emotional wellness may compensate for social wellness. Adults with no social networks and low neurotic personalities had less risk for cognitive impairment compared with adults with no social networks and high neurotic personalities (Wang et al., 2009). Acknowledging the limitations, the literature highlights the apparent interconnectiveness of each dimension of wellness and the importance of evaluating older adults holistically.

Protecting cognition for the current aging demographic as well as populations to follow is essential for the health and economic stability of American society. Examining cognition through the Six Dimensions of Wellness supports the IOM's vision to *intentionally* promote wellness and prevent disease (NAS, 2010). The interconnectedness of each dimension of wellness illustrates the significance of evaluating older adults holistically; promoting wellness in one or more dimensions may be an effective strategy to prevent cognitive impairment and protect cognition in aging adults (Fratiglioni et al.,

2004; Hartman-Stein & Potkanowicz, 2003; Hendrie et al., 2006; Lee et al., 2010). Wellness may contribute to healthy cognition and prevention of cognitive decline in aging. Future research is needed to further examine the relationship between wellness and cognition in aging and determine if one or more dimensions of wellness predict greater protection from cognitive impairment and decline in older age. If one or more dimensions are more predictive of maintained cognition, nurses will be able to develop targeted, evidence-based wellness interventions designed to protect cognition in older age.

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