

Research Article

Cognitive Functioning and Associated Factors in Older Adults: Results from the Indonesian Family Life Survey-5 (IFLS-5) in 2014-2015

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Objective. The study aims to investigate cognitive functioning and associated factors in a national general population-based sample of older Indonesians. **Methods.** Participants were 1228 older adults, 65 years and older (median age 70.0 years, Interquartile Range=6.0), who took part in the cross-sectional Indonesian Family Life Survey-5 (IFLS-5) in 2014-15. They were requested to provide information about sociodemographic and various health variables, including cognitive functioning measured with items from the Telephone Survey of Cognitive Status (TICS). Multivariable linear regression analysis was performed to assess the association of sociodemographic factors, health variables, and cognitive functioning. **Results.** The overall mean cognition score was 14.7 (SD=4.3) (range 0-34). In adjusted linear regression analysis, older age, having hypertension, and being underweight were negatively associated with better cognitive functioning and higher education was positively associated with better cognitive functioning. **Conclusion.** Several sociodemographic and health risk factors for poor cognitive functioning were identified which can guide intervention strategies in Indonesia.

1. Introduction

Cognitive function is known to be influenced by many factors such as home environment in childhood, genes, and sociodemographic factors [1]. Cognitive decline is commonly detected at middle age, and from that point onwards age-related decline is the rule [2]. There is little research on cognitive functioning in the general population among older adults in Indonesia [3–5].

Previous studies found that cognitive performance in older adults has been associated with socioeconomic factors, illness conditions and health status, social capital, and health behaviours [6]. Socioeconomic factors for better cognitive functioning include younger age [6–9], female or male sex [7], higher education [4–7, 10], higher economic status

[4, 8, 10], and residing in urban areas [8]. Illness conditions and health status factors may include no depressive symptoms [11], no insomnia [12–14], no hypertension [15], no heart failure [16], being not undernourished [17], better self-rated health status [6], higher life satisfaction, and better Quality of Life [6, 18, 19], and not having functional disability [16]. Some studies found that social cohesion or social capital [3, 10, 20] was associated with better cognitive capacity. Several healthy behaviours such as not smoking [21, 22] and physical activity or exercise [6, 23–25] have also been identified as positively linked to cognitive functioning.

The study aims to investigate cognitive functioning and associated factors in a national probability sample of older persons (50 years and above) who participated in the Indonesian Family Life Survey-5 (IFLS-5) in 2014-2015.

2. Method

2.1. Study Design and Participants. Data were analysed cross-sectionally from the “Indonesian Family Life Survey-5 (IFLS-5)” in 2014-2015 [26]. The IFLS-5 used a multistage stratified sampling design [26]. We followed the methods of Peltzer et al., 2018 [27]. In all, 1228 65 years and older individuals were included with complete cognitive functioning measurements. The response rate was above 90%.

2.2. Measures. Cognitive functioning was measured with items from the “Telephone Survey of Cognitive Status (TICS)” [28], which was face-to-face interview administered in this study. The TICS included items on awareness of the date and day of the week and a self-reported memory question, with response options of excellent, very good, good, fair, and poor. Then the participant was asked to serially subtract 7s from 100. Then an immediate and delayed word recall of 10 nouns was given [26]. Total scores ranged from 0 to 34. Possible dementia was defined as having scores of 0-8, similar to the modified TICS in the Health and Retirement Study in USA [29].

Sociodemographic factor questions included age, gender, education, residential status, country region, and subjective socioeconomic status [26].

Social capital was assessed with 4 items, related to the past 12-month participation in “(1) Community meeting, (2) Voluntary labour, (3), Programme to improve the village/neighbourhood, and (4) Religious activities.” Response options, were “yes” or “no” [26] (Cronbach’s alpha 0.69). Those who scored 0 times with “yes” were considered as having low social capital.

Self-reported health status was measured with the question, “In general, how is our health?” Response options were 1=very healthy, 2=somewhat healthy, 3=somewhat unhealthy, and 4=unhealthy [26].

Life satisfaction was assessed with the question, “Please, think about your life as a whole. How satisfied are you with it?” Response options ranged from 1=completely satisfied to 5=not all satisfied [26]. Low life satisfaction was defined as not very or not at all satisfied.

