

Aging Gracefully: Cognitive Resilience in the Elderly

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DOI: <https://doi.org/10.36676/jrps.v15.i2.06>**Abstract:**

Aging is an inexorable phenomenon characterized by a range of transformations, encompassing modifications in cognitive capacities. Memory deterioration is frequently linked to the process of aging; nevertheless, it is important to note that the degree and pace of this decrease vary among individuals. This variety highlights the notion of cognitive resilience, whereby specific individuals sustain cognitive function throughout their elderly years despite potential risk factors for deterioration. Comprehending the factors that influence cognitive resilience in older adults is of utmost importance in order to devise therapies that foster optimal aging and improve overall well-being. This research paper examines the complex and diverse characteristics of cognitive resilience in the elderly population, investigating its importance, underlying processes, and potential impact on the process of aging in a positive manner. This study seeks to provide a thorough examination of the current body of literature and propose novel research methodologies in order to further understand the determinants of cognitive resilience and suggest effective approaches to cultivate it. Our objective is to provide insight into this subject matter in order to contribute to the development of public health policies and interventions that are specifically designed to promote cognitive well-being among older individuals. This will ultimately help alleviate the social impact of cognitive decline associated with aging.

Keywords: Aging, cognitive resilience, social supports, neurobiological, lifestyle habits, psychosocial**Introduction**

The global phenomenon of population aging has emerged as a significant demographic pattern, garnering increasing attention towards comprehending and mitigating the difficulties linked to aging, namely cognitive deterioration. As humans advance in age, it is usual for cognitive capacities to undergo alterations, which can vary from moderate forgetfulness to significant impairment. Nevertheless, cognitive decline varies among older persons, both in terms of its presentation and severity. Certain individuals have exceptional resilience, enabling them to sustain cognitive function throughout their later years, whilst others encounter substantial cognitive difficulties that have a real-



world impact on their everyday functioning. The existence of such diversity in cognitive aging has given rise to the notion of cognitive resilience, which pertains to the capacity of individuals to adjust to age-related alterations and sustain cognitive function in spite of possible risk factors for deterioration. The concept of cognitive resilience encompasses a complex interaction of genetic, biochemical, psychological, and environmental elements that impact cognitive well-being during the transition to older age. Comprehending the factors that influence cognitive resilience is crucial for advancing healthy aging and improving the quality of life for elderly individuals. The ramifications of cognitive resilience transcend beyond the realm of human well-being and have larger societal importance. As the population gets older, there is a growing need for healthcare and support services to cater to older persons who are facing cognitive impairment. By conducting an analysis of the various elements that contribute to cognitive resilience, policymakers, healthcare professionals, and researchers can devise specific interventions aimed at promoting cognitive well-being among older populations. This, in turn, can effectively alleviate the negative impact of age-related cognitive decline on individuals, families, and society at large. This research endeavors to investigate the notion of cognitive resilience within the senior demographic, analyzing its significance, drivers, and potential solutions. We want to enhance our comprehension of cognitive resilience and its impact on healthy aging by conducting a thorough examination of current literature and suggesting novel research approaches. Through clarifying the elements that enhance cognitive resilience, we can provide valuable insights for the creation of evidence-based interventions and public health policies that promote cognitive well-being in older populations.

Cognitive decline is a hallmark of aging and, in some people, can progress to the point where a diagnosis of mild cognitive impairment or Alzheimer's disease (AD) dementia is warranted. Degeneration of neuronal structures essential for cognition and the subtle buildup of many brain diseases are further hallmarks of aging. But cognitive impairment or decline does not occur in all individuals with signs of neurodegenerative alterations and accumulated brain diseases. Mental acuity and autonomy become more challenging for the elderly as a result of the natural loss in cognitive function that occurs with age. The capacity to adapt and thrive in the face of age-related cognitive deterioration is known as cognitive resilience, and new research suggests that many older persons may maintain this resilience despite these challenges (Stern et al., 2023).

