1. Introduction

Adults aged 65 or older accounted for 8.5% of the world's population as of 2015, and this percentage is projected to reach nearly 17% by 2050 (He, Goodkind, & Kowal, 2016). Approximately 75% of American adults aged 65 years old or older had more than one chronic condition such as heart disease, arthritis, or diabetes as of 2014 (Buttorff, Ruder, & Bauman, 2017). Unsurprisingly, they are concerned with and interested in health- and wellness-related topics. Health information seeking—defined as "the ways in which individuals go about obtaining information, including information about their health, health-promoting activities, health risks to one's health, and illnesses" (Lambert & Loiselle, 2007, p. 1008)—is an important part of older adults' everyday lives as they cope with their health conditions. Research evidence shows that successful health information seeking enables patients to be better informed about their health conditions and treatment options and can result in the improvement of health-promoting activities and clinical outcomes (Chaudhuri, Le, White, Thompson, & Demiris, 2013; Harada, Shibata, Lee, Oka, & Nakamura, 2016). Therefore, it is important to explore how older adults seek, use, share, and even avoid health information in the process of dealing with their health conditions in everyday life settings.

2. Problem statement

Older adults often experience major life changes, including retirement and declining health, and therefore have specific information needs (Wicks, 2004). Previous studies have found that the most common and primary information need for older adults involves health and wellness, such as symptoms of specific diseases, effects of medications and supplements, healthy diets, and exercises that are safe and helpful for mitigating health conditions (Su & Conaway, 1995; Taha, Sharit, & Czaja, 2009; Wicks, 2004; Williamson & Asla, 2009). Despite the increasing population and the high number of older adults living with chronic health conditions, this is a relatively less-studied user group in the health information behavior literature, especially regarding everyday life information seeking (ELIS). Considering that older adults' daily routines, especially those who are retired, mainly involve nonwork activities rather than work-related activities, ELIS is an important context of their health information behavior. There is, however, a lack of research on factors rooted in daily life, such as way of life and mastery of life

(Savolainen, 1995), related to the health information behavior of older adults. More research is needed to examine how older adults' daily routine, which is more likely to involve nonwork activities compared to younger adult populations, and basic coping styles affect their health information behavior in the ELIS context. Insight gained from such research would help the development of information systems and health literacy and intervention programs that are aligned with the health information behaviors of older adults in the ELIS context.

This exploratory study investigated the characteristics of older adults' health information behavior using the ELIS model proposed by Savolainen (1995). This study addressed the following research questions:

- What online and offline sources do older adults use to seek health information, and why do they rely on those sources?
- What are the characteristics of older adults' health information behavior in the ELIS context?

3. Literature review

3.1. Savolainen's ELIS model

Savolainen (1995) defined ELIS as "the acquisition of various informational (both cognitive and expressive) elements which people employ to orient themselves in daily life or to solve problems not directly connected with the performance of occupational tasks" (pp. 266–267). His definition highlights that individuals' ELIS involves both orienting information seeking, or keeping themselves updated with current events or areas of personal interest, and practical information seeking as part of the process of solving problems in daily life. Savolainen's (1995) ELIS model posits that information-seeking behavior can be understood by examining preferences in prioritizing various daily activities (i.e., way of life) and general attitude and coping strategies regarding everyday problems (i.e., mastery of life). Defined as the "order of things" (Savolainen, 1995, p. 262), way of life can be reflected by the nature of hobbies (i.e., activities performed on a regular basis). Defined as "keeping things in order" (Savolainen, 1995, p. 259), mastery of life is characterized by two underlying dimensions that describe whether an individual's belief in and expectations about the solvability of everyday problems is optimistic or pessimistic and whether the person's general approach to the problem-solving situations is analytic and systematic (i.e., cognitive) or unpredictable and emotional (i.e., affective). Based on these dimensions, four types of mastery of life emerge: optimistic-cognitive,

pessimistic-cognitive, defensive-affective (also known as optimistic-affective), and pessimistic-affective (Savolainen, 1995). Additionally, the ELIS model identifies other personal and social factors affecting ELIS, such as material, cultural, cognitive, and social capital (Savolainen, 1995).

