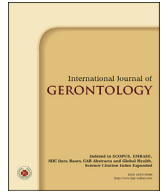




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Original Article

Depression in Older Adults Among Community: The Role of Executive Function

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SUMMARY

Background: Although previous studies have proposed that elderly depression is associated with higher negative affect (NA) and lower positive affect (PA), the relationship between elderly depression and executive function remains controversial.

Methods: Participants were recruited from the community and assessed using the Mini-Mental State Examination, the Geriatric Depression Scale, PA and NA tests, the Modified Card Sorting test (MCST), and a test of verbal fluency (VF). The participants were 319 middle-aged people (mean age = 58.05) and 276 elderly people (mean age = 74.41). The participants in each age group were then divided into a depression group and a control group according to their geriatric depression scale scores.

Results: Compared to the middle-aged group, the elderly group displayed significantly poorer executive function. Compared to the elderly control group, the depressed elderly group displayed poorer executive function, but this phenomenon was not found in the middle-aged group. Stepwise regression analysis showed that the factors of depression were NA and low PA for both the middle-aged and elderly depression groups. However, executive function including MCST and VF were non-significant variables in regression analysis.

Conclusion: Executive dysfunction in elderly people with depression may be associated with the age effect. As people with depression age, their executive dysfunction becomes more pronounced. An elevated NA and lack of PA can explain the severity of depression, but executive function cannot explain depression in either middle-aged or elderly people.

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1. Introduction

Studies have shown that approximately 65% of elderly people over 65 years old exhibit depressive emotions or symptoms. These depressive symptoms typically influence various health aspects of elderly people, such as physiological, psychological, and self-perceived health¹. Aggravated depression in elderly people is strongly associated with mortality². It is necessary to highlight the importance of early preventive intervention for people with depressive disorder.

The tripartite model was proposed by Clark and Watson³, who asserted that negative affect (NA) and lack of positive affect (PA) are

factors associated with depression. NA pertains to a broad range of aversive mood states, people with high levels of NA are more likely to experience intense stress and dissatisfaction at all times, even in the absence of a stressor⁴. Furthermore, they easily develop somatic symptoms and typically exhibit physical problems⁵. A lack of PA reflects an individual's lack of pleasurable engagement with the environment, indifference toward surrounding objects and events, and lack of participation in activities⁶.

Lawton, Parmelee, Katz, and Nesselrode conducted a 30-day follow-up among 78 old adults, of which 19 persons had been diagnosed with major depression⁷. The results indicated that the mean scores of PA were highest in persons without depression and lowest in those with major depressive disorder. Meanwhile, NA was lowest in non-depressed persons and highest in those with major depression. They also found that depressed persons reported persistent, invariant low PA rather than persistent NA while non-depressed persons showed moderate variability in their reports

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of PA but little change in their lack of NA. Another study also demonstrated that low PA and high NA were risk factors for depression one year later. The authors of that study suggested that lack of PA, or anhedonia, may be of particular importance in depression among older persons in the community, who may fail to report depressive symptoms such as sadness⁸.

Based on the above literature, depression is related to NA and lack of PA. Depression experienced by elderly people may also be related to deteriorating executive function. Executive function is conceptualized as volition, planning, purposive action, and effective performance, which involve the translation of a purposive plan and thought into a productive self-serving activity. The actor needs to initiate, maintain, switch, and stop sequences of complex behavior⁹.

Executive dysfunction is commonly associated with deficits from lesions in frontal regions and with some psychiatric disorders, such as depression, which present marked frontal dysfunctions. Alexopoulos and colleagues¹⁰ proposed the concept of depression-executive dysfunction (DED) syndrome, which is characterized by psychomotor retardation, reduced interest in activities, impaired insight, and behavioral disability. Based on clinical, neuropathological, and neuroimaging findings, DED syndrome suggests that frontostriatal dysfunctions of the brain may contribute to the development of late-onset depression¹⁰.

