# How Active Ageing Dimensions are Associated with Mental Health of Older People in the Iranian Context?

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Active Aging (AA), which is the process of health promotion, collaboration, and increasing the quality of life in old age, may be a strategy to prevent many future challenges in countries like Iran that have a rapidly aging population. This study aimed to measure AA dimensions in Iran and examine their associations with the quality of mental health among Iranian elderly. A quantitative cross-sectional survey of a random sample of 623 community residents of Tehran aged 55 years or older was conducted. In total, 590 people responded. AA was measured using the Active Aging Index (AAI), including four domains, and mental health of the participants was measured using the 15-item General Health Questionnaire (GHQ) scale. Associations between AA and GHQ was examined using Mixed-Effect Linear Regression analysis. The overall AAI score was calculated at 26.8 (men 33.9 vs. women 20.6) out of 100. Higher scores in the first domain (employment) and lower scores in the third domain (independent, healthy, and secure living) and the fourth domain (enabling environment) were linked with poorer mental health, but the second domain (participation in society) showed no association. Different aspects of AAI showed different associations with mental health. In addition, it seems that the AAI, as a tool for measuring AA, needs a profound modification in the Iranian context, using qualitative studies in Iran.

**Keywords**

Active Aging Index • mental health • aging • ageing • Iran

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## Background

Iran is a country with a strong cultural and religious background and about 97% of its population are Shia Muslims (Fathi, 2017). Iran is one of the fastest aging countries in the world, mainly due to very rapid decline in its fertility rate. The proportion of the elderly population was 8% in 2011 and is projected by the United Nations (UNs) to rise to 19% by 2030 and 31% by 2050 (Beard, 2010; Danial, Motamedi, Mirhashemi, Kazemi, & Mirhashemi, 2014). According to the UN, Iran ranks third in the world in terms of the pace of population aging ((UN). 2009), after the United Arab Emirates and Bahrain. The swiftness of the population's aging in Iran means Iran has less time to adjust to the associated challenges as compared to most of the world, particularly to developed regions. Future older people of Iran will have fewer adult children to depend on for care and fewer available sources of support in old age (Sheykhi, 2008; Tajvar, Grundy, & Fletcher, 2018).

Active Aging (AA) may be a strategy that can address many of the future challenges of population aging in Iran as well as other regions. AA refers to a situation where people participate in the formal labor market, engage in unpaid productive activities, and live healthy, independent, and secure lives as they age (Zaidi, Harper, Howse, Lamura, & Perek-Białas, 2018). The World Health Organization (WHO) has defined the AA as ". . . the process of health promotion, collaboration, and security opportunities to increase the quality of life as people age" (World Health Organization, 2002). According to this definition, AA is a multidimensional concept, comprising three main components as "participation", "security", and "health" that help people to remain active and independent despite getting older (Buys & Miller, 2006).

Mental disorders are very common in old age, which can also adversely influence the physical health and quality of life of older people (Bhattacharya, Choudhry, & Lakdawalla, 2008). Older people, because of exposure to various stressors such as the onset of chronic conditions and functional limitations, the loss of sources of income, the loss of spouse and confidants, and feeling loneliness are vulnerable to mental disorders (Binder & Nemeroff, 2010). Evidence indicates that this issue is even more common among Iranian elderly compared to their age-mates in the rest of the world. While approximately 15% of adults aged 60+ suffer from a mental disorder globally (WHO, 2017), this figure is 22–29% in Iran (Rashedi, Malakouti, & Rudnik, 2018). However, it should be noted that mental health problems are under-identified by health professionals and older people themselves, and the stigma surrounding these conditions makes barriers for seeking help (WHO, 2017). Research on the mental health status among Muslim populations is limited. A 2007 national demographic study by the Pew Research Center found that 78% of Muslim samples were "happy" or "very happy" with life. However, this finding was reported in an American normative sample at 87%. International data on a number of mental disorders show that the rate of schizophrenia among Muslims is similar to that of non-Muslims (Al-Issa, 2000).

One of the factors is the level of having an active life in old age, so that with increasing activity, mental health is expected to improve (Karimian & Shekarchi Zadeh, 2007; Khalaji, 2000). Any intervention that could improve mental health of older people should be highly considered and practiced. There is evidence from Western countries that AA enables people to enhance their potential for physical and mental health and to participate in society and also to provide them with adequate protection, security, and care when required (Lee, 2006; Mendoza-Ruvalcaba & Fernández-Ballesteros, 2016).

