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ORIGINAL ARTICLE

Geriatrics, Gerontology and Aging

Risk and protective factors for reduced life-space mobility among older adults with joint disease in Colombia: analysis of secondary data from a nationwide population-based survey

Fatores de risco e proteção para mobilidade reduzida no espaço de vida de idosos com doenças articulares na Colômbia: análise de dados secundários de uma pesquisa nacional de base populacional

Brenda Gómez-Gonzalez[a], Brenda Coll-Tello[a], Luis Wallis-Mosquera[a], Laura Cristina Valdez-Muñoz[b], Geraldine Altamar-Canales[a]

[a]Departamento de Medicina Familiar, Universidad del Valle – Cali, Colombia.
[b]Universidad Santiago de Cali – Cali, Colombia.

Correspondence data
Brenda Gómez-González – Calle 41 # -7-05 – Cambulos – ZIP Code: 760042 – Cali, Colombia. Email: Brenda.gomez@correounivalle.edu.co

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Abstract

Objective: To determine the association between life space and self-reported joint disease in the 2015 SABE Colombia survey.

Methods: Cross-sectional observational study of secondary data collected during the SABE Colombia 2015 survey. Life space was considered the dependent variable, and self-reported joint disease as an independent variable. An ordinal probit model was used to determine the different influences of each variable including biological, sociodemografic, health condition and geriatric syndromes on the life space of each respondent, categorized as follows: 1=Confined to bedroom, 2=Confined to home, 3=Neighborhood, 4=Around town, 5=Out of town.

Results: 6158 respondents reported joint disease, corresponding to an overall prevalence of 25.99% (95%CI 24.53–28.81%), stratified by life space as follows: confined to room, 3.73%; housebound, 10.31%; neighborhood, 13.64%; town, 49.24%; and out of town, 23.08%. Among female respondents, 78.26% were confined to their homes. The mean (SD) age of this population was 71.8 (8.3) years; respondents confined to their sleeping quarters were on average older. Men were less likely to have reduced life-space mobility, with the probability decreasing by 1.00% compared to women. Having the frailty phenotype increased the probability of having one's life space confined to the bedroom by 0.69% compared to nonfrail respondents.

Conclusion: Our findings suggested that being female, older, having a lower score on the Lawton scale, and being frail are factors that were associated with reduced life spaces. On the other hand, being male, having a higher socioeconomic status, higher educational attainment, good self-perception of health, and belonging to social groups were associated with a greater likelihood of having unlimited life-space mobility.

Keywords: life space, mobility, osteoarthritis, aged, ageing.

INTRODUCTION

Globally, the population over 65 is growing at a faster rate than all other age groups, and it is estimated that the number of people aged 80 and over will triple from 143 million in 2019 to 426 million in 2050.[1] As the number of older adults increases, so does the population with chronic noncommunicable diseases, including degenerative diseases, which generate disability and a surge in health-related costs.

Among this group of conditions are those that compromise the integrity of the osteoarticular system.[2] Specifically, osteoarthritis (OA), a degenerative disease associated with cartilage deterioration, proliferative reaction of the subchondral bone, and inflammation of the synovial membrane,[3] affects cartilage and can present with bone and muscle involvement.[4] OA behaves as a heterogeneous group of conditions, which lead to chronic, severe pain, limited mobility, and chronic disability in older adults, causing a significant reduction in their quality of life and limitation in their life space.[5,6] It is estimated that 70% of people living with OA are unaware of the disease, and up to 90% experience symptoms that can become disabling, pain being the main symptom reported.[7]

The University of Alabama Study of Aging Life-Space Assessment (LSA) has been used since 1985 as a measure of mobility and social participation for older adults, and it reflects environmental complexity, which facilitates or prevents their displacement.[8] It is a good indicator of people's internal balance and environmental challenges in response to everyday life, showing not only participation patterns, but also physical ability, and is useful in assessing major changes in functionality.[9] In addition, it has been observed that a large life space and social interaction have an impact on the perception of loneliness in older adults.[10]

By limiting people's mobility and quality of life, situations such as disability assistance requirements and increased health expenditures are associated with negative mental health outcomes, including depression and cognitive deterioration.[5] OA is considered a major health problem because it causes pain and associated disability worldwide.[9] According to the SABE Colombia 2015 population survey, joint disease (known in the survey as arthritis-osteoarthritis) was the second most frequent chronic condition, higher in women and with a greater prevalence with increasing age of the respondents, especially in those over 80 years.[11] However, we do not know how this pathological condition has affected the functional capacity and life space of those who reported having it.

The objective of this study is to analyze the association between life space and joint disease in adults over 60 years of age who participated in the 2015 Colombian Nationwide Survey of Health, Well-being, and Aging (SABE Colombia 2015).

METHODS

We conducted an analytical cross-sectional observational study using secondary data from the SABE Colombia 2015 survey, conducted by the Ministry of Health and Administrative department of science , technology and innovation " Colciencias" in collaboration with the Caldas University and Valley University.