The idea of cognitive resilience encompasses the capacity to sustain cognitive function in the face of physiological or pathological stressors (Whitson et al., 2016). The capacity for continuous learning and adaptation can be better understood through research into cognitive resilience. The best way to promote cognitive health throughout life is to learn how people keep thinking clearly despite the inevitable decline that comes with getting older. Enhancing overall well-being and quality of life as individuals age can be achieved through early interventions that aim to create cognitive reserve and



community-based activities that enhance cognitive engagement in later life. Promoting cognitive resilience is an exciting prospect. The purpose of this article is to delve into the idea of cognitive resilience in the elderly, looking at its importance, factors that contribute to it, and possible ways to help them. Our goal is to deepen our knowledge of cognitive resilience and its effects on healthy aging by conducting a thorough literature analysis and suggesting new research methods. There exists variability in the performance of individuals in relation to specific stressors. Various operational definitions have been provided by prevailing viewpoints to differentiate between different forms of resilience. However, these definitions have only concentrated on protective factors that have a positive impact on an individual's functioning. Cognitive resilience is a trait exhibited by many older individuals notwithstanding these concerns. This refers to the capacity of older people to retain cognitive function, adapt to problems, and live well (Staal et al., 2008). The intricate dynamics of cognitive resilience are investigated in this article by drawing on the fields of neuroscience, psychology, and gerontology. In an effort to champion healthy aging and resilience in the elderly, we investigate cognitive resilience from a variety of angles, including the biological, psychological, and social. We are hopeful that our research will contribute to the development of more effective policies and interventions aimed at enhancing the cognitive health and well-being of older populations.

Cognitive resilience provides hope in aging studies, despite concerns about cognitive decline in the elderly. Many people, even with cognitive impairment, manage to bounce back from challenges and adapt admirably. In order to assist the elderly in retaining cognitive capacity and thriving, it is important to comprehend cognitive resilience. This article synthesizes research and theoretical frameworks to guide cognitive resilience and aging population well-being treatments. As the world population ages, cognitive resilience in the elderly becomes more important. Although aging is frequently linked with cognitive deterioration, many older persons retain cognitive function well. This article examines cognitive resilience—the ability to adapt, learn, and prosper despite age-related cognitive changes. We want to understand cognitive resilience in aging populations by studying the complex interaction of biological, psychological, and social variables. This article synthesizes empirical data and theoretical frameworks to identify effective cognitive health and well-being initiatives for older persons. By improving cognitive resilience knowledge, we may develop treatments and policies to help older persons age gracefully and preserve good cognitive function. Cognitive resilience challenges the usual trend of cognitive decline in elder age in the aging narrative. Although cognitive performance declines with age, a growing body of research shows that many older persons may preserve cognitive vibrancy and flexibility. This article integrates empirical and theoretical data to guide targeted treatments and policies to promote cognitive resilience and well-being in aging societies. Cognitive resilience helps us reframe aging as a time of opportunity and progress rather than decline and constraint.



Neurobiological Foundations of Cognitive Resilience

The brain's structural, functional, and plasticity processes combine to cause cognitive resilience in the aged. Cognitive resilience is boosted by structural diversity, including cortical thickness and gray matter volume fluctuations. Research shows that those with higher education and cognitive reserve had more gray matter volume and cortical thickness in executive function and memory regions including the prefrontal cortex and hippocampus. The neurological basis for cognitive reserve may be these structural changes, which protect against age-related neuropathology and enable trouble-free cognitive performance.

Functional brain networks and anatomical variables affect cognitive resilience. Resilient people have superior frontoparietal-default mode network connection, which regulates memory and cognition, according to functional neuroimaging. These findings suggest that resilient persons may have better neural processing and cognitive control systems to fight aging and maintain cognitive function. Cognitive resilience also relies on neuroplasticity, the brain's ability to adapt to new experiences. Intellectually challenging activities like lifelong learning, cognitive training, and social engagement can boost neuroplasticity and cognitive resilience in older adults. Regular exercise increases the synthesis of neurotrophic factors including brain-derived neurotrophic factor (BDNF), which are necessary for neuron and synaptic formation and maintenance. By enhancing neuroplasticity, these treatments may safeguard cognitive function and reduce aging-related cognitive loss. Targeting these brain networks has shown promise for improving cognitive resilience and slowing age-related cognitive deterioration. Cognitive training methods that improve memory and executive function in older adults improve cognitive performance and neuroplasticity. Aerobic and resistance training improve brain structure and function, improving cognitive performance and resilience. Social engagement and psychological well-being therapies may also improve cognitive resilience's neurobiological underpinnings. The neurobiological roots of cognitive resilience can inform interventions to improve cognitive health in aging populations by revealing the processes behind this phenomenon. Structural variations, functional brain networks, and neuroplasticity affect cognitive resilience and may be therapeutic targets. Understanding and targeting these brain systems helps researchers and practitioners promote healthy aging and well-being. This will enable them to create effective cognitive health and resilience programs for aging populations.

