

Adaptive behavior in older adults according to age and schooling

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Abstract

Adaptability is an important aspect of human behavior that determines the successful accomplishment of a task. The objective to study was to compare the patterns of Adaptive Behavior (AB) in older adults of both sexes according to age range and schooling. A cross-sectional descriptive (comparative) study was designed on 65 older adults (30 males and 35 females) of the Maule region (Chile). The sample was non-probabilistic. The age range was 70 to 85 years. Weight and height were evaluated and Body Mass Index (BMI) was calculated. A scale of self-perception of AB in older adults was applied. BMI in males was $29.5 \pm 3.9 \text{ kg/m}^2$ and in females was $28.4 \pm 5.0 \text{ kg/m}^2$. The AB values in males were 150.0 ± 13.0 points and in females 57.0 ± 15.0 points ($p < 0.05$). The values of AB by schooling were: In males: High School Education 142.3 ± 11.5 points and Secondary Education 151.6 ± 14.6 points ($p < 0.05$). In females: High School 149.6 ± 15.2 points and Secondary Education 159.8 ± 15.1 points ($p < 0.05$). This study found that females performed better in AB, specifically in self-care, home life, self-direction, and socialization than their male counterparts; in addition, older adults of both sexes with higher education had better scores in AB than those with secondary education.

Key Words: adaptive behavior, educational level, older adults, Chile.

Eur J Transl Myol 35 (4) 13518, 2025 doi: 10.4081/ejtm.2025.13518

Adaptive Behavior (AB) is defined as the set of conceptual, social, and practical skills that have been learned and performed by people throughout their daily lives.¹ Understanding the construct of adaptive behavior in older adults has to do with communication, safety, leisure, use of recreational spaces, self-care, self-direction, home life, functional skills, socialization, health, and ability to function.²

These skills allow us to meet social expectations according to our age group.³ Adaptability is an important aspect of human behavior, which often determines who will, and who will not, successfully perform a given task.⁴

In fact, old age is characterized by the loss of physical and cognitive functions, deterioration of quality of life, and increased prevalence of chronic and metabolic diseases,⁵ among others, which affect effective adaptation as human beings move towards senescence.

As adults age, they respond more slowly to simple stimuli and take longer to learn new behaviors, which potentially decreases their adaptive capacity.⁴

Several studies have reported that older adults underestimate their health status, so they are more likely to show adaptive behavior related to reductions in mobility,⁶ lifestyle deterioration, frailty, prevalence of sedentary lifestyle, musculoskeletal disorders, are some of the factors that predominate during old age and cause serious consequences for overall health and well-being.^{6,7}

These factors lead older adults to high dependency rates and the transformation of health and social care to adapt to new behaviors during old age,⁸ so studying AB according to age and schooling in older adults in a region of Chile is highly relevant.

In fact, some previous studies have reported that a higher level of education, including social and material resources, reflect better favorable experiences across the lifespan,^{9,10} even, those with low educational and socioeconomic status experience poorer psychosocial functioning than their highly educated counterparts.¹¹

Therefore, this study aimed to compare patterns of AB in older adults of both sexes according to age range and schooling.

Materials and Methods

Type of study and sample

A descriptive (comparative) study was designed on 65 older adults (30 males and 35 females) from the Maule region (Chile). The sample was non-probabilistic (accidental). The age range was 70 to 85 years.

All volunteers participated in a physical activity project organized by the municipality of Talca, Maule region (Chile) during the year 2023. All those who authorized informed consent and those who were self-sufficient and did not need assistance to reach the municipality's program were included in the study. Adults who were not in the established age range and those who had difficulty in moving, listening, reading, and moving alone were excluded. The study conducted was approved by the ethics committee of the Universidad Católica del Maule (Chile) (UCM 105-2022).

Techniques and procedures

Data collection was carried out in the facilities of the National Sports Institute IND (closed environment). Data collection was organized in two stages: The anthropometric evaluation and the application of the AB survey.