Despite the importance of population aging in Iran, the extent of active and productive life among older people of Iran and its link to health has not been well researched. There are only a few studies measuring selective aspects of activity or are qualitative studies (Mohamadi, Allah Yari, Darveshpoorkakkei, Akabakshyi, & Saraei, 2020; Mohammadi, Allahyari, Darvishpoor Kakhaki, Saraei, & Fereshtehnejad, 2017; N, 2012). The main aim of this study was to measure

the status of the individual-level AA among the contemporary older population of Tehran and its gender difference using the Active Aging Index (AAI). The second objective was to examine the associations between AAI scores and the mental health of older people. Considering the dimensions of the AAI tool, it was hypothesized that being employed, having more participation in society, having independent and secure living capacity, and living in an enabling environment in old age should be associated with a better mental health status among older people. This study has been conducted with the hope that the results would help develop interventions to maintain or preserve the active life and health of the growing older population in Iran.

## Methods

### *Study Design, Sampling and Data Collection*

This study was a quantitative cross-sectional survey of older people, aged 55+ years old, living in Tehran. This age border was selected based on the indicators defined in the original AAI. For this study, 623 samples were selected based on an alpha level of 0.05 and power of 80% using an expected odds ratio (OR) of 2 and a design effect of 1.5 and expected 10% non-response, based on results from earlier studies (Tajvar et al., 2018). Multistage stratified cluster sampling method was adopted in order to ensure representation of older people from neighborhoods of different socioeconomic status. For the first stage, three districts out of 22 municipal districts of Tehran were chosen from areas of ranging socioeconomic status. Then, one neighborhood from each district was randomly selected. The number of samples in each neighborhood was then calculated using probability proportionate to size allocation method within study clusters. In the neighborhoods, study samples were selected through systematic random sampling method, so that one of every ten houses randomly selected based on the municipal blocks' maps prepared by the municipality of Tehran. Of the selected houses, it was asked whether any people aged 55 or older are living there and if so he/she agrees to participate. The number of samples in each neighborhood was calculated using probability proportionate to size allocation method within study clusters. Data collection stage took about seven months. The data were collected through face-to-face interviews conducted at respondents' homes. Ethical considerations including confidentiality and informed consent were taken, and ethical approval was received from the ethical committee of the Tehran University of Medical Sciences (Ethics number: IR.TUMS.SPH.REC.1397.4974.)

### *Study Variables and Measurement*

The study variables were collected using a structured multi-sectional questionnaire. Given that one third of the elderly were illiterate, the questionnaires, after providing the necessary explanations and obtaining their informed consent, were completed through face-to-face structured interviews at their home. Transparency and clarity of the questions were already checked in a pilot study with older people. The first section of the questionnaire consisted of demographic and socioeconomic characteristics of the elderly such as age, sex, education, marital status, family size, employment status, and income. The quality of participant mental health, as the outcome variable in this survey, was assessed by 15-item General Health Questionnaire (GHQ) scale, its' reliability and validity already approved by Malakouti and colleagues (2007) in a previous study on Iranian elderly. This scale measures four dimensions of mental health including physical symptoms, social functioning, depression, and anxiety, with a maximum score of 45 and a minimum of zero. Higher scores on the scale indicate poorer mental wellbeing. The status of the AA among older people was also measured by the original AAI, as developed by Zaidi and

colleagues (Zaidi et al., 2013). The validity and reliability of this scale was checked and reported by Zaidi (Zaidi et al., 2013). AAI is a practical tool to measure AA, enabling policymakers, researchers, and other interested parties to devise evidence-informed strategies in dealing with the challenges of population aging and to identify areas where appropriate policies can realize the active potential of older people (Zaidi et al., 2013).

This index comprises 22 individual indicators that are disaggregated by sex and grouped into four domains including "Employment" (four indicators), "Participation in society" (three indicators), "Independent, healthy and secure living capacity" (19 indicators), and "Enabling environment for active aging" (three indicators; see Table 1). As the original AAI questionnaire is in English, it was first translated to Farsi and then back translated to ensure that its concepts were translated appropriately. The Farsi questionnaire was then checked with a number of experts to ensure that the questions were developed well and in accordance with the original questions. After completion of the fieldwork, we followed the same approach for weighting and scoring the AAI indicators and domains as the original AAI (Stanton, 2015).