Savolainen also noted that although the concept of ELIS is based in nonwork contexts, it is not the opposite of job-related information seeking. He elaborated that the boundary of people's information seeking on various topics in their everyday life is not sharply distinguished by whether it is job related or not. For instance, seeking information concerning self-development such as language courses may be nonwork information seeking related to hobbies, but it may also be part of job-related information seeking. ELIS and job-related information seeking thus tend to overlap and complement each other (Savolainen, 1995).

3.2. Older adults as a user group

Retirement age based on the U.S. Social Security Administration (now 66 years old, although it had been 65 for many years) is often used to define senior citizens or older adults (U.S. Social Security Administration, 2019). This age classification has been widely used for nationwide demographic surveys such as the U.S. census. However, defining older adults solely by age may not be appropriate when studying them as a user group of information systems because of their wide range of abilities and experiences with technology (Fisk et al., 2009; Moffatt, 2013).

In terms of technology adoption and use, Charness and Boot (2009) highlighted that older adults are a more heterogeneous user group than other age groups due to different rates of perceptual, cognitive, and psychomotor declines. Hong, Lui, Hahn, Moon, and Kim's (2013) study found significant variation in intentional behaviors regarding technology acceptance between older adults defined by cognitive age and chronological age. The literature focusing on information behavior also has reported notable differences in the range and types of information needs and related information-seeking behaviors among older adults (Asla & Williamson, 2015; Asla, Williamson, & Mills, 2006; Selwyn, Gorard, Furlong, & Madden, 2003; Wu & Li, 2016). Therefore, it is important to use a definition of older adults that flexibly accommodates the potential variance in information behavior among older adults rather than using a definition relying on a single chronological age cutoff. For example, Neugarten (1974) categorized older adults broadly as young-old (55–75 years old) and old-old (75+ years old) adults. Young-old

adults are characterized as healthy and active older people who are energetically engaged in leisure and social activities; old-old adults often face significant disabilities. Laslett (1989) divided the human life span into four ages: the first age is when education, socialization, and preparation for work occurs; the second age is when occupational, social, and family-related activities (e.g., marriage, childbirth, child nurturing) are active; the third age usually begins with retirement, when people have time for self-fulfillment; and the fourth age is the last stage of the life cycle, which is characterized by illness, frailty, dependence, and the imminence of death (for more in-depth discussion regarding definitions of older adults, see Asla, 2013).

3.3. Older adults' health information-seeking behavior

Older adults use different sources for health information, such as interpersonal sources (e.g., care providers, family members, friends), traditional mass media (e.g., television, newspapers), and web-based sources (e.g., websites and social media; Chaudhuri et al., 2013; Gollop, 1997; Hall, Bernhardt, & Dodd, 2015; Hardt & Hollis-Sawyer, 2007). However, older adults consider their health care providers to be the most reliable source of health information, due to not only their perceived expertise, but also the fact that they are a living source with whom they could discuss their health (Chaudhuri et al., 2013).

Older adults' health information-seeking behaviors have been studied by considering their perceptions of the credibility of information sources (Chaudhuri et al., 2013; Choi, 2013); attitudes during office visits (e.g., if and how actively they question doctors or nurses; Chaudhuri et al., 2013; Checton, Greene, Carpenter, & Catona, 2017); internet usage for health information seeking (e.g., how often, how long, or how regularly they search for health information online; Chang & Im, 2014; Cutilli, Simko, Colbert, & Bennett, 2018; Enwald et al., 2017; Flynn, Smith, & Freese, 2006); or intentions or actual behaviors of sharing health information with others (e.g., whether they discuss health- and wellness-related issues with or provide health information to others; Enwald et al., 2017). Several factors, including age, education, and health literacy, affect older adults' health information-seeking behaviors. Specifically, older individuals are less likely to seek information related to their health conditions, share health information with others, or think about physical exercises needed to manage their health conditions (Chaudhuri et al., 2013; Enwald et al., 2017; Hardt & Hollis-Sawyer, 2007). Women tend to seek health information more actively than men (Chaudhuri et al., 2013; Ek, 2015; Enwald et al., 2017; Flynn et al., 2006). Those with inadequate health literacy perceive more barriers to health information seeking, such

as lack of access to health information resources, less appreciation for the value of information seeking, and reduced ability to search information using the internet, relative to those with an adequate level of health literacy (Cutilli et al., 2018; Jeong & Kim, 2016; Sørensen et al., 2012; Wu & Li, 2016). The preceding studies provided valuable insights into older adults' preferred sources of health information and the factors affecting their health information seeking and use behaviors. However, few of them focused on how older adults' daily routine (i.e., way of life) and coping style (i.e., mastery of life) affect their ways of seeking, using, and sharing health information in everyday life settings. The present study aimed to fill this gap in the literature.