Chronic medical condition was assessed with the question, “Has a doctor/paramedic/nurse/midwife ever told you that you had...? High blood pressure, Stroke,” (yes, no) [26]. Hypertension was measured and classified using standard procedures [26, 30].

The *Centres for Epidemiologic Studies Depression Scale (CES-D: 10 items)* was used to assess depressive symptoms, and scores 10 or more were classified as having depressive symptoms [31] (Cronbach’s alpha = 0.67).

Insomnia symptoms were assessed with five items from the “Patient-Reported Outcomes Measurement Information System (PROMIS)” sleep disturbance measure [32] and with five items from the PROMIS sleep impairment measure [33]. Cronbach’s alpha was 0.82 for the 10-item scale in this study. Insomnia was classified using criteria close to the “Insomnia Severity Index” [34], with clinically significant insomnia having total scores of ≥ 21 -40.

Nutrition status: Heights and weights were taken using standard procedures [26]. Body mass index (BMI) was calculated as weight in kg divided by height in metre squared and underweight classified as $<18.5 \text{ kg/m}^2$ [35].

Tobacco use was assessed with two questions: (1) “Have you ever chewed tobacco, smoked a pipe, smoked self-enrolled cigarettes, or smoked cigarettes/cigars?” (yes, no); (2) “Do you still have the habit or have you totally quit?” (still have, quit) [26]. Responses were grouped into never, quitters, and current tobacco users.

Physical activity was assessed with an abbreviated version of the “International Physical Activity Questionnaire (IPAQ) short version, for the last 7 days (IPAQ-S7S)” [36]. Physical activity was categorized according to the IPAQ scoring protocol [37] as low, moderate, and high physical activity.

Functional disability was assessed by 5 items of Activity of Daily Living (ADL) (Cronbach alpha 0.84) and 6 items of Instrumental Activity of Daily Living (IADL) (Cronbach alpha 0.91) [38, 39]. A total functional disability score was calculated, with having no difficulty=0, one=1, or two or more ADL/IADL items=2.

2.3. Data Analysis. Bivariate associations between independent variables and the dependent variable (overall cognition score and possible dementia) were evaluated with linear regression and logistic regression. Variables associated with overall cognition and possible dementia at $P < 0.05$ were subsequently included in a multivariable linear and logistic regression model, respectively. Potential multicollinearity between variables was assessed with variance inflation factors, none of which exceeded critical value. $P < 0.05$ was considered significant. Cross section analysis weights were applied to make the IFLS sample representative of the 2014 Indonesian population in the study provinces [26]. Both the 95% confidence intervals and P values were adjusted taking the survey design of the study into account. All analyses were performed using STATA software version 13.0 (Stata Corporation, College Station, TX, USA).

3. Results

3.1. Sample Characteristics and Cognitive Functioning. The total sample included 1228 older adults, 65 years and older (median age 70.0 years, Interquartile Range=6.0, age range of 65-101 years) in Indonesia. The proportion of women was 44.7%, 74.2% had no or elementary education, 38.9% described themselves as having medium economic status, 54.1% resided in urban areas, and 60.1% were in Java. More than one in three of the participants (36.0%) rated their health status as unhealthy, 17.8% had low life satisfaction, and 18.3% had low social capital. Two-thirds of the sample (66.1%) had hypertension, 2.9% have had a stroke, 5.3% had depressive symptoms, 10.3% had insomnia symptoms, and 19.1% were underweight. More than one-third of the participants (34.6%) were current tobacco users, 51.1% were physically inactive, and 32.1% had one or more functional disability.

The overall mean cognition score was 14.7 (SD=4.3) (range 0-34). In bivariate analysis, older age, female sex,

TABLE 1: Sample characteristics and prevalence of cognitive functioning among older adults in Indonesia.

