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Feature Article

Leisure-time physical activity and neuropsychiatric symptoms of community-dwelling persons with cognitive impairment



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ABSTRACT

Physical activities are recommended to reduce neuropsychiatric symptoms of nursing home residents with mild dementia. However, relevant information is not available for community-dwelling persons with cognitive impairment. Therefore, this cross-sectional study examined the effects of leisure-time physical activities on cognitively impaired persons' neuropsychiatric symptoms and their family caregivers' distress. Activities were described in terms of their frequency, duration, number of different types, and energy expenditure. Participants were 58 dyads of persons with cognitive impairment and their family caregivers. Data on leisure-time physical activities and neuropsychiatric symptoms were collected using a 7-Day Physical Activity Recall and Chinese Neuropsychiatric Inventory, respectively. The most frequently reported activity was strolling (70.7%). The mean weekly activity frequency, duration, and energy expenditure were 4.52 (SD = 4.27) times, 3.7 (SD = 4.38) h, and 771.47 (SD = 886.38) kcal, respectively. The number of different activity types negatively and significantly predicted cognitively impaired persons' mood and psychosis as well as family caregivers' distress.

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Introduction

Dementia is estimated to affect 5–8.5% of older adults (≥ 65 years old) worldwide by 2030.¹ Before dementia is diagnosed, patients usually have mild cognitive impairment.¹ The majority of these persons with cognitive impairment (PWCI) are community-dwelling and cared for by family caregivers (FCG) in the home.^{1,2} However, this situation is aggravated in Asia because of the

extraordinary rate of population aging.³ In addition, most PWCI present with neuropsychiatric symptoms, affecting FCG health, burden, and distress.⁴ In Taiwan community-dwelling PWCI also manifest slightly higher prevalence rates of and more frequent neuropsychiatric symptoms and affective disorders than their institutionalized counterparts, likely due to FCGs reacting more to neuropsychiatric symptoms than professional caregivers and institutional factors such as use of psychotropic medications.⁵

Physical activity seems to stimulate cognitive function of PWCI and older healthy adults and reduce neuropsychiatric symptoms.^{6–9} Physical activity can be classified into various categories. In this study, we focused on leisure-time physical activity (LTPA) because it reflects individuals' deliberate choice and is closely associated with improved health outcomes.¹⁰ Assessing the effects of LTPA requires measuring the amount of engagement in terms of frequency, the number of LTPA types, duration (time), and energy expenditure (FTE).^{6,11} Better understanding the influence of the individual

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components of FTTE on the neuropsychiatric symptoms of community-dwelling PWCI and their FCGs would help in designing LTPA interventions for this population.¹²

In addition, physical inactivity is one of seven potentially modifiable factors attributable to about 13% of Alzheimer's disease cases worldwide.¹³ However, integrating and maintaining a physical-activity program into daily life is a challenge^{14,15} that may be mitigated by designing structured home-based physical-activity programs, to which older adults adhere at higher rates than for center-based interventions.¹⁶ This approach may be especially important for Chinese people who highly value harmonious relationships and closeness, leading them to prefer interacting with family members.¹⁷ Since Taiwan's society, culture, and health care system differ from those in the US,^{10,18} Taiwan-specific evidence on dementia care is needed to guide changes in practice and policy in Taiwan.¹⁹ To fill this gap, this study was designed to test the relationships between LTPA indicators and neuropsychiatric symptoms of PWCI and their FCGs' distress. We hypothesized that:

H1: LTPA of PWCI is negatively associated with their neuropsychiatric symptoms.

H2: LTPA of PWCI is negatively associated with their FCGs' distress.

Methods

Design, participants and settings

This cross-sectional study was conducted between August 2010 and July 2012 with approval of the study hospital's ethics committees (IRB number 97–0483B). A convenience dyad sample of PWCI and their FCGs was recruited from the memory disorder clinics of a teaching hospital and a community hospital as well as the geriatric psychiatry clinics of two teaching hospitals in northern Taiwan. PWCI eligibility was determined by medical record review for these inclusion criteria: (1) having an FCG who provided direct care or supervised their care in the previous 3 months (co-residency was not required), (2) diagnosed with dementia based on DSM-IV criteria²⁰ with consensus agreement among the chief neurologists at the clinical sites, and (3) dementia severity score of 0.5 (very mild dementia) to 2 (moderate dementia) determined by the Clinical Dementia Rating (CDR).²¹ Individuals in this dementia-severity range were chosen as most of them live in the community. PWCI were excluded for: (1) acute illness, severe hearing or visual problems, (2) acute agitation requiring emergency treatment, (3) chronic alcohol abuse or use of drugs affecting central nervous system function, (4) diagnosed with a major psychiatric disorder within the last 2 years, and (5) neurological or systemic illness (e.g., delirium, hypoxia, or unstable thyroid dysfunction).