### *Statistical Modeling and Data Analysis*

The data were described using descriptive statistics including mean, standard deviation, frequency, and percentage. Normality of the outcome variable (mental health) was checked through Kolmogorov-Smirnov test, histograms, and Q-Q plots, which all indicated non-normal distribution. Thus, Spearman Correlation Analysis was used to check the correlations among exposure and outcome variables. In order to examine associations between the domains of the AAI and its overall score with the mental health of older people, multi-level linear regression analysis (mixed-effect model) was used, due to the clustering of samples in different neighborhoods. Before decision on the inclusion of covariates in the models, co-linearity between all the study variables was checked and the highly correlated variables were removed. Regression analysis were performed in four models; in Model 1, crude analysis was conducted to check the association of each independent variable (domains and overall score of the AAI) with the GHQ scores separately. As the overall AAI score was calculated by its four domains, separate models were then used for associations of domains and the overall score of the AAI with the outcomes. In Model 2, first the crude associations of domains were checked and then in Model 3 associations with adjusting the effects of covariates were tested. Finally, in Model 4, the associations of the overall AAI score with GHQ scores adjusted for the effects of covariates were examined. The rate of missing data was very low in this study (about 3%), thus observations with missing values were disregarded in the analyses. All the analyses were conducted using STATA software version 14.

## Results

In total, 590 people (297 men, 293 women) out of 623 pre-defined sample size responded (response rate 94%). The main (SD) age was 64.9 (9.4) years and 78% were married. The mean (SD) of family size of participants was 13.7 (7.9%) and 13% were living alone. Regarding education, 28% of participants were illiterate and 34% had ended with primary schooling. Most of the participants (59%) reported to have very low or low income and 37% described themselves as being poorer than the average of residents of Tehran.

Scores of the AAI of the participants by gender, including the domain scores and the overall score, is shown in Table 1. The overall score was calculated at 26.8 in the range of 0–100 and there was a considerable difference between the scores of men and women (men 33.9 vs. women 20.6). However, most of this variation came from the first domain, "employment", as

**Table 1.** Domains, indicators and overall scores of AAI (raw and weighted) of people 55+ years old in Tehran-2018

| Domains | Indicators | Indicator Score | | | Indicator weight within domain | Weighted Indicator Score | | | Domain Score | Domain weight within overall AAI | Weighted Domain Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | Male | Female | | Total | Male | Female | | | |
| 1. Employment | 1.1 Employment rate 55-59 | 37.5 | 65.7 | 19.8 | 25 | 9.4 | 14.4 | 4.9 | Total: 27.2<br>M: 45.2<br>F: 10.4 | 35 | Total: 9.5<br>M: 15.8<br>F: 3.6 |
| | 1.2 Employment rate 60-64 | 24.5 | 44.0 | 6.6 | 25 | 6.1 | 11.0 | 1.6 | | | |
| | 1.3 Employment rate 65-69 | 24.5 | 39.3 | 8.6 | 25 | 6.1 | 9.8 | 2.1 | | | |
| | 1.4 Employment rate 70-74 | 22.5 | 32.0 | 6.6 | 25 | 5.6 | 8.0 | 1.6 | | | |
| 2. Participation in society | 2.1 Voluntary work (aged 55+) | 31.0 | 38.3 | 23.5 | 25 | 7.7 | 9.6 | 5.9 | Total: 21.4<br>M: 23.2<br>F: 21.0 | 35 | Total: 7.5<br>M: 8.1<br>F: 7.3 |
| | 2.2 Care to children (aged 55+) | 34.4 | 30.9 | 37.8 | 25 | 8.6 | 7.7 | 9.4 | | | |
| | 2.3 Care to older adults (aged 55+) | 12.5 | 11.7 | 13.3 | 30 | 3.7 | 3.5 | 4.0 | | | |
| | 2.4 Political participation (aged 55+) | 6.9 | 8.0 | 5.8 | 20 | 1.4 | 2.4 | 1.7 | | | |
| 3. Independent, healthy and secure living | 3.1 Physical exercise (aged 55+) | 49.6 | 57.5 | 41.6 | 10 | 5.0 | 5.7 | 4.2 | Total: 41.4<br>M: 41.7<br>F: 41.2 | 10 | Total: 4.1<br>M: 4.2<br>F: 4.1 |