| Variables | | Total sample N (%) | Overall cognition score M (SD) | Bivariate analysis Beta (95% CI) |
|----------------------------------|---------------------|-----------------------|-----------------------------------|-------------------------------------|
| All | | 1228 | 14.7 (4.3) | |
| Age in years | 65-74 | 995 (81.2) | 15.2 (4.3) | Reference |
| | 75 and over | 233 (18.8) | 12.6 (3.6) | -2.61 (-3.18 to -2.05)* * * |
| Gender | Female | 540 (44.7) | 14.4 (4.4) | Reference |
| | Male | 688 (55.3) | 15.0 (4.2) | 0.54 (0.003 to 1.09)* |
| Formal education | Low | 880 (74.2) | 13.8 (4.0) | Reference |
| | High | 346 (25.8) | 17.6 (4.0) | 3.80 (3.25 to 4.35)* * * |
| Economic background | Poor | 408 (34.9) | 13.9 (4.0) | Reference |
| | Medium | 492 (38.9) | 15.2 (4.4) | 1.26 (0.65 to 1.87)* * * |
| Residence | Rich | 328 (26.1) | 15.2 (4.5) | 1.29 (0.60 to 1.97)* * * |
| | Rural | 520 (45.9) | 13.9 (4.1) | Reference |
| Region | Urban | 708 (54.1) | 15.4 (4.4) | 1.49 (0.95 to 2.02)* * * |
| | Sumatra | 248 (20.2) | 14.7 (3.8) | Reference |
| Social capital | Java | 738 (60.1) | 14.8 (4.4) | 0.15 (-0.42 to 0.73) |
| | Major island groups | 242 (19.7) | 14.2 (4.2) | -0.41 (-1.12 to 0.30) |
| Subjective health status | High | 986 (81.7) | 14.8 (4.3) | Reference |
| | Low | 242 (18.3) | 14.3 (4.3) | -0.52 (-0.15 to 1.19) |
| Life satisfaction | Healthy | 762 (64.0) | 15.0 (4.4) | Reference |
| | Unhealthy | 466 (36.0) | 14.3 (4.2) | -0.68 (-1.23 to -0.13)* |
| Hypertension | Moderate, high | 1007 (82.2) | 15.0 (4.4) | Reference |
| | Low | 220 (17.8) | 13.8 (3.9) | -1.20 (-1.85 to -0.56)* * * |
| Stroke | No | 414 (33.9) | 15.3 (4.3) | Reference |
| | Yes | 790 (66.1) | 14.5 (4.3) | -0.85 (-1.42 to -0.28)** |
| Depressive symptoms (≥15 scores) | No | 1191 (97.1) | 14.7 (4.3) | Reference |
| | Yes | 37 (2.9) | 14.8 (3.7) | 0.11 (-1.20 to 1.43) |
| Insomnia symptoms | No | 1168 (94.7) | 14.8 (4.3) | Reference |
| | Yes | 60 (5.3) | 13.6 (3.9) | -1.23 (-2.38 to -0.08)* |
| Underweight (BMI <18.5) | No | 1106 (89.7) | 14.8 (4.4) | Reference |
| | Yes | 121 (10.3) | 14.0 (3.9) | -0.87 (-1.66 to -0.07)* |
| Tobacco use status | No | 981 (80.9) | 15.0 (4.4) | Reference |
| | Yes | 234 (19.1) | 13.8 (4.1) | -1.16 (-1.82 to -0.49)* * * |
| Physical activity | Never, former | 812 (65.4) | 15.0 (4.4) | Reference |
| | Current | 416 (34.6) | 14.3 (4.2) | -0.74 (-1.29 to -0.18)** |
| ADL/IADL | Medium, high | 612 (48.9) | 14.9 (4.4) | Reference |
| | Low | 616 (51.1) | 14.6 (4.3) | -0.28 (-0.82 to 0.25) |
| ADL/IADL | None | 822 (67.9) | 15.0 (4.3) | Reference |
| | One | 301 (23.9) | 14.6 (4.3) | -0.69 (-1.30 to -0.07)* |
| | Two or more | 105 (8.2) | 13.5 (4.2) | -1.16 (-2.18 to -0.15)* |

* * *P<0.001; **P<0.01; *P<0.05. (I) ADL=(Instrumental) Activities of Daily Living.

lower education, lower economic background, rural residence, unhealthy subjective health status, low life satisfaction, depressive symptoms, insomnia symptoms, having underweight, having hypertension, current tobacco use, and functional disability were associated with poorer cognitive functioning (see Table 1).