This survey included 23 694 people living in urban and rural areas of Colombia, over 60 years of age, who were interviewed in their homes. The evaluation included socioeconomic variables, health status, nutrition, cognition, depression, anthropometric and biological measures, and social support networks, assessed using a questionnaire composed of 404 questions distributed across 13 sections. The participants were selected in 246 municipalities of the country, including a disaggregation at the national and regional levels and in four major cities: Bogotá, Cali, Medellín, and Barranquilla.

The results were analyzed by five subregions: Atlantic, Eastern, Central, Pacific, Orinoco, and Amazon, as well as Bogotá (Capital District), during 2014 and 2015. Of the total population surveyed, 6158, corresponding to 25.99% (95%CI 24.53–28.81%), reported having joint disease, identified as arthritis-osteoarthritis – the second most frequent pathological condition in the sample.

For our study, we performed statistical analyses (Student's *t*-test, Mann–Whitney *U*, chi-squared test, and Fisher's exact test) to compare variables between sexes. We also applied a univariate and multivariate logistic model to identify variables related to reduction in life-space mobility.

We selected life space as the dependent variable and self-reported joint disease as the independent variable.

The independent variables were divided, according to how they were grouped in the SABE Colombia study, into different categories of determinants: biological (sociodemographic factors), health conditions (self-reported joint disease, arthritis-arthrosis, pain and management of joint disease, other chronic noncommunicable diseases), and geriatric syndromes (dependence for basic and instrumental activities of daily living, malnutrition, frailty, and depression), as described below:

- Life space was assessed through the life space questionnaire, which characterizes the respondent's usual pattern of individual mobility during the month preceding the assessment date, determining how far a person moves and the trips he/she makes, stratified into 5 levels: *Level 0* (confined to the bedroom), *Level 1* (other rooms in the house other than the room where you sleep), *Level 2* (outside your home but only to the entrance of your home; includes terrace, front yard, patio, hallway of your apartment), *Level 3*

(moves in places in your own neighborhood other than your yard or your apartment building); *Level 4* (places outside your neighborhood but only within the city); and *Level 5* (places outside your city).[1,2]

- Biological determinants (sociodemographic): age in completed years at the time of the interview; sex; region of origin, according to the subregions into which Colombia is divided following the guidelines of the National Department of Statistics: Atlantic, Pacific, Central, Eastern, Amazon, Orinoco, and Bogota; and area of origin, according to the location within each municipality (municipal capital, population center, or dispersed rural);[3,4] monthly income as a function of the legal minimum wage (at the time of the survey, COP$ 644.350/ US$ 322); and the highest educational level attained by the respondent (none, preschool, primary, secondary, technical or technological, higher, or postgraduate).[5]
- Determinants of health conditions: self-reported joint disease, identified through the question "Did a doctor or nurse ever tell you that you have arthritis, osteoarthritis, or rheumatism?" (defined as follows: arthritis, inflammation of a joint; osteoarthritis, degenerative joint disease with cartilage wear; rheumatism, medical problems affecting the joints, such as pain; joint disease management and chronic noncommunicable diseases).[6,8]
- Determinants of geriatric syndromes: functionality for basic activities of daily living (BADL), functionality for instrumental activities of daily living (IADL), frailty, malnutrition, self-perceived health, and depression.

Functionality for BADL was assessed with the Barthel Index and categorized into degrees of dependency (< 20 points, totally dependent; 20 to 35 points, severely dependent; 40 to 55 points, moderately dependent; 60 to 95 points, slightly dependent; 100 points, independent).[9] Functionality for instrumental activities of daily living (IADL), according to the modified Lawton scale, was categorized dichotomously as dependent (either requires help or is unable) or independent (does not require any help) for any of the following activities: financial management, daily shopping, meal preparation, use of public transportation, use of the telephone, and taking medication.[5]

Frailty was defined as the respondent meeting 3 or more of the Fried criteria as modified by Alvarado [11] (unintentional weight loss in the last 3 months, grip strength adjusted for sex and BMI, self-reported physical fatigue or exhaustion based on two questions of the geriatric depression scale, difficulty walking 400 meters, and physical activity according to the Reuben scale).

Nutritional status was evaluated with the Mini Nutritional Assessment (MNA), which identifies three categories: normal (greater than or equal to 24 points), at risk of malnutrition (17 – 23.5 points), and malnourished (less than 17 points).[8] It was also measured objectively by calculation of the Body Mass Index (BMI; body weight [kg]/height [cm]^2). Respondents were categorized by BMI as underweight (< 18.5), normal (19 to 24.9), overweight (≥ 25), or obese (type I: 30.0 – 34.9; type II: 35.0 – 39.9; type III: ≥ 40).[5,9] Height in centimeters was adjusted with the variable knee height for changes due to aging.[12,13]

Self-perception of health was evaluated in the SABE Colombia Survey with the question "How do you think your health has been in the last few days?", with a score of 1 for "very good", 2 for "good", 3 for "fair", 4 for "poor", and 5 for "very poor".[14]

Depression was evaluated by applying the Yesavage geriatric depression scale (range 0–15), with scores expressed as normal (< 6 points), mild or subsyndromal depression (6 to 9 points), and major depression (> 10 points).[15]

The variables taken from the 2015 SABE Colombia survey are listed in Table 1.

