Predicting Independent Functioning in an Elderly Population: The Evaluation of Working Memory Capacity as a Biomarker of Ageing.

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ABSTRACT

The ageing process is characterised by declines in physical and cognitive ability and by a general increase in dependence in carrying out daily tasks. Maintenance of functional *in*dependence is critical to quality of life in elderly populations (Black & Rush, 2002; Sulander et al., 2005). Therefore, identifying measures that can predict functional ability is of particular interest to societies with an ageing population.

Due to increases in inter-individual and intra-individual variability with age, chronological age has been demonstrated to be a poor predictor of an individual's functional ability (Bauco et al., 1996; Willis et al., 1992). Consequently, other, more successful indicators, referred to as biomarkers, have been established (e.g. grip strength and visual acuity). However, of these more accurate measures, few are cognitive. This is surprising given the reported strong and positive relationship between independent functioning and intact cognition (Atkinson et al., 2005; Bäckman & Hill, 1996). Therefore, the current project investigated whether a task of working memory capacity (Reading Span), could predict a range of independent functioning outcome measures.

Employing a longitudinal study design (three measurement occasions over approximately 18 months), 150 community-dwelling participants, 70 years of age and over (99 females, 51 males), were tested on a range of cognitive and physiological tasks. Cross-sectional results from logistic and linear regressions showed that chronological age was in fact a significant predictor of all three functional outcome measures. In contrast, Reading Span was a significant predictor only of one outcome measure (reasoning ability). Some of the physiological and sensorimotor biomarkers were found to predict two of the three functional outcome measures. Therefore, cross-sectional results showed that all of the biomarkers were limited in their ability to predict

outcomes measured concurrently and, in the current sample, chronological age was the best predictor of some outcome measures. However, over time, Reading Span became a significant predictor of most of the outcome measures and explained a comparable amount of variance to age. Reading Span also often accounted for more variance than physiological and sensorimotor variables.

The current sample was healthy, independent functioning and cognitively intact. Performance variability was low initially and was further reduced by the presence of selective attrition (i.e. individuals with poorer reasoning and crystallised ability and lesser working memory capacity dropped out of the study). Based on this, it is not surprising that biomarkers were able to explain less than 10% of the variance in *any* outcome measure. In summary, the current study shows that working memory capacity, as measured by Reading Span, is a valuable addition to the assessment of functional ability in an elderly population and highlights the importance of cognition in this context. However, further investigations are required before Reading Span can be described as a *biomarker* of ageing.