Anthropometric measurements were collected according to the recommendations of the International Society for the Advancement of Kineanthropometry,¹² Body weight was assessed using a digital scale (SECA, BMI 804, Hamburg, Germany) with an accuracy of 0.1 kg. Height was measured according to the Frankfurt plane using a portable stadiometer (Seca 216, GmbH and Co. KG, Hamburg, Germany) with an accuracy of 0.1 mm. Body Mass Index BMI was calculated using the formula: [BMI = weight (kg)/height (m)²].

AB was assessed using the survey technique. The instrument used was the AB Self-Perception Scale for Chilean females aged 60 to 88 years proposed by Gómez-Campos *et al.*⁸ The scale presented some sociodemographic variables such as age, sex, occupation, schooling (secondary and higher education), and type of housing. This scale in the original study showed a Cronbach's Alpha of $r = 0.83$, however, in this study, it showed $r = 0.87$.

The scale was applied in a traditional pencil and paper form. It was administered by two of the researchers. The older adults were previously informed about the contents of the scale and the time to respond (20 to 30 minutes approximately). At all times, the interviewers were together with the volunteers to resolve any type of doubt and/or difficulty.

Statistics

The normal distribution of the data was verified by Shapiro-Wilk. All data were normal. Subsequently, descriptive statistical values (mean, standard deviation, range) were calculated. Differences between sexes were verified through the t-test for independent samples. Differences between age categories were verified by one-way ANOVA and Tukey's test of specificity. The effect size of the differences was determined by Cohen's d test.¹³ The effect size was considered to be no effect (Cohen's $d < 0.20$),

small (Cohen's $d = 0.21$ to 0.49), medium (Cohen's $d = 0.50$ to 0.79), and large (Cohen's $d > 0.80$). All calculations were performed in Excel spreadsheets and SPSS 18.0.

Results

The anthropometric variables and AB dimensions of older adults of both sexes are observed in Table 1. There were significant differences between both sexes in body weight, height, home life, and self-care ($p < 0.05$). Males presented higher weight and height than females (median effect size $d = 0.54$ and 0.74), however, females presented higher values in the home life and personal care dimension than their male counterparts (effect size $d = -0.46$ and -0.48). There were no differences between the sexes in age, BMI, and the other AB dimensions ($p > 0.05$).

The AB values and anthropometric measurements according to age ranges are shown in Table 2. In both sexes, we verified small effect sizes in the anthropometric measures and the 11 dimensions of AB (Cohen's $d < 0.45$). The mean values and deviations remained relatively stable throughout the three age ranges, except for body weight, where the effect size between the 70 to 75 years and 80 to 85 years categories was median (Cohen's $d = 0.59$).

The comparisons of AB and BMI according to the schooling of older adults of both sexes are shown in Figure 1. For example, males with secondary education presented 142.3 ± 11.5 points with those with higher education 151.6 ± 14.6 points ($p < 0.05$), while females with secondary education obtained 149.4 ± 15.2 points and with higher education 159.8 ± 15.1 points ($p < 0.05$).

Concerning BMI there were no differences in both sexes, in males the BMI with middle education was $29.5 \pm 2.3 \text{ kg/m}^2$, and with higher education was $29.5 \pm 5.1 \text{ kg/m}^2$ ($p > 0.05$), and in women with middle education was $29.4 \pm 4.5 \text{ kg/m}^2$ and with higher education was $28.0 \pm 5.3 \text{ kg/m}^2$ ($p > 0.05$).

Discussion

This study aimed to compare the AB patterns in older adults of both sexes according to age range and schooling. The results indicate that women presented a better performance in four of the AB dimensions (self-care, home life, self-direction, and socialization) compared to males. In addition, older adults of both sexes categorized with higher education evidenced better performance on the AB relative to their peers with secondary education.

