

## The Challenge of Measuring Intrinsic Capacity

E. Gonzalez-Bautista<sup>1,2</sup>, J.R. Beard<sup>3</sup>

1. Gerontopole of Toulouse University Hospital, Institute on Aging, Research and Clinical Alzheimer's Disease Center, CMRR, Toulouse, France; 2. Maintain Aging Research team, CERPOP, Université de Toulouse, Inserm, Université Paul Sabatier, Toulouse, France; 3. Butler Columbia Aging Center, Mailman School of Public Health, Columbia University, USA

Corresponding Author: John R Beard, Butler Columbia Aging Center, Mailman School of Public Health, Columbia University, USA, [drjohnbeard@outlook.com](mailto:drjohnbeard@outlook.com)

The paper “The ICOPE Intrinsic Capacity Screening Tool: Measurement Structure and Predictive Validity of Dependence and Hospitalization” (1) uses data from the Toledo Study of Healthy Aging to examine the structure of the screening tool currently adopted by the WHO Integrated Care for Older People program. Applying an innovative approach that is both formative and reflective, it identifies issues with the current tool, particularly concerning the cognition and sensory domain items.

This is somewhat surprising, particularly given the significant body of evidence suggesting that these measures can be helpful predictors of adverse outcomes when used independently. For example, three-word recall, a component of the cognitive domain of the IC screening that dropped out of the Toledo analysis, has been shown to predict the risk of dementia (2). Of course, this does not mean that these short tests are appropriate for use as a brief instrument to identify older adults at risk of future functional decline, and the study findings suggest that more work is needed to identify such a tool.

Another interesting point raised by the paper is that work to date on the IC construct has generally adopted a reflective rather than a formative approach (3, 4). This can largely be explained by the purpose of much of this previous work, which was not aimed to develop a summary measurement tool (i.e. no scoring algorithm was proposed) but to examine the intercorrelation between a range of variables within existing datasets to explore how intrinsic capacity might be structured.

While there is general agreement that intrinsic capacity can be considered a latent construct that emerges from complex underlying characteristics, it is still unclear whether it is best assessed as a formative or reflective construct. A reflective measurement model assumes that the indicators measured are manifestations of the construct being studied. For example, intelligence might be measured by testing characteristics such as working memory and abstract reasoning (5). On the other hand, a formative measurement model assumes the indicators are not manifestations of this common property but are defining characteristics of it (6). For example, quality of life might be considered as a consequence of health, satisfying relationships and financial security. A recent review concluded that intrinsic capacity might best be approached as a formative construct of five domains (5). However, the question then arises whether these domains themselves are reflective or formative in nature.

The concept of intrinsic capacity was first proposed in WHO's 2015 World Report on ageing and health. This Report drew on extensive gerontological theory to consider health in

older adults from the perspective of functioning rather than the presence or absence of disease. Intrinsic capacity was used to describe all the individual level attributes that might contribute to an individual's ability to be and do the things they value. The Report framed this ability as arising from the capacity of the individual, the environment they inhabited and the interaction between the individual and this environment. While the Report did not expand on the characteristics that might comprise intrinsic capacity, a structure composed of key dimensions including locomotor, cognitive, sensory and psychological capacities, as well as vitality - a domain reflecting energy balance - was subsequently proposed based on gerontological theory and the International Classification of Functioning, Disability and Health (7).

Researchers later used Exploratory Factor Analysis to examine whether the data in several longitudinal studies was consistent with this framing. This is similar to the initial steps of the analysis by Rodriguez-Laso et al. (1) The theoretical structure fitted well with that suggested by the data from these longitudinal studies, and the general intrinsic capacity factor was found to be a powerful predictor of subsequent care dependence and, in more recent research, mortality (8, 9). This prognostic value was maintained even after adjustment for the number of morbidities being experienced by study participants. This suggests that assessing capacity in clinical practice could add valuable prognostic information that might not be otherwise considered.

Several approaches have subsequently been used to measure intrinsic capacity and assess its relationship with adverse outcomes in population-based and clinical settings: reflective (4, 10) structural-equation modelling (SEM), formative SEM (11), z-scores from domain measures (12), mean score values of domain measures re-scaled (13), principal component analyses (14), number of impairments (15). However, none of these have proposed a standard measurement instrument, and the lack of consensus on how to approach and measure this construct is a major impediment to implementing the WHO Healthy Ageing framework in research and clinical practice.

Alongside the World Report, the WHO has also sought to encourage integrated person-centred care for older adults, most notably through the Integrated Care for Older People (ICOPE) program. ICOPE arose after extensive consultation with clinicians and a comprehensive assessment of existing literature on community-based interventions. The entry point to the ICOPE program is a brief assessment of the five domains of capacity outlined above using a set of screening measures

derived from clinical and research experience. This screening tool was never designed as a measure of intrinsic capacity in itself. Instead, it is used to identify possible impairments in specific domains and is then followed by a more in-depth assessment of the relevant domain. The critical clinimetric issue is to find a balance between the specificity and sensitivity of this instrument. The utility of the current approach is currently being tested in large trials in France (16) and China.

Another important consideration arises from the paper by Rodríguez-Laso et al. (1). A validated brief measure of intrinsic capacity could be very useful as an outcome in epidemiologic or clinical research. The question is how best to develop this. The authors suggest that this might best be achieved using both reflective and formative approaches thus overcoming some of the limitations of current research. If this can lead to an instrument that is not only a valid measure of capacity, but that can be reliably measured across time while remaining sensitive to change, it could potentially transform our ability to monitor health across the second half of life.

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