An exploratory analysis of variables was conducted using statistical tests such as Student's *t*-test, the Mann–Whitney *U* test, chi-squared test, or Fisher's exact test as appropriate. A significance level of α=0.05 was established. Univariate and multivariate logistic models were constructed to determine variables influencing reduced life space. Data processing and analysis were performed in RStudio®.

This study was approved by the Institutional Review Committee of Human Ethics of the Faculty of Health of Universidad del Valle on February 12, 2021 (opinion no. 003-2021). It was not considered to involve any risk, as it is entirely based on a secondary analysis of data already collected during the 2015 SABE survey. The original research complied with ethical standards and was authorized by the Colombian Ministry of Health and approved by Universidad del Valle.

RESULTS

We analyzed a total of 23 694 records of older adults who were able to complete the survey, with an actual nationwide response rate of 66.00% across 244 municipalities. Of these respondents, 6158 reported having joint disease, for an overall prevalence of 25.99% (95%CI 24.53–28.81%). The groups were distributed by life space as follows: confined to bedroom, 3.73% (n=230); confined to home, 10.31% (n=635); in the neighborhood, 13.64% (n=840); around town, 49.24% (n=3042); and out of town, 23.08% (n=1421). Figure 1 shows a flow diagram chart of participants with self-reported joint disease, stratified by life space.

Sociodemographic and biological determinants

Concerning the sociodemographic determinants, the mean (SD) age was 71.83 (8.30) years. Respondents whose life space was confined to their bedroom were older (76.91 [9.63] years) than those who reported life spaces extending outside town (70.39 [7.53] years). Overall, 74.36% (n = 4579) of the study population was female, of whom 78.26% (n = 506) were housebound. Regarding other sociodemographic determinants, people with an educational attainment greater than primary school were more frequently found to have life spaces extending "around town" and "out of town". Respondents with joint disease were more frequently in the socioeconomic strata 1 and 2. Just over half had completed basic (primary) education (59.69%), nearly one in five did not report any formal education whatsoever (19.42%), and only 6.10% of people reported formal schooling past the secondary education level. Among the latter group, life spaces frequently extended to the neighborhood or farther.

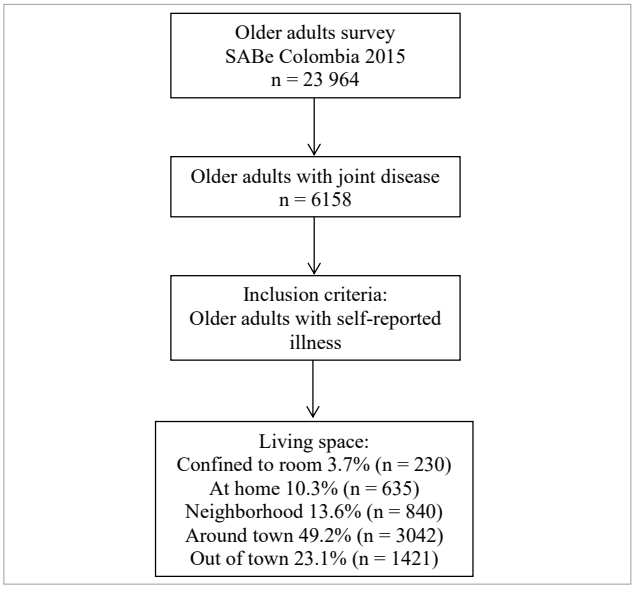

FIGURE 1. Flowchart of participants of the SABE Colombia 2016 survey with self-reported joint disease.

TABLE 1. Sociodemographic and biological determinants, SABE Colombia 2015 survey.