3.2. Predictors of Cognitive Functioning. In adjusted linear regression analysis, older age, having hypertension, and

having underweight were negatively associated with better cognitive functioning and higher education was positively associated with better cognitive functioning (see Table 2).

3.3. Prevalence and Predictors of Possible Dementia. The prevalence of possible dementia was 6.8%. In multivariable logistic regression analysis, older age, lower education, and residing in Java were associated with possible dementia (see Table 3).

TABLE 2: Multivariable linear regression analysis of factors in bivariate analysis associated with overall cognitive scores among older adults in Indonesia.

| Variables | Beta (95% CI) | P-value |
|---|------------------------|---------|
| Age in years | | |
| 65-74 | Reference | |
| 75 and over | -2.26 (-2.82 to -1.70) | <0.001 |
| Formal education | | |
| Low | Reference | |
| High | 3.28 (2.71 to 3.85) | <0.001 |
| Economic background | | |
| Poor | Reference | |
| Medium | 0.57 (-0.006 to 1.15) | 0.053 |
| Rich | 0.34 (-0.31 to 0.98) | 0.310 |
| Residence | | |
| Rural | Reference | |
| Urban | 0.36 (-0.16 to 0.87) | <0.167 |
| Subjective health status | | |
| Healthy | Reference | |
| Unhealthy | -0.18 (-0.70 to 0.34) | 0.501 |
| Life satisfaction | | |
| Moderate, high | Reference | |
| Low | -0.16 (-0.84 to 0.51) | 0.635 |
| Hypertension | | |
| No | Reference | |
| Yes | -0.63 (-1.14 to -1.10) | 0.018 |
| Depressive symptoms (≥ 15 scores) | | |
| No | Reference | |
| Yes | -0.33 (-1.55 to 0.89) | 0.594 |
| Insomnia symptoms | | |
| No | Reference | |
| Yes | 0.02 (-0.78 to 0.81) | 0.965 |
| Underweight (BMI <18.5) | | |
| No | Reference | |
| Yes | -0.67 (-1.30 to -0.03) | 0.040 |
| Tobacco use status | | |
| Never, former | Reference | |
| Current | -0.42 (-0.99 to 0.16) | 0.158 |
| Functional disability | | |
| ADL/IADL=0 | Reference | |
| ADL/IADL=1 | -0.11 (-0.68 to 0.45) | 0.698 |
| ADL/IADL=2 or more | -0.29 (-1.26 to 0.69) | 0.563 |

(I) ADL=(Instrumental) Activities of Daily Living.

4. Discussion

The study aimed to assess cognitive function and its correlates in older adults in Indonesia. The prevalence of possible dementia was 6.8%, which is a little lower than in the American Health and Retirement Study of 2012 (8.8%) [29]. Consistent with previous studies [6–8, 10], this study found that younger age, higher education, and in bivariate analysis better economic status and living in urban areas were associated with better cognitive functioning. The strong association between higher educational level and better cognitive

functioning may be related to underperforming of illiterate participants on tasks requiring immediate verbal attention and working memory [40, 41]. The most robust finding was the association of TICS performance with age and education in the multivariable regression models.

In agreement with previous studies [6, 11–14, 18, 19], this study found in bivariate analysis a negative association between depressive symptoms, low life satisfaction, insomnia symptoms, and cognitive functioning. Consistent with previous studies [15, 17], this study found that having

TABLE 3: Prevalence of possible dementia and bivariate and multivariable logistic regression with prevalence of possible dementia among older adults in Indonesia.