In general, it is widely known that experiences acquired in older adults throughout life as they age, e.g., ways of coping with the environment, management of economic and social resources, relationships, and support systems could profoundly affect longevity and quality of life in older adults.¹⁴

In fact, in this study, females reflected better performance in self-care, home life, self-direction, and socialization, which evidences that gender seems to play a relevant role in AB. For example, self-care refers to the rational way, a positive attitude to maintain health and constancy during

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life,¹⁵ especially with basic hygiene (includes oral hygiene, bathing, defecation, shaving, brushing and combing hair), which procedures are vital for health.¹⁶ Some studies have evidenced that older adults (patients with heart failure), had lower self-care behaviors than women,^{17,18} which could explain the results of this study.

Home living activities refer to activities that have to do with cleaning at home, food preparation, and use of household appliances. These activities are characterized by living independently¹⁹ and there are often different social roles by gender, where females generally manage these activities more than males, although the increase

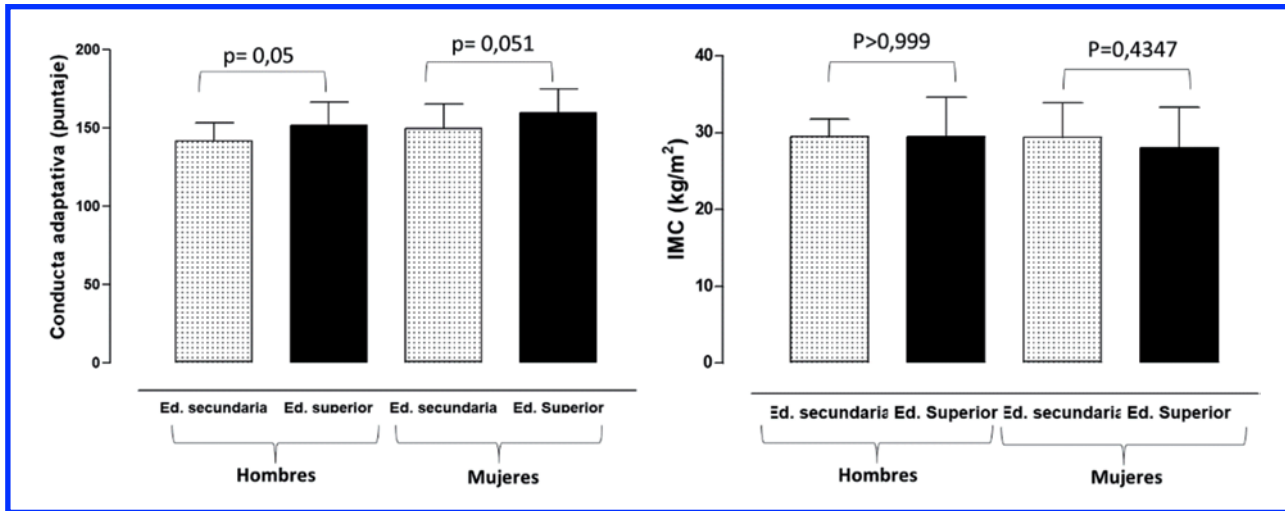


Figure 1. Comparison of AB and BMI of older adults according to schooling.

Table 1. Characteristics of the sample studied.

Variables	Males (n= 30)			Females (N= 35)			Differences	
	X	SD	CI	X	SD	CI	P	d cohen
Age (years)	77.1	3.7	75.7-78.5	77.2	3.5	76.1-78.4	0.841	-0.01
Anthropometry								
Weight (kg)	79.6	12	75.1-84.0	65	11	61.3-68.8	0.000	0.54
Height (cm)	164	6.2	161.9-166.6	152	5.3	149.6-153.3	0.000	0.74
BMI (kg/m ²)	29.5	3.9	28.0-30.9	28.4	5.0	26.7-30.1	0.332	0.12
Adaptative behaviour								
Communication	13	1.8	12.3-13.6	13.5	1.7	12.9-14.1	0.243	-0.14
Use of resources	15	1.7	14.3-15.6	15	2.1	14.3-15.7	0.896	0
Home life	12.2	2.1	11.4-12.9	14.3	1.9	13.6-14.9	0.000	-0.46
Health	10.3	1.5	9.8-10.9	10.8	1.5	10.3-11.4	0.201	-0.01
Safety	12.7	1.4	12.2-13.3	12.9	5.4	11.0-17.7	0.903	-0.02
Personal care	16.7	1.7	16.0-17.3	18.6	1.8	18.0-19.2	0.000	-0.48
Functional skills	16.8	2	16.0-17.6	15.6	2.8	14.7-16.6	0.059	0.24
Leisure	13.3	2.2	12.5-14.1	14	2.5	13.2-14.9	0.24	-0.15
Self-direction	15.4	3	14.3-16.5	16.7	1.8	16.0-17.3	0.034	-0.25
Socialization	12.1	2.3	11.2-13.0	13.1	1.4	12.7-13.6	0.026	-0.25
Functional capacity	13	1.7	12.3-13.6	12.8	1.7	12.2-13.4	0.694	0.06
Total scale (puntos)	150	13	145.7-155.1	157	15	152.2-162.3	0.049	-0.24