Variables	Confined to room	Confined to home	Neighborhood	Around town	Out of town	Total	p-value
n (%)	230 (3.73)	635 (10.31)	840 (13.64)	3032 (49.24)	1421 (23.08)	6158 (100)	
Sex and age – n (%)							
Male	50 (21.74)	129 (20.31)	188 (22.38)	805 (26.55)	407 (28.64)	1579 (25.64)	0.000
Female	180 (78.26)	506 (79.69)	652 (77.62)	2227 (73.45)	1014 (71.36)	4579 (74.36)	
Age, mean (SD)	76.91 (9.63)	76.48 (9.51)	72.43 (8.10)	70.86 (7.84)	70.39 (7.53)	71.83 (8.30)	0.000
BMI – n (%)							
BMI, mean (SD)	26.66 (5.47)	27.06 (5.60)	27.42 (5.23)	27.54 (5.09)	27.69 (4.81)	27.53 (5.10)	0.000
Underweight	27 (11.74)	79 (12.44)	99 (11.79)	329 (10.85)	135 (9.50)	669 (10.86)	
Overweight	28 (12.27)	126 (19.84)	194 (23.1)	766 (25.26)	356 (25.05)	1470 (23.87)	0.001
Obese	36 (15.65)	88 (13.86)	155 (18.45)	581 (19.16)	318 (22.38)	1178 (19.13)	
Socioeconomic stratum – n (%)							
1 and 2	181 (78.70)	503 (79.21)	702 (83.57)	2344 (77.31)	1070 (75.30)	4800 (77.95)	
3 and 4	47 (20.43)	131 (20.63)	138 (16.43)	664 (21.90)	329 (23.15)	1309 (21.26)	0.000
5 and 6	2 (0.87)	1 (0.16)	0 (0.00)	24 (0.79)	22 (1.55)	49 (0.80)	
Area of origin – n (%)							
Municipal seat	177 (76.96)	448 (70.55)	552 (65.71)	2351 (77.54)	1026 (72.2)	4554 (73.95)	
Populated center	16 (6.96)	38 (5.98)	80 (9.52)	182 (6.00)	124 (8.73)	440 (7.15)	0.000
Dispersed rural	37 (16.09)	149 (23.46)	208 (24.76)	499 (16.46)	271 (19.07)	1164 (18.90)	
Monthly income in relation to minimum wage – n (%)							
≤1 × MW	10 (4.35)	40 (6.30)	41 (4.88)	298 (9.83)	231 (16.26)	620 (10.07)	
1–3 × MW	158 (68.70)	454 (71.50)	614 (73.10)	2138 (70.51)	950 (66.85)	4314 (70.06)	0.001
>3 × MW	0 (0.00)	5 (0.79)	0 (0.00)	59 (1.95)	50 (3.52)	114 (1.85)	
Level of education – n (%)							
None	68 (29.57)	172 (27.09)	229 (27.26)	541 (17.84)	186 (13.09)	1196 (19.42)	
Primary	137 (59.57)	371 (58.43)	497 (59.17)	1846 (60.88)	825 (58.06)	3676 (59.69)	
Secondary	22 (9.57)	71 (11.18)	96 (11.43)	452 (14.91)	248 (17.45)	889 (14.44)	0.000
Technical	1 (0.43)	10 (1.57)	12 (1.43)	99 (3.27)	67 (4.71)	189 (3.07)	
Higher	0 (0.00)	4 (0.63)	4 (0.48)	60 (1.98)	53 (3.73)	121 (1.96)	
Postgraduate	0 (0.00)	0 (0.00)	0 (0.00)	25 (0.82)	38 (2.67)	63 (1.02)	

SD: standard deviation; BMI: body mass index, MW: minimum wage.

Regarding biological determinants, the mean (SD) BMI of respondents with osteoarthritis was 27.50 (5.09) kg/m^2, with a significant difference between groups according to their LSA (p = 0.00). The prevalence of underweight, overweight, and obesity in the overall population was 10.86, 23.87, and 19.13% respectively. People with a BMI classified as normal weight, overweight, or obesity were more likely to report life spaces extending outside the home. Regarding comorbid chronic noncommunicable diseases in respondents with joint disease, the most common were high blood pressure (62.53%), diabetes mellitus (19.48%), and osteoporosis (26.73%), without any statistically significant association with any LSA. All information on sociodemographic and biological determinants is available in Tables 1 and 2.

Determinants of health conditions

Self-perception of health was evaluated in the last 30 days preceding the survey. Overall, 43.49% of respondents rated their health as fair and 11.08% as poor or very poor. Self-reported perception of fair health was constant in all groups of people regardless of the reported life space, being more frequent in those with life spaces consistent with greater independence. People with joint disease and self-reported very good or good health more often reported that their life spaces extended to

TABLE 2. Determinants of health, SABE Colombia 2015 survey.