| Variables | | Possible dementia N (%) | Unadjusted Odds Ratio (95% CI) | Adjusted Odds Ratio (95% CI) |
|----------------------------------|---------------------|----------------------------|-----------------------------------|---------------------------------|
| All | | 76 (6.8) | | |
| Age in years | 65-74 | 48 (5.4) | 1 (Reference) | 1 (Reference) |
| | 75 and over | 28 (12.9) | 2.61 (1.53, 4.46)* * * | 2.40 (1.37, 4.18)** |
| Gender | Female | 39 (7.8) | 1 (Reference) | --- |
| | Male | 37 (6.0) | 0.76 (0.46, 1.27) | |
| Formal education | Low | 72 (8.8) | 1 (Reference) | 1 (Reference) |
| | High | 4 (0.9) | 0.11 (0.03, 0.34)* * * | 0.14 (0.04, 0.44)* * * |
| Economic background | Poor | 30 (7.4) | 1 (Reference) | --- |
| | Medium | 28 (6.5) | 0.86 (0.48, 1.52) | |
| Residence | Rich | 18 (6.5) | 0.87 (0.45, 1.68) | |
| | Rural | 44 (9.5) | 1 (Reference) | 1 (Reference) |
| Region | Urban | 32 (4.6) | 0.46 (0.28, 0.77)** | 0.62 (0.36, 1.05) |
| | Sumatra | 8 (3.1) | 1 (Reference) | 1 (Reference) |
| Social capital | Java | 51 (7.3) | 2.42 (1.12, 5.25)* | 2.52 (1.14, 5.55)* |
| | Major island groups | 17 (6.9) | 2.40 (1.00, 5.75) | 2.28 (0.93, 5.59) |
| Subjective health status | High | 51 (6.4) | 1 (Reference) | --- |
| | Low | 25 (8.6) | 1.36 (0.77, 2.39) | |
| Life satisfaction | Healthy | 44 (6.2) | 1 (Reference) | --- |
| | Unhealthy | 32 (7.9) | 1.30 (0.78, 2.18) | |
| Hypertension | Moderate, high | 62 (6.7) | 1 (Reference) | --- |
| | Low | 14 (7.5) | 1.16 (0.61, 2.22) | |
| Stroke | No | 18 (4.9) | 1 (Reference) | --- |
| | Yes | 58 (8.0) | 1.73 (0.96, 3.11) | |
| Depressive symptoms (≥15 scores) | No | 76 (7.0) | 1 (Reference) | --- |
| | Yes | 0 (0.0) | 0.08 (0.06, 0.10)* * * | |
| Insomnia symptoms | No | 71 (6.6) | 1 (Reference) | --- |
| | Yes | 5 (11.5) | 1.87 (0.68, 5.13) | |
| Underweight (BMI <18.5) | No | 71 (7.0) | 1 (Reference) | --- |
| | Yes | 5 (5.3) | 0.70 (0.26, 1.90) | |
| Tobacco use status | No | 60 (6.6) | 1 (Reference) | --- |
| | Yes | 15 (7.7) | 1.18 (0.63, 2.24) | |
| Physical activity | Never, former | 43 (5.7) | 1 (Reference) | --- |
| | Current | 33 (8.9) | 1.63 (0.98, 2.71) | |
| ADL/IADL | Medium, high | 40 (6.6) | 1 (Reference) | --- |
| | Low | 36 (7.0) | 1.06 (0.64, 1.76) | |
| ADL/IADL | None | 45 (6.2) | 1 (Reference) | --- |
| | One | 23 (7.6) | 1.23 (0.69, 2.19) | |
| | Two or more | 8 (9.6) | 1.65 (0.71, 3.82) | |

* * *P<0.001; **P<0.01; *P<0.05. (I) ADL=(Instrumental) Activities of Daily Living.

hypertension and underweight were associated with poor cognitive functioning.

Unlike some previous studies [6, 8, 16], this study did not find an association between heart failure, self-rated health status, functional disability, and cognitive functioning. Some studies [3, 10, 20] found a positive association between social capital and better cognitive functioning, while this study did not find such an association. Consistent with previous studies [21, 22], this study found in bivariate analysis that current tobacco use was negatively associated with cognitive

functioning, while no association was found for physical activity, as found previously [6, 23–25].

4.1. Limitations of the Study. The study was limited by the self-reported measurements and the cross-sectional nature of the study.

5. Conclusion

Several sociodemographic and health risk factors such as being underweight and having hypertension were identified

for poor cognitive functioning that can guide intervention strategies in Indonesia.

Data Availability

Data from the IFLS-5 is available from RAND at <http://www.rand.org/labor/FLS/IFLS.html>.

Additional Points

Policy Impact. This study describes for the first time sociodemographic and modifiable risk factors for cognitive functioning in Indonesia. **Practice Impact.** Agencies focusing on the promotion of cognitive functioning programmes in older adults should integrate modifiable risk factors such as having hypertension and being underweight as identified in this study.

Conflicts of Interest

The authors declare no conflicts of interest.

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