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Rethinking Sociodemographic Predictors of Physical Literacy and Health Literacy in Older Females

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Abstract

Health literacy (HL) and physical literacy (PL) are theoretically influenced by sociodemographic status, but studies rarely have examined this problem in older persons from southeastern Europe. This study aimed to evaluate the associations between certain sociodemographic indices and PL and HL in older females from Croatia. The sample of participants included 47 urban females (60-83 years of age) from southern Croatia. Sociodemographic factors included age (in years), educational level (elementary school level, high school education, college/university level), and socioeconomic status (below average, average, above average). The PL and HL were evaluated via standardized questionnaires (PL - Perceived Physical Literacy Questionnaire for Adults, HL - European Health Literacy Survey Questionnaire). No significant correlation between age and total scores of HL and PL was detected (Pearson's R=0.15 and 0.09 for HL-total and PL-total, respectively, $p>0.05$). The highest level of understanding of information related to health promotion was found in college/university educated participants (F test=3.34, $p<0.05$). PL competence was highest in participants with above-average socioeconomic status (F test=4.19, $p<0.05$). Despite some significant associations, sociodemographic factors were poorly related to the HL and PL status of older women. The results highlight that PLs and HLs are likely more strongly influenced by lifelong habits, accumulated experience, and consistent exposure to health systems and information.

Keywords: *physical competence, health behavior, postmenopausal women, correlation*

Introduction

Health literacy (HL) is a critical determinant of health outcomes, particularly among older adults, who often face increasing healthcare needs and chronic disease burdens. For females aged 60 years and above, especially in southeastern Europe, adequate HL plays a central role in navigating complex health systems, understanding medication regimens, and making informed decisions about preventive and therapeutic interventions (Bobinac, 2023). Research consistently shows that low HL is associated with poorer self-rated health, higher hospitalization rates, and reduced use of preventive services in this demographic. Furthermore, age-related cognitive changes, lower educational attainment, and limited digital literacy can compound challenges in accessing and interpreting health information (Findley, 2015). Older women may also experience sociocultural barriers, such as traditional gender roles and limited autonomy, which can restrict their engagement with health education resources. Improving HL in this group is therefore vital not only for enhancing individual quality of life but also for reducing avoidable health disparities and healthcare costs.

Physical literacy (PL), which encompasses motivation, confidence, physical competence, knowledge, and understanding to value and engage in physical activity, is increasingly recognized as a cornerstone of healthy aging (Petrusevski, Morgan, MacDermid, Wilson, & Richardson, 2022). For

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older women, maintaining PL is crucial for sustaining functional independence, preventing falls, and managing chronic conditions such as osteoporosis, arthritis, and cardiovascular diseases. In southeastern Europe, where health inequalities and sedentary lifestyles among aging populations are particularly pronounced, low levels of PL can accelerate physical decline and reduce overall quality of life. Moreover, older females often face specific barriers, such as reduced access to fitness infrastructure, social isolation, and gendered expectations regarding activity levels (Kowalczyk, Nowicka, & Sas-Nowosielski, 2017). A strong foundation in PL can foster a sense of self-efficacy and body awareness, which support lifelong engagement in movement and exercise. Interventions that promote age- and gender-sensitive approaches to PL have been shown to enhance not only physical functioning but also mental well-being and social participation in older women (Jones et al., 2018). Therefore, supporting PL in this population is an essential public health goal, with benefits extending to individuals, families, and healthcare systems alike.

Identifying and understanding the sociodemographic factors associated with health and PL is essential for designing effective, targeted public health interventions. In the context of HL, these factors—such as age, education, income, marital status, and place of residence—play pivotal roles in shaping an individual's ability to access, understand, and apply health-related information (García-García & Pérez-Rivas, 2022). Older women with lower educational attainment or income often face significant barriers to HL, including limited access to healthcare information, digital tools, and formal health education (Estrela, Semedo, Roque, Ferreira, & Herdeiro, 2023). In southeastern Europe, cultural norms and gendered expectations can further restrict women's engagement with health services, particularly in rural or underserved areas. Additionally, social isolation or the absence of supportive networks may hinder comprehension and decision-making in health-related contexts.