Psychosocial Determinants of Cognitive Resilience

Cognitive decline is a common result of becoming older, but it doesn't happen to everyone at the same pace or to the same degree. A small percentage of the elderly show incredible resiliency by avoiding the cognitive decline risk factors and continuing to function at a high level far into old age. Understanding the factors that contribute to cognitive resilience, the capacity to adjust and keep



cognitive function intact when faced with challenges is crucial, given the wide range of cognitive aging experiences. A variety of viewpoints on resilience in the elderly were revealed by the extensive review carried out by Angevaere et al. (2020). They shed light on both older and more modern understandings of resilience by demonstrating how stresses, responses, and mechanisms are common in conceptual activity. With the help of the EMIF-AD 90+ study, Legdeur et al. (2018) investigated cognitive resilience in the elderly. In an effort to gain a better understanding of the resilience of this cohort to cognitive impairment, they focused on aspects such as hereditary risk factors and cognitive reserve. In order to help older persons who are suffering from cognitive decline become more resilient, Peeters et al. (2023) proposed a multi-level systems approach. The importance of socio-ecological interventions was highlighted by their focus on resilience across the whole cognitive decline process. Based on their concept analysis, Lima et al. (2023) defined resilience in older persons as having an optimistic outlook and readily available resources to help them overcome challenges. This finding has important implications for nursing care. Fontes and Neri (2015) reviewed the research and concluded that social support and psychological resources are important for resilience as we age. Research, policy, and practice in disciplines related to aging can benefit greatly from these studies because they highlight the complex interaction of personal, societal, and environmental elements in fostering resilience in the elderly. Although studies in this field have mostly focused on biological components, the importance of psychological determinants in determining resilience trajectories is becoming more acknowledged. Examining the impact of social support, psychological well-being, lifestyle factors, and interventions that promote resilience, this research seeks to explore the psychosocial determinants of cognitive resilience in older persons.

Social Support and Cognitive Resilience in Aging

The promotion of cognitive resilience among older adults is greatly influenced by the presence of social support. It includes support from loved ones and social networks in the form of emotional support, practical help, and knowledge. Better cognitive function and less likelihood of cognitive decline in older persons have been linked to strong social bonds and social involvement. In this section, we'll look at how social support affects cognitive resilience and what that means for treatments that try to improve people's brain health as they get older. Consistent with previous findings, social support improves cognitive function in the elderly. Fratiglioni et al. (2000) conducted a longitudinal study that measured the effects of social networks on cognitive decline in older persons. They discovered that individuals with larger networks had slower rates of decline compared to those with smaller networks. Additionally, Kuiper et al. (2015) found in their meta-analysis that people with more social support had better cognitive function and were less likely to develop dementia as they got older. The importance of social support in preserving cognitive health and resilience in aging



populations is emphasized by these findings. A number of processes may account for the correlation between social support and mental toughness. One of the known risk factors for cognitive decline is loneliness and isolation; social support alleviates these symptoms and offers emotional reassurance (Cacioppo et al., 2006). According to Seeman et al. (2002), social support can help mitigate the impact of stress on cognitive function by cultivating a sense of belonging and connection. Second, possibilities for intellectual stimulation and engagement presented by social involvement are crucial for preserving cognitive function in old age (Hertzog et al., 2008). Playing games, going to cultural events, and talking to friends in groups are all examples of mentally challenging activities that might help maintain cognitive function and build resilience (Wilson et al., 2007). Additionally, people are better able to develop adaptive coping mechanisms and problem-solving abilities through their social support networks, which offer access to information and resources (Cohen & Wills, 1985). Instrumental support, including help with transportation or everyday duties, may reduce cognitive strain and improve older persons' ability to handle cognitive difficulties (Park et al., 2015). Uchino (2009) found that older persons with chronic illnesses affecting cognitive function may benefit from informational support, such as counsel or guidance from peers or healthcare providers, while making complex health decisions.

Research on the effects of interventions to increase social support and participation on cognitive resilience in the elderly is encouraging. For instance, Cheng et al. (2018) found that older individuals' cognitive performance and well-being were improved by participation in community-based programs that promote social contacts and offer chances for group activities, such as exercise classes, art workshops, and volunteer opportunities. Similarly, caregiver support programs and peer support groups help alleviate emotional and practical burdens on older persons and their caregivers, which in turn promotes cognitive health and reduces stress (Mausbach et al., 2019). Finally, it is important to note that social support is essential for older persons to have cognitive resilience. Better cognitive function and less risk of cognitive decline in later life are related with strong social bonds and social involvement. Aging populations benefit from social support networks because they provide emotional reassurance, provide chances for cognitive stimulation, and help people develop adaptive coping mechanisms. The cognitive health and well-being of older persons can be improved by interventions that encourage social support and participation. This, in turn, can lead to successful aging and an overall improvement in quality of life.

