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LONG PAPER

COVID-19 information source and behavior preference in later life: the role of health satisfaction, socio-demographic background, and country of residence

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Abstract

Purpose The aim of this study was to clarify how health satisfaction, socio-demographic background, and country of residence in older internet users correspond with their preference for COVID-19 information sources or for behaviors aimed at acquiring this information.

Methods The sample ($N = 4233$) was drawn from the 2020 wave of the Ageing + Communication + Technologies (ACT) cross-national longitudinal research study. Multinomial and logistic regression models were employed to analyze the data.

Results An association was found between health satisfaction and preference for interpersonal communication to obtain COVID-19 information over traditional media consumed via traditional devices. Substantial socio-demographic (gender, age, education, marital status) differences were found, particularly regarding preference for digital media. Moreover, sizable cross-country differences were detected.

Conclusions The results point to the existence of a remarkable divide with respect to the COVID-19 information source/behavior preference even in a digitally advantaged population. Public decision makers and communities should be more involved in assisting older adults to obtain necessary and up-to-date information regarding COVID-19.

Keywords COVID-19 · Cross-country differences · Information seeking · Interpersonal communication · New media · Older adults · Source preference · Traditional media

1 Introduction

The novel coronavirus (COVID-19) has become a major concern for the entire population of the world [37]. The virus has been spread across the globe causing increased morbidity and mortality [18]. The World Health Organization (WHO) declared COVID-19 as a global health emergency in January 2020, and this status has been preserved until May 2023 [39]. As of November 18, 2023, more than 697 million cases of infection and more than 6.9 million deaths related to COVID-19 have been registered globally [43]. The pandemic has affected the lives of various population groups, including older adults, who despite the currently low global concern about the new strain, EG.5 [39], remain to be a vulnerable population category [5]. In accordance with the definition by the United Nations [36], we refer to older adults as people aged 60 years or older.

Obtaining information via various sources has become essential during the pandemic [45]. They include, but are not limited to, traditional media [6, 22], social media [22, 28], websites designed for healthcare instruction (e.g., CDC or WHO websites) [48], healthcare staff, family and friends [15, 47], and more. Prior studies have already shown that older adults, like the general population, tend to engage in COVID-19 information seeking from various sources. This information is highly important for them as they have an elevated risk of severe or lethal consequences of coronavirus infection [46]. Older adults are known to be highly loyal to traditional media [32], with a relatively low tendency toward media displacement [25]. For example, they tend to watch TV to obtain COVID-19 information [45]. Some older adults, however, also use the internet or social media to obtain COVID-19 information [4, 20, 42]. Asking

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family members and/or friends, who are frequently relied upon as information sources by the older population [20], also emerged as means for older adults to get COVID-19 information.

1.1 The current study

While it is already known that older adults implement or at least consider implementing various steps aimed at obtaining COVID-19 information or updates, less is known about what shapes their preference for these steps. Hence, the goal of this study is to identify the factors associated with preference for COVID-19 information sources or behaviors.

While numerous studies have investigated the use of COVID-19 information sources as a phenomenon of interest in the general population [2, 11, 22, 28, 35], very few studies have focused on the older population. Furthermore, the existing research on this population group has numerous shortcomings. Lund and Ma [20] examined information seeking behavior during the COVID-19 pandemic. Their study focused on rural older adults and was conducted using qualitative methodology. These two factors (rural population and qualitative methodology) preclude a more generalized understanding of information seeking behaviors among older adults during the pandemic. In addition, a study by Wong et al. [42] investigated the use of social media, and study by Campos-Castillo [4] investigated the use of the internet as a source of COVID-19 information. Yet the research has shown that COVID-19 information is not obtained from the online sources only [2, 11, 20, 22]. Finally, the abovementioned studies used national samples, thus disregarding the international perspective, which has been found to be important in understanding the peculiarities of media use among older adults [30, 38]. The current study is quantitative, it uses a large international sample, and refers to older adults regardless of the type of their locality of residence inside each country. As opposed to previous studies conducted among older adults, it considers a wider array of COVID-19 information sources and behaviors.

This study investigated the impact of several potential predictors of the studied phenomena. One of these factors is health satisfaction. It can serve as a proxy measure for health status, as it can be assumed that people with good or excellent health might also be highly satisfied with their health, and, perhaps, vice versa. Studies on issues related to technology and later life during COVID-19 employed measures of health and found a relationship between them and the studied phenomena. Better health was associated with lower technostress [27]. Poorer mental health was associated with a greater likelihood of engagement in online COVID-19 information seeking [4]. However, no study attempted to link between health status or any of their proxy measures, including health satisfaction, and COVID-19 information source or behavior preference. Hence, the current study can be seen as a novelty in this regard.

Second, we consider socio-demographic background factors. This consideration is based on the findings of previous research suggesting that background characteristics are related to media use in later life, both before the pandemic [30] and during its course [4]. Socio-demographic differences have also been found regarding the use of COVID-19 information sources [2, 11, 22, 28]. Understanding the impact of socio-demographic background on COVID-19 information source or behavior preference is also important in view of the prevalence of the digital divide in later life [10].

Finally, we consider differences between countries for the following reasons. First, studies conducted in the general population show that the lists of the most commonly used COVID-19 information sources differ between countries. One Malaysian study found that the most frequently used sources were the country's Ministry of Health, television, and online news portals [22]. An Australian study found that TV news broadcasts and the government's app were the most frequently mentioned sources [33]. In Vietnam, online sources, training programs at universities, and radio and television broadcasts were found to be the most frequently accessed sources [35]. In Turkey, online journalism, social media, and family and friends were found being the most commonly used COVID-19 information sources [11]. Part of the explanation for these differences can be attributed to difference in communication cultures and habits. According to Hall [14], cultures of the world can be presented on a low–high communication context continuum. In high context cultures (e.g., Israel and Spain), information networks are extensive and people constantly update each other about their everyday activities [1]. This may leave little need for using other sources to obtain COVID-19 information. In contrast, people belonging to low context countries (North America, Northern and Central Europe) strive to get as much information as possible about others or the external matters [1]. This may "push" them toward getting as much detailed information as possible from the sources which are capable to supply it. Second, countries implemented different strategies for coping with the pandemic [7]. For example, whereas Israel mandated three nationwide lockdowns [23], Finland for the most part imposed regional limitations and strong recommendations aimed at mitigating the transmission of COVID-19 [34]. Therefore, older people residing in different countries could have varying degrees of freedom in implementing particular steps to acquire COVID-19 information.

To summarize this section, three research questions were defined:

RQ1: How health satisfaction is related to the COVID-19 information source/behavior preference by older Internet users?

