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# Cognitive performance as a predictor of functional decline among the non-disabled elderly dwelling in a Japanese community: A 4-year population-based prospective cohort study

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## Abstract

This study longitudinally examined the relationships between the specific domains of cognitive performance and functional decline among the community elderly. The study population was 119 men and 194 women aged 70–84 at baseline, who were examined at both baseline and in a 4-year follow-up survey. Katz's Index and the Tokyo Metropolitan Institute of Gerontology Index of Competence (TMIG-IC) were used for measuring the functional capacities of basic activities of daily living (BADL) and higher-level competence, respectively. For the purpose of analyses, declines in each subscale of functional capacity during the follow-up period were used as outcome variables; and specific domains of cognitive performances, including information processing speed, executive function, orientation, and episodic memory at baseline, were used as independent variables. Multiple logistic regression analyses, adjusted for the potential confounders, showed that information processing speed and orientation were associated independently and inversely with BADL decline, and that information processing speed and executive function were related independently and inversely to higher-level competence decline. These results suggested that information processing speed and orientation are reliable predictors for decline in BADL, and information processing speed and executive function are also reliable predictors for decline in higher-level competence among the community elderly.

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**Keywords:** Functional decline; BADL; Higher-level competence; Cognitive performance; Prospective cohort study; Community elderly

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## 1. Introduction

Along with the worldwide graying of populations, the maintenance of functional capacity among the elderly has become a major issue in geriatrics and gerontology (Aguero-Torres et al., 1998; Stuck et al., 1999). Functional capacity is regarded as a critical component of ability in order for older people to live independently in their everyday lives. Functional capacity contains two major components: “BADL” and “higher-level competence.” BADLs include basic level activities, such as walking, eating, bathing, dressing, and toileting. Higher-level competence, indicating higher-level functional capacity above BADLs, corresponds to the fifth, sixth, and seventh sublevels of Lawton’s hierarchical model of behavioral competence (Lawton, 1972) and includes activities such as preparing meals, managing money, taking medications, writing forms, and visiting the homes of friends.

To better understand the nature of functional capacity, previous studies have identified the following predictors for declining functional capacity among the elderly (Stuck et al., 1999): cognitive functioning, depression, comorbidity, functional limitation in the lower limbs, physical activity, social contact, smoking, and vision impairment, etc. Recent longitudinal studies have confirmed the relationship of level of cognitive performance to functional decline (Moritz et al., 1995; Aguero-Torres et al., 1998; Ishizaki et al., 2006; McGuire et al., 2006) among cognitively normal older people dwelling in a community. However, most of these previous studies used relatively simple cognitive scales (e.g., the Mini-Mental State Examination (MMSE)) (Folstein et al., 1975; Ishizaki et al., 2006) and the Short Portable Mental Status Questionnaire (SPMSQ) (Pfeiffer, 1975; Moritz et al., 1995) to evaluate the relationship (Gill et al., 1997). Further exploration to confirm which specific domains of cognitive performance more closely predict functional decline may be needed to facilitate the development of effective and efficient strategies for preventing or slowing functional decline among the elderly.

The present study therefore examined the relationship of specific domains of cognitive performance (information processing speed, executive function, orientation, and episodic memory) and functional decline (declining in BADL and higher-level competence) among community dwelling, non-disabled older people using a 4-year prospective, population-based approach.

## 2. Subjects and methods

### 2.1. Participants

The source of data for the present study was the Longitudinal Interdisciplinary Study on Aging conducted by the Tokyo Metropolitan Institute of Gerontology (Shimonaka et al., 1997; Iwasa et al., 2007). The study was administered in Itabashi ward, which is located in the north part of Tokyo. As of 1991, a sample of 4440 residents (aged 50–74 years) had been obtained systematically from the municipal resident registration files (*Juumin Kihon Daichou* in Japanese) in the area. We acquired 3097 completed sets of data in the first round of home-visit surveys in 1991. We then conducted follow-up interviews every succeeding

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