

Cognitive Diversity In Community-dwelling Older Adults: A Person-centered Profiling Approach To Active Living

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Decision trees provide a clinically intuitive map of these profiles or patterns, translating complex data into actionable profiles. This approach supports precision-oriented gerontological practice by identifying subgroups that may benefit from targeted interventions, such as fatigue management, emotional support, active-living or functional optimization, rather than one-size-fits-all strategies. By embedding machine learning within gerontological theory and clinical reasoning, this study demonstrates how cognitive ability can be understood as a set of lived profiles, not merely a distribution of scores.

INTRODUCTION	METHODS	RESULTS	CONCLUSIONS	REFERENCES																																																																																								
Cognitive health in later life is shaped by a complex interplay of psychological, functional, environmental factors and behavioral factors such as active living. Active living (AL) addresses aging-related effects associated with inactivity and isolation. Older adults have expressed AL as a way of being, influenced by physical and mental capacities, and social determinants of health (SDoH). Traditional regression approaches quantify average effects but often obscure meaningful heterogeneity within populations. This study applies clinically grounded Classification and Regression Tree (CART) analysis to identify distinct self-perceived cognitive profiles (SPCA) among community-dwelling older adults and to reveal the combinations of everyday experiences that differentiate them into different degrees of SPCA.	• 👥 Sample Size: 1,612 participants • 🌐 Countries Involved: 🇨🇦 Canada, 🇬🇧 United Kingdom, 🇺🇸 United States, 🇳🇱 Netherlands • 📊 Analysis Method: 🌳 Regression Tree • 📋 Survey Focus: • 👤 Personal and Intrinsic Capacity (IC) Factors • 🏠 Social Determinants of Health (SDOH) • 🚶 Active Living (AL) Indicators: 17 indicators combined into a continuous score (range: 0–51) • Cognitive ability: 7 items on memory and attention lapses (range: 0-14)	• Mean age = 71 years (SD: 5.2) years • Average cognitive ability measured on C3Q_short = 11/14 (SD: 3.0). • Seven major factors characterized people into 8 degrees of interpretable cognitive ability profiles. • These profiles were characterized first by good or poor sleep quality. Among people with good sleep, cognitive ability varied by resilience, interest in learning new things, and fatigue. For people with poor sleep quality, cognitive ability varied by physical function, presence of anxiety/depression, and feeling useful.	Self-perceived Cognitive Ability Profiles <table><tr><th></th><th></th><th></th><th></th><th>Mean CA</th><th>95 CI</th><th>N</th><th>Description</th></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Sleeps well</td></tr><tr><td>A</td><td>+sleep</td><td>-resilience</td><td>+ learning new things</td><td>13.0</td><td>10.05-13.90</td><td>630</td><td>High resilience, interest in learning new things</td></tr><tr><td>B</td><td>+sleep</td><td>-resilience</td><td>-learning new things</td><td>10.6</td><td>9.48-11.68</td><td>31</td><td>High resilience, low interest in learning new things</td></tr><tr><td>C</td><td>+sleep</td><td>-resilience</td><td>+ fatigue</td><td>12.5</td><td>11.61-13.35</td><td>48</td><td>Low resilience, rarely fatigued</td></tr><tr><td>D</td><td>+sleep</td><td>-resilience</td><td>-fatigue</td><td>10.5</td><td>9.73-11.25</td><td>63</td><td>Low resilience, often fatigued</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Does not sleep well</td></tr><tr><td>E</td><td>-sleep</td><td>+ physical function</td><td>+ anxiety/depression</td><td>11.9</td><td>11.22-12.48</td><td>89</td><td>Functional, not anxious</td></tr><tr><td>F</td><td>-sleep</td><td>+ physical function</td><td>-anxiety/depression</td><td>10.4</td><td>9.94-10.88</td><td>161</td><td>Functional, anxious</td></tr><tr><td>G</td><td>-sleep</td><td>-physical function</td><td>+useful</td><td>11.0</td><td>9.85-12.09</td><td>30</td><td>Not functional, feels useful</td></tr><tr><td>H</td><td>-sleep</td><td>-physical function</td><td>-useful</td><td>8.1</td><td>7.40-8.78</td><td>75</td><td>Not functional, does not feel useful</td></tr></table> • Of all these novel findings, usefulness and resilience are active living factors contributing to cognitive ability. Furthermore, low sleep quality most strongly predicted self-perceived cognitive impairment followed by reduced physical function and lack of usefulness.					Mean CA	95 CI	N	Description								Sleeps well	A	+sleep	-resilience	+ learning new things	13.0	10.05-13.90	630	High resilience, interest in learning new things	B	+sleep	-resilience	-learning new things	10.6	9.48-11.68	31	High resilience, low interest in learning new things	C	+sleep	-resilience	+ fatigue	12.5	11.61-13.35	48	Low resilience, rarely fatigued	D	+sleep	-resilience	-fatigue	10.5	9.73-11.25	63	Low resilience, often fatigued								Does not sleep well	E	-sleep	+ physical function	+ anxiety/depression	11.9	11.22-12.48	89	Functional, not anxious	F	-sleep	+ physical function	-anxiety/depression	10.4	9.94-10.88	161	Functional, anxious	G	-sleep	-physical function	+useful	11.0	9.85-12.09	30	Not functional, feels useful	H	-sleep	-physical function	-useful	8.1	7.40-8.78	75	Not functional, does not feel useful	Askari, S., Fellows, L., Brouillette, M.-J., Moriello, C., Duracinsky, M., & Mayo, N. E. (2018). 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Measuring what matters to older persons for active living: part II cross-sectional validity evidence for OPAL measure across four countries. <i>Quality of Life Research</i>, 33(10), 2661-2673. https://doi.org/https://doi.org/10.1007/s11136-024-03720-1 Mayo N.E., N. L., Brouillette M.J., Fellows L., Askari S. (2020). <i>Developing a Computerized adaptive test for the Communication Cognitive Concerns (C3Q) measure using decision regression trees. Quality of Life Research</i>, 29(1), 1-196.
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