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Exploring Interventions to Reduce Cognitive Decline in Aging

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Abstract

As the population ages, risks for cognitive decline threaten independence and quality of life for older adults and present challenges to the health care system. Nurses are in a unique position to advise clients about cognitive health promotion and to develop interventions that optimize cognition in the growing aging population. A literature review was completed to provide nurses working in mental health and geriatric care with an overview of research related to the promotion of successful cognitive aging for older adults. Research evaluating cognitively stimulating lifestyles and the effects on cognitive function of older adults of interventions targeting cognitive training, physical activity, social engagement, and nutrition were reviewed. Overall research findings support positive effects of cognitive and physical activity, social engagement, and therapeutic nutrition in optimizing cognitive aging. However, the strength of the research evidence is limited by research designs. Conclusions include recommended applications for health promotion to optimize cognitive aging and future direction for research.

Keywords

Cognition and Aging; Interventions; Health Promotion

As the population ages, risks for cognitive decline threaten independence and quality of life for older adults and present challenges to the health care system. “Brain health” programs developed by aging interest groups such as the American Association of Retired Persons and the Alzheimer’s Association provide directives for nutrition, physical and cognitive activities, and other lifestyle modifications to enhance older adults’ cognition and memory. Computer training, memory tapes, and Nintendo games are also marketed to the lay public with claims of enhancing cognition, assuming that “use it or loose it” applies to cognitive as well as physical health (Casel, 2002). As health care experts, nurses may be asked to advise older adults about ways to optimize cognitive abilities in aging.

Geriatric and mental health nurses are in a unique position to identify changes in elder clients’ cognition, distinguishing between normal and pathological processes but also providing cognitive health promotion. Thus, nurses need to become knowledgeable about cognitive aging as a basis for educating clients and for developing and testing interventions to promote cognitive wellbeing. This paper provides an overview of the current state of the science in cognitive aging and a review of recent research with implications for practice and future research.

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The review identified research reports completed since 2000 by searching the terms "cognition" and "aging" in Medline, CINAHL, and Psych Info data bases. Additional significant research prior to 2000 was identified from manuscript references. More specific search terms including "lifestyle factors," "cognitive and exercise interventions," and "social engagement" were included to narrow topics and to organize the review.

Cognitive Changes of Aging

Knowledge of the normal and pathological changes in cognition that occur in aging is essential background to understanding interventions to optimize cognition in older adults. "Normal" cognitive aging includes established declines in cognitive processes that affect every day functional abilities for older adults such as driving, banking, and medication administration (Fillit et al., 2002). Cognition or intelligence includes abilities such as use of symbols and abstractions, acquiring new information, and adapting to changing situations. The intelligence quotient was developed to provide an index of cognition, including assessment of mathematical reasoning, word fluency, vocabulary, inductive reasoning, and spatial orientation. Intelligence, learning, and memory are three key cognitive domains that normally change during aging and have implications for maintaining independence and quality of life (Hooyman & Kiyak, 2007).

The Seattle Longitudinal study was a randomized controlled clinical trial that compared cognitive assessments initially collected in 1956 and continued over seven intervals in members of a Health Maintenance Organization. Contextual, health, and personality variables were measured in relation to cognitive abilities and real life tasks (Schaie, Willis, & Caskie, 2004). The study established that age-related patterns of decline in specific intellectual abilities vary among aging individuals, but that fluid (or process based) intelligence declines earlier than crystallized abilities (based on accumulated knowledge). Fluid ability declines occur at younger ages in women, increasing disability for this population that outlive male counterparts. Even crystallized (content based) abilities decline by the late 70s, and reductions in perceptual speed start in young adulthood. Most persons experience measurable cognitive loss by age 60, with widespread declines by age 75 (Schaie, Willis, & Caskie, 2004). Over the past decade, research has focused on determining why some elders have preserved cognitive function in aging as a basis to develop and test interventions to maintain cognitive abilities of older adults.

Theories of Cognitive Aging

Theoretically, age-related cognitive changes normally occur as outcomes of distal or proximal life events. Distal events are early life experiences such as physical, cultural, and social conditions that influence cognitive development and functioning. For example, vocabulary becomes increasingly diverse with age. In contrast, current cohorts of elders who were not exposed to computers as children are challenged by this new techology. Continued use of established cognitive abilities is also important to maintain performance (Fillit et al., 2002).