Like with HL, identifying sociodemographic factors that influence PL is essential for promoting active aging and reducing functional decline in older women. PL is shaped not only by individual motivation and physical capability but also by broader social determinants such as education, income, the environment, and cultural expectations (Gilic, Sekulic, Munoz, Jaunig, & Carl, 2025). Women over 60 years of age who have lower socioeconomic status or limited educational backgrounds may have fewer opportunities to engage in structured physical activity or lifelong movement learning, leading to reduced physical confidence and competence. Geographic location could also play a role: those in rural or economically marginalized areas often face infrastructural limitations, such as a lack of access to safe recreational spaces or age-appropriate programs (McCreery, Penney, & Jeanes, 2024). Furthermore, gendered roles and caregiving responsibilities may discourage older women from prioritizing their own physical activity. Recognizing these sociodemographic disparities is vital for developing inclusive PL interventions that not only improve movement competence but also support autonomy, well-being, and sustained participation in active lifestyles.

Not surprisingly, studies specifically investigated the associations between sociodemographic factors and HL and PL. For example, rural residence, low wealth, and low education are associated with poor HL, which can be explained primarily by restricted health service use and, by extension, poor access to HL resources (Wongnaah, Osborne, Duodu, Seidu, & Ahinkorah, 2025). Consistently, a lower educational level was associated with lower HL, even in rural Bangladesh, Vietnam and the Netherlands (Fottrell et al., 2025; Nguyen, Giang, Bui, & Nguyen, 2025; Vlaanderen, Mughini-Gras, Bourgonje, & van der Giessen, 2024). Moreover, studies have rarely investigated the sociodemographic correlates of PL, and even if this has been the case, authors have evaluated the associations between sociodemographic factors and physical activity (as one of the PL facets).

Therefore, this study aimed to evaluate the associations between sociodemographic characteristics, HL and PL, specifically for older females from urban center. Specifically, we were particularly interested in this age group and urban environment since we intended to identify associations between the studied variables precisely. Initially, we hypothesized that sociodemographic characteristics would be significantly but weakly correlated with HL and PL.

Methods

Participants

The study sample consisted of 47 women aged 60--80 years, all of whom were residents of the city of Split, located in southern Croatia. Recognizing the strong influence of sociocultural factors on both HL and PL, we deliberately limited the geographic scope to a single urban area to minimize cultural variability among participants. The sample included women with a broad range of health statuses—from those without any diagnosed conditions to individuals managing serious health issues such as diabetes, cardiovascular diseases, and arthritis. Over 60% of women reported participation in some form of recreational physical activity. The participants were personally invited to join the study and participate in testing at the Faculty of Kinesiology, University of Split, Croatia. Before data collection, they were fully informed that participation was voluntary and that they could withdraw at any time. The study team explained all potential benefits and risks, and written informed consent was obtained from each participant. The inclusion criteria were as follows: being female, aged over 60 years, residing in the city of Split, having adequate physical independence and motor function to travel to the testing site unaided, and possessing sufficient cognitive ability to comprehend and complete questionnaires on HL and PL. The exclusion criteria included being under the age of 60, having cognitive impairments affecting questionnaire completion, or lacking the motor function and independence required to reach the testing location. The study protocol was approved by the Ethics Committee of the Faculty of Kinesiology.

Variables

In this study, we observed sociodemographic factors (independent variables), HL, and PL (dependent variables).

Sociodemographic variables were self-reported and included age (in years), educational level (elementary school, high school, college/university level), and socioeconomic status (below average, average, above average).