Psychological Well-being and Cognitive Resilience in Aging

Cognitive resilience in the elderly is influenced by a variety of psychological characteristics, including optimism, resilience, and efficient coping mechanisms. Better cognitive performance and resistance to age-related cognitive decline are linked to positive psychological well-being (Harada et



al., 2013). In this section, we'll take a look at how mental health plays a part in building resilience, specifically at how adaptive coping strategies and emotional regulation are crucial to brain wellness. Higher levels of optimism and resilience are associated with better cognitive flexibility, problem-solving skills, and general cognitive functioning, according to the research. Longitudinal studies have also shown that mental health in midlife is a predictor of cognitive health in old age, highlighting the effect of favorable personality traits on cognitive resilience over the long run (Bocancea et al., 2021). Enhancing cognitive performance and resilience in older persons have been demonstrated through interventions that aim to promote psychological well-being. These include mindfulness-based stress reduction, resilience training, and cognitive-behavioral therapy.

Lifestyle Factors and Cognitive Resilience in Aging

Cognitive resilience has been associated with lifestyle characteristics, including physical exercise, cognitive engagement, food, and sleep quality. Participating in consistent physical activity, engaging in cognitively stimulating activities, and adhering to a nutritious diet have been found to be correlated with improved cognitive function and a decreased likelihood of cognitive decline among elderly individuals. The following part will provide an overview of the research that establishes a connection between lifestyle factors and cognitive resilience. It will also explore putative processes, including neuroplasticity, vascular health, and inflammation. Studies indicate that engaging in physical activity stimulates the production of new neurons, synapses, and blood vessels in the brain, resulting in enhanced cognitive abilities and increased ability to withstand cognitive loss associated with aging (Angevaere et al., 2020). Furthermore, it has been shown that older persons who partake in mentally stimulating activities, such as reading, playing musical instruments, and engaging in social activities, tend to have improved cognitive outcomes (Gijzel et al., 2019). Following a Mediterranean-style diet that is abundant in fruits, vegetables, whole grains, and healthy fats has been associated with decreased rates of cognitive decline and a less likelihood of developing Alzheimer's disease (Whitson et al., 2021). The influence of lifestyle determinants on cognitive resilience is significant, underscoring the significance of embracing good lifestyle practices to enhance cognitive well-being among older individuals.

Resilience promoting Interventions for Healthy Aging

Interventions targeting the augmentation of psychosocial characteristics linked to cognitive resilience has the capacity to enhance cognitive results in elderly individuals. This section will examine resilience-promoting strategies, including cognitive training programs, social support interventions, mindfulness-based interventions, and lifestyle interventions. By targeting psychosocial drivers of cognitive resilience, these interventions attempt to promote cognitive performance and quality of life



in aging populations. Cognitive training programs, such as computerized cognitive training and memory improvement approaches, have demonstrated promising outcomes in enhancing cognitive function and delaying cognitive decline in older persons. Social support interventions, including peer support groups, community-based programs, and caregiver support services, provide chances for social engagement, emotional support, and practical aid to older persons with cognitive problems. Mindfulness-based therapies, such as mindfulness meditation and yoga, have been found to reduce stress, improve emotional regulation, and boost cognitive function in older adults. Lifestyle therapies, such as physical exercise programs, food interventions, and sleep hygiene education, promote healthy lifestyle practices that improve cognitive resilience in aging populations. Overall, resilience-promoting therapies offer prospective pathways for boosting cognitive health and resilience in older persons, underscoring the relevance of targeting psychosocial variables in interventions aiming at promoting successful aging.