BMI, body mass index; X, mean; SD, standard deviation; CI, confidence interval.

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Table 2. Comparison of anthropometric means and AB values according to age ranges.

Variables	Males				Differences				Females				Differences						
	70 to 75 years (n=8)	75 to 80 years (n=16)	80 to 85 years (n=6)		70 to 75 years (n=10)	75 to 80 years (n=17)	80 to 85 years (n=8)		70 to 75 years (n=10)	75 to 80 years (n=17)	80 to 85 years (n=8)		70 to 75 years (n=10)	75 to 80 years (n=17)	80 to 85 years (n=8)		a-b	a-c	b-c
	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	a-b	a-c	b-c
Age (years)	73	1	76.9	1.3	83.1	2.1	-0.86	-0.95	-0.87	72.9	1.5	77.7	1.3	81.6	1.2	-0.86	-0.95	-0.84	
Anthropometry																			
Weight (kg)	82.6	5	80.9	14	72.1	8.8	0.07	0.59	0.35	63	8.6	65.2	13	67	8.7	-0.1	-0.23	-0.08	
Height (cm)	166	6	164	6.5	164	5.3	0.45	0.22	0.00	149	5.8	152	4.5	153	6.2	-0.27	-0.27	-0.05	
BMO (kg/m ²)	30	3	30.2	4.3	27	3.1	-0.02	0.44	0.39	28.3	4.4	28.2	6	28.8	3.7	0	-0.06	-0.06	
Adaptive behaviour																			
Communication	13.3	1	13.1	1.6	12.2	2.9	0.14	0.24	0.19	12.9	1.8	13.6	2	14	0.8	-0.18	-0.37	-0.13	
Use of resources	14.8	1	14.8	2	15.8	1.2	0.00	-0.37	-0.29	15.7	1.6	14.9	1.5	14.5	3.3	0.25	0.23	0.08	
Home life	11.6	2	12.7	2.1	11.5	2	-0.25	0.02	0.28	14.6	0.7	14.1	2.5	14.1	1.8	0.13	0.18	0.00	
Health	10.4	2	10.4	1.6	10.2	1.5	0.00	0.00	0.06	10.6	1.6	11.2	1.5	10.3	1.5	-0.19	0.09	0.29	
Safety	12.6	1	12.6	1.7	13.5	1.5	-0.07	-0.3	-0.05	11.9	2.4	12.1	2.2	15.6	1.5	-0.04	-0.23	-0.22	
Personal care	16.5	2	17.1	1.7	15.8	1.5	0.17	0.21	0.38	18.8	1.6	18.8	1.6	17.9	2.4	0.00	0.18	0.22	
Functional skills	17.6	1	16.4	2.1	16.7	2.6	0.32	0.21	-0.06	16.1	2.3	15.5	2.2	15.4	4.2	0.27	0.1	0.01	
Lesiure	12.5	1	13.7	2.5	13.5	2.2	-0.3	-0.25	0.04	14.1	3.2	14.1	2.1	13.8	2.7	0.00	0.05	0.06	
Self-direction	15.6	3	15	3.5	16	1.1	0.09	-0.09	-0.19	15.8	3	17.1	0.9	16.8	0.9	-0.28	-0.22	0.16	
Socialization	12.6	2	12.1	2.6	11.3	1.9	0.11	0.33	0.17	12.6	1.9	13.2	1	13.6	1.1	-0.19	-0.31	-0.15	
Functional sapacity	12.5	2	13.3	1.4	12.7	2.4	-0.27	-0.05	0.15	13.2	1.3	13.2	1.5	11.5	2.1	0.00	0.00	0.42	
Total scale (points)	150	10	151	15	149	11	-0.05	0.03	0.08	156	13	158	11	157	23	-0.06	-0.03	0.01	

