

# ACTIVE AGING AND ITS INTERFACE WITH SOCIAL DETERMINANTS OF HEALTH

## O envelhecimento ativo e sua interface com os determinantes sociais da saúde

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### ABSTRACT

**OBJECTIVE:** To analyze the relationship between active aging and social determinants of health in older people living in the catchment area of a primary health care facility. **METHODS:** A cross-sectional study was conducted to assess exposure variables of the schematic model by Dahlgren and Whitehead; the outcome variable active aging was created by means of latent class analysis. Participants were categorized as highly, moderately, and minimally active. Data analysis was performed using a forward multinomial regression model. **RESULTS:** Overall, 155 elderly people participated in the study, most of them classified as highly active. Older subjects had a higher chance for being minimally active (OR = 5.72) and moderately active (OR = 3.27). Lack of a family life (OR = 3.90) and education level of 4 years or less (OR = 2.90) were shown to be risk factors for moderate levels of active aging. **CONCLUSION:** The present study demonstrated that advanced age, lack of family life, and an education level of 4 years or less were associated with a higher chance for elderly attending Family Health Strategy units to present low levels of active aging. It is suggested that these factors should be taken into account when directing public policies aimed at active aging.

**KEYWORDS:** epidemiology; aging; health of the elderly; social determinants of health.

### RESUMO

**OBJETIVO:** Analisar a relação entre o envelhecimento ativo e os determinantes sociais da saúde em idosos residentes em uma área coberta por serviço de Atenção Primária à Saúde. **MÉTODO:** Desenho seccional, trabalhando-se com as variáveis de exposição do modelo esquemático de Dahlgren e Whitehead e a variável desfecho *envelhecimento ativo* construída por meio da Análise de Classes Latentes. O envelhecimento foi categorizado como  *muito, médio e pouco ativo*. Para análise dos dados utilizou-se a regressão multinomial, método *forward*. **RESULTADOS:** Participaram do estudo 155 idosos, a maioria classificada na categoria de envelhecimento  *muito ativo*. Idade avançada apresentou maior chance para envelhecimento  *pouco ativo* (OR = 5,72) e  *médio ativo* (OR = 3,27). Não ter convívio familiar (OR = 3,90) e ter menos de 4 anos de estudo (OR = 2,90) apresentaram-se como fatores de risco para envelhecimento  *médio ativo*. **CONCLUSÃO:** O presente estudo demonstrou que ter idade avançada, não ter convívio familiar e ter menos de quatro anos de estudo estiveram associados a uma maior chance de idosos atendidos pela Estratégia Saúde da Família apresentarem baixos níveis de envelhecimento ativo. Sugere-se que os referidos fatores sejam levados em consideração no direcionamento de políticas públicas voltadas ao envelhecimento ativo.

**PALAVRAS-CHAVE:** epidemiologia; envelhecimento; saúde do idoso; determinantes sociais da saúde.

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Received on: 11/14/2017. Accepted on: 02/02/2018

DOI: 10.5327/Z2447-211520181700078

## INTRODUCTION

Aging may be considered an achievement and a responsibility for both public administrators and the society as a whole.<sup>1</sup> With the use of the expression “active aging”,<sup>2</sup> the World Health Organization (WHO) introduced a new perspective on older adults, recognizing them as active participants in their own health dynamics.

Public services for this population provide conditions for their lives to flow smoothly, considering the family context and social network to which they belong.<sup>3</sup> In some developing countries, including Brazil, population aging is understood as a phenomenon characterized by the overlap of epidemiological processes combined with unfavorable political, social and economic contexts. Thus, it may be assumed that the magnitude of social disparities may vary among the demographic groups of society according to their socioeconomic conditions.<sup>4</sup>

Approaching health from the perspective of its social determinants may be particularly associated with understanding how society is organized to produce material and social life, a phenomenon that is related to the productive forces and productive social relationships and may be situated historically in a social formation.<sup>5</sup>

Hence, there is the need to expand current knowledge on social determinants of health and their possible relations with aging. Moreover, here we provide objective foundations for the development of public policies for the elderly. Within this context, the present study aimed to investigate the relationship between social determinants of health and active aging among older people living in the catchment area of a primary health care (PHC) facility.