Proximal (recent) factors also contribute to reduced cognitive performance in aging. Multiple serial cognitive processes including processing speed, size of working memory, inhibition of extraneous environmental stimuli, and sensory losses contribute to cognitive decline. Cognitive capacity remains intact with aging, but encoding, storage, and retrieval become less efficient or are interrupted by reduced attention and working memory capacity (Fillit, et al., 2002). Slowed processing speed can interfere with problem solving by extending the time required for an older adult to perceive, interpret, select, and execute responses.

Reduced working memory occurs due to slowed processing involving the sequence of recall (Kramer, Bherer, Colcombe, Dong, & Greenough, 2004). Limited amounts of information are held in working (short-term) memory for immediate recall or are encoded and stored in secondary (long-term) memory. In aging, actual memories are preserved. However, short term memory (the amount of information held in immediate consciousness) is reduced, and retrieval of information from long-term memory stores is slowed. Reductions in the efficiency of encoding and recall, attention, and brain plasticity (the ability to adapt to novel information) are also implicated as normal changes in cognitive aging (Hooyman & Kayak, 2007).

National Institutes of Health experts from Aging, Mental Health, and Neurological Diseases and Stroke Institutes recently identified a need for research on healthy brain aging to include demographic, social, and biological determinants of cognitive and emotional health in older adults (Hendrie et al., 2006). An expert panel identified socioeconomic, education, physical, and psychosocial factors as determinants of cognition in aging. The panel called for research in four key areas with promise for improving cognitive aging. These include cognitive activity, physical activity, social engagement, and nutrition. This review will present research findings of studies that examine relationships between lifestyle and activities factors and cognition in aging followed by research testing targeted interventions to improve cognition focusing on cognitive activity, physical activity, social engagement, and nutrition.

Lifestyle Factors Associated with Maintained Cognition

Research has identified lifestyle practices such as education, leisure pursuits, intellectual engagement, and expertise that are associated with successfully maintenance of cognitive abilities. Physical activity, diet, and social activity are additional factors linked to maintained cognition in aging that have been used as a basis for interventions to prevent cognitive decline.

Cognitive Activity Factors

The MacArthur Studies of Successful Aging established the psychological and physiological benefits of education on cognition in aging individuals (Kubzansky et al., 1998). It has been established that education exerts protective effects on both memory and crystallized intelligence (accumulated knowledge), with minor effects on fluid cognition (processing speed and abilities). Cognitive inactivity has been associated with reduced performance on fluid intelligence measures, while use of cognitive abilities can minimize effects of low educational level. Other research supports the effects of socioeconomic status and prior life experiences on cognitive performance in older adults (Kramer et al., 2004).

Persons with cognitively stimulating occupations maintain higher cognitive functioning with aging. College professors, pilots, physicians, musicians, and architects have been studied as high cognitive activity groups. Occupational complexity or mental activities demanding thought processing and independent judgment, have been correlated with higher performance on measures of intellectual flexibility, memory, verbal abilities, fluency, and visual spatial measures in aging. Older adults in cognitively demanding occupations function higher than age mates, however, their performance eventually declines with advancing age (Salthouse, 2006).

Chess and bridge are leisure activities that demand working memory and reasoning skills. Older adults who play bridge score higher on working memory and reasoning measures compared to nonplayers and working crossword puzzles has also been associated with maintained cognition in older adults (Mireles & Charness, 2002). However, other research on self-selected leisure activities fails to support these findings. Subjects who reported a

high frequency of participation in cognitively demanding activities did not have higher cognitive performance in a subsequent study (Salthouse et al., 2002). Although the majority of correlational studies suggest benefits from cognitively demanding activities, more rigorous research designs will be needed to establish firm causal relationships.

Physical Activity Factors

Many studies have investigated physiological benefits of physical exercise in aging; however few examine potential cognitive benefits. Physical activity should enhance cognition as cardiovascular fitness increases cerebral blood flow and oxygen delivery to the brain, increasing neuron formation and maintaining brain volume (Etnier, Nowell, Landers, & Sibley, 2006).

Yaffe and colleagues (Yaffe, Barnes, Nevitt, Lui, & Covinsky, 2001) investigated women over 65 who were physically and cognitively healthy. Participants reported the number of blocks they walked at baseline (also used to estimate caloric expenditure). Those who walked more (adjusted for health, medication, and lifestyle factors) were significantly less likely to demonstrate cognitive declines in the Mini Mental Status Examination (MMSE) 6 years later.