4. Methodology

The researcher conducted a basic (generic) qualitative study (Merriam, 2009) to understand how older adults seek, use, and share health information in everyday life. The target population of this study was American older adults regularly using online health information. Purposive and snowball sampling methods were employed to recruit subjects using the following criteria: American adults aged 55 or older, based on Neugarten's (1974) definition, who had searched the internet for health information at least once during the preceding six months.

4.1. Participant recruitment and data collection procedure

A lifelong learning center at a university in the southern United States was the initial recruitment site where the researcher identified several participants and looked for further participants using the snowball sampling technique. When potential participants expressed interest in the study through phone calls or emails, the researcher conducted a prescreen test using two established instruments, the Short Portable Mental Status Questionnaire (Pfeiffer, 1975) and the Wechsler Memory Scale III (Wechsler, 1997). The former, consisting of 10 simple questions (e.g., cite the date, recall the names of former presidents, complete a small subtraction problem), is an instrument developed to assess the presence and degree of intellectual impairment. As suggested by the developer of the instrument, the following scale was used to determine if the participant passed the prescreen test (Pfeiffer, 1975): 0 to 2 errors = intact; 3 to 4 errors = mild intellectual impairment; 5 to 7 errors = moderate intellectual impairment; and 8 to 10 errors = severe intellectual impairment. The latter is an instrument developed to test memory. The researcher read aloud a short story (65 words long) and the participants were asked to recall as many words as they could. The developer of the instrument suggested that participants pass the test if they recall at least six words (Wechsler, 1997). These two prescreen tests ensured that

participants possessed adequate cognitive function for the study, or the ability to answer interview questions based on their recall. In the present study, the prescreening disqualified no potential participants.

The researcher employed semi-structured interviews to collect data. The researcher held each face-to-face, one-on-one interview session at a site of the participant's choosing. After the participant indicated understanding and accepting the proposed research, the researcher asked the participant to provide informed consent. The researcher then asked interview questions following an interview protocol. To better understand the participants' familiarity and experiences with the internet, the first questions asked about the participants' internet usage and experience. The next questions focused on the participants' health information needs, purpose of internet searches, sources used to obtain necessary health information both on- and offline, reasons for using the sources mentioned, how they used the health information they obtained, and with whom they shared their findings. The last set of questions focused on cues and heuristics employed by the participants to assess the credibility of health information they found on the web; the findings were reported elsewhere [blinded for review]. All participants completed the semistructured interview. No one declined to answer any of the interview questions or withdrew from the interview. The final sample size was 21. Each participant received a monetary incentive for participating.

4.2. Profiles of study participants

Of the 21 participants, 16 were women. Nineteen were Caucasian; two were African American. The participants' ages ranged from 61 to 80 years, with a mean of 70.3 (median = 70, SD = 5.6). Fifteen held a bachelor's or higher degree; five took college courses but did not obtain a college degree; only one participant did not experience higher education. Most participants (n = 16) mentioned family members such as parents, siblings, children, and grandchildren as part of their social networks. Those in a marital or romantic relationship (n = 13) considered their spouse (or partner) to be an important social contact. Friends and local community members were also mentioned as social contacts. Concerning the participants' medical history and current health status, 17 had at least one chronic condition (e.g., cardiovascular diseases, arthritis, cancer). Those with no health issues (n = 4) still reported interest in health information about common illnesses in older age (e.g., dementia) and well-being (e.g., nutrition, healthy diet, exercise). All participants had more than five years of experience with the internet. More than a

half (n = 12) spent at least 16 hours online each week or more than two hours per day, on average. The profile of the participants is presented in Table 1.