HL was evaluated via the validated Croatian version of the European Health Literacy Survey Questionnaire (HLS-EU-Q), as reported in prior studies (Blažević, Blazevic, & Sekulic, 2024; Geets-Kesić, Maras, & Gilić, 2023). This tool measures an individual's ability to access, understand, evaluate, and ap-

ply health-related information for making informed health decisions and utilizing healthcare services. The study examined twelve HL subdomains: (i) accessing healthcare information (HC-AC), (ii) understanding healthcare information (HC-U), (iii) appraising healthcare information (HC-AP), (iv) applying healthcare information (HC-APPL), (v) accessing disease prevention information (DP-AC), (vi) understanding disease prevention information (DP-U), (vii) appraising disease prevention information (DP-AP), (viii) applying disease prevention information (DP-APPL), (ix) accessing health promotion information (HP-AC), (x) understanding health promotion information (HP-U), (xi) appraising health promotion information (HP-AP), and (xii) applying health promotion information (HP-APPL). A general HL index (HL-total) was calculated via a 4-point Likert scale with response options ranging from very difficult (1) to very easy (4).

The PL was assessed via the Perceived Physical Literacy Questionnaire for South Eastern Europe (PPLQ-SEE), which was recently developed and studied for reliability and validity (Gilic et al., 2025). This instrument consists of 24 items distributed across six core domains: (i) physical competence, (ii) understanding, (iii) motivation, (iv) confidence, (v) knowledge, and (vi) physical activity behavior. Items from the first four domains are rated on a six-point Likert scale ranging from 5 (strongly agree) to 0 (strongly disagree), whereas the knowledge domain includes dichotomous (true–false) items. In the present study, we focused on five subdomains—PL-competence, PL-understanding, PL-motivation, PL-confidence, and PL-knowledge—along with a total PL score (PL-total) as indicators of participants' PL levels.

Statistics

The Kolmogorov–Smirnov test was used to check the normality of the distributions for all the variables. As a result, descriptive statistics included calculations of the means; minimum, maximum and standard deviations for age; and PL and HL indicators, while frequencies and percentages were reported for the remaining variables.

To identify the associations between age and HL- and PL-derived variables, we calculated Pearson's correlations. Analysis of variance (ANOVA) was used to establish the effects of educational status and socioeconomic status on HL and PL, with Scheffe post hoc test calculations, when appropriate.

Statistica ver 14.5 (Tibco Inc., Palo Alto, CA, USA) was used for all calculations, and a p-level of 95% was applied.

Results

The descriptive statistics for all the studied variables are presented in Table 1. Generally, all the HL and PL variables showed appropriate distributions, with the expected theoretical ranges of scores achieved.

Table 1. Descriptive statistics for the study variables

	Mean	Minimum	Maximum	SD
Age (years)	70.34	60.00	82.00	5.88
PL-competence (score)	64.15	0.00	100.00	26.46
PL-understanding (score)	96.60	60.00	100.00	7.85
PL-motivation (score)	87.59	0.00	100.00	23.92
PL-confidence (score)	74.15	0.00	100.00	26.83
PL-knowledge (score)	82.98	44.44	100.00	16.36
PL-total (score)	81.09	40.56	95.56	11.50
HC-AC (score)	37.59	8.33	50.00	10.94
HC-U (score)	39.63	16.67	50.00	9.51
HC-AP (score)	32.36	12.50	50.00	9.29
HC-APPL (score)	40.60	20.83	50.00	7.50
DP-AC (score)	39.89	12.50	50.00	10.45
DP-U (score)	42.85	25.00	50.00	7.96
DP-AP (score)	36.24	20.00	50.00	8.21
DP-APPL (score)	31.21	16.67	50.00	10.71
HP-AC (score)	34.40	6.67	50.00	10.59
HP-U (score)	34.33	4.17	50.00	12.55
HP-AP (score)	41.91	22.22	50.00	8.50
HP-APPL (score)	37.32	16.67	50.00	9.98
HL-total (score)	37.14	24.11	48.23	7.11
	F	Cumulative F	%	Cumulative %
Educational level				
Elementary school	9	9	19.1	8.5
High school	28	37	59.6	78.7
College/University level	8	45	17.0	95.7