RQ2: Which socio-demographic characteristics are related to the COVID-19 information source/behavior preference by older Internet users?

RQ3: What are the cross-country differences in the COVID-19 information source/behavior preference by older Internet users?

The results can inform policy about how to effectively provide COVID-19-related information. They can also be applied to public campaigns designed to improve health information delivery and its accessibility for older adults, especially in times of major public health crises. From a theoretical perspective, this study will yield a profile of older internet users and outline disparities along health, socio-demographic, and country lines, thereby contributing to relevant approaches such as the digital divide theory.

2 Methodology

2.1 Data

The data used for the current study were obtained from the 2020 wave of the Ageing + Communication + Technologies (ACT) cross-national longitudinal research study. This project has involved researchers from Austria, Canada, Finland, Israel, the Netherlands, Romania, and Spain. In each one of the participating countries, commercial institutions contacted older internet users in 2016 (then aged 60 years or above) and followed them up twice at two-year intervals (2018, 2020). During November 2020, the data were collected online from all countries, except for Romania, where they were collected via telephone survey [17]. In that month Romania had the first maximum number of COVID-19 infection cases [24], Spain experienced a decrease in number of infection cases after the second wave peak [3], and Israel experienced some decrease in excess mortality due to the infection with the virus [13]. In November 2020, the period of preparation for the worldwide vaccination campaign, which was launched in the end of the subsequent month [29], was full of swing. As a result, it cannot be totally ruled out that some of the responses were influenced by the timing of data collection. The database was available for the research team in May 2021. In total, responses were collected from 4445 older adults during the third wave of the survey.

2.2 Sample

The current study explored the data on the survey participants' preference for sources or behaviors intended for obtaining the latest information/updates regarding COVID-19. Because this thematic section was only included in the current wave of the survey, a longitudinal design was not possible. Of the 4,445 participants, 121 respondents had missing data on the item asking about these sources or behaviors. In addition, 91 participants provided responses (under the specification of "other" sources) that could not be matched to any of the existing categories used for construction of the dependent variables. Hence, a total of 212 entries were discarded. As a result, the analytical sample of this study included 4,233 older internet users aged 63 years or older.

2.3 Measures

2.3.1 Dependent variables

COVID-19 information source preference (grouped). The related questionnaire item asked: "*Of the following options – please indicate the one that you are most likely to use when you look for updates/new information regarding COVID-19/ Coronavirus/Corona/…*". Thirteen options were offered for response, which were grouped into four major categories: (1) *traditional medium used* via *traditional devices* (television viewed on a TV set, radio listened to on a radio set, or print newspapers); (2) *traditional medium used* via *digital devices* (television viewed on a computer or mobile phone, radio listened to on a computer or mobile phone, or online newspapers); (3) *designated new medium* (websites such as those of the World Health Organization, Ministry of Health, different healthcare services, or related Telegram or WhatsApp channels); and (4) *interpersonal communication source or behavior* (using social networking sites, calling someone likely to have COVID-19 information, messaging via mobile phone to someone likely to have this information, sending an email to someone likely to have this information, or contacting someone likely to have this information via a computer-based program).

Preference for specific COVID-19 information sources. The five most frequently mentioned options from the original item (mentioned by at least 5% of the sample) were analysed separately. These included: television watched on a TV set; designated websites; online newspapers; print newspapers; and radio listened on a radio set. Each of these sources was recoded into a dichotomous variable (1 = Selected, 0 = Not selected).

2.3.2 Independent variables

Health satisfaction was measured with a single item on a continuous scale ("*Thinking about your physical health, how satisfied are you with your health as a whole?*"). Response options ranged from one (completely dissatisfied) to ten (completely satisfied).

Socio-demographic background: Gender was as a dichotomous variable, with women as the reference category. *Age* was measured continuously in years. *Level of education* was measured as a dichotomous variable, with respondents with non-tertiary (post-secondary or lower) education representing the reference category. *Marital status* was assessed dichotomously, with unmarried (single, divorced, widowed) respondents serving as the reference category. *Having children* was defined dichotomously, with respondents who had no children at all as the reference category. *Occupational status* was also defined as a binary variable, with respondents who reported a status other than working either full- or part-time as the reference category. *Type of residential locality* was defined by two dummy variables—large urban locality (big cities) and small urban locality (suburbs of big cities, towns, or small cities)—with residents of rural localities (country villages or farms/homes in the countryside) as the reference category.

Country of residence: Six dummy variables were computed. Austria was chosen as the reference category since the distribution of the first dependent variable among its respondents resembled the total distribution of this variable the most (see Supplementary Table 1).

2.3.3 Statistical analysis

Data were analysed using SPSS v.23 software. First, a multinomial regression model was used to explore the associations between the independent variables and the grouped COVID-19 information sources. This statistical technique was chosen because the current dependent variable consisted of four categories. The *traditional media* via *traditional devices* category was set as the reference as it was the largest category of the four. Second, the likelihood of using each of the five most commonly chosen options was assessed using a series of logistic regression analyses. In all models, only significant findings were reported. In the binary logistic regression analysis, collinearity diagnostics were performed. In all models, the variance inflation factor value did not exceed the threshold of two, suggesting that multicollinearity was not the issue in the analysis. Missing cases in the multivariable analysis ($n = 148$) were handled by listwise deletion.

3 Results

3.1 Descriptive statistics

Table 1 provides the descriptive statistics of the sample.

With respect to general background characteristics, 54.3% of the respondents were male; the age ranged from 63 to 97 years, with a mean age of 70.5 years ($SD = 5.5$). With respect to socioeconomic status, 38.2% had tertiary education and 10% worked either full or part time. With respect to residential patterns, 35.8% resided in large cities, 44.1% in small cities, and the remainder resided in rural localities. With respect to family background, 70.3% were married and 60.9% had children. On average, respondents reported moderate-high health satisfaction ($M = 7.04$, $SD = 1.98$).

With respect to *grouped* COVID-19 information source preference, 49.1% of the sample mentioned one traditional medium used via traditional devices. Somewhat lower share of respondents mentioned any one designated new medium (30%), any one traditional medium used via digital devices (14.4%), and any one interpersonal communication source/behavior (6.5%). The most frequently mentioned *specific* sources were: television watched on a TV set, (37.1% of the sample), designated websites (28.5%), online newspapers (9.5%), print newspapers (6.6%), and radio listened via radio set (5.4%). This means that 87.1% of the study participants preferred to turn to any of these sources in order to obtain COVID-19 information.