## METHOD

This was a population-based, cross-sectional study focused on the catchment area of a PHC facility in Recife, northeastern Brazil. At the time of data collection, the number of elderly people covered by this facility was 291. Inclusion criterion was individuals aged 60 years or older who were being followed up by a PHC team in Recife. Exclusion criterion was the presence of severe cognitive impairment preventing the participant to answer questions included in the study protocol.

Data collection started after the project was approved by the Research Ethics Committee of Universidade Federal de Pernambuco under number CAAE 41859515.8.0000.5208. Interviews and protocols regarding active aging were applied to older people living in the catchment area of the above mentioned PHC facility. Participants were informed on the objectives of the study and were invited to voluntarily

participate by signing an informed consent form, as recommended by Resolution No. 466/12 of the Brazilian National Health Council.

Independent variables consisted of the social determinants of health included in the schematic model by Dahlgren and Whitehead.<sup>6</sup> Due to the complexity of the variables of this model, our approach was limited to simply collecting indicators of how these variables are manifested in the study population.

The assessment of the dependent variable (active aging) was based on the WHO official document entitled “Active aging: a health policy”<sup>2</sup> and on the pillars of aging in the society: health, participation, and safety. In the present study, active aging was investigated only from the perspective of health.

Assuming that active aging is a latent variable, it was assessed by measuring participants’ functional capacity and quality of life. Functional capacity was measured using the Lawton and Brody scale, which covers eight instrumental activities of daily living, and quality of life was measured using the World Health Organization Quality of Life Assessment-Old (WHOQOL-OLD) instrument.<sup>7</sup> Finally, individual’s level of physical activity was classified according to their answers to the study instruments.

The explanatory variables were divided into hierarchical levels to enable the development of a hierarchical model.<sup>8</sup> Variables with  $p$ -value  $< 0.25$  in the univariate analysis were kept in the multiple analysis.<sup>9</sup> Multiple analysis was performed using a hierarchical model, starting with the most distal variables. These variables were entered into the model one at a time, and those statistically associated with the outcome (significance level of 10%) remained in the final model.<sup>8</sup>

The model for the assessment of active aging was built using latent class analysis (LCA),<sup>10</sup> in which several models with different numbers of latent classes were created and tested until we found the ideal model to express this variable. Therefore, individuals were classified into distinct groups with homogeneous within-group characteristics.

For the selection of the most appropriate statistical model for the latent variable, the following criteria were observed: Akaike’s information criterion (AIC), Bayesian information criterion (BIC), and adjusted BIC. The model with the lowest values for these criteria was selected. We also considered the highest value of entropy.<sup>11</sup>

The latent variable active aging was created through LCA, dividing elderly people into three classes of physical activity level: highly active, moderately active, and minimally active.

After the latent variable active aging was created (dependent variable), an analysis was conducted to investigate the

association between this variable and social determinants of health (independent variables). Multinomial logistic regression with simple and multiple (hierarchical) analysis was used to assess the above association and calculate odds ratio (OR).

In the multiple analysis, the same procedure was repeated for the subsequent levels (intermediate and proximal). Level-1 variables remained in the analysis of level-2 variables, even though there were changes in statistical significance.<sup>8</sup> The strength of association was expressed in OR, with a 95% confidence interval (95%CI). The Pearson's chi-square test was used (and the Fisher's exact test, as appropriate), considering a significance level of 5%. The R software, version 3.3.2, was used to create the latent variable and to perform the other analyses.

## RESULTS

After participants were recruited within the catchment area of a PHC facility, 155 elderly people were enrolled in the study. The majority of subjects ( $n = 113$ ; 72.9%) were classified as highly active, followed by those classified as moderately active ( $n = 29$ ; 18.7%) and minimally active ( $n = 13$ ; 8.4%) (Table 1).

Most of the sample belonged to the younger population ( $n = 74$ ; 47.7%), were female ( $n = 115$ ; 74.2%) and had black, brown, yellow (Asian), or red (Indigenous Brazilian) skin ( $n = 126$ ; 82.3%). With regard to marital status, the number of married individuals ( $n = 71$ ; 45.9%) was similar to that of widowed, separated or divorced, and single individuals (Table 2).