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Table 1. Descriptive statistics for the study variables

	Mean	Minimum	Maximum	SD
Missing	2	47	4.3	100.0
Socioeconomic status				
Below average	6	6	12.8	8.5
Average	31	37	66.0	78.7
Above average	10	47	21.3	100.0
Missing	0	47	0.0	100.0

Legend: PL – physical literacy, HC-AC – accessing healthcare-related information, HC-U – understanding healthcare-related information, HC-AP – appraising healthcare-related information, HC-APPL – applying healthcare-related information, DP-AC – accessing information related to disease prevention, DP-U – understanding information related to disease prevention, DP-AP – appraising information related to disease prevention, HP-APPL – applying information related to disease prevention, HP-AC – accessing information related to health promotion, HP-AP – appraising information related to health promotion, HP-U – understanding information related to health promotion, HP-APPL – applying information related to health promotion

The associations between age and total HL and PL scores are presented in Figure 1. No significant correlation was found between participants' age and their HL (Figure 1A) or between age and PL (Figure 1B) (Pearson's R=0.15 and 0.09, respectively).

Figure 2 presents the correlations between age and different facets of HL and PL. For total scores, none of the HL subscores or HL-sob scores were significantly correlated with participants' age, with correlation coefficients ranging from

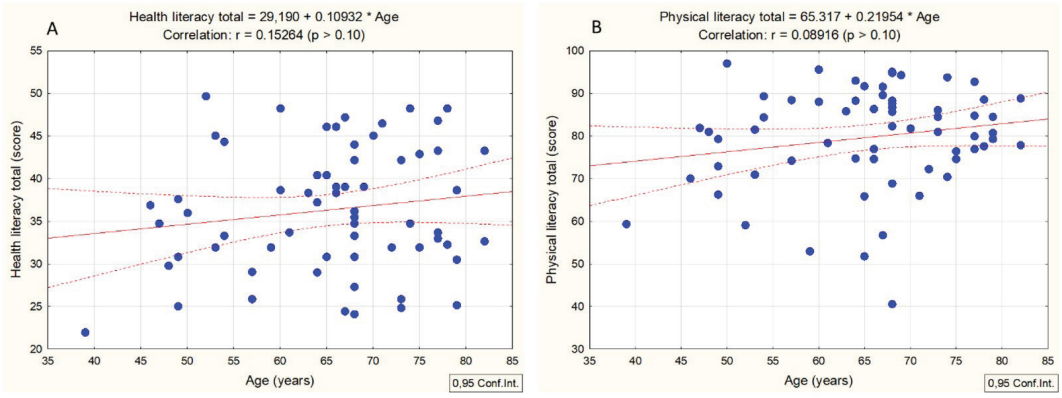

FIGURE 1. Correlations between age and health literacy total score (1A) and physical literacy total score (1B)

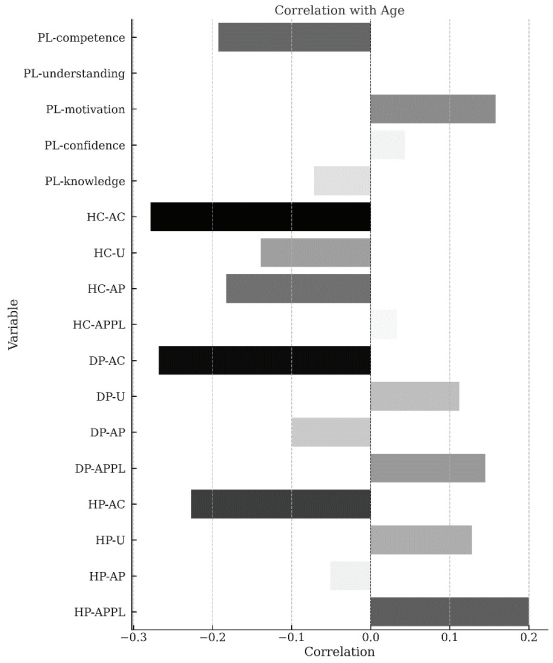

FIGURE 2. Correlations between age and physical literacy subscores and health literacy subdomains (for abbreviations, please see Table legends)

<0.02 (for correlation between age and PL understanding) to 0.27 (for correlation between age and HC-AC).