Variables	Confined to room	Confined to home	Neighborhood	Around town	Out of town	Total	p-value
Chronic noncommunicable diseases – n (%)							
High blood pressure	163 (70.87)	415 (65.35)	522 (62.14)	1885 (62.17)	866 (60.94)	3851 (62.53)	0.021
Diabetes mellitus	45 (19.57)	126 (19.84)	171 (20.36)	569 (18.77)	289 (20.34)	1200 (19.50)	0.713
Osteoporosis	59 (25.65)	192 (30.24)	191 (22.74)	813 (26.81)	391 (27.52)	1646 (26.73)	0.020
Self-perception of health – n (%)							
Very good	2 (0.87)	5 (0.79)	8 (0.95)	61 (2.01)	36 (2.53)	112 (1.82)	0.000
Fair	80 (34.78)	225 (35.43)	349 (41.55)	1391 (45.88)	633 (44.55)	2678 (43.49)	
Poor	23 (10.00)	73 (11.50)	88 (10.48)	301 (9.90)	114 (8.02)	599 (9.73)	
Very poor	7 (3.04)	4 (0.63)	11 (1.31)	45 (1.48)	16 (1.13)	83 (1.35)	
Comparison with contemporaries – n (%)							
Better	55 (23.91)	166 (26.14)	241 (28.69)	1141 (37.63)	624 (43.91)	2227 (36.16)	0.000
Worse	35 (15.22)	73 (11.50)	125 (14.88)	405 (13.36)	147 (10.34)	785 (12.75)	
Physical activity at least 3 times a week – n (%)							
Yes	15 (6.52)	48 (7.56)	82 (9.76)	503 (16.59)	312 (21.96)	960 (15.59)	0.000
No	215 (93.48)	587 (92.44)	758 (90.24)	2529 (83.41)	1109 (78.04)	5198 (84.41)	
Participation in social groups – n (%)							
Sports groups	6 (2.61)	4 (0.63)	10 (1.19)	87 (2.87)	42 (2.96)	149 (2.42)	0.000
Health groups	4 (1.74)	6 (0.94)	13 (1.55)	83 (2.74)	34 (2.39)	140 (2.27)	0.029
Social groups	74 (32.17)	218 (34.33)	352 (41.90)	1354 (44.66)	723 (50.88)	2721 (44.19)	0.000
Reasons why you do not participate – n (%)							
Not interested	60 (26.09)	159 (25.04)	215 (25.60)	769 (25.36)	317 (22.31)	1520 (24.68)	0.000
No time	9 (3.91)	32 (5.04)	65 (7.74)	270 (8.91)	133 (9.36)	509 (8.27)	
Family does not allow it	2 (0.87)	12 (1.89)	15 (1.79)	28 (0.92)	11 (0.77)	68 (1.10)	
Occupations prevent it	9 (3.91)	18 (2.83)	34 (4.05)	132 (4.35)	61 (4.29)	254 (4.12)	
Age	70 (30.43)	172 (27.09)	131 (15.60)	333 (10.98)	114 (8.02)	820 (13.32)	
Joint pain report – n (%)							
Joint pain last month	176 (76.52)	546 (85.98)	695 (82.74)	2501 (82.49)	1183 (83.25)	5101 (82.84)	0.019
In the past 12 months, have you seen a doctor specifically for your arthritis, rheumatism, or osteoarthritis?	131 (56.96)	395 (62.20)	498 (59.29)	1857 (61.25)	882 (62.07)	3763 (61.11)	0.454
In relation to your arthritis or osteoarthritis, are you taking any medication?	117 (50.87)	356 (56.06)	413 (49.17)	1557 (51.35)	715 (50.32)	3158 (51.28)	0.090
Have you had any surgery?	11 (4.78)	23 (3.62)	32 (3.81)	171 (5.64)	86 (6.05)	323 (5.25)	0.039
Have you gone to physical or occupational therapy?	17 (7.39)	65 (10.24)	75 (8.93)	394 (12.99)	222 (15.62)	773 (12.55)	0.000

their neighborhood. When they were asked how they perceived their health as compared to the health of their peers, people who reported feeling better had larger life spaces; the frequency of self-reported health better than that of one's peers increased to 43.49% among those able to travel out of town, whereas those who considered their health worse than their peers' were more often confined to their room.

Of the survey respondents with joint disease, 82.84% reported joint pain in the preceding month, and those who had attended physical or occupational therapy had life spaces extending to their neighborhood (p = 0.00). Although this was not statistically significant, more than half of respondents had to see a doctor or take medication, regardless of self-reported life-space mobility. Eighty-six percent of those confined at home reported joint pain in the preceding month, and 61.11% attended a health facility for an OA-related assessment.

Older adults with joint disease reported low participation in sports and health groups as opposed to those who reported participating more frequently in social groups, such participation was higher as life-space mobility improved, from 32.17% in respondents confined to their bedroom to 50.88% in those who reported leaving town.

Just over half of respondents who did not participate in social groups reported that their life space was confined to their home, and just over half of housebound respondents reported not participating in groups because of their age. Those who reported not participating in social activities also reported other reasons, such as lacking interest (24.68%), advanced age (13.32%), and not having time for such activities (8.27%).

All information on determinants of health is available in Table 2.

Functional capacity and geriatric syndromes

Just over 81.00% of respondents reported being independent or slightly dependent on basic activities of daily living (BADL). Most independent and slightly dependent respondents reported life spaces extending outside their neighborhood; however, 18.27% of slightly dependent people reported being housebound. About 15.74% of respondents reported moderate dependence for BADL; just over one third of these were housebound, and another third were confined to their bedroom. Two-thirds of people with self-reported health reported being independent for instrumental activities of daily living (IADL), especially those reporting life-space mobility extending to their neighborhood or farther. People who reported dependence for IADL consequently had reduced life spaces.

When assessing the affective domain with the Yesavage geriatric depression scale, almost half of respondents met the criteria for major depression; of these, one in three reported having their life space constrained to their home, with frequency increasing as the life space was larger. A similar phenomenon was found among respondents who met screening criteria for mild depression. Numeric findings did not have statistical significance (Table 3).

