

Section A: CPH to complete	
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Guidance title:	Disability, dementia and frailty in later life - mid-life approaches to prevention
Committee:	PHAC D
Subject of expert testimony:	Psychosocial protective and risk factors
Evidence gaps or uncertainties:	
What are the psychosocial protective factors and risk factors for dementia? e.g. social capital, loneliness, connectivity	
Which protective and risk factors are independent and which mediate others?	
Section B: Expert to complete	
Summary testimony:	[Please use the space below to summarise your testimony in 250 – 1000 words – continue over page if necessary]
Psychosocial risk factors and protective factors related to the development of dementia	
<p>Introduction</p> <p>The World Health Organization estimates that approximately 7.7 million people develop dementia each year. (WHO 2012) The age-standardized prevalence rates of dementia are 1.8%, 6.4%, and 11.9% among males ages 65-74 years, 75-84 years, and 85 years and older; and 1.6%, 5.9%, and 17.0% among females ages 65-74, 75-84, and 85 years and older. (Matthews et al. 2013) There is no treatment that can revert the progressive process of dementia. Given that neurodegeneration begins much earlier than dementia syndrome onset, it is important to identify potentially modifiable risk factors and healthy lifestyle behaviours across the lifespan that may alter the course of cognitive dysfunction. (WHO 2012) In addition, there is potential for the brain's cognitive reserve to act as a compensatory mechanism across the life course.</p> <p>For clarity, the subsequent sections discuss the independent effects of psychosocial determinants, as measured in various populations. The study of these factors reflects the challenges of measurements at appropriate life stages with clear outcomes and the difficulty of any assumptions regarding potential outcomes of interventions based on the effect sizes of observational studies. Recent findings in European and North American literature suggesting possible reduction of age specific cognitive impairment and dementia may provide evidence for outcomes of social policies and effective medical treatments operating in early and mid-life in the last century.</p>	

Education

Several longitudinal, population-based studies have assessed the influence of educational attainment on the risk for cognitive decline. (Yip et al. 2006, Brayne et al. 2010, Letenneur et al. 2000) Findings from the Medical Research Council Cognitive Function and Ageing Study (MRC CFAS) on 2,640 individuals 65 years of age and older living in the UK, showed that more full-time education was associated with lower dementia incidence (p-trend=0.02). (Yip et al. 2006) Pooled analyses from the European Studies of Dementia network (EURODEM), indicated that education was significantly associated with dementia, but only in women. Furthermore, the age-adjusted risk of dementia and Alzheimer's disease was statistically significantly higher among women with 7 years or less of education than women with 12 or more years of education (RR=3.78, 95% CI: 1.64, 8.72; and RR=4.30, 95% CI: 1.55, 11.90, respectively). Sex differences in dementia risk may reflect differentials in brain size, stress and hormone levels, although mixed evidence abounds. (Letenneur et al. 2000)

Four theories are commonly used to explain the association between education and cognitive dysfunction. The brain reserve capacity (BRC) model holds that a higher level of education (as well as high pre-morbid intelligence) may be an indirect measure of greater brain reserve, which protects against the development of impairment. (Tuokko et al. 2003, Satz et al. 1993, Schmand et al. 1997) In contrast, the cognitive reserve model suggests that high educational attainment and greater cognitive reserve may delay the onset of dementia. (Tuokko et al. 2003, Stern et al. 2002) Conversely, low rates of cognitive decline among high-functioning older people may be attributed to ascertainment bias. Individuals with high levels of education may be more familiar with test taking/content and may be less likely to screen positive for impairment. (Tuokko et al. 2003, Stern et al. 2002) Finally, education may be a proxy for socio-economic status which may influence early life exposures that impact brain development. (Hall et al. 2000)

Occupation

Occupation may influence the development of morbidity through various mechanisms, such as access to information and material goods. (Karp 2005, Berkman 2000) Complex work tasks may also increase intellectual flexibility and cognitive functioning, thereby reducing the risk for dementia in later life. In a population-based longitudinal cohort of 913 older people, manual workers had a higher risk for Alzheimer's disease and all types of dementia compared to non-manual workers, after controlling for the effects of age and sex (RR=1.6, [95% CI: 1.2, 2.2] and RR=1.5, [95% CI: 1.2, 1.9], respectively). (Qiu et al. 2003) Low occupational position may be associated with neurotoxic workplace exposures (Kamel 2004, Whalley et al. 2001), low income, and unhealthy behaviour patterns, (Pampel et al. 2010, Qiu et al. 2003) which may have subsequent deleterious effects on mental health.