**Table 1** Classification of active aging according to Latent Class Analysis considering mean scores for Lawton and Brody scale and for World Health Organization of Quality of Life Instrument-Old (WHOQOL-OLD), number of observations, and probabilities of study (Recife, 2015).

| Level of active aging                    | Latent class analysis |               |                   | Entropy |
|--|-----------------------|---------------|-------------------|---------|
|  | Minimally active      | Highly active | Moderately active |         |
| Mean                                     |                       |               |                   |         |
| Lawton and Brody scale                   | 20.4970               | 16.6070       | 11.2480           |         |
| WHOQOL-OLD                               | 97.1890               | 90.0720       | 86.8960           |         |
| No. of observations (no. of individuals) | 13                    | 113           | 29                |         |
| Unconditional probabilities              | 0.0839                | 0.7290        | 0.1871            | 0.9490  |
| Diagonal ALC probabilities               | 0.9960                | 0.9960        | 0.8950            |         |

WHOQOL-OLD: World Health Organization of Quality of Life Instrument-Old; ALC: average latent class.

**Table 2** Prevalence of active aging and its association with social determinants of health (Recife, 2015).

| Social determinants of health                               | Total |       | Level of active aging |       |                   |       |                  |       | p-value |
|---|-------|-------|-----------------------|-------|-------------------|-------|------------------|-------|---------|
|   |       |       | Highly active         |       | Moderately active |       | Minimally active |       |         |
|   | n     | %     | n                     | %     | n                 | %     | n                | %     |         |
| Age (years)   |       |       |                       |       |                   |       |                  |       |         |
| 60 to 69  | 74    | 47.74 | 63                    | 55.75 | 8                 | 27.59 | 3                | 23.08 | 0.013   |
| 70 to 79  | 57    | 36.77 | 36                    | 31.86 | 15                | 51.72 | 6                | 46.15 |         |
| ≥ 80  | 24    | 15.48 | 14                    | 12.39 | 6                 | 20.69 | 4                | 30.77 |         |
| Sex   |       |       |                       |       |                   |       |                  |       |         |
| Men   | 40    | 25.81 | 33                    | 29.20 | 3                 | 10.34 | 4                | 30.77 | 0.097   |
| Women   | 115   | 74.19 | 80                    | 70.80 | 26                | 89.66 | 9                | 69.23 |         |
| Skin color  |       |       |                       |       |                   |       |                  |       |         |
| White   | 29    | 18.71 | 25                    | 22.12 | 1                 | 3.45  | 3                | 23.08 | 0.039   |
| Black, brown, yellow (Asian), or red (Indigenous Brazilian) | 126   | 81.29 | 88                    | 77.88 | 28                | 96.55 | 10               | 76.92 |         |
| Marital status  |       |       |                       |       |                   |       |                  |       |         |
| Married   | 71    | 45.81 | 56                    | 49.56 | 9                 | 31.03 | 6                | 46.15 | 0.201   |
| Widowed/divorced/single                                     | 84    | 54.19 | 57                    | 50.44 | 20                | 68.97 | 7                | 53.85 |         |

Continue...