TABLE 3. Functional capacity and geriatric syndromes, SABE Colombia 2015 survey.

Variables	Confined to room	Confined to home	Neighborhood	Around town	Out of town	Total	p-value
Instrumental activities of daily living, Lawton scale – n (%)							
Dependent	141 (61.30)	372 (58.58)	349 (41.55)	949 (31.30)	354 (24.91)	2165 (35.16)	0.000
Independent	89 (38.70)	263 (41.42)	491 (58.45)	2083 (68.70)	1067 (75.09)	3993 (64.84)	
Basic activities of daily living, Barthel scale – n (%)							
Totally dependent	15 (6.52)	10 (1.57)	2 (0.24)	9 (0.30)	3 (0.21)	39 (0.63)	
Severely dependent	28 (12.17)	40 (6.30)	7 (0.83)	39 (1.29)	10 (0.70)	124 (2.01)	
Moderately dependent	67 (29.13)	199 (31.34)	146 (17.38)	399 (13.16)	158 (11.12)	969 (15.74)	0.000
Slightly dependent	22 (9.57)	116 (18.27)	160 (19.05)	397 (13.0.9)	188 (13.23)	883 (14.34)	
Independent	98 (42.61)	270 (42.52)	525 (62.50)	2188 (72.16)	1062 (74.74)	4143 (67.28)	
Depression, Yesavage geriatric scale – n (%)							
None	8 (3.48)	26 (4.09)	24 (2.86)	130 (4.29)	51 (3.59)	239 (3.88)	
Mild depression	62 (26.96)	156 (24.57)	230 (27.38)	989 (32.62)	467 (32.86)	1904 (30.92)	0.159
Major depression	74 (32.17)	232 (36.54)	400 (47.62)	1443 (47.59)	730 (51.37)	2879 (46.75)	
Nutritional status – n (%)							
Malnutrition	55 (23.91)	138 (21.73)	225 (26.79)	793 (26.15)	385 (27.09)	1596 (25.92)	0.141
Risk of malnutrition	82 (35.65)	243 (38.27)	373 (44.40)	1613 (53.20)	782 (55.03)	3093 (50.23)	
Frailty – n(%)							
Frail	92 (40.0)	181 (28.50)	151 (17.98)	353 (11.64)	146 (10.27)	923 (14.99)	0.000

When frailty was evaluated with Fried's criteria, the frequency of respondents with the frailty phenotype who were confined to their bedroom was more than double (40.00%) that of respondents whose life space extended to their neighborhood (17.98%). The frequency of frailty in people with better life-space mobility (around town and out of town) was similar at 11.64% and 10.27% respectively, and consistent with the prevalence of frailty in the general population of 2015 SABE Colombia respondents. No statistically significant differences in nutritional status were found (Table 3).

Ordinal model

We constructed an ordinal model to determine the influences of the different explanatory variables on the levels of life-space mobility. The variable life space was divided into categories from 1 to 5, in which "confined to bedroom" corresponded to the first category and "out of town" was the fifth. To interpret the model coefficients, marginal effects were calculated in each of the life space categories. In the first category, the variables male sex, medium and high socioeconomic strata, independence for BADL, and good and very good self-perception of health had a statistically significant negative effect. According to this model, a man with joint disease would be 1.00% less likely to belong to this category compared to women who reported joint disease in the SABE survey. Likewise, the likelihood that an individual who reported belonging to medium or high socioeconomic strata would have their life space confined to their bedroom is 0.62% and 2.17% lower when compared to individuals who reported belonging to socioeconomic strata 1 and 2. Respondents who were independent for BADL were also less likely to have their life space confined to their bedroom. In addition, good or very good self-perception of health decreased the likelihood of having a reduced life space by 0.76% to 1.20%, respectively, compared to poor self-perception of health. Conversely, frailty increased the likelihood of reduced life-space mobility: compared to nonfrail peers, respondents with this geriatric syndrome were 0.69% more likely to be confined to their bedroom (Table 4).

As for the fifth category (life space extending out of town), variables such as age and being a smoker significantly reduced the likelihood of belonging to this category. For each complete year of age, the likelihood of having an unlimited life space was decreased by 0.42%; current smokers

TABLE 4. Living space category "confined to room", SABE Colombia 2015 survey.