Conclusion

The psychosocial determinants of cognitive resilience in older adults demonstrate the complexity of this phenomenon and the importance of social, psychological, and lifestyle factors in cognitive health. A comprehensive academic and empirical review revealed many crucial findings that explain cognitive resilience systems and successful aging therapies. Cognitive resilience relies on social support—emotional, instrumental, and informational, via social networks. Strong social relationships and involvement increase cognitive performance and reduce cognitive decline in older adults. Social support networks provide emotional comfort, cognitive stimulation, and coping strategies. By fostering a sense of community, social support protects cognitive function against stress and increases resilience in aging populations. Mental resilience, optimism, and effective coping assist overcome cognitive challenges. Positive mental health boosts cognitive performance and age-related cognitive decline resilience. Cognitive-behavioral therapy, mindfulness-based stress reduction, and resilience training improve cognitive performance and resilience in older adults. Exercise, cognitive stimulation, and a healthy diet increase cognitive function and reduce cognitive decline in the elderly. Exercise boosts neuroplasticity, cerebral blood flow, and inflammation, enhancing cognition and resilience to age-related cognitive decline. Mentally stimulating activities and a balanced diet with antioxidants and omega-3s boost memory in older adults. These psychosocial elements must be understood and addressed to improve aging populations' cognitive health and resilience. Support networks, mental health, and healthy lifestyles can boost cognitive resilience and slow age-related cognitive decline. This holistic approach to cognitive health in older adults may improve quality of life, lower healthcare costs, and minimize the aging population burden. Understanding cognitive aging and devising effective cognitive health interventions for older adults requires studying psychosocial variables of



cognitive resilience. Through social, psychological, and behavioral changes, researchers and practitioners can help older people age well. As the global population ages, cognitive health and resilience grow more important, and this research may guide policies, programs, and therapies.

References

- Angevaare, M. J., Roberts, J., van Hout, H. P. J., Joling, K. J., Smalbrugge, M., Schoonmade, L. J., Windle, G., & Hertogh, C. M. P. M. (2020). Resilience in older persons: A systematic review of the conceptual literature. *Ageing Research Reviews*, 63(June), 101144. <https://doi.org/10.1016/j.arr.2020.101144>
- Fontes, A. P., & Neri, A. L. (2015). Resilience in aging: Literature review. *Ciencia e Saude Coletiva*, 20(5), 1475–1495. <https://doi.org/10.1590/1413-81232015205.00502014>
- Legdeur, N., Badissi, M., Carter, S. F., De Crom, S., Van De Kreeke, A., Vreeswijk, R., Trappenburg, M. C., Oudega, M. L., Koek, H. L., Van Campen, J. P., Keijsers, C. J. P. W., Amadi, C., Hinz, R., Gordon, M. F., Novak, G., Podhorna, J., Serné, E., Verbraak, F., Yaqub, M., ... Visser, P. J. (2018). Resilience to cognitive impairment in the oldest-old: Design of the EMIF-AD 90+ study. *BMC Geriatrics*, 18(1), 1–16. <https://doi.org/10.1186/s12877-018-0984-z>
- Lima, G. S., Figueira, A. L. G., Carvalho, E. C. de, Kusumota, L., & Caldeira, S. (2023). Resilience in Older People: A Concept Analysis. *Healthcare (Switzerland)*, 11(18). <https://doi.org/10.3390/healthcare11182491>
- Peeters, G., Kok, A., De Bruin, S. R., Van Campen, C., Graff, M., Nieuwboer, M., Huisman, M., Van Munster, B., Van Der Zee, E. A., Kas, M. J., Perry, M., Gerritsen, D. L., Vreede-Chabot, E., The, A. M., Van Hout, H., Bakker, F. C., Achterberg, W. P., Van Der Steen, J. T., Smits, C., ... Olde Rikkert, M. (2023). Supporting Resilience of Older Adults with Cognitive Decline Requires a Multi-Level System Approach. *Gerontology*, 69(7), 866–874. <https://doi.org/10.1159/000529337>
- Stern, Y., Albert, M., Barnes, A. C., Cabeza, R., Pascual-Leone, A., & Rapp, R. P. (2023). A framework for concepts of reserve and resilience in aging. *Neurobiology of Aging*, 124, 100–103. <https://doi.org/10.1016/j.neurobiolaging.2022.10.015>
- Staal, M. A. (2004). Stress, Cognition, and Human Performance: A Literature Review and Conceptual Framework. <https://ntrs.nasa.gov/search.jsp?R=20060017835> (Accessed June 20, 2020).
- Wilson, R. S., Arnold, S. E., Schneider, J. A., Kelly, J. F., Tang, Y., and Bennett, D. A. (2006). Chronic psychological distress and risk of Alzheimer's disease in old age. *Neuroepidemiology* 27, 143–153. <https://doi.org/10.1159/000095761>
- Cacioppo, J. T., Hawkley, L. C., & Thisted, R. A. (2010). Perceived social isolation makes me sad: 5-