Leisure activities

A systematic review by Fratiglioni et al. 2004 highlighted the importance of an active and socially integrated lifestyle in late life for the prevention of dementia (most studies were conducted in people ages 65 years and older). Participation in leisure activities provides mental stimulation and social engagement, which in turn, may produce more efficient cognitive networks. (Fratiglioni et al. 2004) In the Bronx Aging Study, frequent participation in leisure activities, such as reading books or newspapers, playing board games or cards, and playing musical instruments, was associated with decreased dementia risk compared to rare activity participation (HR=0.65, [95% CI: 0.43, 0.97], HR=0.26 [95% CI: 0.17, 0.57], HR=0.31, [95% CI:

0.11, 0.90], respectively). (Verghese et al. 2003)

Social network

The social network refers to the web of social ties that an individual is embedded in and the characteristics of those ties. Social engagement is associated with social support and access to resources. (Fratiglioni et al. 2004, Berkman et al. 2000) Rates of depression, a well-established risk factor for cognitive impairment, tend to decline as social support increases. (Fauth et al. 2012) Social isolation, characterized by factors such as a small social network, unmarried status, and lack of participation in activities with other people, has been reported to increase the risk for dementia. In the Kungsholmen Project on Swedish participants ages 75 years and older, a poor or limited social network was a determinant of cognitive dysfunction. (Fratiglioni et al. 2000)

Loneliness

There is growing recognition and interest in emotional determinants of mental health, such as feelings of loneliness or sensitivity to psychological distress. (Holwerda et al. 2012) Further research is needed to determine the extent that the quantity versus the quality of social interactions impact cognition. In the prospective, community-based Amsterdam Study of the Elderly (AMSTEL), 'feeling lonely', a subjective measure of distress, rather than 'being alone', an objective measure of distress, was associated with the development of dementia. Of 2,173 participants, those who reported feelings of loneliness at baseline in 1990-91 had 1.64 times greater odds of developing dementia at 3-year follow-up than participants who did not report feeling lonely (OR=1.64, [1.05, 2.56]). (Holwerda et al. 2012)

Mental activity

Complex patterns of mental activity across the lifespan are associated with a reduced risk of dementia in people ages 64 years and older. (Valenzuela et al. 2006) As per the disuse hypothesis, lack of intellectual stimulation may contribute to atrophy of cognitive processes. (Salthouse 1991) A random-effects meta-analysis of cohort studies revealed that mentally-stimulating leisure activities had a protective effect on dementia incidence (combined OR=0.50, [95% CI: 0.42, 0.61, p<0.0001]). (Valenzuela et al. 2006) In the Kungsholmen Project, participants who engaged in mental activity, as evidenced by reading, writing, painting, drawing, doing cross-word puzzles, had a lower risk for DSM-III-R dementia than those who did not engage in mental activity (RR=0.54, [95% CI: 0.34, 0.87]). (Wang et al. 2002)

Conclusion

Active participation in a number of cognitive lifestyle factors throughout the life course is important for mental health, and may provide additive value compared to participation in any single cognitive lifestyle factor. (Marioni et al. 2012, Valenzuela et al. 2006) There is growing interest in modifiable mid-life risk factors in relation to cognitive health in late life. Promising mid-life strategies to reduce the risk for dementia include engagement in mental, physical, and social activities. (Hughes et al. 2009) Further population-based, longitudinal studies using validated instruments are needed to provide greater insight into this issue and to overcome common methodological limitations, such as reverse causality.

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