3.2 Multivariable findings

3.2.1 Predicting the preference for COVID-19 information source (grouped)

Table 2 shows the results of the multinomial regression analysis on *grouped* COVID-19 information source preference.

According to Table 2, health satisfaction was positively associated with mentioning one designated new medium ($OR = 1.05$, $p = 0.019$) and negatively – with mentioning one interpersonal communication source or behavior ($OR = 0.91$, $p = 0.004$) as a preferred option for COVID-19 information seeking.

Table 2 also shows significant differences along sociodemographic lines. First, male gender was positively associated with mentioning a traditional medium used via digital devices ($OR = 1.43$, $p = 0.001$) and an interpersonal communication source or behavior ($OR = 1.52$, $p = 0.004$). Age was negatively associated with mentioning a traditional medium used via digital devices ($OR = 0.94$, $p < 0.001$) and a designated new medium ($OR = 0.95$, $p < 0.001$). In contrast, having tertiary education level was positively associated with mentioning a source belonging to these categories. Being employed was positively associated with mentioning an interpersonal communication source or behavior ($OR = 1.57$, $p = 0.033$). Residence in large urban localities was negatively associated with mentioning a designated new medium ($OR = 0.73$, $p = 0.005$). Finally, being married was negatively associated with mentioning an interpersonal communication source or behavior as a preferred option for COVID-19 information seeking ($OR = 0.6$, $p = 0.001$).

Table 1 Sample statistics

Variable categories	*N*	%	M (SD)
Socio-demographic background			
Gender			
Male		2297 54.3	
Female	1936	45.7	
Age (63–97)		4232	70.5 (5.5)
Education			
Tertiary		1604 38.2	
Not-tertiary	2597	61.8	
Occupational status			
Employed		417 10.0	
Other statuses	3747	90.0	
Locality			
Large urban		1507 35.8	
Small urban	1855	44.1	
Rural	848	20.1	
Marital status			
Married		2964 70.3	
Not married	1250	29.7	
Children			
Yes		2565 60.9	
No	1649	39.1	
Satisfaction with health (1–10)		4209	7.04 (1.98)
COVID-19 information source or behavior preference			
General types of options			
Traditional medium used via traditional devices		2079 49.1	
Traditional medium used via digital devices	609	14.4	
Designated new medium	1270	30.0	
Interpersonal communication source/behavior	275	6.5	
Specific (most frequently mentioned) options		1569 37.1	
Television watched on a TV set	1208	28.5	
Designated websites	404	9.5	
Online newspapers	280	6.6	
Newspapers in print	230	5.4	
Radio listened on a radio set			

% Percentage of cases in each category (for categorical variables) *M* Mean (for continuous variables), *n* Number of cases in each category, *SD* Standard Deviation

Substantial differences between countries were also found. Residing in Canada was negatively associated with mentioning a designated new medium ($OR = 0.68$, $p = 0.007$) and an interpersonal communication source or behavior ($OR = 0.49$, $p = 0.007$). Residing in Finland was positively associated with mentioning a traditional medium used via digital devices ($OR = 2.41$, $p < 0.001$) and a designated new medium ($OR = 1.69$, $p < 0.001$), but was negatively associated with mentioning an interpersonal communication source or behavior ($OR = 0.37$, $p = 0.001$). Residing in the Netherlands was positively associated with mentioning a traditional medium used via digital devices ($OR = 2.1$, $p < 0.001$) and a designated new medium ($OR = 2.24$, $p < 0.001$). Residing in Romania was negatively associated with mentioning a traditional medium used via digital devices ($OR = 0.26$, $p < 0.001$), a designated new medium ($OR = 0.15$, $p < 0.001$), and an interpersonal communication source or behavior ($OR = 0.59$, $p = 0.032$). Finally, residing in Spain was positively associated with mentioning a traditional medium used via digital devices ($OR = 2.01$, $p < 0.001$), but was negatively associated with mentioning a designated new medium ($OR = 0.73$, $p = 0.01$) as a preferred option for COVID-19 information-seeking.

3.2.2 Predicting the preference for specific COVID-19 information sources

Table 3 shows the results of the logistic regression analyses on preference for each of the five *specific* COVID-19 information sources.

As Table 3 shows, health satisfaction was positively associated with mentioning designated websites as a preferred

Table 2 Multinomial regression analyses estimating the likelihood of preferring (grouped) COVID-19 information sources/behaviors by health satisfaction, socio-demographic background, and country of residence