(*Continued*)

**Table 1.** (*Continued*)

| Domains | Indicators | Indicator Score | | | Indicator weight within domain | Weighted Indicator Score | | | Domain Score | Domain weight within overall AAI | Weighted Domain Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | Male | Female | | Total | Male | Female | | | |
| | 3.2 Access to health and dental care (aged 55+) | 26.5 | 21.0 | 32.0 | 20 | 5.3 | 4.2 | 6.4 | | | |
| | 3.3 Independent living (aged 75+) | 44.8 | 42.8 | 48.3 | 20 | 9.0 | 8.5 | 9.7 | | | |
| | 3.4 Relative median income (aged 65+) | 55.0 | 60.0 | 50.0 | 10 | 5.5 | 6.0 | 5.0 | | | |
| | 3.5 No poverty risk (aged 65+) | 50.0 | 60.0 | 40.0 | 10 | 5.0 | 6.0 | 4.0 | | | |
| | 3.6 No material deprivation (aged 65+) | 22.9 | 23.6 | 22.2 | 10 | 2.3 | 2.4 | 2.2 | | | |
| | 3.7 Physical safety (aged 55+) | 76.1 | 73.4 | 78.8 | 10 | 7.6 | 7.3 | 7.9 | | | |
| | 3.8 Lifelong learning (aged 55-74) | 16.9 | 15.8 | 17.9 | 10 | 1.7 | 1.6 | 1.8 | | | |

(*Continued*)

**Table 1.** (*Continued*)

| Domains | Indicators | Indicator Score | | | Indicator weight within domain | Weighted Indicator Score | | | Domain Score | Domain weight within overall AAI | Weighted Domain Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | Male | Female | | Total | Male | Female | | | |
| 4. Capacity and enabling environment for active aging | 4.1 Life expectancy at age 55 | 24.2 | 23.6 | 24.7 | 33 | 8.0 | 7.8 | 8.1 | Total: 28.7<br>M: 29.2<br>F: 28.2 | 20 | Total: 5.7<br>M: 5.8<br>F: 5.6 |
| | 4.2 Share of healthy life expectancy at age 55 | 13.9 | 13.2 | 14.5 | 23 | 3.2 | 3.0 | 3.3 | | | |
| | 4.3 Mental well-being (aged 55+) | 42.8 | 42.7 | 43.0 | 17 | 7.2 | 7.3 | 7.3 | | | |
| | 4.4 Use of ICT (aged 55-74) | 34.6 | 36.6 | 32.8 | 7 | 2.4 | 2.5 | 2.3 | | | |
| | 4.5 Social connectedness (aged 55+) | 45.2 | 47.1 | 43.3 | 7 | 5.9 | 6.1 | 5.6 | | | |
| | 4.6 Educational attainment (aged 55+) | 29.0 | 35.4 | 23.2 | 13 | 2.0 | 2.5 | 1.6 | | | |
| Overall score of AAI | | | | | | | | | | 100 | Total: 26.8<br>M: 33.9<br>F: 20.6 |

this figure was 45.2 among men and only 10.4 among women, with the average of 27.2. The values of the other three domains were highly similar among men and women, as "participation in society" was 21 vs. 23.2 among women and men respectively, as well 41.2 vs. 41.7 for "Independent, healthy, and secure living", and 28.2 vs. 29.2 for "capacity and enabling environment for active aging".

The descriptive results regarding the mental health of participants as measured by the GHQ-15 are reported in Table 2. The mean score of GHQ-15 of all participants (n = 590) was calculated at 16.9 (SD = 7.1) in the range of 0–45 with higher scores indicating poorer mental health. This figure was 16.3 (SD = 6.9) for men and 17.2 (SD = 7.4) for women. About one third of the participants reported often or always having headaches, insomnia, feeling nervous and taking longer over the things than usual. About one third of people believed that they cannot do things well and were not satisfied with the way they carried out they tasks. One third of participants felt that they were not playing a useful part in things and not able enjoy their normal day-to-day activities, by degrees of "rather" to "much more than usual". However, with regard to the questions indicating severe mental disorders, such as feeling worthless or hopeless, being too nervous, and wishing to die, about 11–20 % reported to have such a feeling "often" or "always".

