Health Behaviors and Transitions of Physical Disability Among Community-Dwelling Older Adults

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This study examined the transitions of disability over 5 years among older adults and the influences of health behaviors on these transitions. Data was obtained from the community cohort of the National Long-Term Care Survey in 1994 (n = 5,089) and their follow-up data in 1999. Generalized logit regressions revealed that obesity increased the risk of disability. Light drinking decreased the risk of disability. Among disabled individuals, the risk of status decline was higher for those underweight or physically inactive, and those taking vitamin and/or mineral supplements regularly or working on a hobby were less likely to further decline in the disability statuses. In an older population, having more contacts with friends, having regular social activities, and having a body mass index ≥ 25 were beneficial to survival. These findings indicate that older adults may have greater personal control over their lives based on their choices about lifestyles and social connections.

Keywords: aging; physical disability; activities of daily living; healthy behaviors; longitudinal studies

Physical disability is defined as difficulty or dependence in self-care tasks (Activities of Daily Living, ADL) (Fried et al. 2004). The performance of ADLs reflects the individual’s ability to live independently. Therefore, it is an important problem among older adults living in the community (Manton 1988; Gill, Hardy, and Williams 2002). Our previous

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analysis revealed that among older adults aged 65+ with a certain degree of functional limitation, at least 39% had developed severe disability over a 15-year time period (Wu et al. 2007). A common perception about the long-term disabled elderly is that they are not likely to improve or regain independent functioning. Recent evidence demonstrates that disability for many older people is a highly dynamic process that is reversible and often recurrent, particularly for those who are physically frail (Boaz 1994; Gill et al. 2002; Gill and Kurland 2003; Hardy and Gill 2004; Hardy et al. 2005; Manton 1988). Disability transition can occur in either direction, decline or improvement, for all age groups (Lagergren 1994).

Although chronic diseases have been identified as the main cause of functional decline and death, many studies now suggest that chronic diseases might not be a necessary consequence of aging (Fried and Guralnik 1997). As the eradication of diseases could be viewed as the elimination or reduction of forces external to individuals and their lifestyle choices, individual choices about behavior and lifestyle may play a very important role in longevity and physical function in old age. Recently, there has been a controversy regarding the degree to which healthy lifestyles can increase longevity and postpone functional decline (Hubert et al. 2002). Some studies have examined the relationship between disability and specific types of lifestyle behaviors. Findings from these studies have demonstrated the benefits of physical activity and the negative consequences of sedentary behaviors for maintaining ADL ability (Elia 2001; Haight et al. 2005; Hardy and Gill 2005). Some reports indicated that moderate alcohol use was associated with better ADL outcome (LaCroix et al. 1993; Wang et al. 2002). The potential harm of body weight in old age has recently received considerable attention. Consistent findings show that obesity leads to the onset of disability (Fried and Guralnik 1997; Ferraro et al. 2002; Jenkins 2004; Wu et al. 2007) and being underweight is a strong predictor of mortality (Seidell and Visscher 2000; Taylor and Østbye 2001). However, controversy exists about the relationship between obesity and mortality among older people (Rossner 2005). There are some studies suggesting that obesity increases the risk of mortality (Østbye and Taylor 2005), has no effect on mortality (Darmadi-Blackberry et al. 2004; Reynolds, Saito, and Crimmins 2005), and decreases the risk of mortality (Inelmen et al. 2003; Rossner 2001; Taylor and Østbye 2001). In addition, although social networks and social activities have been found to be strongly related to survival and health status among the elderly, information about its effect on disability outcomes remains unclear and further analysis is needed for a better understanding (Mendes de Leon et al. 1999). A recent study conducted by Hubert and
colleagues (2002) assessed the relationship between morbidity and a lifestyle score created by adding the number of three unhealthy factors (smoking, physical inactivity, and underweight/overweight). This analysis method aimed to assess the combined impact of the three unhealthy factors on morbidity. The results indicate that any two or more of these unhealthy behaviors existing simultaneously led to an accelerated decline on the level of morbidity. To our knowledge, few analyses have been conducted to examine a variety of disability transition outcomes in a broader set of explanatory variables related to health behaviors. In this study we attempted to fill this gap in the literature by analyzing data from the National Long Term Care Survey (NLTCS) (Clark 1998).

The objectives of this study were to examine the variation of changes in functional status over 5 years, including onset, recovery, improvement, and decline of disability, and death. In addition, we examined the independent effect of each behavioral explanatory variable on the changes of functional status. Verbrugge and Jette (1994) proposed a conceptual model of the disablement process based on qualitative research. This model hypothesized that diseases and chronic conditions are the main causes of disability via specific impairments and functional limitations. In addition to the main disablement pathway, risk factors such as sociodemographic, lifestyle, psychological, and social factors can also regulate the disability progression. According to this theory and the previous research findings (as surveyed above), we hypothesized that after controlling for the effects of demographics and the burden of comorbidity, some behavioral factors such as physical activity, smoking, drinking, body mass index, vitamin intake, hobbies, social contacts, and social participations will have independent contributions to the transitions of physical disability over 5 years.