Variable	Estimate (SE)	OR	95% CI for OR		p
			LB	UB	
Traditional medium consumed via *digital devices*[a]					
Intercept	2.96 (0.72)				0.000
Health satisfaction	– 0.02 (0.03)	0.98	0.93	1.02	0.327
Male[1]	**0.35 (0.10)**	**1.43**	**1.16**	**1.75**	**0.001**
Age	**– 0.06 (0.01)**	**0.94**	**0.92**	**0.96**	**0.000**
Tertiary education[2]	**0.39 (0.10)**	**1.48**	**1.21**	**1.81**	**0.000**
Employed[3]	0.12 (0.17)	1.13	0.82	1.56	0.466
Large city[4]	– 0.20 (0.14)	0.82	0.62	1.06	0.132
Small city[4]	– 0.15 (0.13)	0.86	0.67	1.12	0.265
Married[5]	– 0.14 (0.11)	0.87	0.70	1.09	0.214
Has children[6]	– 0.15 (0.10)	0.86	0.70	1.05	0.141
Canada[7]	– 0.21 (0.20)	0.81	0.54	1.21	0.308
Finland[7]	**0.88 (0.17)**	**2.41**	**1.73**	**3.34**	**0.000**
Israel[7]	0.28 (0.20)	1.32	0.88	1.97	0.176
Netherlands[7]	**0.74 (0.21)**	**2.10**	**1.39**	**3.17**	**0.000**
Romania[7]	**-1.35 (0.26)**	**0.26**	**0.16**	**0.43**	**0.000**
Spain[7]	**0.70 (0.16)**	**2.01**	**1.48**	**2.74**	**0.000**
Designated new medium [a]					
Intercept	3.29 (0.56)				0.000
Health satisfaction	**0.05 (0.02)**	**1.05**	**1.05**	**1.09**	**0.019**
Male[1]	0.003 (0.08)	1.003	0.86	1.18	0.967
Age	**– 0.06 (0.01)**	**0.95**	**0.93**	**0.96**	**0.000**
Tertiary education[2]	**0.56 (0.08)**	**1.75**	**1.49**	**2.06**	**0.000**
Employed[3]	0.03 (0.14)	1.03	0.79	1.34	0.827
Large city[4]	**– 0.31 (0.11)**	**0.73**	**0.59**	**0.91**	**0.005**
Small city[4]	– 0.13 (0.10)	0.86	0.70	1.05	0.145
Married[5]	– 0.02 (0.09)	.98	0.82	1.16	0.799
Has children[6]	– 0.14 (0.08)	0.87	0.74	1.02	0.082
Canada[7]	**– 0.39 (0.14)**	**0.68**	**0.51**	**0.90**	**0.007**
Finland[7]	**0.53 (0.12)**	**1.69**	**1.33**	**2.16**	**0.000**
Israel[7]	0.12 (0.15)	1.12	0.84	1.49	0.433
Netherlands[7]	**0.81 (0.15)**	**2.24**	**1.68**	**2.998**	**0.000**
Romania[7]	**– 1.93 (0.20)**	**0.15**	**0.10**	**0.22**	**0.000**
Spain[7]	**– 0.32 (0.12)**	**0.73**	**0.57**	**0.93**	**0.010**
Interpersonal communication source/behavior [a]					
Intercept	0.60 (0.95)				0.524
Health satisfaction	**– 0.09 (0.03)**	**0.91**	**0.86**	**0.97**	**0.004**
Male[1]	**0.42 (0.14)**	**1.52**	**1.15**	**2.02**	**0.004**
Age	– 0.02 (0.01)	0.98	0.95	1.002	0.074
Tertiary education[2]	0.05 (0.14)	1.05	0.79	1.39	0.736
Employed[3]	**0.45 (0.21)**	**1.57**	**1.04**	**2.38**	**0.033**
Large city[4]	– 0.11 (0.19)	0.90	0.62	1.30	0.567
Small city[4]	– 0.01 (0.18)	0.99	0.69	1.41	0.941
Married[5]	**– 0.51 (0.15)**	**0.60**	**0.45**	**0.80**	**0.001**
Has children[6]	– 0.25 (0.15)	0.78	0.59	1.03	0.082
Canada[7]	**– 0.72 (0.27)**	**0.49**	**0.29**	**0.82**	**0.007**
Finland[7]	**– 0.99 (0.30)**	**0.37**	**0.21**	**0.67**	**0.001**
Israel[7]	0.17 (0.24)	1.19	0.74	1.91	0.482
Netherlands[7]	0.05 (0.29)	1.05	0.60	1.84	0.869
Romania[7]	**– 0.53 (0.25)**	**0.59**	**0.36**	**0.96**	**0.032**
Spain[7]	0.24 (0.19)	1.27	0.87	1.85	0.220
Model chi-square	615.41				0.000
-2log likelihood	8,519.48				
R^2	0.155				

CI Confidence Interval, *LB* Lower Bound, *N* Number of cases included in the analysis, *OR* Odds Ratio, *P* Significance value, R^2 Coefficient of determination (Nagelkerke), *SE* Standard Error, *UB* Upper Bound

Significant results appear in bold

[a]Traditional media consumed via traditional devices

[1]Female, [2]Non-tertiary education, [3]Not employed, [4]Rural locality, [5]Not married, [6]Has no children, [7]Austria

option for COVID-19 information seeking (*OR = 1.06, p = 0.001*).

Of socio-demographic background, age was the most consistent factor as it was associated with mentioning each of the five examined sources albeit in different directions: positively – with mentioning non-digital forms of media (television via TV set, radio via radio set, and print newspapers), and negatively—with mentioning digital forms of media (online newspapers and designated new media). Male gender corresponded to a greater likelihood of mentioning online newspapers (*OR = 1.38, p = 0.006*) but to a lower likelihood of mentioning television watched via TV set (*OR = 0.86, p = 0.041*). In addition, having tertiary level of education was negatively associated with mentioning television watched on a TV set (*OR = 0.63, p < 0.001*), but was positively associated with mentioning online newspapers (*OR = 1.47, p = 0.001*) and designated websites (*OR = 1.65, p < 0.001*). Being married was positively associated with mentioning television watched via TV set (*OR = 1.21, p = 0.019*), but was negatively associated with mentioning radio listened via radio set (*OR = 0.65, p = 0.006*). Residing in large locality corresponded to a greater likelihood of mentioning television watched via TV set (*OR = 1.27, p = 0.019*). Finally, having children was also positively associated with mentioning television watched via TV set (*OR = 1.3, p = 0.001*) but was negatively associated with mentioning printed newspapers as a preferred option for COVID-19 information-seeking (*OR = 0.69, p = 0.005*).

Substantial cross-country differences were also found. Residing in Canada was positively associated with

Table 3 Binary logistic analyses estimating the likelihood of preferring specific COVID-19 information sources by health satisfaction, socio-demographic background, and country of residence (n = 4,085)