The Nurse's Health Study (N=1800) provides additional evidence that physical activity reduces risks for cognitive decline. Computed energy expenditures for reported activities of 70 to 81-year-olds were regressed on cognitive measures over time. Those reporting highest levels of activity had a 20% risk reduction for cognitive decline and dementia (Weuve et al., 2004).

Another study provides evidence of benefits of physical activity in later life. Participants who maintained or increased their physical activity were 3.6 times less likely to exhibit cognitive decline (measured by MMSE scores). Men in the lowest activity quartile at baseline had significantly elevated risks for cognitive decline as they aged (van Gelder et al., 2004).

A study of 1,000 older adulta in rural communities relied on multiple regression to predict relationships between self-reported exercise and MMSE score changes over 2 years. The highest exercise group had an odds ratio of 0.39 (95% CI 0.19, 0.78) for significant declines in MMSE scores. Even the least frequent and strenuous level of exercise exhibited some protective effects on cognition in this study (Lytle, Vander Bilt, Pandav, Dodge, & Ganguli, 2004).

Social Engagement Factors

Other researchers have examined how social support and engagement in social activities affect cognition in aging and determined that social involvement and productive activities lower mortality outcomes as much as physical exercise. As part of the Epidemiological Study of the Elderly (EPESE), over 2000 community-dwelling older adults reported their social, fitness, and productive activities. Elders with higher social activity had lower mortality after 13 years, controlling for age, sex, race/ethnicity, marital status, income, body mass index, smoking, functional disability, and comorbidities. Those with fewer social ties were at increased risk for cognitive decline, after controlling for multiple factors. The 12 year odds ratio for avoiding cognitive decline was 2.37 (CI = 1.07 – 4.88) for socially involved elders (Bassuk et al., 1999). Still another analysis found that actual involvement with one's social network, not just having an available network protected against cognitive decline (Seeman, Lusignolo, Albert, & Berkman, 2001). Productivity, defined as participation in 18 activities within domains of housework, yard work, childcare, and paid and volunteer work was also associated with improved cognitive performance. A study of

350 older adults used multivariate analysis to examine relationships between social network characteristics (network size, contact frequency, and emotional support received) in relation to changes in global cognition (MMSE) over 12 years. Actual engagement and receipt of emotional support, not just the availability of a social network, provided protective effects on cognition (Holtzman et al., 2004).

Trajectories of cognition and social relations were examined over a 7-year period in a study that determined that social integration, family ties, and engagement with family were all associated with maintained cognitive function in older adults. Specifically, social integration, reflected by participation in community activities, was protective of cognitive abilities in the most advanced age cohorts (Beland, Zunzunegui, Alvarado, Otero, & del Ser, 2006).

Nutritional Factors

Nutrition has been identified as a critical factor in successful cognitive aging as well as in abnormal cognitive decline including dementia. The limited research in this area uses cohort studies to identify nutritional intake and metabolic indicators correlated with cognitive performance in aging. Supplements such as antioxidants, vitamins, fats, and minerals, prescribed for common chronic diseases such as hypertension, hyperlipidemia, and diabetes, also show beneficial effects on cognitive aging. Elevated inflammation and vascular disease markers, such as homocysteine, are implicated in abnormal cognitive decline and dementia. Vitamins B^6, B^{12}, and folate may reduce homocysteine. Diets featuring polyunsaturated fats and omega 3 fatty acids are also associated with maintained cognition in older adults, while transfats and saturated fats are associated with cognitive decline. Antioxidants, such as Vitamins C and E, that show promise in limiting vascular inflammation, are now being evaluated as supplements to reduce cognitive declines for aging adults (Morris, 2006)

Diet in relation to MMSE scores was studied in malnourished African elders. Participants who took vitamin supplements demonstrated improved scores, suggesting a protective effect of vitamins on cognition in nutrient deficient older adults (Ojofeitimi et al., 2002). Nutrient intake was correlated with cognitive scores of rural-dwelling Italian elders, controlling for age, gender, education, total energy intake, cigarette smoking, alcohol consumption, and physical activity (Correa-Leite, Nicolosi, Cristina, Hauser, & Nappi, 2001). A healthy diet negatively correlated with cognitive decline (cumulative odds ratio 0.85, 95% CI 0.77–0.93).

The Nutrition, Aging, and Memory in Elders (NAME) study is also in progress and will evaluate potential relationships between multiple cognitive measures and blood levels of hematological factors, electrolytes, micronutrients, macronutrients, minerals, proteins, amino acids, lipids, and genetic markers in homebound elders who are at risk for cognitive decline (Scott et al., 2006). These efforts will add to knowledge of how nutrition can improve cognitive performance in older adults.