BMI, body mass index, X, mean, SD, standard deviation.

in males participation is currently not exclusive to females.²⁰

Regarding Self-direction activities, these refer to the organization and/or coordination of their own life,²¹ for example, to the organization and planning of activities at home, such as appointments and meetings. This avoids setbacks and delays in their daily activities, which is apparently determinant for the females in this study. In general, females are more likely to implement protective behaviors towards self-care.²²

As for socialization, it is classically known for the beneficial effects of real life support.²³ These have to do with relationships with relatives, bonds of friends, group meetings, and others. Female socialization often emphasizes verbal expressiveness and focuses on warmth and intimacy seeking²⁴ and some studies have even highlighted gender differences in socialization, where higher levels of social participation are observed more in older females than males.^{25,26}

In sum, apparently, about these five dimensions of AB, the «stay alive» theory proposed by Anne Campbell is fulfilled in this study, since it is highlighted that females produce stronger self-protective reactions than men to aggressive threats because self-protection tends to have a higher AB value for females than for males,²⁷ which evidences a higher AB in favor of females.

In this study, we also verified that older adults of both sexes categorized with higher education presented elevated AB values relative to their peers with secondary education. This shows that demographic and contextual factors are closely linked to the AB of the studied older adults. Some studies related to quality of life have shown that demographic factors and educational level achieved, race/ethnicity,²⁸ and financial security have reached higher levels of quality of life in older adults.²⁹

This shows that the level of schooling (higher education) plays a relevant role among older adults, as it guarantees a better AB. These findings may provide an important point for intervention in quality of life among older adults.³⁰ In addition, schooling may have a profound impact on older adults' AB, as it may aid in the adoption of preventive behaviors during senescence. An increase in educational attainment is accompanied by increased awareness, a greater sense of responsibility, improved self-efficacy, and increased judgment and decision-making ability³¹ among older adults.

The study has some limitations, these have to do with the sample selection (non-probabilistic), as the results cannot be generalized to other sociocultural contexts. The type of cross-sectional study does not allow for cause and effect relationships, which future studies should take into consideration and project longitudinal studies. Some strengths are also highlighted, given that this study is one of the first in Chile to investigate AB in three age ranges, whose information can serve as a baseline for future comparisons, as well as for implementing possible intervention programs to improve some AB domains (self-care, home life, self-direction, and socialization).

Conclusions

In conclusion, the results indicate that women performed better in adaptive capacities (AC). Particularly in areas such as self-care, family life, self-direction and socialization, compared to their male counterparts. In addition, it was observed that older adults of both genders with higher education achieved higher scores on AC compared to those with only high school education. These findings suggest that both gender and educational level play a significant role in the development of adaptive capacities in the older population.

List of abbreviations

AC, adaptive capacities
AB, adaptive behavior
BMI, Body Mass Index

Conflict of interest

The authors declare no potential conflict of interest, and all authors confirm accuracy.

Ethics approval

The Ethics Committee of Universidad Católica del Maule approved this study (UCM 105-2022). The study is conformed with the Helsinki Declaration of 1964, as revised in 2013, concerning human and animal rights.

Informed consent

All patients participating in this study signed a written informed consent form for participating in this study.

Patient consent for publication

Written informed consent was obtained from a legally authorized representative(s) for anonymized patient information to be published in this article.

Availability of data and materials

All data generated or analyzed during this study are included in this published article.

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Submitted: 22 December 2024.

Accepted: 23 April 2025.

Early access: 8 August 2025.