**Table 2** Continuation.

| Social determinants of health                      | Total |       | Level of active aging |       |                   |        |                  |        | p-value |
|--|-------|-------|-----------------------|-------|-------------------|--------|------------------|--------|---------|
|  |       |       | Highly active         |       | Moderately active |        | Minimally active |        |         |
|  | n     | %     | n                     | %     | n                 | %      | n                | %      |         |
| Smoking status                                     |       |       |                       |       |                   |        |                  |        |         |
| Non-smoker   | 85    | 54.84 | 61                    | 53.98 | 20                | 68.97  | 4                | 30.77  | 0.025   |
| Current smoker                                     | 14    | 9.03  | 10                    | 8.85  | 4                 | 13.79  | 0                | 0.00   |         |
| Former smoker                                      | 56    | 36.13 | 42                    | 37.17 | 5                 | 17.24  | 9                | 69.23  |         |
| Consumption of high-fat foods                      |       |       |                       |       |                   |        |                  |        |         |
| Yes  | 27    | 17.42 | 25                    | 22.12 | 2                 | 6.90   | 0                | 0.00   | 0.038   |
| No   | 128   | 82.58 | 88                    | 77.88 | 27                | 93.10  | 13               | 100.00 |         |
| Sugar consumption                                  |       |       |                       |       |                   |        |                  |        |         |
| Yes  | 62    | 40.00 | 46                    | 40.71 | 14                | 48.28  | 2                | 15.38  | 0.127   |
| No   | 93    | 60.00 | 67                    | 59.29 | 15                | 51.72  | 11               | 84.62  |         |
| Engagement in leisure activities                   |       |       |                       |       |                   |        |                  |        |         |
| Yes  | 130   | 83.87 | 17                    | 15.04 | 7                 | 24.14  | 1                | 7.69   | 0.399   |
| No   | 25    | 16.13 | 96                    | 84.96 | 22                | 75.86  | 12               | 92.31  |         |
| Source of information                              |       |       |                       |       |                   |        |                  |        |         |
| Television   | 26    | 16.77 | 22                    | 19.47 | 3                 | 10.34  | 1                | 7.69   | 0.440   |
| Other (radio, newspaper, internet)                 | 129   | 83.23 | 91                    | 80.53 | 26                | 89.66  | 12               | 92.31  |         |
| Family life  |       |       |                       |       |                   |        |                  |        |         |
| Yes  | 48    | 30.97 | 5                     | 17.24 | 2                 | 15.38  | 41               | 36.28  | 0.069   |
| No   | 107   | 69.03 | 24                    | 82.76 | 11                | 84.62  | 72               | 63.72  |         |
| Uses public health care services                   |       |       |                       |       |                   |        |                  |        |         |
| Yes  | 73    | 47.10 | 13                    | 44.83 | 4                 | 30.77  | 56               | 49.56  | 0.422   |
| No   | 82    | 52.90 | 16                    | 55.17 | 9                 | 69.23  | 57               | 50.44  |         |
| Uses social assistance services                    |       |       |                       |       |                   |        |                  |        |         |
| Yes  | 23    | 14.84 | 3                     | 10.34 | 4                 | 30.77  | 16               | 14.16  | 0.186   |
| No   | 132   | 85.16 | 26                    | 89.66 | 9                 | 69.23  | 97               | 85.84  |         |
| Waste management                                   |       |       |                       |       |                   |        |                  |        |         |
| Collected  | 147   | 94.84 | 26                    | 89.66 | 13                | 100.00 | 108              | 95.58  | 0.442   |
| Other (burnt, buried, etc.)                        | 8     | 5.16  | 3                     | 10.34 | 0                 | 0.00   | 5                | 4.42   |         |
| Literacy   |       |       |                       |       |                   |        |                  |        |         |
| Yes  | 108   | 69.68 | 14                    | 48.28 | 8                 | 61.54  | 86               | 76.11  | 0.011   |
| No   | 47    | 30.32 | 15                    | 51.72 | 5                 | 38.46  | 27               | 23.89  |         |
| Years of education                                 |       |       |                       |       |                   |        |                  |        |         |
| > 4  | 71    | 45.81 | 60                    | 53.10 | 7                 | 24.14  | 4                | 30.77  | 0.010   |
| ≤ 4  | 84    | 54.19 | 53                    | 46.90 | 22                | 75.86  | 9                | 69.23  |         |
| Had an occupational accident                       |       |       |                       |       |                   |        |                  |        |         |
| Yes  | 24    | 15.48 | 17                    | 15.04 | 3                 | 10.34  | 4                | 30.77  | 0.235   |
| No   | 131   | 84.52 | 96                    | 84.96 | 26                | 89.66  | 9                | 69.23  |         |
| Bothered by noise pollution                        |       |       |                       |       |                   |        |                  |        |         |
| Yes  | 29    | 18.71 | 3                     | 10.34 | 2                 | 15.38  | 24               | 21.24  | 0.449   |
| No   | 126   | 81.29 | 26                    | 89.66 | 11                | 84.62  | 89               | 78.76  |         |
| Bothered by air pollution                          |       |       |                       |       |                   |        |                  |        |         |
| Yes  | 36    | 23.23 | 9                     | 31.03 | 1                 | 7.69   | 26               | 23.01  | 0.279   |
| No   | 119   | 76.77 | 20                    | 68.97 | 12                | 92.31  | 87               | 76.99  |         |
| Source of income                                   |       |       |                       |       |                   |        |                  |        |         |
| Work (formal and informal)                         | 72    | 46.45 | 59                    | 52.21 | 8                 | 27.59  | 5                | 38.46  | 0.050   |
| Other (retirement, social benefits, third parties) | 83    | 53.55 | 54                    | 47.79 | 21                | 72.41  | 8                | 61.54  |         |
| Income   |       |       |                       |       |                   |        |                  |        |         |
| 1 MW   | 100   | 64.52 | 21                    | 72.41 | 6                 | 46.15  | 73               | 64.60  | 0.367   |
| 2 MW   | 36    | 23.23 | 5                     | 17.24 | 6                 | 46.15  | 25               | 22.12  |         |
| 3 MW   | 19    | 12.26 | 3                     | 10.34 | 1                 | 7.69   | 15               | 13.27  |         |