Summary of Correlational Research

Overall, correlational research supports the association of cognitive and physical activity, social engagement, and balanced nutrition with maintained cognitive performance in aging, with some reports of conflicting findings. These findings must be interpreted cautiously because correlational research designs fail to establish cause and effect relationships and favor self-selecting samples of “successfully aging” elders, not representative of the population at large. Although convenient, cross-sectional designs may also be affected by cohort effects (ways that one generation varies from another), preventing the isolation of true age-related cognitive trends. For example, reduced mathematical abilities of elders may

be a product of limited secondary education in mathematics when they attended school, not a result of aging.

Although longitudinal studies examining associations between established lifestyle factors and cognition overcome cohort differences to identify cognitive changes, subject attrition frequently results in replacing subjects with available healthy older adults, resulting in increasingly biased samples of successfully aging individuals. Variation in performance in different cognitive domains and within cohorts also confounds the identification of age-related changes. Complex research designs with large samples are also needed to control for multiple factors such as personality, education, occupation, and sensory and physical health that may affect cognition. For example, persons of higher socioeconomic status can afford higher education that is more cognitively stimulating and logically leads to cognitively challenging professional careers. Professional careers, in turn, support privileged lifestyles that engender well-being. Intensity of cognitive stimulation is difficult to quantify and may vary between individuals and among individuals across activities. Reliance on participant-reported outcome measures is another common practice that may result in inaccuracies and bias.

The research on nutritional intake illustrates the challenges in correlational research designs. Control of past dietary practices is impossible, and inaccuracies in reports of current dietary intake complicate research in humans. Thus nutritional research is frequently conducted on animals where cumulative nutritional practices and other confounding lifestyle factors can be controlled. Human studies have primarily examined cohort effects in international older adult populations with identified nutritional deficiencies or in cross-sectional cohort studies.

The Nun Study (Snowdon et al., 1996) successfully controlled for many factors that potentially influence cognitive aging and concluded that cognitively stimulating activities protect against cognitive decline. Diaries of novice nuns entering the convent in adolescence and their periodic entries across their lifespans were analyzed, comparing linguistic complexity, which is an indirect measure of cognition. Nuns entering the convent with lower linguistic complexity typically engaged in less cognitively stimulating roles in the convent and had higher rates of dementia in later years as confirmed on autopsy. Nuns whose initial narratives were more complex were less likely to exhibit dementia, even though plaques and tangles may have been present on autopsy. This study controlled many lifestyle factors such as diet and environment but not the earliest life experiences. The availability of samples that permit this level of control is limited, and future research designs using advanced statistical techniques will be needed to adequately address and control the complex of factors that affect cognitive aging.

Correlational research provides evidence of how lifestyle factors affect cognitive performance in aging. However, these effects may only partially determine cognitive performance for older adults. It has been estimated that only 25% of performance differences are due to age (Salthouse, 2006). To clearly establish an effect of cognitive activity on altering age-related cognitive declines, research must demonstrate differences in cognitive functioning between high- and low-stimulation groups that increase with age (Salthouse et al., 2002). Despite multiple limitations, research examining associations between naturally occurring or self-selected activities provides a basis for identifying interventions to improve cognitive aging.

Testing Interventions to Optimize Cognitive Aging

Based on correlational research, interventions to promote cognitive performance have been developed. These interventions must be tested to establish causal evidence of the effects of cognitive, physical, social, and nutritional interventions on cognitive aging

Cognitive Interventions

Targeted cognitive interventions are becoming popular, especially memory training interventions. Memory training classes have demonstrated that elders, like young adults, can improve their performance on cognitive tasks including perceptual discrimination, visual search, recognition, recall, and spatial perception (Kramer et al., 2004). Memory training for healthy older adults typically teaches mnemonic strategies, concentration and attention, relaxation, personal insight, self-monitoring, motivation, feedback, and problem solving that have succeeded in improving memory performance (McDougall, 2000).

Memory training including stress management, health promotion, and memory self-efficacy support has also been tested in older adults in a retirement residences (McDougall, 2000). Improved memory performance and efficacy beliefs were reported post-intervention. However, improved memory performance was not associated with improved ADL performance. Negative correlations of memory with depression suggest that memory training may impact other outcomes that improve quality of life.