Boone et al¹¹ examined the relationship between neuropsychological test scores and the presence and severity of depression. Emotional and neuropsychological tests revealed that only moderate depression is associated with poor executive function, reflected by the tasks of verbal fluency (VF) and the Wisconsin Card Sorting Test (WCST). However, this relationship was not found in elderly people with mild depression. These findings suggest that the relationship between executive dysfunction and elderly depression may be affected by the severity of depression. Another study used the Trail Making Test (TMT) and VF to explore the executive function of older adults, but no difference in executive function was found between depressed and non-depressed groups¹². Similar results were obtained from the patients aged 40–80 years with a remitted state of depression; a group difference was observed only on the TMT while, on the WCST, there was no difference between depressed and non-depressed participants¹³. Since the TMT involves the motor and speed functions of elderly adults, the researchers in that study proposed that executive deficits are correlated with age rather than depression in old adults.

Therefore, the executive dysfunction observed in elderly patients with depression may be associated with the age effect. Since identifying sources of heterogeneity in late life depression is an important issue, the present study targeted elderly people living in the community who demonstrated mild depression, collected a greater number of samples living in the community, and divided the samples into two age groups: elderly and middle-aged. This approach helped to clarify the role of executive function in elderly people with depression. The hypotheses of the present study are 1) that the executive dysfunction observed in elderly patients with depression may be associated with the age effect and 2) that depression in elderly people is related to their PA, NA, somatic arousal, and executive function.

2. Method

2.1. Participants

This study was approved by the institutional review board, and informed consent was obtained before the tests were conducted. The inclusion criteria were 1) age older than 45 years, 2) normal verbal communication, and 3) Mini-Mental State Examination

scores in the normal range according education level. Exclusion criteria were 1) history of psychiatric disorders except depression, 2) severe medical illness within the 3 months preceding the study, and 3) neurological disorders. The above exclusion criteria was screened according to self-reports of participants and professional inquiry by a trained neurologist. The Modified Card Sorting Test, Verbal Fluency Test, Geriatric Depression Scale, and Mood and Anxiety Symptom Questionnaire were then administered by a psychologist. Initially, 698 participants were recruited through the health examination activity from 12 community centers in northern of Taiwan. After screening by above criteria, 595 participants were included in this study; 276 participants aged 65 years and older were categorized as the elderly group, and 319 aged 45–64 years were classified as the middle-aged group.

2.2. Materials

2.2.1. Mini-mental state examination (MMSE)

The MMSE was designed by Folstein, Folstein, and McHugh¹⁴. The MMSE, which can test cognitive function, comprises the following five major categories: orientation, registration, attention and calculation, recall, and language. The maximum score for this test is 30. Since the MMSE is related to educational levels, according to the Chinese version and norm, the suggested cutoff point for dementia is 13 for educational levels below 2, 22 for educational levels 3–9, and 24 for educational levels 10 and above¹⁵.

2.2.2. Modified card sorting test (MCST)

The MCST was developed by Nelson based on the WCST¹⁶. This test aims primarily at determining the participants' abilities in concept formation and mental shifting associated with executive function. The MCST scoring is based on the number of completed categories and perseverative errors. A high number of perseverative errors or a low number of completed categories indicates poor executive function, which is related to damage in the frontal lobe, specifically the dorsolateral prefrontal cortex. The Chinese version has good reliability and validity¹⁷.

2.2.3. Verbal fluency test (VF)

The VF test requires participants to say as many words as possible from a category (e.g., animals or fruits) within 60 s. The purpose is to determine the participants' semantic and associative memory and abilities required for executive functioning such as volitional control and purposive action¹⁸. In the Chinese version, the VF tests require participants to list words associated with 3 categories—fruits, fish, and vegetables—for 1 min. Subsequently, the number of words provided are added up to yield the VF test scores¹⁹.

2.2.4. Geriatric depression scale—15 items (GDS-15)

The original GDS consisted of 30 items, and it was later simplified into 15 items to form the GDS-15. Researchers in Taiwan translated the GDS-15 into Chinese and compared it with the Center for Epidemiological Studies Depression Scale (CES-D) according to criterion validity, which, in turn, determined that the Chinese version of the GDS-15 has excellent criterion-related validity²⁰. The GDS-15 also has good validity for younger adults²¹. In addition, the use of 5 as a cutoff point has been reported to present the best sensitivity for depression level and to produce robust results²⁰, indicating that participants achieving a score of 5 or higher on this scale demonstrate visible signs of depression.

2.2.5. Mood and anxiety symptom questionnaire (MASQ)

The MASQ was developed by Clark and Watson³. This questionnaire measures the emotional states of participants over the

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