The results of mixed-effect linear regression model on the associations between the AAI and the GHQ using four models are presented in Table 3. In the first model, a crude analysis was performed between each dimension of the AAI and the overall score with GHQ score, and only the AAI3 (coefficient = -0.11, $p < 0.001$) and AAI4 (coefficient = -0.26, $p < 0.001$) showed a significant negative association, so that lower scores of these domains were associated with poorer mental health. In model 2, when we entered all the four domains simultaneously in the model, the result was almost the same as before, although the strength of associations were slightly attenuated. In the third model, when the second model was repeated, with controlling the effects of covariates, except the AAI2, other domains showed a significant association with the GHO score, so that higher scores in the AAI1 (coefficient = 0.01, $p = 0.03$) and lower scores in AAI3 (coefficient = - 0.009, $p = 0.03$) and the AAI4 (coefficient = - 0.18, $p < 0.001$) were linked with poorer mental health. The overall score also did not show a significant association with mental health in model 4 (coefficient = 0.01, $p = 0.40$). Of the covariates, in both models 3 and 4, only being illiterate showed a relationship with poorer mental health, but there was much stronger link with this variable in model 4 compared to the Model 3 (coefficient = 2.44, $p = 0.001$).

## Discussion

Aging is usually associated with a decline in physical and mental functioning. Functional disabilities, together with the sedentary lifestyle in old age, exacerbates the problems facing old people and imposes heavy economic, social, and psychological costs on their own health and on communities (Leeder, Raymond, Greenberg, Liu, & Esson, 2004; Strong, Mathers, Leeder, & Beaglehole, 2005).

Research on mental health status among Muslim population is limited. It is generally expected that religion plays a positive role in filling the voids of life and supporting aging, coping with stress, adapting to circumstances, providing meaning for life and death, and encouraging older people to engage in group religious activities and ceremonies (Bahrami, 2004). However, due to the role of many other factors in mental health of older people, the role of religion could be diminished. For instance, populations in many Arab countries, such as Iraq, Lebanon, Palestine and Kuwait, have directly or indirectly experienced armed conflict, repression, and human rights violations for years and even decades, leading to a higher rate of mental health problems, psychotic symptoms, and psychiatric diagnoses (Al-Krenawi, 2005). In addition, mental health

**Table 2.** Frequency distribution of mental health status of older people aged 55+ using GHQ-15

| **Have you recently . . .** | | **0 (No) N (%)** | **1 (Sometimes) N (%)** | **2 (Often) N (%)** | **3 (Always) N (%)** |
|---|---|---|---|---|---|
| GHQ1 | Been getting any pains in your head? | 197 (33.4) | 278 (47.1) | 82 (13.9) | 33 (5.6) |
| GHQ2 | Lost much sleep over worry? | 183 (31) | 223 (37.8) | 150 (25.4) | 34 (5.8) |
| GHQ3 | Had difficulty in staying asleep once you are off? | 200 (33.9) | 230 (39) | 133 (22.5) | 27 (4.6) |
| GHQ4 | Been feeling nervous and strung-up all the time? | 186 (31.5) | 225 (38.1) | 152 (25.8) | 27 (4.6) |
| GHQ5 | Been taking longer over the things than usual you do? | 72 (12.2) | 341 (57.8) | 170 (28.8) | 7 (1.2) |
| | | **0 (More so than usual)** | **1 (Same as usual)** | **2 (Rather less than usual)** | **3 (Much less than usual)** |
| GHQ6 | Been managing to keep yourself busy and occupied? | 119 (20.2) | 332 (56.3) | 134 (22.7) | 5 (0.8) |
| GHQ7 | Felt on the whole you were doing things well? | 59 (10) | 308 (52.2) | 214 (36.3) | 9 (1.5) |
| GHQ8 | Been satisfied with the way you have carried out your tasks? | 64 (10.8) | 302 (51.2) | 210 (35.6) | 14 (2.4) |
| GHQ9 | Felt that you are playing a useful part in things? | 61 (10.3) | 311 (52.7) | 203 (34.4) | 15 (2.5) |
| GHQ10 | Been able to enjoy your normal day-to-day activities? | 99 (16.8) | 313 (53.1) | 170 (28.2) | 8 (1.4) |
| | | **0 (No)** | **1 (Sometimes)** | **2 (Often)** | **3 (Always)** |
| GHQ11 | Been thinking of yourself as a worthless person? | 361 (61.2) | 163 (27.6) | 55 (9.3) | 11 (1.9) |
| GHQ12 | Felt that life is entirely hopeless? | 343 (58.1) | 151 (25.6) | 78 (13.2) | 18 (3.1) |
| GHQ13 | Felt that life isn't worth living? | 374 (63.4) | 127 (21.5) | 71 (12) | 18 (3.1) |
| GHQ14 | Found at times you couldn't do anything because your nerves were too bad? | 251 (42.5) | 222 (37.6) | 99 (16.8) | 18 (3.1) |
| GHQ15 | Found yourself wishing you were dead and away from it all? | 400 (67.8) | 114 (19.3) | 49 (8.3) | 27 (4.6) |