Living space	dy/dx	SD	Err	p-value	95%CI
Confined to room					
Socioeconomic stratum (ref: low – 1 and 2)					
Medium (3 and 4)	-0.01	0.00	-3.07	0.002	(-0.01; -0.00)
High (5 and 6)	-0.02	0.00	-6.96	0.000	(-0.03; -0.016)
Male sex	-0.01	0.00	-5.03	0.000	(-0.01; -0.01)
Activities of daily living	-0.01	0.00	-3.04	0.002	(-0.01; -0.00)
Dependency for activities of daily living, Barthel scale (ref: severely dependent)					
Moderately dependent	0.01	0.02	0.39	0.700	(-0.04; 0.06)
Slightly dependent	0.01	0.02	0.32	0.753	(0.04; 0.06)
Independent	0.04	0.02	0.17	0.868	(-0.04; 0.05)
Body weight (ref: underweight)					
Normal	-0.01	0.00	-1.93	0.054	(-0.01; 0.00)
Overweight	-0.01	0.00	-2.28	0.023	(-0.02; -0.00)
Obese	-0.01	0.00	-2.11	0.034	(-0.02; -0.00)
Depression (ref: mild depression)					
No depression	-0.00	0.00	-0.33	0.744	(-0.01; 0.01)
Major depression	0.00	0.00	0.04	0.971	(-0.00; 0.00)
Frail (ref: nonfrail)	0.01	0.00	1.68	0.093	(-0.00; 0.02)
Self-perception of health (ref: poor and very poor)					
Fair	-0.01	0.00	-2.22	0.027	(-0.01; -0.00)
Very good and good	-0.012	0.00	-3.34	0.001	(-0.02; -0.00)
Social group participation	-0.01	0.00	-3.66	0.000	(-0.01; -0.00)
Age	0.00	0.00	4.89	0.000	(0.00; 0.00)

Ref: reference; dy/dx: marginal changes; SD: standard deviation; Err[1]: error; CI: confidence interval.

had their likelihood reduced by 5.01% compared to former smokers. Conversely, male sex, reporting independence for IADL, belonging to medium and high socioeconomic strata, having a good self-perception of health, and belonging to a social group increased the probability of having an unlimited life space. As shown in Table 5, being male increased the probability of one's life space extending out of town by 6.68%. Comparable situations occurred in those who reported independence for IADL (probability of having unlimited life space increased by 4.35%).

In the middle and high socioeconomic strata, the likelihood of having one's life-space mobility extend out of town increased 3.85% and 26.76% respectively, when compared to lower strata. Better health self-perception increased this likelihood between 3.68% to 6.37%, compared to individuals who endorsed poor health self-perceptions. Similar behavior was seen in those who reported belonging to a social group, as the probability of being in this category of life-space mobility was 3.96% (Table 4).

DISCUSSION

Osteoarthritis is a heterogeneous group of conditions affecting joints and peri-articular tissues, with consequent joint pain progressing in intensity from moderate and incidental to severe and chronic. Pain impacts functional capacity due to limited mobility, up to the point of chronic disability, especially in older adults. In the 2015 SABE Colombia survey, 25.99% of the participants reported joint disease. However, this survey did not record the most affected joint location and did not distinguish osteoarthritis from other forms of arthritis as a disease. The survey also could not associate subsequent functional impairment, especially of mobility and social participation (i.e., life space) with joint disease; therefore, we conducted the present study to evaluate the potential association between life space and self-reported joint disease among respondents of 2015 SABE Colombia. By evaluating the sociodemographic determinants, we were able to establish that women have a reduced life space, and that older age increases the likelihood of having a limited

TABLE 5. Living space category "out of town", SABE Colombia 2015 survey.

Living space	dy/dx	Std.	Err.	p-value	CI95%
Out of town					
Socioeconomic stratum (ref: low – 1 and 2)					
Medium (3 and 4)	.0385331	.0132472	2.91	0.004	(.0125691; .0644971)
High (5 and 6)	.267593	.0831387	3.22	0.001	(.1046442; .4305418)
Male sex	.0667971	.0136938	4.88	0.000	(.0399577; .0936364)
Activities of daily living	.0435396	.0127777	3.41	0.001	(.0184958; .0685835)
Dependency for activities of daily living, Barthel scale (ref: severely dependent)					
Moderately dependent	-.0557155	.1812168	-0.31	0.758	(-.4108938; .2994629)
Slightly dependent	-.0472194	.181253	-0.26	0.794	(-.4024687; .3080299)
Independent	-.0269718	.1812173	-0.15	0.882	(-.3821512; .3282076)
Body weight (ref: underweight)					
Normal	.0346337	.0165028	2.10	0.036	(.0022888; .0669786)
Overweight	.044387	.0179296	2.48	0.013	(.0092456; .0795284)
Obese	.0401464	.0174183	2.30	0.021	(.0060071; .0742857)
Depression (ref: mild depression)					
No depression	.0083067	.0260672	0.32	0.750	(-.0427841; .0593975)
Major depression	-.0003886	.0108283	-0.04	0.971	(-.0216117; .0208346)
Frailty (ref: nonfrail)					
Frail	-.0355284	.0187938	-1.89	0.059	(-.0723636; .0013068)
Self-perception of health (ref: poor and very poor)					
Fair	.0368056	.0148934	2.47	0.013	(.0076149; .0659962)
Very good and good	.0637279	.01639	3.89	0.000	(.0316042; .0958517)
Social group participation	.0396199	.0104522	3.79	0.000	(.019134; .0601057)
Cigarette smoking (ref: former smokers)					
Smoker	-.0509668	.0196886	-2.59	0.010	(-.0895558; -.0123778)
Never smoked	-.0055682	.0117599	-0.47	0.636	(-.0286171; .0174807)
Age	-.0041947	.0007886	-5.32	0.000	(-.0057403; -.0026491)

