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COMMENTARY

Potential intervention targets to improve cognitive empathy in older adulthood

Dylan J. Jester[1,2] and Brent T. Mausbach[1]

[1]*Department of Psychiatry, University of California San Diego, La Jolla, CA, USA*
[2]*Sam and Rose Stein Institute for Research on Aging, University of California San Diego, La Jolla, CA, USA*
Email: djester@health.ucsd.edu

In this issue, Gutiérrez-Cobo *et al.* (2021) present the results of an empirical study on cognitive empathy using a performance-based measure among 902 adults aged 18 to 79 years. Cognitive empathy, or one's ability to accurately recognize the thoughts and emotions of others, is an important skill for relating to others as they experience their own emotions. They sought to determine whether educational attainment moderated age-related differences in cognitive empathy by using the Reading the Mind in the Eyes Test (henceforth "Eyes Test"). The Eyes Test is a performance-based measure of cognitive empathy that requires participants to choose one of four suspected emotional states of 36 pictures of human eyes. This test is a validated measure of Theory of Mind, which is the ability to attribute a mental state to an individual with the ultimate goal of predicting behavior and responding appropriately. Theory of Mind is most often measured to determine the clinical severity of social deficits in individuals living with autism-spectrum disorder (Kimhi, 2014), but it is also known to differ across other psychiatric and neurological conditions such as schizophrenia-spectrum disorders (De Achával *et al.*, 2010), social anxiety (Machado-de-Sousa *et al.*, 2010), and Alzheimer's disease and related dementias (Fliss *et al.*, 2016) among others. Prior work has suggested that an inverted-U-shaped curve between cognitive empathy and age exists (O'Brien *et al.*, 2013), such that cognitive empathy increases in young adulthood, peaks in middle age, and decreases in older adulthood. However, few have examined this inverted-U-shaped curve with a large sample that would allow for more nuanced understanding of the effects of educational attainment and sex. While age differences in cognitive empathy do exist and have been replicated in several studies (Duval *et al.*, 2011; Khanjani *et al.*, 2015; Li *et al.*, 2013; O'Brien *et al.*, 2013), these differences in cognitive empathy may be explained by individual characteristics such as educational attainment and cognitive abilities (Duval *et al.*, 2011; Li *et al.*, 2013).

The hypotheses in Gutiérrez-Cobo *et al.* (2021) were largely supported: an inverted-U-shaped curve between age and cognitive empathy was present (peaking in the 30s and declining in older adulthood), sex differences in cognitive empathy appeared with women scoring higher than men with a small effect size, and educational attainment moderated the effect of age on cognitive empathy. That is, those with the highest level of education (i.e. college educated) showed the least change in cognitive empathy across the adult lifespan compared to those with high school education or less than high school education. Moreover, the interaction between educational attainment and age on cognitive empathy was most pronounced after early middle age around 35 years, signifying that differences in cognitive empathy by educational attainment may widen specifically over late middle age and older adulthood (Gutiérrez-Cobo *et al.*, 2021).

Gutiérrez-Cobo *et al.* (2021) argue that educational attainment may affect cognitive empathy through cognitive reserve, a construct that explains how adults with significant neuropathology may have preserved functioning in day-to-day life (i.e. through the greater efficiency and integrity of remaining neuronal networks) (Stern, 2013). Higher cognitive reserve is protective of developing Alzheimer's disease and related dementias even after controlling for Alzheimer's disease neuropathological burden (Nelson *et al.*, 2021). Unlike education, cognitive reserve may be more easily modifiable in middle age and older adulthood through increased occupational complexity (Boots *et al.*, 2015), social engagement (Evans *et al.*, 2018), and stimulating leisure activities (Stern, 2013).

These findings provide one more of many poignant reasons to actively reduce disparities in the access to and quality of educational services for successive generations. However, reducing disparities in educational attainment is a complex task, as it requires an in-depth understanding of the predisposing factors that originally exacerbated disparities (e.g. housing and socioeconomic inequities that affect public school

funding, workforce shortages in school systems, etc.). Moreover, even if educational reform was made possible through governmental intervention, it may take several years or decades to implement across a single state or country. Therefore, focusing on *scalable interventions* that directly target empathy and related constructs (e.g. compassion, wisdom) may be a more cost-effective and expedited pathway toward reducing age-related differences in cognitive empathy among older adults with limited formal education.