The Seattle Longitudinal Study (Schaie et al., 2004) identified older adults with existing declines in either inductive reasoning or spatial orientation performance and provided a brief (5 hour) training program designed to improve these skills. Two-thirds of participants demonstrated improvement with 40% returning to a baseline level obtained 14 years earlier. Ongoing effects continued up to 7 years after training. This study supports the value of cognitive training for these specific cognitive abilities that normally decline in aging.

The Advanced Cognitive Training for Independent and Vital Elderly (ACTIVE) clinical trial provided strong evidence of cognitive training effectiveness. Two thousand healthy, community-dwelling older adults were randomly assigned to one of three training groups or to a no-contact control group (Ball et al., 2002). Ten training sessions were provided for (1) verbal episodic memory, (2) inductive reasoning, or (3) processing speed. Immediate post-training improvements occurred in specific targeted skills that continued for 2 years.

The 5-year follow-up for the ACTIVE study reported that the 10-session cognitive training followed by four booster treatments resulted in both better performance on training specific domains (memory, reasoning, or processing speed) and in less functional decline in instrumental activities of daily living (IADLs) for the inductive reasoning group (Willis et al., 2006). Experimental (versus control) group participants were less likely to suffer significant declines in health related quality of life (Wolinsky et al., 2006). These findings provide direction for ongoing research to test the impact of cognitive interventions on daily lives of older adults.

Physical Activity Interventions

A meta-analysis of 18 clinical trials that examined the impact of fitness interventions on cognition of older adults reported benefits for executive functions, higher level functions including planning, abstraction and selection of relevant sensory information (Colcombe & Kramer, 2003; Correa-Leite et al., 2001). The analysis examined the type of exercise intervention, the duration of training sessions, the length of involvement, and cardiopulmonary improvement (VO^2 max.). Global cognitive improvements were noted in both the experimental and control groups. The strongest effects on executive function were noted for combined aerobic exercise and strength training and for more intensive exercise. Women demonstrated greater gains, possibly due to lower baseline exercise levels (Kramer, Colcombe, McAuley, Scalf, & Erickson, 2005).

A meta-regression analysis of cross-sectional and pre- and post-test exercise intervention research found no differences in cognitive performance for physically fit versus sedentary

groups. Relatively small effect sizes of 0.25 were noted for post-intervention changes in the pre- and post-test design studies, although post-intervention cognitive functions declined contrary to the hypothesis (Etnier et al., 2006). The analysis indicates that on average fitness explained only a limited (8%) amount of the variation in cognition.

Research testing the effects of physical exercise supports benefits of physical activity on preserving cognitive function in aging. However, evidence is limited by selection bias and primary reliance on MMSE scores that may not be sensitive to subtle cognitive changes in older adults' cognition.

Social Interventions

Based on evidence of the protective effects of social involvement and productive activities on cognition in aging, the Experience Corps program was implemented and tested as a cognitive protective intervention in a randomized clinical trial (Fried et al., 2004). Older adults worked with elementary school students in supportive interactive roles for 15 hours weekly over the school year. Physical activity, strength, reported social support networks, and cognitive activity significantly increased for these elders. This program is a novel start in targeting social engagement interventions to enhance cognitive aging for older adults. These studies support the theory that active involvement with society and engagement in meaningful activity are critical to "successful aging."

Nutritional Interventions

Clinical trials focusing specifically on nutrition and cognitive aging are needed to further explore nutrition as a potential intervention to improve cognitive function for older adults. In a 2005 study, a small (N=67) group of frail older adults with limited or no measurable cognitive decline was included in a 6-month trial testing a daily enriched drink on cognitive measures (Wouter-Wesseling et al., 2005). Short and intermediate memory improved, and plasma B^{12} increased in the experimental group while homocysteine levels declined.

Evaluation of Intervention Research

Studies that evaluate the outcomes of cognitive interventions have recently been initiated and provide introductory evidence of effectiveness. However, many of these studies fail to isolate specific cognitive domains, and inconsistency in use of outcome measures makes interpreting results across studies challenging. In addition, other limitations complicate studies testing cognitive interventions. Most research reports benefits from physical activity on preserving cognitive performance in aging. However, evidence is limited by sample selection bias and primary reliance on outcome measures such as MMSE scores, which may not be sensitive to subtle changes in cognition. Thus research using rigorous designs with common outcome measures is needed to allow comparison across multiple studies. Increasingly sophisticated research designs using large samples are needed to meet criteria for representative populations as well as to control the multiple factors that may affect cognition in aging.