The differences among groups in terms of educational level were significant for HP-U (F test=3.34, p<0.05), highlighting the specific level of association between educational level and the level of understanding information related to health promotion, with the highest level of this HL subscore in women who were better educated (significant post hoc differences between college/university level and elementary school) (Table 2).

Table 2. Differences in educational level for health literacy and physical literacy variables (analysis of variance – ANOVA)

	Elementary school (n = 9)		High school (n = 28)		College/University Level (n = 8)		ANOVA	
	Mean	SD	Mean	SD	Mean	SD	F test	p-level
PL-competence (score)	63.29	24.82	67.50	31.29	70.31	17.46	0.07	0.98
PL-understanding (score)	96.95	6.73	98.67	2.81	92.08	10.67	1.46	0.24
PL-motivation (score)	87.71	22.39	81.00	30.87	77.92	22.77	1.23	0.31
PL-confidence (score)	75.29	22.19	59.50	35.31	65.00	31.14	2.35	0.09
PL-knowledge (score)	81.27	14.70	81.11	17.41	79.86	23.73	0.84	0.48
PL-total (score)	80.90	9.58	77.56	14.49	77.03	14.63	1.58	0.21
HC-AC (score)	36.19	10.68	37.50	10.39	36.46	9.92	0.22	0.88
HC-U (score)	38.21	9.29	38.75	7.36	38.02	11.57	0.44	0.72
HC-AP (score)	32.26	9.44	31.67	5.62	30.47	10.29	0.11	0.95
HC-APPL (score)	39.40	7.38	39.17	8.38	38.02	8.32	0.19	0.91
DP-AC (score)	39.05	10.89	40.42	9.22	38.37	8.32	0.52	0.67
DP-U (score)	41.83	8.49	40.56	10.16	39.24	8.23	0.21	0.89
DP-AP (score)	36.19	8.25	37.00	7.93	33.33	8.61	0.24	0.87
DP-APPL (score)	32.54	10.62	28.89	9.73	27.43	12.58	1.16	0.34
HP-AC (score)	34.10	11.18	35.00	6.33	33.13	8.73	0.75	0.53
HP-U (score)	31.11	12.29	34.17	10.54	39.17	11.98	3.34	0.03
HP-AP (score)	41.43	8.45	39.44	9.24	39.81	9.13	0.98	0.41
HP-APPL (score)	37.62	9.67	36.25	11.29	33.61	8.40	0.65	0.58
HL-total (score)	36.73	7.20	36.99	7.35	34.68	7.39	0.32	0.81

Legend: PL – physical literacy, HC-AC – accessing healthcare-related information, HC-U – understanding healthcare-related information, HC-AP – appraising healthcare-related information, HC-APPL – applying healthcare-related information, DP-AC – accessing information related to disease prevention, DP-U – understanding information related to disease prevention, DP-AP – appraising information related to disease prevention, HP-APPL – applying information related to disease prevention, HP-AC – accessing information related to health promotion, HP-AP – appraising information related to health promotion, HP-U – understanding information related to health promotion, HP-APPL – applying information related to health promotion

Table 3 presents the differences between groups formed on the basis of the self-declared socioeconomic status in the HL- and PL-derived variables. A significant difference among groups was found solely for PL competence (F test=4.19, p<0.05). In general, the highest level of PL competence was detected in participants who self-declared above-average socioeconomic status (significantly different from participants who declared below-average socioeconomic status).