**Table 3.** Associations between the domains of Active Aging Index and its overall score and GHQ (Mixed-effect linear regression analysis)

| GHQ | Model 1 Crude analysis | Model 2 Association with domains | Model 3 Association with domains + Covariates | Model 4 Association with overall AAI+ Covariates |
|---|---|---|---|---|
| | Coefficient (p) | Coefficient (p) | Coefficient (p) | Coefficient (p) |
| **Main independent Variables:** | | | | |
| AAI1 | 0.006 (0.331) | 0.007 (0.214) | **0.01 (0.034)** | - |
| AAI2 | 0.01 (0.396) | 0.02 (0.053) | 0.009 (0.411) | - |
| AAI3 | **–0.11 (<0.001)** | **–0.05 (0.001)** | **0.009 (0.037)** | - |
| AAI4 | **–0.26 (<0.001)** | **–0.25 (<0.001)** | **–0.18 (<0.001)** | - |
| Overall AAI | –0.01 (0.260) | - | - | 0.01 (0.404) |
| **Covariates:** | | | | |
| Age (older) | - | - | 0.04 (0.261) | 0.06 (0.098) |
| Gender (women) | - | - | 0.90 (0.178) | 0.28 (0.699) |
| Income (poorer) | - | - | 1.01 (0.091) | 0.87 (0.211) |
| Marital status (non-married) | - | - | 0.42 (0.582) | 0.97 (0.238) |
| Family Size (larger) | - | - | 0.01 (0.64) | 0.03 (0.481) |
| Education (illiterate) | - | - | **1.34 (0.052)** | **2.44 (0.001)** |
| Ethnicity (non-Persian) | | | –0.56 (0.381) | –0.15 (0.818) |

policies and laws are almost nonexistent in many Arab countries such as Libya and Yemen. In Egypt, for example, most mental health laws are outdated and not appropriate for the new concepts of community psychiatry. Also, the number of specialists working in psychiatry is much less than the demand for such services (A Okasha, 2003; Ahmed Okasha, 2004). Although older people in the Arab world traditionally continue to live with their children, more older women are increasingly living alone (Mehio-Sibai, Beydoun, & Tohme, 2009). At the same time, the persistence of informal and traditional forms of long-term care in Muslim families is threatened due to various factors such as modernization, urbanization, and sedentary life (Hussein & Ismail, 2017), making older people in these societies more vulnerable to mental disorders.

"Active Aging" strategies, could enable people to enhance their potential for physical, social, and mental wellbeing throughout the whole life course and to participate in society according to their needs, desires, and capacities (Lee, 2006). The results of this study, however, highlighted an overall relatively poor AAI score of older adults in the city of Tehran. In comparison with the overall AAI and its domain-specific scores of the EU-28 countries in 2018 (Leeder et al., 2004), the overall AAI score and the scores of the third and fourth domains of Iranian elderly are considerably poorer, but Iranians are doing slightly better in the second domain and almost the same with the first domain of average of the EU-28 countries. According to the results of this