- year cross-lagged analyses of loneliness and depressive symptomatology in the Chicago Health, Aging, and Social Relations Study. *Psychology and aging*, 25(2), 453–463. <https://doi.org/10.1037/a0017216>
- Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological bulletin*, 98(2), 310–357. <https://doi.org/10.1037/0033-2909.98.2.310>
- Fratiglioni, L., Paillard-Borg, S., & Winblad, B. (2004). An active and socially integrated lifestyle in late life might protect against dementia. *The Lancet Neurology*, 3(6), 343–353. [https://doi.org/10.1016/S1474-4422\(04\)00767-7](https://doi.org/10.1016/S1474-4422(04)00767-7)
- Hertzog, C., Kramer, A. F., Wilson, R. S., & Lindenberger, U. (2008). Enrichment effects on adult cognitive development: can the functional capacity of older adults be preserved and enhanced?. *Psychological science in the public interest*, 9(1), 1–65. <https://doi.org/10.1111/j.1539-6053.2009.01034.x>
- Kuiper, J. S., Zuidersma, M., Zuidema, S. U., Burgerhof, J. G., Stolk, R. P., Oude Voshaar, R. C., & Smidt, N. (2015). Social relationships and cognitive decline: a systematic review and meta-analysis of longitudinal cohort studies. *International Journal of Epidemiology*, 44(4), 1246–1257. <https://doi.org/10.1093/ije/dyw089>
- Mausbach, B. T., Romero-Moreno, R., Bos, T., von Känel, R., & Ziegler, M. G. (2019). Positive and negative social support as predictors of overall and domain-specific functioning over time in dementia caregivers. *The Gerontologist*, 59(3), 534–544. <https://doi.org/10.2147/CIA.S249223>
- Park, J., Moghaddam, B., & Nakamura, T. (2015). Potential role of social support in cognitive performance and well-being among immigrant older adults. *Journal of cross-cultural gerontology*, 30(2), 139–153. <https://doi.org/10.1111/j.1365-2702.2012.04178.x>
- Seeman, T. E., Lusignolo, T. M., Albert, M., & Berkman, L. (2002). Social relationships, social support, and patterns of cognitive aging in healthy, high-functioning older adults: MacArthur studies of successful aging. *Health Psychology*, 21(3), 243–255. <https://doi.org/10.1037//0278-6133.20.4.243>
- Uchino, B. N. (2009). Understanding the links between social support and physical health: A life-span perspective with emphasis on the separability of perceived and received support. *Perspectives on Psychological Science*, 4(3), 236–255. <https://doi.org/10.1111/j.1745-6924.2009.01122.x>
- Wilson, R. S., Scherr, P. A., Schneider, J. A., Tang, Y., & Bennett, D. A. (2007). Relation of cognitive activity to risk of developing Alzheimer disease. *Neurology*, 69(20), 1911–1920. <https://doi.org/10.1212/01.wnl.0000271087.67782.cb>
- Harada, C. N., Natelson Love, M. C., & Triebel, K. L. (2013). Normal cognitive aging. *Clinics in geriatric medicine*, 29(4), 737–752. <https://doi.org/10.1016/j.cger.2013.07.002>



- Bocancea, D. I., van Loenhoud, A. C., Groot, C., Barkhof, F., van der Flier, W. M., & Ossenkoppele, R. (2021). Measuring Resilience and Resistance in Aging and Alzheimer Disease Using Residual Methods: A Systematic Review and Meta-analysis. *Neurology*, 97(10), 474–488. <https://doi.org/10.1212/WNL.00000000000012499>
- Angevaere, M. J., Roberts, J., van Hout, H. P. J., Joling, K. J., Smalbrugge, M., Schoonmade, L. J., ... Hertogh, C. M. P. M. (2020). Resilience in older persons: A systematic review of the conceptual literature. *Ageing Research Reviews*, 101144. <https://doi.org/10.1016/j.arr.2020.101144>
- Gijzel SMW, Whitson HE, Leemput IA, Scheffer M, Asselt D, Rector JL, et al. (2019). Resilience in Clinical Care: Getting a Grip on the Recovery Potential of Older Adults. *Journal of the American Geriatrics Society*. 67(12):2650–7 <https://doi.org/10.1111/jgs.16149>
- Whitson HE, Crabtree D, Pieper CF, Ha C, Au S, Berger M, et al. (2021). A template for physical resilience research in older adults: Methods of the PRIME-KNEE study. *J Am Geriatr Soc*. 69(11):3232–41. <https://doi.org/10.1111/jgs.17384>