Implications for Ongoing Research

Research has begun to examine how lifestyle factors, physical and mental activity, social engagement, and nutrition affect changes in cognitive functions with advancing age. Overall, these studies provide initial support for the premise that physical and mental activity, social support, and balanced nutrition provide protective effects on cognition in aging. Ongoing research is needed to verify these findings and to identify and isolate specific factors that positively influence cognitive changes that occur with aging. In

addition, potential synergistic effects of interventions combining cognitive and physical exercise, social engagement, and nutrition should be explored.

Research designs must move beyond convenient cross-sectional studies to longitudinal trials that can establish causal relationships and control for the numerous confounding factors such as lifestyle variables that may impact cognition. Sensitive outcome measures must be identified and used consistently among investigators to enable synthesis of findings from multiple studies. To be meaningful, research must assess whether cognitive gains improve performance of everyday activities, critical outcomes for maintaining independence and well-being of older adults. Associated effects of cognitive interventions on improving mood and reducing depression should continue to be explored as secondary outcomes. Clinical trial testing of interventions will be critical to advance this area of health promotion for an aging population.

To overcome sampling that favors inclusion of the healthiest elders and fails to reflect a representative population of older adults, additional research is needed to evaluate potential restorative and preventive cognitive interventions for older adults with different cognitive and physical conditions. Testing of interventions must also compare age ranges of older adults to determine optimal timing or critical periods for intervention effectiveness. Future research must more consistently evaluate the impact of cognitive training on ADLs and IADLs to identify interventions that promote everyday competence and independence that will make meaningful contributions to the quality of life of aging adults. Analyses comparing the benefits and effectiveness of different cognitive interventions will establish best practices for cognitive health promotion.

Additional research must establish (1) optimal formats, lengths, and durations of interventions; (2) whether boosters are necessary to maintain effects; and (3) how to target interventions to individual cognitive levels. Clinical trials will be essential to provide firm causal evidence of cognitive training effectiveness. To be judged effective, interventions must result in differential rates of decline in cognitive function within specific age groups.

Implications for Practice

Clinicians working with older adults in a variety of settings can incorporate knowledge of the beneficial effects of cognitive activity, physical exercise, social involvement, and nutrition into health promotion for older adults. Older adults reporting cognitive declines (such as memory loss) should undergo cognitive testing. Testing that distinguishes normal versus pathological changes will enable clinicians to provide reassurance to most older adults that they are experiencing changes as a normal part of the aging process. Reassurance may alleviate undue anxiety, depression, and social isolation due to fear others will notice cognitive decline.

Anticipatory guidance for older adults should be expanded to focus on cognitive as well as physical health. Within a holistic framework, nurses should routinely counsel patients on cognitive benefits of social engagement, balanced nutrition, and physical activity as well as participation in cognitively demanding activities. Families and significant others should be made aware of the cognitive benefits associated with maintaining social connections and activities with elder family members. Counseling should go beyond emphasizing the physical benefits of a balanced, therapeutic diet to explain the added cognitive benefits that may be realized. Knowledge that therapeutic diets prescribed for common chronic conditions such as cardiovascular disease and diabetes may have protective cognitive effects may increase diet adherence in older adults.

Older adults may also be advised to add new cognitive, physical, and social activities, and improved nutrition to support successful cognitive aging and to improve neuroplasticity, increased neuronal connections in the brain, that increase cognitive reserve, the ability to respond successfully to changing environmental stimuli (Vance & Wright, 2009). Research evidence confirming these benefits of initiating new cognitive health activities is also needed. Nurses are uniquely positioned to advise older adults on general cognitive health promotion lifestyles as well as for prescribing specific cognitive remediation now readily available using computer and gaming technologies (Vance, McNees, & Meneses, 2009).

Findings of current research suggest that supportive care for older adults can incorporate activities that prevent or limit cognitive disabilities in older adults. Cognitive and physical activities, social engagement, and nutrition to support successful cognitive aging must become integral to elder care. Cognitive interventions may support older adults in maintaining self-care as well as cognitive performance into advanced ages. For example, community dwelling older adults who comprehend and follow prescribed medication regimes may be able to extend aging in place at home compared to those with more substantial cognitive decline.

Potential benefits of cognitively supportive long-term care environments may overcome the negative stigma of moving to assisted living or nursing home settings. Health care workers in institutions caring for older adults must be cognizant of how important physical, cognitive, and social activities and adequate nutrition may be to maintain cognitive abilities for older adults. Programs tailoring activities to the appropriate cognitive levels of the diverse older adults living together in these settings also need to be explored. Ongoing awareness of future research will be important for promoting successful cognitive aging for the growing population of older adults.

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