



Associations of sleep duration and sleep quality with life satisfaction in elderly Chinese: The mediating role of depression



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ABSTRACT

This study investigated whether sleep duration and quality were related to life satisfaction (LS) among older Chinese adults and whether depression mediated those relationships. Cross-sectional data from the aging arm of the Rugao Longevity and Aging Study were used. Sleep duration, sleep quality, depression, LS and covariates were analyzed using logistic regressions. To assess the potential mediation of depression on the association between sleep duration and quality and LS, Aroian tests were used. Of 1756 older Chinese adults aged 70–84 years, 90.7% of the men and 83.3% of the women reported being satisfied with their lives. After adjusting for covariates, older adults who slept ≤ 6 h per night were more likely to suffer from life dissatisfaction compared with those who slept 7–8 h (OR = 2.67, 95% CI 1.86–3.79), and individuals who slept poorly were almost 2 times (OR = 2.91, 95% CI 2.16–3.91) more likely to have life dissatisfaction. The Aroian tests confirmed that these relationships were partially mediated by depression ($p < 0.001$). Between short sleep and LS, the mediating effect of depression accounted for 13.9% of the total effects. Moreover, the mediating effect of depression on the association between sleep quality and LS was 13.3%. Short sleep duration and poor sleep quality were inversely associated with LS, and the relationships were partially mediated by depression. Our study suggests that both sleep and depression status are important factors for LS among the elderly.

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1. Introduction

Throughout history, people have considered happiness to be an ideal and the ultimate goal of human actions. Life satisfaction (LS), an indicator of happiness, is defined as a cognitive judgment or the subjective attitude towards one's life (Diener, Suh, Lucas, & Smith, 1999). Moreover, LS, as a health concept, is inversely linked to all-cause mortality (Kimm, Sull, Gombojav, Yi, & Ohrr, 2012; Li, 2013; ST John, Mackenzie, & Menec, 2015) and positively related to

longevity (Guven & Saloumidis, 2014). Therefore, it is necessary to identify the factors associated with LS.

Sleep, as a part of a healthy lifestyle, plays an important role in sustaining health status. Sleep problems such as insufficient sleep duration and poor sleep quality can lead to mental disorders (Furihata et al., 2015; Park, Yoo, & Bae, 2013), chronic health conditions (e.g., metabolic syndrome (Hung et al., 2014) and cardiovascular disease (Chien et al., 2010)), and even death (Chien et al., 2010; Bernert, 2015). Accordingly, it is necessary to pay close attention to sleep status and its correlates.

Depression is a public mental health problem that is experienced worldwide. Several studies have shown that short sleep duration and poor sleep quality are linked to elevated depressive symptoms (Furihata et al., 2015; Ozturk et al., 2015; Zhai, Zhang, & Zhang, 2015). Meanwhile, low occurrences of depression have

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been strongly related to LS (Koivumaa-Honkanen, Kaprio, Honkanen, Viinamaki, & Koskenvuo, 2004; Nes et al., 2013). These results imply that short sleep duration and poor sleep quality are associated with life satisfaction through the mediating role of depression.

Currently, China's population is experiencing dramatic aging. Unfortunately, up-to-date information regarding sleep duration, sleep quality, depression and LS among the elderly is scarce. Given this context, we conducted this study to examine (1) the relationships between LS and both sleep duration and quality among older Chinese adults aged 70–84 years and (2) the mediating role of depression that accounts for the association.

2. Methods

2.1. Subjects

Data from the aging arm of the Rugao Longevity and Aging Study (RuLAS, conducted between November 2014 and December 2014) were used. Details about the study have been described elsewhere (Liu et al., 2015). Briefly, approximately 1960 individuals were randomly selected according to 5-year age and sex strata based on a detailed registry of all elderly individuals aged 70–84 years ($n=11198$) from the Public Health Bureau of Jiang'an township, which is a typical medium-sized township in Rugao, China. A detailed structured questionnaire and physical examination were administered by trained physicians from the Rugao People's Hospital. This study included 1756 individuals who had complete information on sleep duration, sleep quality and LS.