FCGs were included if they met these criteria: (1) >18 years old, and (2) willing to participate in this study. FCGs were excluded if they (1) reported a cognitive disorder such as severe memory problems or demonstrated a major affective disorder, (2) had a hearing or visual impairment that was not adequately corrected, (3) were prescribed drugs known to impair or enhance attention, e.g., antidepressants, barbiturates or other depressants, amphetamines, and (4) had insufficient command of Mandarin, Taiwanese or Hakka.

Of the 74 dyads screened, six were excluded for reasons related to the PWCI's death ($n = 1$), refusal to participate ($n = 2$), nursing home placement ($n = 1$), and change of FCG ($n = 2$). Of the remaining 68 dyads, eight were excluded for reasons related to the FCGs: refusal to fill out the 7-Day Physical Activity Recall ($n = 2$), and not meeting the inclusion criteria ($n = 6$). Two other FCGs were excluded because they failed to provide complete data for calculating energy expenditure of PWCI. The characteristics of these two

FCGs and the other FCG participants did not differ. However, our older participants were less educated and our FCGs were younger than a representative sample of Taiwanese PWCI-FCG dyads.²² Our final sample consisted of 58 dyads with complete data, which was within our estimated sample size of 50–100, calculated using a minimum significant R square with a power of 0.80 for 5–10 independent variables at an alpha level of 0.50.²³

Procedures

Participating physicians referred the dyads to trained research assistants who conducted the initial interview in the clinics and explained the study purpose. Data on cognitively impaired participants' Chinese Mini Mental State Examination (MMSE)^{24–26} and CDR^{21,27,28} were collected by medical chart review. Other data were obtained in face-to-face interviews. After obtaining dyads' informed consents, the research assistants visited dyads at the PWCI's homes to collect data on the measures described below.

Measures

Cognitive function

Older participants' global cognitive function was assessed by trained hospital staff using the Chinese MMSE.^{24,25} MMSE scores range from 0 to 30; higher scores indicate higher levels of global cognitive function. The MMSE has been shown to be adequate for assessing the elderly in Taiwan.²⁶

Dementia severity

Dementia severity, as determined by the on-site psychiatrist using the Chinese CDR,^{21,27,28} was extracted from the medical chart by the research assistants. The CDR assesses impairment in six cognitive categories (memory, orientation, judgment and problem solving, community affairs, home and hobbies, and personal care) on a 5-point scale (none = 0, questionable = 0.5, mild = 1, moderate = 2 and severe = 3).²⁷ The Chinese CDR global score has an inter-rater reliability (kappa coefficient) of 0.63.²⁸

Depressive symptoms

Depressive symptoms of PWCI were self-reported to research assistants using the Chinese GDS-S.^{29,30} The GDS-S has 15 yes/no questions, with higher scores indicating more depressive symptoms. Cronbach's alpha of the GDS-S in Taiwanese PWCI was 0.81,³¹ while the Cronbach's alpha coefficient was 0.62 in this study.

Performance of activities of daily living (ADL)

Older participants' ADL performance was reported by FCGs to research assistants using the CBI,³² which assesses ability in eating, transferring, grooming, toileting, bathing, walking, climbing stairs, dressing, as well as bowel and bladder control. Scores range from 0 (total dependence) to 100 (total independence); higher scores indicate better functioning. The CBI had an excellent Cronbach's alpha coefficient of 0.94 in hospitalized stroke patients and moderate-to-excellent agreement between raters for individual items (kappa = 0.53–0.94) and total score (intra-class correlation coefficient [ICC] = 0.94).³³ In this study, the CBI had a Cronbach's alpha coefficient = 0.76.

Neuropsychiatric symptoms

Older participants' neuropsychiatric symptoms were reported by FCGs to research assistants using the CNPI,³⁴ which assesses the severity and frequency of 12 neuropsychiatric symptoms. Higher scores indicate more severe neuropsychiatric symptoms.³⁵ The CNPI had a Cronbach's alpha coefficient of 0.78 in Taiwanese patients with Alzheimer's disease.³⁴ In this study, Cronbach's alpha

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