Predictors	Television on a TV set		Radio on a radio set		Newspapers in print		Online newspapers		Designated websites	
	OR [95% CI]	*P*	OR [95% CI]	*p*	OR [95% CI]	*p*	OR [95% CI]	*p*	OR [95% CI]	*p*
Constant	0.05	0.000	0.004	0.000	0.004	0.000	1.85	0.455	8.39	0.000
Health satisfaction	1.004 [0.97; 1.04]	0.396	.992 [0.93; 1.06]	0.808	0.98 [0.92; 1.04]	0.481	0.96 [0.91; 1.01]	0.146	**1.06 [1.02; 1.10]**	**0.001**
Male[1]	**0.86 [0.74; 0.994]**	**0.041**	0.89 [0.66; 1.20]	0.448	1.05 [0.80; 1.37]	0.744	**1.38 [1.10; 1.74]**	**0.006**	0.91 [0.78; 1.05]	0.192
Age	**1.03 [1.02; 1.04]**	**0.000**	**1.05 [1.02; 1.07]**	**0.000**	**1.06 [1.03; 1.08]**	**0.000**	**0.96 [0.94; 0.98]**	**0.000**	**0.95 [0.94; 0.97]**	**0.000**
Tertiary education[2]	**0.63 [0.54; 0.73]**	**0.000**	.97 [0.72; 1.30]	0.832	0.95 [0.72; 1.25]	0.717	**1.47 [1.18; 1.83]**	**0.001**	**1.65 [1.42; 1.92]**	**0.000**
Employed[3]	0.85 [0.66; 1.08]	0.173	0.97 [0.58; 1.63]	0.919	1.12 [0.67; 1.87]	0.678	1.07 [0.75; 1.52]	0.711	0.94 [0.74; 1.21]	0.643
Large urban[4]	**1.27 [1.04; 1.54]**	**0.019**	1.07 [0.73; 1.58]	0.728	1.09 [0.76; 1.56]	0.635	.995 [0.74; 1.34]	0.972	0.82 [0.67; 1.004]	0.055
Small urban[4]	1.14 [0.94; 1.37]	0.179	1.02 [0.70; 1.50]	0.915	1.04 [0.74; 1.45]	0.826	1.09 [0.82; 1.45]	0.557	0.93 [0.77; 1.12]	0.429
Married[5]	**1.21 [1.03; 1.42]**	**0.019**	**0.65 [0.48; 0.88]**	**0.006**	1.26 [0.93; 1.70]	0.133	0.99 [0.77; 1.27]	0.916	1.09 [0.92; 1.28]	0.334
Has children[6]	**1.30 [1.13; 1.51]**	**0.001**	1.09 [0.81; 1.46]	0.564	**0.69 [0.53; 0.89]**	**0.005**	1.01 [0.81; 1.26]	0.947	0.91 [0.78; 1.06]	0.239
Canada[7]	**2.60 [2.02; 3.34]**	**0.000**	0.65 [0.40; 1.08]	0.099	**0.17 [0.09; 0.32]**	**0.000**	0.85 [0.56; 1.31]	0.466	**0.76 [0.58; 0.99]**	**0.040**
Finland[7]	**0.77 [0.61; 0.98]**	**0.033**	**0.38 [0.23; 0.64]**	**0.000**	0.77 [0.55; 1.09]	0.139	0.94 [0.65; 1.36]	0.731	**1.48 [1.18; 1.85]**	**0.001**
Israel[7]	1.26 [0.97; 1.64]	0.090	0.71 [0.43; 1.19]	0.193	**0.41 [0.25; 0.68]**	**0.001**	0.67 [0.42; 1.07]	0.093	0.79 [0.60; 1.04]	0.090
Netherlands[7]	**0.60 [0.44; 0.80]**	**0.001**	**0.19 [0.08; 0.45]**	**0.000**	0.96 [0.65; 1.42]	0.822	0.86 [0.54; 1.36]	0.532	**1.85 [1.42; 2.41]**	**0.000**
Romania[7]	**7.59 [5.73; 10.05]**	**0.000**	**0.32 [0.17; 0.63]**	**0.001**	**0.12 [0.05; 0.27]**	**0.000**	**0.36 [0.21; 0.63]**	**0.000**	**0.11 [0.07; 0.17]**	**0.000**
Spain[7]	**1.33 [1.07; 1.64]**	**0.010**	1.27 [0.88; 1.85]	0.199	**0.19 [0.12; 0.30]**	**0.000**	**1.79 [1.30; 2.47]**	**0.000**	**0.56 [0.45; 0.71]**	**0.000**
Model chi-square	502.47	0.000	82.18	0.000	165.58	0.000	104.001	0.000	378.85	0.000
-2 log likelihood	4,882.85		1,659.73		1,839.01		2,474.18		4,495.87	
R^2	0.158		0.057		0.102		0.054		0.127	
Overall percentage correct	69.6		94.5		93.3		90.4		72.4	

CI Confidence Interval, *OR* Odds Ratio, *P* Significance level, R^2 Coefficient of determination (Nagelkerke)

Significant results appear in bold

[1]Female, [2]Non-tertiary education, [3]Not employed, [4]Rural locality, [5]Not married, [6]Has no children, [7]Austria

mentioning television watched via TV set (*OR = 2.6, p < 0.001*), but was negatively associated with mentioning printed newspapers (*OR = 0.17, p < 0.001*) and designated websites (*OR = 0.76, p = 0.04*). Residing in Finland was positively associated with mentioning designated websites (*OR = 1.48, p = 0.001*), but was negatively associated with mentioning television watched via TV set (*OR = 0.77, p = 0.033*) and radio listened via radio set (*OR = 0.38, p < 0.001*). Residing in Israel was negatively associated with mentioning printed newspapers (*OR = 0.41, p = 0.001*). Residing in the Netherlands was positively associated with mentioning designated websites (*OR = 1.85, p < 0.001*), but was negatively associated with mentioning television watched via TV set (*OR = 0.6, p = 0.001*) and radio listened to via radio set (*OR = 0.19, p < 0.001*). Residing in Romania was positively associated with mentioning television watched via TV set (*OR = 7.59, p < 0.001*), but was negatively associated with mentioning radio listened via radio set (*OR = 0.32, p = 0.001*), printed newspapers (*OR = 0.12, p < 0.001*), online newspapers (*OR = 0.36, p < 0.001*), and

designated websites ($OR = 0.11, p < 0.001$). Finally, residing in Spain was positively associated with mentioning television watched via TV set ($OR = 1.33, p = 0.01$) and online newspapers ($OR = 1.79, p < 0.001$), but was negatively associated with mentioning printed newspapers ($OR = 0.19, p < 0.001$) and designated websites as preferred option for COVID-19 information seeking ($OR = 0.56, p < 0.001$).

4 Discussion

The goal of this study was to examine the role of health satisfaction, socio-demographic background, and country of residence on COVID-19 information source or behavior preference in older adulthood. As shown in the Results section, these factors play a varying role in the explanation of the studied phenomena. Throughout this section, we refer to the encountered associations in both types of models analyzed.

First, health satisfaction appeared to play a relatively minor role in explanation of the study's outcomes. The negative association found in the multinomial analysis between this variable and a preference for interpersonal communication source/behavior implies the overall significance of close social circles and personal relationships when health begins to deteriorate in later life. Social networking sites and personal connections are likely be preferred due to their immediacy and the greater potential scope of the help (both instrumental and expressive). With respect to the positive association between health satisfaction and consideration of choosing designated websites found in the logistic regression analysis (and a similar association found in the multinomial model), a potential explanation is somewhat different. Higher health satisfaction, which could, to some extent, reflect better health, allows for more rigorous COVID-19 information seeking via sources that offer more detailed and nuanced knowledge regarding the pandemic. More research is needed to clarify this relationship.

Second**,** significant socio-demographic differences were found, especially with respect to the preference for designated new media. These differences, for the most part, were discovered along age and education lines, corresponding to the notion of a grey divide [10]. Older age is associated with slower adoption and tougher approach toward innovation acceptance [44]. As for education, seeking information on the websites of established expert organizations, such as the WHO, ministries of health and local healthcare services, requires knowledge about reliable information sources and greater curiosity regarding the subject matter. Such analytical and information seeking and processing skills are usually acquired at colleges and universities.