Method

Data Source

The NLTCS was conducted by the Duke University Center for Demographic Studies and sponsored by the National Institute of Aging. The NLTCS studied people in the United States aged 65 and older with a particular emphasis on the aged who were functionally impaired, including community and institutional residents. The sample was randomly drawn from Medicare beneficiary enrollment files. An initial screening interview was used to identify functional status of the participants, and to determine
who would receive a subsequent detailed community or institutional interview. The NLTCS was conducted in 1982, 1984, 1989, 1994, 1999, and 2004. This study used the 1994 community sample and the follow-up data in 1999. The survey of 1994 was chosen because it oversampled nondisabled people and the oldest old (aged 95+). This method of sampling increased the variance in disability outcome, which can increase precision of data analysis and enhance the representativeness of the sample. The 2004 wave data had not been released at the time this analysis was completed, and hence it was not used in the analysis. A total of 5089 older adults had received the community detailed interviews in 1994. The 3,067 participants having detailed follow-up information in 1999 were used for this study, including the 284 deaths identified by the 1999 screening.

The Outcome Variable

Physical disability was assessed by the ADL scale, which contains six activity items, including eating, dressing, bathing, toileting, mobility around the home, and transferring in and/or out of bed. The respondents were asked whether they were able to perform each of the six items without assistance from another individual for at least three months. The ADL disability score ranged from 0 to 6, with a higher score indicating an accumulation of disabilities. We tracked the disability scores of the sample at the two time points. In this community cohort, 320 became institutionalized during the 5-year period, and so they received institutionalized follow-up interviews in 1999. The ADL scale was included in both community and institutional surveys with consistent wording of questions in both surveys and across waves.

Based on ADL disability scores measured at the two time points, the sample was categorized into six groups: “Maintain” were those without an ADL limitation in the five years; “Onset” were those with 0 score of disability initially and follow-up scores > 0 (this could include new onset and recurrence of disability); “Same-status” were those with the same disability score over time; “Declined,” “Improved,” and “Recovered” were those with disability scores that increased, decreased, and returned to 0, respectively. Those who had died had no follow-up data and so they were grouped separately as “Death.”

Explanatory Variables

Body Mass Index. Self-reported weight and height were used to calculate Body Mass Index (BMI)—weight (kilograms) divided by the square of
height (meters). According to the Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults (Flegal et al. 1998), BMI values were categorized into four levels: less than 18.5 (underweight), 18.5 – 24.9 (normal weight), 25 – 29.9 (overweight), and 30 or higher (obese).

*Lifestyle habits.* Respondents were asked how many days per week they drank alcoholic beverages (such as beer, wines, or liquor) and then how many drinks they consumed on days when they drank. In addition, respondents reported whether they smoked at the time of the interview, and if yes, how many cigarettes they smoked per day. We adopted the criteria that had been used in other studies for categorizing alcohol consumption and smoking status (Taylor and Østbye 2001; Ferraro et al. 2002). The subjects were classified into “Heavy drinker” (daily, or 3-6 times/week with more than 5 drinks each time), “Light drinker” (1-2 times/week, or 3-6 times/week with less than 5 drinks each time), and “Nondrinker.” Current smokers were classified into “Heavy smoker” (1 or more pack/day), and “Light smoker” (less than 1 pack/day). Physical activity was assessed by a comparison question, “Would you say that you are physically more active, less active, or about the same as other persons your age?” The measures for hobby and for consumption of vitamin and/or mineral supplements were dichotomized. The respondents reported whether they were working on a hobby (such as painting, sewing, arts, and craft), and whether they were taking vitamin and/or mineral supplements at least once a week.

*Social connection.* The level of social connection was evaluated by social contacts and social activities, using four dichotomous variables: frequent contact with friends, frequent contact with relatives, regular participation in social activities, and regular participation in senior activities. These four variables were coded as 1 = “yes” and 0 = “no.” They were created by summarizing the responses to the following questions.

The respondents were asked “Did you talk with friends including neighbors during the past month?” (yes/no) and “Did you talk with relatives including children during the past month?” (yes/no). Those who answered “yes” to each question reported in what way the contact had occurred (by phone and/or by visit) and how often. “Frequent contact” was defined as calling and visiting at least three times last month.

The respondents were asked, “Did you go to a meeting of a civic, religious, professional, recreational club, or a religious service during the prior month?” (yes/no). Those who answered “yes” were classified as “regularly