MW: minimum wage.

As for family life, most participants reported not visiting relatives very often ( $n = 107$ ; 69.0%). Similarly, most considered themselves to be literate ( $n = 108$ ; 69.7%), although having an education level of 4 years or less ( $n = 84$ ; 54.2%).

Our findings highlighted the association between active aging and age, skin color, smoking, consumption of high-fat foods, literacy, education level, and family income ( $p < 0.05$ ), and also a possible association of active aging with family life and sex ( $p < 0.10$ ).

However, source of information was the only variable that did not remain in the multinomial multivariate hierarchical analysis. It was also found that the confidence interval ranges of some variables suggest small sample size (Table 3). After multivariate analysis, age, family life, and education level remained associated with active aging. With regard to age, it was observed that the greater the age the greater the chance for the elderly to be moderately or minimally active. Subjects aged 70 to 79 years had a 6-fold increased chance of being minimally

**Table 3** Univariate analysis of the association between active aging and social determinants of health based on a multinomial model (Recife, 2015).

| Social determinants of health                               | Level of active aging |       |         |                  |       |         |       |       |
|---|-----------------------|-------|---------|------------------|-------|---------|-------|-------|
|   | Moderately active     |       |         | Minimally active |       |         |       |       |
|   | OR                    | 95%CI | p-value | OR               | 95%CI | p-value |       |       |
| Age (years)   |                       |       |         |                  |       |         |       |       |
| 60 to 69  | 1.00                  |       |         |                  | 1.00  |         |       |       |
| 70 to 79  | 3.28                  | 1.27  | 8.49    | 0.014            | 3.50  | 0.83    | 14.85 | 0.089 |
| ≥ 80  | 3.38                  | 1.01  | 11.28   | 0.048            | 6.00  | 1.21    | 29.87 | 0.029 |
| Sex   |                       |       |         |                  |       |         |       |       |
| Men   | 1.00                  |       |         |                  | 1.00  |         |       |       |
| Women   | 3.57                  | 1.01  | 12.63   | 0.048            | 0.93  | 0.27    | 3.23  | 0.907 |
| Skin color  |                       |       |         |                  |       |         |       |       |
| White   | 1.00                  |       |         |                  | 1.00  |         |       |       |
| Black, brown, yellow (Asian), or red (Indigenous Brazilian) | 7.94                  | 1.03  | 61.18   | 0.047            | 0.95  | 0.24    | 3.71  | 0.939 |
| Marital status  |                       |       |         |                  |       |         |       |       |
| Married   | 1.00                  |       |         |                  | 1.00  |         |       |       |
| Widowed/divorced/single                                     | 2.18                  | 0.92  | 5.21    | 0.078            | 1.15  | 0.36    | 3.62  | 0.816 |
| Smoking status  |                       |       |         |                  |       |         |       |       |
| Non-smoker  | 1.00                  |       |         |                  | 1.00  |         |       |       |
| Current smoker  | 1.22                  | 0.34  | 4.32    | 0.758            | 0     | 0.00    |       | 0.938 |
| Former smoker   | 0.36                  | 0.13  | 1.04    | 0.060            | 3.27  | 0.94    | 11.31 | 0.062 |
| Consumption of high-fat foods                               |                       |       |         |                  |       |         |       |       |
| Yes   | 1.00                  |       |         |                  |       |         |       |       |
| No  | 3.84                  | 0.85  | 17.29   | 0.080            |       |         |       | 0.877 |
| Sugar consumption   |                       |       |         |                  |       |         |       |       |
| Yes   | 1.00                  |       |         |                  | 1.00  |         |       |       |
| No  | 0.74                  | 0.32  | 1.67    | 0.463            | 3.78  | 0.80    | 17.84 | 0.094 |
| Engagement in leisure activities                            |                       |       |         |                  |       |         |       |       |
| Yes   | 1.00                  |       |         |                  | 1.00  |         |       |       |
| No  | 1.80                  | 0.66  | 4.86    | 0.248            | 0.47  | 0.06    | 3.86  | 0.483 |