Other socio-demographic parameters played a modest role in predicting the study outcomes. As to gender, men were found in the multinomial analysis being more likely to mention interpersonal communication than women. This finding appears to contradict women's greater preference for interaction [16] and higher likelihood of health information-seeking [8, 21] found in earlier studies. This somewhat surprising finding can be partially explained by men's greater susceptibility to this virus [12] and consequently greater needs for the relevant information. Yet, further investigations of this finding are needed. As for family-related predictors, logistic regression analyses found that married respondents were more likely to mention watching television on a TV set and less likely to mention listening to the radio on a radio set than were unmarried respondents. As for the former finding, older couples, also because of loyalty toward traditional media [32], may prefer watching television together as a type of a family habit. This habit may allow them to better understand COVID-19 information broadcasted on TV channels, as watching may proceed actively, i.e. by means of verbal and/or non-verbal communication between partners. The latter finding may suggest that people who live with a partner may have less time to listen to the radio, which is typically considered a source of companionship for older people including those living alone [19]. Besides marital status, having children was associated with a higher likelihood of mentioning TV and a lower likelihood of mentioning print newspapers. Watching television can sometimes involve children, especially those residing with parents in the same household. Children can be used as intermediaries in explaining and discussing information broadcasted on television, for example, if this information is contradictory, confusing or misleading, or it refers to the use of new technologies during the pandemic. Therefore, older adults who have children, prefer watching TV as it may allow them to get an immediate COVID-19 information support.

As for locality, residence in large cities corresponded to a greater likelihood of mentioning television watched via TV set. This may correspond to the notion of more tough COVID-19 restrictions and their enforcement in large localities as compared to rural settings [26]. This enforcement, coupled with abovementioned media loyalty, could lead older people residing in large localities to obtain COVID-19 information on TV. In addition, the findings of the multinomial analysis suggested that rural respondents were also found to be more likely to use designated new media. This finding corroborates the social diversification hypothesis [21] and may reflect a greater desire among people in rural localities to be better informed about the current situation due to the potentially lower provision of health services to their localities as compared to urban ones.

The study also found major country differences with respect to mentioning COVID-19 information sources in both multinomial and logistic models. Several explanations can be posited for these differences. First, countries

implemented different strategies aimed at mitigating the transmission of COVID-19 (compare Israel [23] and Finland [34]). Therefore, people in these countries may differ in their need and/or desire for information or the freedom to obtain it and, consequently, use different sources or same sources to varying extents. Second, the media landscape differs from country to country, such that different countries may have prepared media sources differently to cover the course of the pandemic and provide the latest information regarding it. For example, this can explain why digital forms of media were more preferable in Finland and less in Romania. Third, cultural differences should be considered, especially with respect to choosing interpersonal communication. These cultural differences may explain why Finnish respondents, residing in a country with low context culture, demonstrated a particularly low preference for interpersonal communication for COVID-19 information acquisition which was confirmed in multinomial analysis.

4.1 Limitations

This study is not without limitations. First, owing to its cross-sectional design, causal associations cannot be confirmed. For example, it cannot be confirmed that one prefers a particular information source *because* he/she reached a particular level of satisfaction with own health. Second, the study population comprised older internet users. This restricts generalization of the findings to all older adults, especially when discussing the choice of traditional media and interpersonal communication. Third, the study measures had some disadvantages. The outcome variable did not define COVID-19-related information. Some of this information may refer to health issues such as vaccines or surgical procedures [20] or statistics [6], while some of it may include administrative measures and restrictions on congregating in public places. Moreover, respondents were asked to choose only one option in the related item, while they could have preferred multiple options. Future studies on COVID-19 information acquisition in later life should allow participants choosing all sources or behaviors that apply to them. Furthermore, health satisfaction was used only as a proxy for health status or self-rated health. Understanding of the relationship between these constructs and the ability of health satisfaction to adequately reflect health status requires further research. Fourth, the study was unable to assess whether the preferred sources were actually used, reflecting the potential for the intention-behavior gap [31]. This limitation can serve as a topic for future (longitudinal) research. Finally, given the rapid changes in the course of the pandemic and the fact that it has recently ended, the findings of the study may apply for the studied period only and therefore may not accurately reflect the current situation with the choices and preferences for COVID-19 information sources.

5 Conclusion

To conclude, this study demonstrated numerous differences in COVID-19 information-seeking among older people. Even though all respondents were internet users and are probably more digitally advanced than the general population, they appeared to constitute a highly heterogeneous group in terms of their preferences for COVID-19 information sources or behaviors.

These differences should be acknowledged in national and community-level information campaigns. Moreover, when planning digital skills training and issuing guidelines for older adults, policy makers and health communication professionals should take socio-demographic differences found in this study into consideration to maximize the reach of the information and ensure that older adults obtain necessary and reliable information on new media. Given the major impact of age and education on the study outcomes, special efforts should be made with relation to older and less educated older adults. Because the mentioned impact was found mainly with respect to online/digital sources, older and less educated olds should get more training on their use. In addition, these categories should be trained on how to retrieve reliable COVID-19 information from various sources, including the official ones, how to identify misinformation, and more.

The study findings also indicate that living as a family (sometimes with children) plays a notable role in older adults' COVID-19 information seeking behavior. Having a partner and/or children can correspond to a greater pool of opportunities for getting related information assistance and, as shown in the multinomial analysis, diminishes the need for turning to external sources. Therefore, families are expected to assist their older members in their attempts to get precise and updated COVID-19 information via both traditional and new media. Communities should encourage family members to maintain the role of information providers and supporters for their older relatives.

The findings of this study call for further research on the effects of the interaction between socio-demographic factors and COVID-19 information-seeking behaviors, an interaction that appears to be shaped by multiple factors simultaneously. In addition, further research is necessary to achieve a deeper understanding of choices for COVID-19 information-seeking. Although respondents in the current study were asked to choose the most likely option for COVID-19 information-seeking, the reasons and motivations behind their choices remain unknown. Qualitative

studies can shed more light on the reasons and goals related to COVID-19 information seeking and on older people's preferences for particular sources and behaviors.

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Author's contribution DR: Article general idea development, data analysis, writing of the original draft, review, and editing.

ST: Conceptualization, funding acquisition, project administration, project methodology (design, operationalization), data collection, writing of the original draft, review, and editing.

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Data availability The database of this project is not yet available to the public. The study reported in the manuscript has not been preregistered. More information about the ACT project is available at: https://actproject.ca/act/longitudinal-study/

Declarations

Conflict of interest Financial interests: The authors declare they have no financial interests.
Non-financial interests: None.

Consent to participate Informed consent was not obtained from study participants since they were surveyed anonymously.