[Table 1 goes here]

Overall, the study sample consisted of more young-old (n = 15) than old-old (n = 6) adults, and participants tended to be highly educated and familiar with the internet. The profile of the study sample may not represent the broader older adult population; however, the characteristics of the sample were in line with those of the target population, American older adults who regularly use the internet. Based on findings from recent nationwide surveys (Alijanipour et al., 2014; Smith, 2014), American adults younger than 75 years old (i.e., young-old adults) with higher income and education levels tend to use the internet more than adults aged 75 or older (i.e., old-old adults) with lower income and education levels.

4.3. Data analysis

All interviews were voice recorded and transcribed for data analysis. The ELIS model (Savolainen, 1995) guided the construction of the initial codes used in the data analysis (see Table 2). Although coding was primarily guided by the predefined coding scheme based on the ELIS model (i.e., theoretical coding), the researcher also sought emergent themes not identified by the coding scheme using open coding.

In an attempt to increase the dependability of the coding scheme, process, and results (Lincoln & Guba, 1985), a third-party coder was recruited. The researcher and third-party coder first coded a transcribed interview independently. Then they compared their coding results to identify differences in their codes through a face-to-face meeting. Examples of different coding results included cases where different mastery of life types were assigned to the identical statement and an obvious code was not assigned to a statement by either coder. Both coders discussed and resolved such discrepancies and refined the rules for assigning codes. They coded another interview, this time reading the transcript together and exchanging opinions immediately when any disagreements or discussion points emerged. Using the refined coding scheme, the researcher recoded all interviews. QSR NVivo 10 software (Castleberry, 2012) aided the systematic analysis of the interview data.

[Table 2 goes here]

5. Findings

This section presents the findings of the study according to the themes derived from the data analysis, which was mainly guided by Savolainen's (1995) ELIS model (see Table 2). In particular, the subsequent sections report on the sources of health information employed by older adults and the characteristics of their health information behavior in the ELIS context in terms of orienting and practical health information seeking, way of life and mastery of life types, and role allocation in elderly couples' ELIS.

5.1. Sources in older adults' everyday health information-seeking

Most participants ($n = 20$) mentioned health care providers, such as primary care physicians or specialists, as their primary health information source. Those with chronic diseases ($n = 17$) relied on information from doctors who provided medical treatments for their health conditions. One participant ($n = 1$) in the study, however, could not afford a doctor and had to rely on online health information.

> Since I don't have medical insurance, I can't go to the doctor like I'm supposed to like I did when I was working and had insurance through my job. (P21)

Beyond health care providers, a spouse or partner was most commonly mentioned as an interpersonal source of health information. Those in a couple relationship ($n = 13$) regularly shared information on various topics, including health- and wellness-related topics, with their spouse or partner. In many cases involving couples, one person served as the primary source of health information. Further discussion of the role allocation in older adult couples' health information seeking is provided in the discussion section.

Another interpersonal source of health information was a friend group or community members, especially those with the same (or similar) health conditions, namely, "people like me." Older adults shared with these people not only health information but also firsthand experiences and tips they acquired while treating their health conditions.

Many participants ($n = 18$) highly valued government-run websites, including the National Institutes of Health and Centers for Disease Control and Prevention, and university hospitals such as Johns Hopkins Medicine and Harvard Medical School. They regarded such websites as online versions of these public organizations that have established reputations in the medical field. They believed that information on such websites was based on solid research instead of opinion, and the sites intended to improve public wellness and health instead of

promoting products. For similar reasons, websites of official associations geared toward addressing certain diseases, such as the American Association for Cancer Research and the American Arthritis Society, were considered credible sources of health information.

Some participants ($n = 8$) mentioned commercial websites (i.e., dot-com sites) as useful sources of health information. For example, they visited sites operated by companies like Walgreens or CVS, both large pharmacy and health care retailers, to find information about prescriptions or compare medication prices.

Most participants expressed skepticism regarding social media as an online source of health information. They indicated a belief that social media posts often feature information based on opinion, not fact. Also, they expressed concern about privacy issues and how their health status and medical information might be disclosed to unwanted people. Nevertheless, some participants ($n = 8$) regarded online community sites, such as Facebook pages on specific diseases, as virtual venues where they could interact with "people like me." They exchanged questions and answers and shared concerns and experiences with other users. Wikipedia was another site mentioned as a useful source of health information. Participants used Wikipedia to find definitions of medical jargon or brief descriptions of diseases of concern. They mentioned being able to understand complex medical terminology thanks to the approachable language in which articles were written. However, they also understood the open, collaborative nature of Wikipedia, and did not immediately assume the information was correct.