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**Table 3** Continuation.

| Social determinants of health                      | Level of active aging |       |       |         |                  |       |       |         |
|--|-----------------------|-------|-------|---------|------------------|-------|-------|---------|
|  | Moderately active     |       |       |         | Minimally active |       |       |         |
|  | OR                    | 95%CI |       | p-value | OR               | 95%CI |       | p-value |
| Source of information                              |                       |       |       |         |                  |       |       |         |
| Television   | 1.00                  |       |       |         | 1.00             |       |       |         |
| Other (radio, newspaper, internet)                 | 2.10                  | 0.58  | 7.56  | 0.258   | 2.90             | 0.36  | 23.50 | 0.319   |
| Family life  |                       |       |       |         |                  |       |       |         |
| Yes  | 1.00                  |       |       |         | 1.00             |       |       |         |
| No   | 2.73                  | 0.97  | 7.71  | 0.057   | 3.13             | 0.66  | 14.83 | 0.150   |
| Uses public health care services                   |                       |       |       |         |                  |       |       |         |
| Yes  | 1.00                  |       |       |         | 1.00             |       |       |         |
| No   | 1.21                  | 0.53  | 2.74  | 0.650   | 2.21             | 0.64  | 7.59  | 0.208   |
| Uses social assistance services                    |                       |       |       |         |                  |       |       |         |
| Yes  | 1.00                  |       |       |         | 1.00             |       |       |         |
| No   | 1.43                  | 0.39  | 5.28  | 0.592   | 0.37             | 0.10  | 1.35  | 0.133   |
| Type of waste management                           |                       |       |       |         |                  |       |       |         |
| Waste collection                                   | 1.00                  |       |       |         | 1.00             |       |       |         |
| Other (burnt, buried, etc.)                        | 2.49                  | 0.56  | 11.11 | 0.231   | 0.00             |       |       | 0.845   |
| Literacy   |                       |       |       |         |                  |       |       |         |
| Yes  | 1.00                  |       |       |         | 1.00             |       |       |         |
| No   | 3.41                  | 1.46  | 7.96  | 0.005   | 1.99             | 0.60  | 6.60  | 0.260   |
| Years of education                                 |                       |       |       |         |                  |       |       |         |
| > 4  | 1.00                  |       |       |         | 1.00             |       |       |         |
| ≤ 4  | 3.56                  | 1.41  | 8.99  | 0.007   | 2.55             | 0.74  | 8.76  | 0.138   |
| Had an occupational accident                       |                       |       |       |         |                  |       |       |         |
| Yes  | 1.00                  |       |       |         | 1.00             |       |       |         |
| No   | 0.03                  | 0.42  | 5.64  | 0.519   | 0.05             | 0.11  | 1.44  | 0.161   |
| Bothered by noise pollution                        |                       |       |       |         |                  |       |       |         |
| Yes  | 1.00                  |       |       |         | 1.00             |       |       |         |
| No   | 2.34                  | 0.65  | 8.38  | 0.193   | 1.48             | 0.31  | 7.15  | 0.623   |
| Bothered by air pollution                          |                       |       |       |         |                  |       |       |         |
| Yes  | 1.00                  |       |       |         | 1.00             |       |       |         |
| No   | 0.66                  | 0.27  | 1.63  | 0.373   | 3.58             | 0.45  | 28.87 | 0.230   |
| Source of income                                   |                       |       |       |         |                  |       |       |         |
| Work (formal and informal)                         | 1.00                  |       |       |         | 1.00             |       |       |         |
| Other (retirement, social benefits, third parties) | 2.34                  | 0.65  | 8.38  | 0.193   | 1.48             | 0.31  | 7.15  | 0.623   |
| Income   |                       |       |       |         |                  |       |       |         |
| 1 MW   | 1.00                  |       |       |         | 1.00             |       |       |         |
| 2 MW   | 0.70                  | 0.24  | 2.04  | 0.508   | 2.92             | 0.86  | 9.88  | 0.085   |
| 3 MW   | 0.70                  | 0.18  | 2.63  | 0.593   | 0.81             | 0.09  | 7.24  | 0.851   |