Table 3. Differences in socioeconomic status for health literacy and physical literacy variables (analysis of variance – ANOVA)

	Below average (n = 6)		Average (n = 31)		Above average (n = 10)		ANOVA	
	Mean	SD	Mean	SD	Mean	SD	F test	p-level
PL-competence (score)	38.75	20.16	67.18	23.53	78.33	12.58	4.19	0.04
PL-understanding (score)	100.00	0.00	95.88	7.86	91.11	10.18	0.84	0.36
PL-motivation (score)	96.67	6.67	83.76	24.75	77.78	20.37	0.65	0.42
PL-confidence (score)	88.75	13.15	70.00	27.61	53.33	29.30	1.38	0.25
PL-knowledge (score)	91.67	10.64	81.41	17.51	62.96	16.97	1.19	0.28
PL-total (score)	83.17	5.28	79.65	12.29	72.70	8.18	0.16	0.69
HC-AC (score)	34.38	7.89	38.79	9.82	37.50	7.22	1.26	0.27
HC-U (score)	36.46	7.89	31.67	9.20	27.78	6.36	0.94	0.34
HC-AP (score)	40.63	10.96	39.32	7.30	31.94	8.67	0.00	0.95

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Table 3. Differences in socioeconomic status for health literacy and physical literacy variables (analysis of variance – ANOVA)

	Below average (n = 6)		Average (n = 31)		Above average (n = 10)		ANOVA	
	Mean	SD	Mean	SD	Mean	SD	F test	p-level
HC-APPL (score)	40.63	11.97	39.04	10.01	34.72	4.81	0.04	0.85
DP-AC (score)	47.22	3.21	40.86	8.53	33.33	9.62	1.43	0.24
DP-U (score)	36.67	7.20	35.58	8.14	33.33	13.33	0.03	0.85
DP-AP (score)	34.72	2.78	30.20	11.70	27.78	5.56	0.51	0.48
DP-APPL (score)	27.50	14.24	34.42	9.49	30.00	11.55	1.76	0.19
HP-AC (score)	35.42	12.95	33.87	12.12	29.17	7.22	0.06	0.81
HP-U (score)	41.67	9.62	40.48	8.79	38.89	9.62	0.00	0.99
HP-AP (score)	41.67	5.89	36.19	9.71	30.56	10.49	0.96	0.33
HP-APPL (score)	37.15	8.49	36.29	7.20	32.21	6.33	0.01	0.94

Legend: PL – physical literacy, HC-AC – accessing healthcare-related information, HC-U – understanding healthcare-related information, HC-AP – appraising healthcare-related information, HC-APPL – applying healthcare-related information, DP-AC – accessing information related to disease prevention, DP-U – understanding information related to disease prevention, DP-AP – appraising information related to disease prevention, HP-APPL – applying information related to disease prevention, HP-AC – accessing information related to health promotion, HP-AP – appraising information related to health promotion, HP-U – understanding information related to health promotion, HP-APPL – applying information related to health promotion

Discussion

Although some aspects of HL and PL were associated with educational level (higher HP-U in better educated participants) and socioeconomic status (higher PL-competence in participants with better socioeconomic status), associations between sociodemographic factors and PL and HL were generally nonsignificant and practically negligible. Therefore, our initial study hypothesis cannot be accepted. In the future, we will specifically discuss the possible reasons for such findings.

Age, health literacy and physical literacy

The absence of a significant correlation between age and PL among older women in our study may reflect the enduring nature of PL once it has been established earlier in life. The PL is grounded in the development of fundamental movement skills, confidence, and positive attitudes toward physical activity—attributes typically shaped during childhood and adolescence. Studies suggest that individuals who acquire these competencies early on are more likely to preserve them well into older adulthood, even in the face of age-related physical decline (Aarts, Paulussen, & Schaalma, 1997; Waller et al., 2018). In this context, women who were previously active or who had participated in organized physical education or sports may retain their movement competence and motivation regardless of their current age. This may buffer the expected decline often attributed to aging alone.