Ethical approval Principal investigators in Canada, Israel, Romania and Spain obtained ethics approval from their Institutional Review Boards (IRBs). In Austria and the Netherlands, there were no IRBs at the institutions involved. In the Netherlands, the head of department gave his ethic approval. In Finland, ethical review was not required according to the standards of the Finnish National Board on Research Integrity.

References

1. Abbas, R., Mesch, G.S.: Cultural values and Facebook use among Palestinian youth in Israel. Comput. Hum. Behav. **48**, 644–653 (2015). https://doi.org/10.1016/j.chb.2015.02.031
2. Ali, S.H., Foreman, J., Tozan, Y., Capasso, A., Jones, A.M., DiClemente, R.J.: Trends and predictors of COVID-19 information sources and their relationship with knowledge and beliefs related to the pandemic: Nationwide cross-sectional study. JMIR Public Health Surveill. **6**(4), e21071 (2020). https://doi.org/10.2196/21071
3. Beca-Martínez, M.T., Romay-Barja, M., Ayala, A., Falcon-Romero, M., Rodríguez-Blázquez, C., Benito, A., Forjaz, M.J.: Trends in COVID-19 vaccine acceptance in Spain, September 2020–May 2021. Am. J. Public Health **112**(11), 1611–1619 (2022). https://doi.org/10.2105/AJPH.2022.307039
4. Campos-Castillo, C.: Gender divides in engagement with COVID-19 information on the internet among US older adults. J. Gerontol. Ser. B **76**(3), e104–e110 (2021). https://doi.org/10.1093/geronb/gbaa133
5. Centers for disease control and prevention [CDC]. (2023). Factors that affect your risk of getting very sick from COVID-19. Available at: https://www.cdc.gov/coronavirus/2019-ncov/your-health/risks-getting-very-sick.html [Accessed: Aug 17, 2023]
6. Curtis, A.F., Rodgers, M., Miller, M.B., McCrae, C.S.: Impact of sex on COVID-19 media exposure, anxiety, perceived risk, and severity in middle-aged and older adults. J. Aging Health (2021). https://doi.org/10.1177/08982643211025383
7. Dryhurst, S., Schneider, C.R., Kerr, J., Freeman, A.L., Recchia, G., Van Der Bles, A.M., Spiegelhalter, D., Van Der Linden, S.: Risk perceptions of COVID-19 around the world. J. Risk Res. **23**(7–8), 994–1006 (2020). https://doi.org/10.1080/13669877.2020.1758193
8. Finney Rutten, L. J., Blake, K. D., Greenberg-Worisek, A. J., Allen, S. V., Moser, R. P., Hesse, B. W.: Online health information seeking among US adults: measuring progress toward a healthy people 2020 objective. Public Health Rep. **134**(6), 617–625 (2019). https://doi.org/10.1177/0033354919874074
9. Fridman, I., Lucas, N., Henke, D., Zigler, C.K.: Association between public knowledge about COVID-19, trust in information sources, and adherence to social distancing: Cross-sectional survey. JMIR Public Health Surveill. **6**(3), e22060 (2020). https://doi.org/10.2196/22060
10. Friemel, T.N.: The digital divide has grown old: Determinants of a digital divide among seniors. New Media Soc. **18**(2), 313–331 (2016). https://doi.org/10.1177/1461444814538648
11. Geçer, E., Yıldırım, M., Akgül, Ö.: Sources of information in times of health crisis: Evidence from Turkey during COVID-19. J. Public Health (2020). https://doi.org/10.1007/s10389-020-01393-x
12. Global health 5050 (2022). COVID-19: data disaggregated by age and sex. Accessed on: Jul 19, 2022. https://globalhealth5050.org/covid19/age-and-sex-data/
13. Haklai, Z., Aburbeh, M., Goldberger, N., Gordon, E.S.: Excess mortality during the COVID-19 pandemic in Israel, March–November 2020: when, where, and for whom? Isr. J. Health Policy Res. **10**, 1–7 (2021). https://doi.org/10.1186/s13584-021-00450-4
14. Hall, E.T.: Beyond Culture. Anchor Press, Doubleday (1976)
15. Ho, H.Y., Chen, Y.L., Yen, C.F.: Different impacts of COVID-19-related information sources on public worry: An online survey through social media. Internet Interv. **22**, 100350 (2020). https://doi.org/10.1016/j.invent.2020.100350
16. Igarashi, T., Takai, J., Yoshida, T.: Gender differences in social network development via mobile phone text messages: a longitudinal study. J. Soc. Pers. Relat. **22**(5), 691–713 (2005). https://doi.org/10.1177/0265407505056492
17. Ivan, L., Schiau, I.: Older audiences and digital media: focus on Romania. Manag. Dyn. Knowl. Econ. **6**(3), 423–447 (2018). https://www.managementdynamics.ro/index.php/journal/article/download/276/228. Accessed 18 Nov 2023
18. Kimhi, S., Eshel, Y., Marciano, H., Adini, B.: Distress and resilience in the days of COVID-19: Comparing two ethnicities. Int. J. Environ. Res. Public Health **17**(11), 3956 (2020). https://doi.org/10.3390/ijerph17113956

