Archives of Gerontology and Geriatrics 60 (2015) 272–280

Contents lists available at ScienceDirect

Archives of Gerontology and Geriatrics

journal homepage: www.elsevier.com/locate/archger

Disability trajectories and associated disablement process factors among older adults in Taiwan

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ARTICLE INFO

Article history:
Received 20 August 2014
Received in revised form 11 December 2014
Accepted 12 December 2014
Available online 22 December 2014

Keywords:
Disability trajectories
Older adults
Disablement process
Latent class growth curves modeling
Taiwan

ABSTRACT

Objectives: We aimed to identify disability trajectories and examine whether the predisposing, intra-individual, and extra-individual factors in the disablement process predicted different disability trajectories among older adults in Taiwan.
Methods: Data were from the Taiwan Longitudinal Study on Aging (TLSA) Survey in 1996–2007 (n = 3186). Disability trajectories for activities of daily living (ADLs) and instrumental activities of daily living (IADLs) were identified by using latent class growth curves modeling. Factors including demographics, health conditions, health behaviors, social relations, and use of assistive devices were significantly predicted different disability trajectories of older adults over the following 11 years by applying hierarchical logistic regression.
Results: Three disability trajectories – maintained function, progressive disability, and consistent disability – were identified. Predisposing factors such as younger age, more educational attainment, and better health conditions had protective effects of leading to a later healthier maintained function trajectory. Intra-individual factors such as engaging in leisure time activities (LTAs) were positively related to the maintained function trajectory but negatively related to the consistent disability trajectory; decreasing social networks was common to those on consistent disability trajectory; dissatisfaction with social support was noted in maintained function trajectory group. An extra-individual factor, using assistive devices, was significantly related to maintaining older adults' disability levels, even for those who started disabled.
Conclusions: The findings suggested that predisposing, intra-individual, and extra-individual factors play different roles in the development of later disability trajectories. More educational attainment, better health conditions, active in LTAs, and using assistive devices might benefit the maintenance of functioning in Taiwanese older adults.

1. Introduction

Measuring disability in older adults is commonly done by assessing for ADLs and IADLs. According to the concept proposed by Nagi (1965) and the extended scheme by Verbrugge and Jette (1994), disability is defined as difficulties in performance of socially defined roles and tasks, such as those involving personal hygiene like bathing, eating, and toileting in ADLs, as well as those involving activities for living independently, like doing housework, taking public transportation, and managing money in IADLs. Studies have shown that older adults with disabilities in ADLs and IADLs have lower quality of life and are at higher risk of institutionalization, hospitalization, and mortality (Luppa et al., 2010; Majer, Nusselder, Mackenbach, Klijs, & van Baal, 2011; Millan-Calenti et al., 2010). Care for older adults with disabilities also requires significant healthcare expenditures (Chan et al., 2002; Fried, Bradley, Williams, & Tinetti, 2001). Therefore, it is important to investigate factors that may influence the functional ability of older adults so that gerontologists can understand the disablement process in the elderly.

In Taiwan, adults aged 65 and over currently represent 11% of the overall population, with that proportion projected to exceed 20% by 2025 (National Development Council in Taiwan, 2012). Current reports from the National Long-Term Care Needs Survey estimate that among Taiwanese older adults aged 65 and older, 14.95% experience disability. As a result of the expected increase in

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http://dx.doi.org/10.1016/j.archger.2014.12.005
0167-4943/

the population of older adults, the total number of disabled older adults is expected to double in the next two decades (Lee et al., 2013).

Disability is a complex process involving the interplay of multiple factors. One of the dominant theoretical frameworks, the disablement process proposed by Verbrugge and Jette (1994), suggests that three sets of factors act in moderating the speed of progression toward disability. They are predisposing factors, intra-individual factors, and extra-individual factors. Predisposing factors are those features of individuals that exist at or before the outset of the disablement process, such as demographic and biological characteristics. Evidence has shown that younger age, male, and more educational attainment are likely to be found in functionally independent older adults (Beckett et al., 1996; Chen, Covinsky, Stijacic Cenzer, Adler, & Williams, 2012; Liang, Wang, et al., 2010), whereas living with comorbidities and depressive symptoms are common in older adults with functional disabilities (Barry, Murphy, & Gill, 2011; Dalle Carbonare et al., 2009; Hung, Ross, Boockvar, & Siu, 2012). As for the intra- and extra-individual factors, the disablement process asserts that these factors serve as buffers, which may increase the individual's capacity or decrease environmental demands in an attempt to retard or reverse the progression of disablement. Intra-individual factors, including better social relations, a healthier lifestyle, and LTAs, play roles in increasing older adults' functional capacities and preventing physical deterioration (Artaud et al., 2013; Boyle, Buchman, Wilson, Bienias, & Bennett, 2007; James, Boyle, Buchman, & Bennett, 2011; Mendes de Leon, Gold, Glass, Kaplan, & George, 2001; Tak, Kuiper, Chorus, & Hopman-Rock, 2013). Extra-individual factors, such as using assistive devices and technology, are seen as external supports that help older adults achieve better functioning. Studies also showed the importance of use of assistive devices among older adults in the recent decade (Cornman, Freedman, & Agree, 2005; Freedman, Agree, Martin, & Cornman, 2006; Martin, Zimmer, & Hurng, 2011). Together, the disablement process involves the interplay of three types of factors. However, the influence of multiple factors has not been thoroughly examined in the literature.