Similarly, the lack of an association between age and HL in our sample could be due to the stability of health-related knowledge and behaviors acquired earlier in life. Older women who have consistently engaged with healthcare systems, managed chronic conditions, or sought out health information over time may maintain their level of HL despite aging. Thus, women who develop strong health self-management practices earlier may demonstrate resilience in maintaining their literacy levels. These findings support the life-course perspective, emphasizing the cumulative effects of early-life experiences on health behaviors in older individuals (Sørensen et al., 2012).

Indeed, the connection between age and HL is not simple because two opposite things can occur as people grow older. On the one hand, aging is often linked with changes in thinking abilities—such as slower memory and difficulty understanding information—which can lower HL (Deary et al., 2009). On this basis, we might expect a negative correlation between HL and participants' age. However, at the same time, older people often deal with more health problems and visit doctors more often. This can make them more interested in health information and more active in learning about their conditions. This increased interest in and experience with the health system can actually improve HL, resulting in a positive correlation between age and HL. These two effects—declining thinking skills and growing interest in health—may cancel each other out, which could explain why we did not find a clear link between age and HL in our results.

Educational level, health literacy and physical literacy

The lack of a significant correlation between educational level and both HL and PL in our study is somewhat unexpected. Education is commonly viewed as a strong predictor of literacy in general, and many studies have shown that higher educational attainment is linked to better health-related knowledge and behaviors (Van Der Heide et al., 2013). However, our findings suggest a more nuanced relationship, likely shaped by generational and contextual factors.

The lack of a significant correlation between educational status and PL suggests that PL is not solely determined by formal schooling. While education can provide some opportunities for physical activity, especially during early years, it is the habits and experiences built throughout life that play a stronger role. The PL includes not only movement skills but also confidence, motivation, and the value placed on physical activity—all of which can develop outside of the classroom and through formal schooling (Blažević et al., 2024; Geets-Kesić et al., 2023). For example, women who have engaged in regular walking, gardening, or recreational activities for many years may maintain a high level of physical literacy regardless of their educational background. Personal lifestyle choices,

family routines, and cultural norms often shape these habits more than school-based instruction does. Therefore, physical literacy appears to reflect a broader life context rather than academic achievement alone.

Another reason for the lack of association between education level and physical literacy in our sample may lie in the shared early-life experiences of women born in the 1950s and 1960s. During his period, access to sports and physical activity was largely equal, as out-of-school sports programs were publicly funded and free for all children (Petrov, 2018). In addition, physical education in schools followed a standardized national curriculum, meaning that most women in this generation received similar exposure to structured physical activity regardless of their formal educational achievements. These early experiences are known to have a strong and lasting impact on physical literacy, often more so than later educational or professional paths do (Dlugonski, Gadd, McKay, Kleis, & Hoch, 2022). As a result, educational differences in adulthood may not reflect meaningful differences in foundational physical literacy developed among youth in this age group.

Similarly, HL is not developed through formal education alone but often grows through everyday experiences and social interactions (Geboers, Reijneveld, Jansen, & de Winter, 2016). Managing personal or family health conditions, visiting doctors, talking with pharmacists, or caring for others all contribute to a practical understanding of health-related information. Older women who have regularly engaged with the healthcare system—regardless of their education level—may build strong HL over time. In many cases, social networks also play a key role, as information is shared and discussed among family, friends, or community groups (Pitt et al., 2019). This type of experiential learning can be just as influential as formal schooling in shaping health-related decision-making skills. Therefore, it is possible that women with lower levels of formal education in our study still achieved similar HL levels through lived experience and social support. This may help explain why no clear link was found between education and HL.

Socioeconomic status, health literacy and physical literacy

The absence of a significant correlation between current socioeconomic status and PL in our sample can be (once again) better understood within the historical and cultural context of the participants. Women born in the 1950s and 1960s in Croatia and the former Yugoslavia experienced a relatively uniform lifestyle during their youth, regardless of their family's economic position. State-supported education, equal access to physical education, and free participation in sports and recreational activities ensured that most girls had similar opportunities to develop movement skills and positive attitudes toward physical activity (Petrov, 2018). Since PL is shaped primarily in early life, these shared early experiences likely had a lasting impact, independent of changes in socioeconomic status later in adulthood. As a result, women who may now differ in income or occupation still have similar physical competencies and confidence developed in their youth.