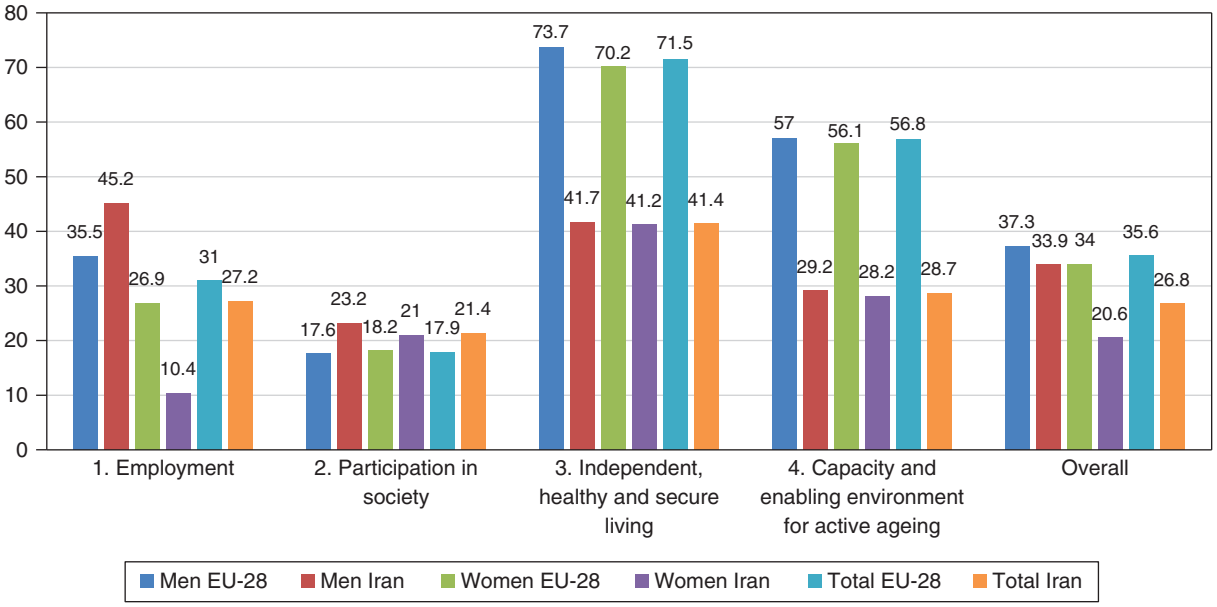


**Figure 1.** Comparison of the overall and domain-specific scores of the AAI of Iranian seniors with those of the EU-28 countries in 2018

study, the AAI score of Iranian women were even poorer than men (33.9 vs. 20.6), which mostly refers to the first domain, employment rate (men 45.2% vs. women 10.4%), as they had almost similar scores in other domains. This finding is in line with the other studies indicating poorer AAI scores of women than men (NON-EU, 2018; Varlamova, Ermolina, & Sinyavskaya, 2017; Walker & Zaidi, 2016)and poorer mental health of women both in Iran (Negahban, Arab, Tajvar, RAHIMI, & RASHIDYAN, 2015; Tajvar et al., 2018)and in other regions (World Health Organization, 2002; Springer, Stellman, & Jordan-Young, 2012).

The findings of this study on associations between the AAI and GHQ scores, controlled for the effects of covariates (Models 3 and 4) showed that except the AAI2 and the overall score of the AAI, other domains had a significant association with the GHQ score. However, the result of the AAI1 (employment) is in contrast with our earlier hypothesis, indicating higher employment rate is associated with poorer mental health, but the direction of association between the other two domains (AAI3 and AAI4) with mental health was compatible with the prior hypothesis. The opposite direction of the AAI1 with mental wellbeing might reflect a forced employment, rather than it being a choice, due to low retirement savings or pensions, poor working conditions, and poor economic status among the elderly. This conclusion is supported by an earlier study (Yahyavi Dizaj J, 2020). According to the results of this study, many of the retired men (44%) returned to work after the age of 60 and continue to be economically active, and one third of older men aged 70–74 reported to be still employed and continue working, which is much higher than the same figure for European men (Figure 1). The forced employment might explain the adverse effect of employment on the mental wellbeing of older people. This should be noted that despite such a finding, 35% of the whole weight of the AAI is covered by the 1st domain only, which suggests a need for modification and localizing the original AAI in the Iranian context. According to this study, putting significance on employment leads to overestimation of the position of countries which, despite the considerable employment rate of older adults, are behind other countries in other indicators (Kafková, 2018).