2.2. Sleep duration

Information on sleep duration over the prior 30 days was obtained by asking "How many hours of actual sleep do you obtain at night?". These data were measured at one time. The answered time was rounded to the nearest whole number. The responses were categorized into 3 categories: ≤ 6 h per night, 7–8 h per night (as the reference group), and ≥ 9 h per night. The definition of categories was consistent with previous studies showing that 7–8 h of sleep per night was associated with the lowest risk of morbidity of type 2 diabetes (Yaggi, Araujo, & Mckinlay, 2006) and mortality (Suzuki et al., 2009; Tamakoshi & Ohno, 2004).

2.3. Sleep quality

Information on sleep quality over the prior 30 days was obtained by asking "In general, would you say your sleep quality is . . .," with 4 response alternatives: "well", "rather well", "rather poor" and "poor". It was used as a categorical variable, describing sleeping well (well or rather well, as the reference group) versus sleeping poorly (poor or rather poor).

2.4. Katz Index of activities of daily living (ADL)

The physical health status of older adults was measured by the Katz Index of ADL, which is based on the six daily tasks of bathing, dressing, indoor transferring, going to the toilet and cleaning oneself afterwards, eating, and continence. The sum scores range from 6 to 18 (Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963). In the current study, the Cronbach's alpha was 0.917 for ADL. This study defined people as functionally independent when their scores equaled 18, and others were considered functionally dependent.

2.5. Depression

Depression was measured by the Chinese version of the 15-item Geriatric Depression Scale (GDS-15), consisting of 15 questions (yes or no) (Yesavage, 1988). In the current study, the Cronbach's alpha of the GDS-15 was 0.715. The presence of depression was defined by a GDS score ≥ 6 (yes; no, as the reference group), which resulted in a sensitivity of 79% and a specificity of 77% (Dennis, Kadri, & Coffey, 2012).

2.6. Life satisfaction

The respondents were asked "How satisfied are you with your current life?" and answered from 5 options: very satisfied, satisfied, fair, unsatisfied, very unsatisfied. This global measure has been used as an indicator of general life satisfaction (Myers & Diener, 1996) and has been shown to be reliable and valid (Lucas & Donnellan, 2012; Nes et al., 2013). It was used as a categorical variable, distinguishing between satisfied (very satisfied, satisfied or fair, as the reference group) and unsatisfied (unsatisfied or very unsatisfied).

2.7. Covariates

The following data were obtained as covariates: age (70–74; 75–79; 80–84), gender (men, women), occupation (farmers, others [workers, cadre or businessmen]), marital status (married, others [widowed, divorced or never married]), education level (illiterate; primary school; middle school or above), smoking status (non-smokers, others [current smokers or former smokers]), drinking status (non-drinkers, others [current drinkers or former smokers]) and ADL (functionally independent, functionally dependent).

2.8. Statistical analyses

To examine the relationships between sleep duration and quality and various factors, chi-squared tests were used. Logistic regressions were used to examine the relationships between sleep duration and quality and life satisfaction. Crude ORs were calculated in Model 1. Model 2 added demographic variables, e.g., age, gender, occupation, marital status, education level, smoking status, drinking status and ADL, to Model 1. Model 3 added depression to Model 2.

The mediating role of depression in the relationships between sleep duration and quality and life satisfaction were tested according to the procedure recommended by Baron and Kenny (1986). Briefly, mediating models require (1) a significant regression path between the predictor A and the mediator B, (2) a significant regression path between the predictor A and the criterion C and (3) a significant regression path between the mediator B and the criterion C. If the path between A and C is no longer significant when B is taken into account, one can conclude that the relationship between A and C was fully mediated by B. Otherwise, B might only partially mediate the relationship. Then, we used Aroian tests to explore whether the mediating effect of the independent variable on the dependent variable through the mediator variable was significant. A significant Aroian test outcome suggests the existence of mediation (Iacobucci, 2012). The size of the mediating effect was measured by the degree of reduction of the odds ratios (ORs) for sleep duration and quality and life satisfaction, which was computed using the formula: $((OR_{inequation2} - OR_{inequation4}) / OR_{inequation2}) \times 100\%$. Statistical analyses were performed using SPSS statistical software 19.0

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