19. Krause, A.E.: The role and impact of radio listening practices in older adults' everyday lives. Front. Psychol. **11**, 3424 (2020). https://doi.org/10.3389/fpsyg.2020.603446
20. Lund, B., Ma, J.: Exploring information seeking of rural older adults during the COVID-19 pandemic. Aslib J. Inf. Manag. (2021). https://doi.org/10.1108/AJIM-04-2021-0118
21. Mesch, G.S.: Ethnic origin and access to electronic health services. Health Informatics J. **22**(4), 791–803 (2016). https://doi.org/10.1177/1460458215590863
22. Mohamad, E., Tham, J.S., Ayub, S.H., Hamzah, M.R., Hashim, H., Azlan, A.A.: Relationship between COVID-19 information sources and attitudes in battling the pandemic among the Malaysian public: Cross-sectional survey study. J. Med. Internet Res. **22**(11), e23922 (2020). https://doi.org/10.2196/23922
23. Muhsen, K., Na'aminh, W., Lapidot, Y., Goren, S., Amir, Y., Perlman, S., Cohen, D.: A nationwide analysis of population group differences in the COVID-19 epidemic in Israel, February 2020–February 2021. Lancet Reg. Health Eur. **7**, 100130 (2021). https://doi.org/10.1016/j.lanepe.2021.100130
24. Mureșan, A.V., Russu, E., Arbănași, E.M., Kaller, R., Hosu, I., Arbănași, E.M., Voidăzan, S.T.: Negative impact of the COVID-19 pandemic on kidney disease management—A single-center experience in Romania. J. Clin. Med. **11**(9), 2452 (2022). https://doi.org/10.3390/jcm11092452
25. Nimrod, G.: Older audiences in the digital media environment. Inf. Commun. Soc. **20**(2), 233–249 (2017). https://doi.org/10.1080/1369118X.2016.1164740
26. Nimrod, G.: Changes in internet use when coping with stress: older adults during the COVID-19 pandemic. Am. J. Geriatr. Psychiatry **28**(10), 1020–1024 (2020). https://doi.org/10.1016/j.jagp.2020.07.010
27. Nimrod, G.: Technostress in a hostile world: Older internet users before and during the COVID-19 pandemic. Aging Mental Health (2020). https://doi.org/10.1080/13607863.2020.1861213
28. Olaimat, A.N., Aolymat, I., Shahbaz, H.M., Holley, R.A.: Knowledge and information sources about COVID-19 among university students in Jordan: A cross-sectional study. Front. Public Health **8**, 254 (2020). https://doi.org/10.3389/fpubh.2020.00254
29. Rosen, B., Waitzberg, R., Israeli, A., Hartal, M., Davidovitch, N.: Addressing vaccine hesitancy and access barriers to achieve persistent progress in Israel's COVID-19 vaccination program. Isr. J. Health Policy Res. **10**(1), 1–20 (2021). https://doi.org/10.1186/s13584-021-00481-x
30. Rosenberg, D., Nimrod, G.: Size matters: Locality of residence and media use in later life. Ageing Soc. (2021). https://doi.org/10.1017/S0144686X21000143
31. Sheeran, P., Webb, T.L.: The intention–behavior gap. Soc. Pers. Psychol. Compass **10**(9), 503–518 (2016). https://doi.org/10.1111/spc3.12265
32. Taipale, S., Oinas, T., Karhinen, J.: Heterogeneity of traditional and digital media use among older adults: A six-country comparison. Technol. Soc. **66**, 101642 (2021). https://doi.org/10.1016/j.techsoc.2021.101642
33. Thomas, R., Greenwood, H., Michaleff, Z.A., Abukmail, E., Hoffmann, T.C., McCaffery, K., Glasziou, P.: Examining Australian's beliefs, misconceptions and sources of information for COVID-19: A national online survey. BMJ Open **11**(2), e043421 (2021). https://doi.org/10.1136/bmjopen-2020-043421
34. Tiirinki, H., Tynkkynen, L.K., Sovala, M., Atkins, S., Koivusalo, M., Rautiainen, P., Keskimäki, I.: COVID-19 pandemic in Finland-preliminary analysis on health system response and economic consequences. Health Policy Technol. **9**(4), 649–662 (2020). https://doi.org/10.1016/j.hlpt.2020.08.005
35. Tran, B.X., Dang, A.K., Thai, P.K., Le, H.T., Le, X.T.T., Do, T.T.T., Ho, C.S.: Coverage of health information by different sources in communities: Implication for COVID-19 epidemic response. Int. J. Environ. Res. Public Health **17**(10), 3577 (2020). https://doi.org/10.3390/ijerph17103577
36. United Nations (UN) (2023) Older persons. Available at: https://emergency.unhcr.org/protection/persons-risk/older-persons#:~:text=An%20older%20person%20is%20defined,or%20age%2Drelated%20health%20conditions [Accessed: Aug 26, 2023]
37. Venkatesh, V.: Impacts of COVID-19: A research agenda to support people in their fight. Int. J. Inf. Manag. **55**, 102197 (2020). https://doi.org/10.1016/j.ijinfomgt.2020.102197
38. Von Humboldt, S., Mendoza-Ruvalcaba, N.M., Arias-Merino, E.D., Costa, A., Cabras, E., Low, G., Leal, I.: Smart technology and the meaning in life of older adults during the Covid-19 public health emergency period: A cross-cultural qualitative study. Int. Rev. Psychiatry **32**(7–8), 713–722 (2020). https://doi.org/10.1080/09540261.2020.1810643
39. Wise, J.: Covid-19: WHO declares end of global emergency. BMJ **381**, 1041 (2023). https://doi.org/10.1136/bmj.p1041
40. World health organization (2015) World report on ageing and health. World Health Organization
41. World health organization. (2023). E.G.5 initial risk evaluation, 9 Aug 2023. Retrieved from: https://www.who.int/docs/default-source/coronaviruse/09082023eg.5_ire_final.pdf?sfvrsn=2aa2daee_1. Accessed 28 Aug 2023
42. Wong, F.H.C., Liu, T., Leung, D.K.Y., Zhang, A.Y., Au, W.S.H., Kwok, W.W., Lum, T.Y.S.: Consuming information related to COVID-19 on social media among older adults and its association with anxiety, social trust in information, and COVID-safe behaviors: Cross-sectional telephone survey. J. Med. Int. Res. (2021). https://doi.org/10.2196/26570
43. Worldometers. (2023). COVID-19 coronavirus pandemic. Available from: https://www.worldometers.info/coronavirus/ (Accessed on 28/8/2023)
44. Wu, Y.H., Damnée, S., Kerhervé, H., Ware, C., Rigaud, A.S.: Bridging the digital divide in older adults: A study from an initiative to inform older adults about new technologies. Clin. Interv. Aging **10**, 193–201 (2015). https://doi.org/10.2147/CIA.S72399
45. Xie, B., Charness, N., Fingerman, K., Kaye, J., Kim, M.T., Khurshid, A.: When going digital becomes a necessity: Ensuring older adults' needs for information, services, and social inclusion during COVID-19. J. Aging Soc. Policy **32**(4–5), 460–470 (2020). https://doi.org/10.1080/08959420.2020.1771237
46. Xie, B., Shiroma, K., De Main, A.S., Davis, N.W., Fingerman, K., Danesh, V.: Living through the COVID-19 pandemic: Community-dwelling older adults' experiences. J. Aging Soc. Policy **33**(4–5), 380–397 (2021). https://doi.org/10.1080/08959420.2021.1962174
47. Zhong, Y., Liu, W., Lee, T.Y., Zhao, H., Ji, J.: Risk perception, knowledge, information sources and emotional states among COVID-19 patients in Wuhan. China. Nurs. Outlook **69**(1), 13–21 (2021). https://doi.org/10.1016/j.outlook.2020.08.005
48. Zimmerman, M.S.: Health information-seeking behavior in the time of COVID-19: Information horizons methodology to decipher source path during a global pandemic. J. Doc. **77**(6), 1248–1264 (2021). https://doi.org/10.1108/JD-01-2021-0022