Likewise, the observed lack of correlation between socioeconomic status and HL may also be influenced by generational similarities among the women studied. In brief, women born in the 1950s and 1960s were exposed to a relatively unified system of healthcare and public health messaging, which was state-driven and widely accessible regardless of social class. These common early-life experiences likely contributed to the development of similar HL and PL levels, regardless of their current differences in education or socioeconomic status. Importantly, this generation grew up in a social context that placed strong trust in institutions and public authorities. Health-related information disseminated through schools, workplaces, and national media is widely accepted and rarely questioned, which likely reinforces consistent attitudes and behaviors toward health management from an early age (Kunitz, 2004). This early trust in public health systems may have shaped a stable foundation of HL that persisted into older adulthood. Additionally, the relatively narrow age range of the sample (60 years and older) may have further reduced age-related variation in literacy outcomes. Together, these factors suggest that long-standing societal structures and generational beliefs may play a key role in shaping HL and PL trajectories.

The fact that all participants in our study were urban-living women may also help explain the lack of significant correlation between socioeconomic status and both health and PL. Urban settings generally provide more consistent access to healthcare services, organized physical activities, and public health information, which can reduce the influence of income or education on individual literacy levels (Aljassim & Ostini, 2020). In such environments, people from different socioeconomic backgrounds often benefit from similar infrastructure, such as local clinics, recreational spaces, and community programs. This shared environment may lead to more comparable experiences in health management and physical activity across the socioeconomic spectrum. Urban residents also tend to have broader access to transportation and social networks, which can further support engagement in health-promoting behaviors. As a result, the influence of current socioeconomic differences may be less pronounced in urban contexts, contributing to the uniform literacy levels observed in our sample.

Limitations and strengths

This study has several limitations that should be acknowledged. First, the sample included only urban-dwelling females over the age of 60, which limits the generalizability of the findings to rural populations, males, or younger age groups. Second, all the data were collected through self-report questionnaires, which may introduce bias due to overestimation, misunderstanding of questions, or social desirability effects. Self-perception of health and PL may not always align with objective measures. These limitations should be considered when interpreting the results and planning future research.

Despite its limitations, this study has several notable strengths. This study is among the first to simultaneously examine the associations between sociodemographic factors and both HL and PL in older adult women. This dual focus provides a more comprehensive understanding of how different aspects of literacy interact within the context of aging. Furthermore, to our knowledge, this is the first study of its kind conducted in southeastern Europe, offering valuable regional insights that are often underrepresented in the international literature. By focusing on a specific and well-defined population, the study also adds depth to the global discussion on aging, health promotion, and equity.

Conclusion

The findings revealed weak or nonsignificant correlations between the examined sociodemographic variables and both HL and PL. These results contrast with previous research that

typically emphasizes the predictive role of such factors, suggesting that additional life-course or contextual influences may better explain literacy outcomes in this population.

A key consideration is the shared generational background of the participants, all born prior to the 1970s, who were exposed to a relatively standardized system of education, public health messaging, and access to physical activity through state-supported programs. These common early-life experiences may have contributed to the development of similar HL and PL levels, regardless of later-life differences in education or socioeconomic status. Additionally, the relatively narrow age range of the sample (60 years and older) may have limited the detection of age-related variability in literacy, further contributing to the lack of significant associations. This highlights the potential long-term impact of uniform early environments on health-related competencies in older adults.

These findings emphasize the importance of a life-course perspective in understanding the development and stability of HL and PL among aging populations. Rather than being shaped primarily by current demographic factors, these literacies may be more strongly influenced by lifelong habits, accumulated experience, and consistent exposure to health systems and information. Future studies should aim to include more diverse samples, particularly rural and socioeconomically heterogeneous groups, to further explore the determinants of HL and PL later in life.

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Conflict of interest
The authors declare that there is no conflict of interest.

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