The result of this study showed no significant association between the 2nd domain (participation in society) and mental health, while, based on the results of earlier studies (Rose, 2000; Sirven & Debrand, 2008) we initially hypothesized having more participation in society would be associated with better mental health. In this study, the average score of the 2nd domain was higher than that of the EU-28 countries, especially in the indicators of "care to children" and "voluntary work". Although the higher scores in this domain may partially reflect the family-oriented culture of Iran, it also may be related to the increasing proportion of young employed women who need to leave their children with their parents. On the other hand, it may also reflect a forced participation of some proportion of elderly because of poor economic status of their families who are not able to afford to take professional care for their dependent elderly or children and thus they somehow force their parents to take this role, instead (Tajvar et al., 2018). The weight of this domain, which is 35% of the original AAI, needs to be modified for the context of Iran.

As aforementioned, a significant positive link was found between the 3rd and 4th domains of the AAI with mental health, indicating that being dependent and also living in a disabling environment, would lead to significantly poorer mental wellbeing of older people. However, despite such an important effect, these two domains share only 20% and 10% of the overall weight of the AAI score, respectively. This needs considerable attention in further studies and probably require increasing the weight of these domains in the Iranian context. As shown in Figure 1, the average scores of these domains were notably lower than the average of the European countries, in particular on the indicators of "access to health care" and "economic status and depravation" in the 3rd domain and also in "life expectancy" and "educational attainment" in the 4th domain. Thus, this result suggests a need to pay special attention by policymakers, particularly to the mentioned indicators, to make the life of future older people of Iran to be more active, independent, and healthy. However, in our search of research in Muslim-majority countries, no similar study has been conducted and it is recommended that related studies be conducted in these regions to be aware of the current situation and, if necessary, take necessary measures to improve the current situation.

With regard to the 3rd domain, "independent, healthy, and secure living capacity", a crucial aspect is the capacity to live independently in older age, not only regarding housing but also in economic terms. It is stated that these aspects are highly correlated with education, e-literacy and physical and mental health, often developed in the earlier stages of life. Therefore, the life-course perspective should be taken into account when analyzing active aging (Commission, 2019). In addition, the WHO in its documents published recently including age-friendly cities and communities (W. H Organization, 2019) has already emphasized the importance of an enabling environment, the 4th domain, to the health and activity of older people. According to the WHO, making work and the urban environment safe and secure, is a prerequisite for old-age activity and independence (Commission, 2019).

As the AAI is a rather new instrument, there is little research examining the effects of the AA measured by the AAI and mental health of older people, which highlights the necessity of work and research on this relatively new area, as populations are becoming older. The AAI contributes to making older people's participation to society more visible, and helps policymakers and other stakeholders understand which areas present more challenging situations, thus requiring more effective interventions to accomplish a societally more balanced aging experience (Commission, 2019).

The results of this study are valuable and have clinical implications for improvements of mental health of elderly. For instance, strong associations of enabling living environment including living independence and creating a safe life was approved and thus implementing relevant strategies by

health workers could be suggested. Additionally, interventions to increase social participation and interaction, physical activity, living with other family members, lifelong learning and access to education are all effective in improving mental health that could be considered by health professionals. Providing regular health education for older people to encourage them to engage in regular physical activity, especially in groups with other people, engaging families and caregivers in more interaction with the elderly and emphasizing reducing their lonely feelings, delegating responsibilities to them so that the individual feel usefulness, and increasing elderly access to education and learning are all ways that mental health professionals can apply to promote the mental health of older people. However, the main weakness of this study is its cross-sectional design, so that the temporal relationships between the overall AAI and its domains with mental health of older people cannot be ascertained and a reverse causality is highly possible. Undertaking a longitudinal study in the future would help to address this concern. Additionally, the results of this study are only generalizable to older people of Tehran. The next survey should be conducted at the national level to be able to have a broader view on the status of the AAI among older people of the whole country including those in less urban areas. Before doing the next study, another recommendation is to conduct a qualitative study to develop a localized AAI questionnaire in the Iranian context. The weight of the indicators or domains might also be different from the original AAI. It is also recommended for further study to do analysis for data of men and women separately, as they had considerable differences in many of the indicators of the AAI.

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