Ref: reference; dy/dx: marginal changes; Std: standard deviation; Err: error; CI: confidence index.

life space increase. Every year lived decreases the likelihood of having an unlimited life space by 0.42%. These findings could be explained by the fact that women live longer than men and are more likely to experience osteoarticular diseases, such as osteoarthritis, arthritis, and osteoporosis, which limit their physical function and, as a result, their life-space mobility.[10,12] Conversely, belonging to middle and high socioeconomic strata, as well as having a higher educational level, decreased the probability of being confined and increased that of having an unlimited life space, as noted by Al Shin et al. who found that a high level of education (≥ 12 years) was associated with higher LSA scores,[7] or Quimbaya and Curcio, who found that high educational level and income were associated with life spaces that allowed older adults to move around the city.[10] It stands to reason that having a low socioeconomic level means fewer economic resources to access means of transportation (own, public transportation, or vehicles for hire), which could act as a barrier to traveling away from home and, thus, reduce life-space mobility.[10]

For this study, people with joint disease who were independent or mildly dependent for BADL, as well as independent for IADL, reported that their life spaces extended outside their neighborhood, as identified by Suzuki et al.[16] among Japanese older adults attending an orthopedic clinic, where having greater autonomy for IADL was associated with a larger life space. However, nearly 20 percent of people with mild dependence reported being homebound, consistent with previous data, such as from NHANES III, in which 25 percent of people with osteoarthritis required help with activities of daily living. Another longitudinal survey in the same country reported how osteoarthritis affects the mobility of the lower limbs to the point of limiting walking at least 3 blocks in the same city or climbing stairs,[6] situations that can be associated with a reduced life space.

Among the determinants of living conditions, it was evident that a good self-perception of health and belonging to social groups were associated with better life-space mobility in adults who reported having joint disease.[16] However, there are few studies available to determine the reasons for this association.

It has been recognized that depressive symptoms in older persons are related to limited life space.[17,18] In this study, depression did not have a significant effect on life-space mobility. However, it is striking that two-thirds of people with joint disease reported depressive symptoms consistent with major depression, which highlights a need for systematic active screening in primary care of the older population, especially after the COVID-19 pandemic, considering that isolation and social distancing measures can affect quality of life and life-space mobility, as observed in a previous study by Rantanen et al.[19]

As in previous studies with people with self-reported joint disease, the frailty phenotype was associated with a more limited life space and lower likelihood of leaving the city.[13] This could be explained by the fact that frail older adults are more likely to have comorbidities and disabilities that can limit mobility and social participation.[14,15]

This study sought to ascertain the association between living space and self-reported joint disease in Colombia, using data from a 2015 nationwide survey. This was the first study in our country to do so and, as an added advantage, included known determinants of health according to how they were addressed in the SABE survey. As disadvantages, we consider it important to highlight that SABE Colombia was a self-report survey, so the diagnosis of osteoarthritis and the affected joints were not confirmed clinically. According to previous studies, the location of joint involvement, especially when the knees and hips are affected, plays an important role in compromising independence for basic or instrumental activities of daily living and functional capacity.[9,18]

CONCLUSION

In this study, we used data from the SABE Colombia 2015 survey to examine the relationship between life space and self-reported joint disease. Factors such as older age, being female, a lower Lawton scale score, and frailty were found to be associated with increased risk of having a reduced life space. On the other hand, being male, having a higher socioeconomic status, a higher educational level, good self-perception of health, and belonging to social groups were related to a greater probability of having an unlimited life space. These findings highlight the importance of early detection and intervention on these factors to avoid a reduction in life space, which can have a negative impact on the quality of life of older adults.

This is the first study in Colombia to analyze the association between life-space mobility and self-reported joint disease. We hope that it will encourage health personnel, researchers, and healthcare decision-makers to conduct follow-up studies on this topic, especially in the wake of the COVID-19 pandemic, which severely limited the life space of our older adults.

DECLARATIONS

Conflict of interest
The authors declare no conflicts of interest.

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Author´s contribution
BGG: conceptualization, data curation, formal analysis, investigation, methodology, project administration, writing – original draft. GAC: formal analysis, funding acquisition, investigation, methodology, project administration, supervision. BCT: software, visualization, validation. LWM: software, visualization, validation. LCVM: investigation, writing – review & editing.

Ethical approval and informed consent
The ethical approval was given by the medical ethics committee of Del Valle University.

Data availability statement
The data that support the findings of this study are available from Colombian SABE 2015 survey , and the analysis of this study will be share by the corresponding author upon reasonable request.

Reporting guidelines
We declare that we comply with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement.

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