In a meta-analysis of 18 randomized controlled trials, Teding van Berkhout and Malouff (2016) found that empathy training was efficacious with a medium effect size (Hedge's $g = 0.63$). However, a larger effect size was witnessed among interventions exclusively focused on cognitive empathy and behavioral training (Hedge's $g = 0.91$) rather than interventions focused on cognitive and affective empathy (Hedge's $g = 0.36$) (Teding van Berkhout and Malouff, 2016). Unfortunately, few methodologically rigorous empathy-focused interventions have been developed for older adults as they often recruit children, adolescents, or university students (Teding van Berkhout and Malouff, 2016). Meta-analyses also suggest that compassion (Cohen's $d = 0.55$) and self-compassion (Cohen's $d = 0.70$) are modifiable through intervention with medium effect sizes (Kirby *et al.*, 2017). Although the behavioral and neural correlates of empathy and compassion are distinct (Preckel *et al.*, 2018), they are both necessary for complex social situations in which Theory of Mind is needed and may affect psychological adjustment in older age (Tavares *et al.*, 2020). Many consider cognitive empathy to be a component of wisdom (Lindbergh *et al.*, 2022), and wisdom can be improved in older age through intervention like other positive psychosocial traits such as resilience (Treichler *et al.*, 2020). Lee *et al.* (2020) conducted a meta-analysis on 57 randomized controlled trials that sought to enhance social, emotional, and spiritual components of wisdom. Analyses suggested that prosocial behaviors (Standardized Mean Difference [SMD] = 0.43), emotional regulation (SMD = 0.67), and spirituality (SMD = 1.00) were all modifiable through clinical interventions, with larger effect sizes being reported in interventions focused on prosocial behaviors in older adulthood (Lee *et al.*, 2020). It is conceivable that randomized controlled trials on empathy, compassion, and wisdom can be tailored to older adults to reduce age-related changes in cognitive empathy by directly targeting the cognitive and behavioral components of cognitive empathy as well as its psychological correlates (e.g. empathy, wisdom). Developing and tailoring controlled trials to be inclusive of older adults with limited formal education and those from lower socioeconomic status will be crucial for implementation and scalability.

There are several notable limitations from Gutiérrez-Cobo and colleagues' (2021) study. First, the inverted-U-shaped curve in cognitive empathy was measured from cross-sectional results. Future work must employ longitudinal methodologies to ascertain intraindividual and interindividual change in cognitive empathy across the lifespan. Second, 2.5% of the sample received less than high school education, 10.8% received high school education, and 86.8% received college education, and many of the lower-educated adults were also above the age of 50 years (Gutiérrez-Cobo *et al.*, 2021). Although the sample size was large enough to find a moderating effect, studies with a large sample of individuals with lower educational attainment (including young adults) may be crucial to determine the generalizability of findings. Finally, prior work has found that older adults perform lower on the Eyes Test but higher on subjective tests of cognitive empathy (e.g. Empathy Quotient – Cognitive Empathy items) (Khanjani *et al.*, 2015). This brings into question whether test choice ultimately affects the relationship between age and cognitive empathy. It may be that older adults' performance on the Eyes Test is affected by age-related change in cognitive functioning (e.g. executive functioning specifically) (Duval *et al.*, 2011) or visual problems, while ratings on subjective tests of cognitive empathy may be less sensitive to cognitive or visual deficits.

In conclusion, Gutiérrez-Cobo and colleagues' (2021) article on changes in cognitive empathy across the lifespan and the moderating role of educational attainment provides a roadmap for future work and trial development. Because education is not easily modified in older adulthood, interventions seeking to improve cognitive empathy should consider targeting it directly or indirectly through its psychological correlates (e.g. compassion and wisdom). Regardless, all cognitive empathy interventions must be tailored to individuals of all educational and socioeconomic statuses. Meta-analyses suggest that cognitive empathy and its correlates (e.g. compassion, wisdom) are modifiable through randomized controlled trials, though few have considered the unique barriers that older adults may face in social situations (e.g. age-related cognitive decline and memory impairment, functional limitations that may socialization, and sensory deficits that impact communication). Future work is also needed to understand the practical/social effect of lower cognitive empathy in older age, and whether these differences have a clinically meaningful effect in the real world.

Conflict of interest

None.

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Description of authors' roles

D. Jester and B. Mausbach wrote the paper.

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