OR: odds ratio; 95%CI: 95% confidence interval; MW: minimum wage.

active compared with younger subjects (OR = 5.72;  $p = 0.045$ ). (Table 4).

Moderate levels of active aging also associated with family life and education level. Older people who did not have a family life were four times more likely to be moderately active

compared with those who had (OR = 3.9;  $p = 0.022$ ). As for education level, study participants with less than 4 years of education had a 2.9-fold increased chance of being moderately active compared with those with more than 4 years of education (OR = 2.9;  $p = 0.045$ ) (Table 4).

**Table 4** Multivariate analysis of the association between active aging and social determinants of health based on a multinomial model (Recife, 2015).

| Social determinants of health                               | Level of active aging |       |         |                  |       |         |       |       |
|---|-----------------------|-------|---------|------------------|-------|---------|-------|-------|
|   | Moderately active     |       |         | Minimally active |       |         |       |       |
|   | OR                    | 95%CI | p-value | OR               | 95%CI | p-value |       |       |
| Age (years)   |                       |       |         |                  |       |         |       |       |
| 60 to 69  | 1.00                  |       |         |                  | 1.00  |         |       |       |
| 70 to 79  | 3.27                  | 1.08  | 9.85    | 0.036            | 5.72  | 1.04    | 31.39 | 0.045 |
| ≥ 80  | 3.08                  | 0.77  | 12.30   | 0.111            | 5.93  | 0.82    | 42.73 | 0.077 |
| Sex   |                       |       |         |                  |       |         |       |       |
| Men   | 1.00                  |       |         |                  | 1.00  |         |       |       |
| Women   | 3.99                  | 0.94  | 16.82   | 0.060            | 1.38  | 0.24    | 7.91  | 0.716 |
| Skin color  |                       |       |         |                  |       |         |       |       |
| White   | 1.00                  |       |         |                  | 1.00  |         |       |       |
| Black, brown, yellow (Asian), or red (Indigenous Brazilian) | 5.92                  | 0.71  | 49.06   | 0.099            | 1.01  | 0.19    | 5.29  | 0.995 |
| Sugar consumption   |                       |       |         |                  |       |         |       |       |
| Yes   | 1.00                  |       |         |                  | 1.00  |         |       |       |
| No  | 0.64                  | 0.24  | 1.69    | 0.366            | 5.44  | 0.85    | 34.56 | 0.073 |
| Family life   |                       |       |         |                  |       |         |       |       |
| Yes   | 1.00                  |       |         |                  | 1.00  |         |       |       |
| No  | 3.90                  | 1.22  | 12.52   | 0.022            | 4.09  | 0.70    | 23.82 | 0.117 |
| Uses public health services                                 |                       |       |         |                  |       |         |       |       |
| Yes   | 1.00                  |       |         |                  | 1.00  |         |       |       |
| No.   | 1.04                  | 0.39  | 2.73    | 0.941            | 3.02  | 0.69    | 13.17 | 0.142 |
| Years of education  |                       |       |         |                  |       |         |       |       |
| > 4   | 1.00                  |       |         |                  | 1.00  |         |       |       |
| ≤ 4   | 2.90                  | 1.02  | 8.25    | 0.045            | 1.85  | 0.42    | 8.15  | 0.418 |
| Had an occupational accident                                |                       |       |         |                  |       |         |       |       |
| Yes   | 1.00                  |       |         |                  | 1.00  |         |       |       |
| No  | 0.81                  | 0.18  | 3.57    | 0.781            | 0.20  | 0.04    | 1.18  | 0.075 |
| Income  |                       |       |         |                  |       |         |       |       |
| 1 MW  | 1.00                  |       |         |                  | 1.00  |         |       |       |
| 2 MW  | 0.90                  | 0.26  | 3.10    | 0.868            | 4.13  | 0.94    | 18.19 | 0.061 |
| 3 MW  | 0.60                  | 0.14  | 2.61    | 0.491            | 1.26  | 0.11    | 14.34 | 0.840 |