Beyond the scope of the factors in the disablement process, a broader body of research has focused on investigating functional changes over time. From comparisons of two points of time to multiple-wave observations, the evidence has indicated that disability in older adults is not only a reversible condition but also a time-dependent process (Gill, Allore, Hardy, & Guo, 2006; Hardy & Gill, 2004; Seidel, Jagger, Brayne, Matthews, & Cfas, 2009). Patterns of disability change over time; in other words, the concept of the disability trajectory and identifying subgroups of older adults with different trajectories has gained recognition as ever more evidence supporting it is published in literatures (Chen, Mullan, et al., 2012; Chiu, Wray, & Ofstedal, 2011; Dodge, Du, Saxton, & Ganguli, 2006; Han et al., 2013; Hsu, 2009, 2013; Liang, Wang, et al., 2010; Liang, Xu, Bennett, Ye, & Quinones, 2010; Rajan et al., 2012; Taylor, 2010; Zimmer, Martin, Jones, & Nagin, 2014). The disability trajectory provides information on both the level of disability and the patterns of functional change over time. Thus, the disability trajectory approach improves current knowledge on tracing long-term functional changes in older adults in later life, and this methodology has gained recognition for its utility in estimating the disability trajectory of older adults.

In studies of the effects of older adults' characteristics on disability trajectory in Taiwan, evidence has indicated many risk factors. One is age and gender differences; the older-old and females experience a higher level of disability initially and a faster rate of decline on the disability trajectory than the younger-old and males do (Liang, Wang, et al., 2010). Chronic diseases, such as diabetes-related comorbidities, appear to be associated with a relatively high speed of functional deterioration for Taiwanese older adults (Chiu et al., 2011). Depressive symptoms are also significantly predicted by the disability trajectory among older adults in Taiwan (Chen, Mullan, et al., 2012). In addition to examination of the disability trajectory as a whole, a further means of identifying the underlying subgroups of disability trajectories has been developed in recent years. Previous researchers have identified several subtypes of disability trajectories, which may be related to differences in the use of long-term care services. Hsu (2013) used a sum scale by measuring the severity of ADL and IADL disabilities and identified four types of disability trajectories among Taiwanese older adults. She found that older adults at a higher level of disablement and progressive functional decline subgroups of trajectories experience a greater use of long-term care services in later life. In addition, different personal characteristics may be related to different types of trajectories. Zimmer et al. (2014) measured the onset of functional limitations and identified three types of functional limitation trajectories in Taiwanese older adults. The study demonstrated that older females and the less-educated elderly had higher probabilities of membership in the early-onset subgroup of functional limitation trajectories than males and their more-educated counterparts. However, past researchers were more likely to examine older adults' disability trajectories in terms of predisposing factors. The influences of intra- and extra-individual factors in the disablement process on disability trajectories are not fully understood. Therefore, we extended previous knowledge by examining the effects of all three important domains in the disablement process of disability trajectories among older adults in Taiwan.

The aims of this study were: (1) to identify distinct subgroups of ADL and IADL disability trajectories among an older population in Taiwan drawn from a national longitudinal survey; and (2) to apply the disablement process to disability trajectories in Taiwan and examine whether the predisposing, intra-individual, and extra-individual factors might predict different disability trajectories of Taiwanese older adults.

2. Materials and methods

2.1. Study population and measurements

Data for analysis came from the TLSA, a national representative survey initiated in 1989 and followed up in 1993, 1996, 1999, 2003, and 2007. The TLSA had a high response rate of around 90%. The details of the study design can be found elsewhere (Hsu, 2013; Liang, Wang, et al., 2010; Zimmer et al., 2014). The TLSA collected three aged-in cohorts to represent the distribution of both community- and institution-dwelling older adults in Taiwan. A sample of 4049 adults aged 60 and older was collected from the first wave in 1989. Two supplemental cohorts aged 50–66 were added in the third and the fifth waves, which included 2462 older adults in 1996 and 1599 older adults in 2003, respectively.

We analyzed the first two cohorts of adults aged 50 and older in the beginning wave of 1996 and traced their functional changes until 2007 due to the statistical requirements for estimating the disability trajectory. Based on the suggestion from Zimmer et al. (2014) that including deceased people may lead to sampling error and bias the estimation of the trajectory, particularly for those who experience early onset of disability, the current study included only those who were alive in 2007. We also restricted respondents to those who completed at least three of the four surveys (1996, 1999, 2003, and 2007) to ensure the robustness of the imputation analysis and trajectory estimation. Multiple imputations for nonresponse data in surveys were used. A total of 3186 respondents were analyzed in the present study, including 1256