OR: odds ratio; 95%CI: 95% confidence interval; MW: minimum wage.

## DISCUSSION

The present study aimed to investigate the relation between social determinants of health and active aging in older people living in the catchment area of a PHC facility. In this sample, there was an increased risk for low or moderate levels of active aging among subjects from 70 to 79 years of age, those who did not have a family life, and those with less than 4 years of education.

Most of the elderly population participating in this study may be classified as highly active. Since functional capacity is one of the factors that influence health perception and is also considered an important marker of quality of life, its preservation is associated with improved quality of aging.<sup>12</sup>

It should also be highlighted that this is a descriptive study with a small sample. If we performed a LCA including two categories, the study would be adequate for logistic analysis, despite its small sample size. However, the choice of conducting a LCA with three categories led to the large scattering of prevalence rates, with wide 95%CI.

Studies based on the logics of active aging have aimed to expand understanding of this phenomenon without being restricted to the age component. Nevertheless, this factor may not be neglected, because it is an important marker of factors and phenomena. It was observed that factors like education level and economic conditions are a major distinguishing feature among older people.<sup>13</sup> This corroborates findings of the present study, since individuals between 70 and 79 years of age were at greater risk of being minimally active compared with younger subjects.

Although this study assessed family life rather than family cohabitation, there was a risk of reduction in physical activity levels to moderately active among more lonely people. However, it is worth emphasizing that the quality of personal relationships is more important than the number of people with whom the elderly person have frequent contact.<sup>14</sup>

With regard to the importance of education for older people, there was a reduction in the quality of aging among elderly who reported to have studied 4 years or less. This finding corroborates those reported in the literature,<sup>15-17</sup> showing

that the greater the education level the greater the resources available for individuals to adapt to the changes resulting from old age. Education level also affects health perception, leading to different understandings on behavioral and mental factors.

This study made it possible to investigate the factors that significantly affected old age and should be addressed to improve quality of aging. Our results suggest the need for developing further studies to gain in-depth knowledge on each determinant and its possible influence on active aging. The present research aims to add to previous literature by promoting a constant update on the topic addressed in this study.

The statistical approach used in this study, which included a small sample size, weakened the power of some results, due to the widely scattered prevalence rates. This fact may increase the risk of type 2 error. Moreover, the sample was composed of elderly treated at a PHC facility, which makes it impossible to extrapolate the results to the overall population of Recife.

Additionally, the lack of a validated model to classify active aging and obtain indicators of how independent variables related to social determinants of health (most of which were self-reported) are manifested in the elderly population did not allow for an in-depth investigation of both dependent and independent variables.

## CONCLUSION

The present study showed that advanced age, lack of family life, and education level of 4 years of less are associated with a higher chance for elderly attending the Family Health Strategy units to present low levels of active aging. It is suggested that these factors should be taken into account when directing public policies aimed at active aging.

## CONFLICT OF INTERESTS

The authors declare no conflict of interests.

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