> They're [Wikipedia articles] usually written in a little more plain language that's easy to understand. So, I use that to get a feel for the topic and then that helps me understand what other sites may be saying. (P18)

> Occasionally, I look at Wikipedia just to get a simple explanation, but don't rely on that 100% because it's not verified. (P01)

5.2. Connected nature of orienting and practical health information seeking

The two types of information seeking identified in the ELIS model (Savolainen, 1995), orienting and practical information seeking, occurred interactively rather than mutually exclusively. When older adults perceived certain health information obtained through orienting health information seeking as interesting and relevant for their current situation or potential needs, they sought further information on the given topic. Participant 8, for example, described hearing about biotin as a hair supplement while chatting with friends. She became interested in

the topic and searched the internet for more information about its effects (and side effects) on her health. In this case, she was exposed to a new health topic through her social networking activity, which encouraged her to seek further information (i.e., from orienting to practical health information seeking).

The opposite case was also found. Participant 13 had started gathering information on Parkinson's disease for her husband. Even after her husband died, she continued seeking information on the disease, such as new medications, by reading newspapers or participating in the Parkinson's Foundation. In this case, a past situation in which she sought specific health information on Parkinson's disease made her follow the topic in her daily life, even after the necessity for practical health information seeking disappeared (i.e., from practical to orienting health information seeking).

5.3. Way of life and orienting health information seeking

Way of life is closely related to informational interests and how individuals acquire orienting information in everyday life (Savolainen, 1995). The participants in the present study were all retirees (except one person whose retirement was scheduled three days after the interview), and the nature of their hobbies was considered an indicator of their daily routine. Hobbies mentioned by participants were grouped into three types: cognitive, affective, and social. The first two types were derived from the typology of hobbies identified in the ELIS model (Savolainen, 1995); the third type was added by the researcher to categorize hobbies that involved face-to-face or virtual interactions with social networks.

The more educated group exhibited interest in more diverse types of hobbies than the less educated group. As a result, the more educated group's interests covered all three types of hobbies, whereas the less educated group's interests covered only affective and social types (see Table 3). Due to greater diversity in hobbies in the more educated group, they seemed to be naturally exposed to more varied information sources in their everyday lives than the less educated group.

> I follow health things that are featured in our local newspaper. There's generally one day a week where the section devoted to health will include exercise, diet, activities that are healthy [and] meetings and seminars that I might be interested in on health topics. (P04)

This difference in way of life between the groups, therefore, could result in different sources of useful health information during daily activities.

[Table 3 goes here]

5.4. Mastery of life and practical health information seeking

The subsequent sections report findings regarding the participants' mastery of life types and associated health information behaviors. Each participant's mastery of life type was categorized based on two underlying dimensions: optimistic vs. pessimistic attitude toward the problem's solvability and cognitive vs. affective coping style, which were identified in Savolainen's (1995) ELIS model. Of note, although people may employ both types of coping strategies or have both types of attitudes toward problem solvability, the proportion tends to be inclined toward one type, rather than balanced (Folkman & Lazarus, 1980). The categorization exercise used in the present paper was hence to characterize the participants' overall approach toward health information-seeking situations by identifying the most prominent mastery of life type among the four identified in the ELIS model (Savolainen, 1995).

5.4.1. Optimistic-cognitive

Individuals who expressed a firm belief that they could find necessary information by consulting different sources and channels were considered to have an optimistic and cognitive attitude toward problem solving. Distinctive characteristics of this group's health information behavior included (a) searching the internet before seeing a doctor to better understand what their doctors would say and prepare to ask specific questions during the visit and (b) seeking further information after the visit to make sense of and verify the health information from their doctor. These older adults sought a better understanding of this new and unfamiliar health information by exploring multiple sources of information on their own, and they were optimistic about finding necessary information to solve their problem or question.

> If I'm taking medication, say, I'm taking one medication, and I want to take an over-the-counter medication, too. Then I'll check and see what the interaction is. If my doctor has given me a diagnosis and I don't understand it, I'll come home and research it. She [the doctor] may have used some terminology, which I didn't understand, or she may have said something like, "Well, you have tendonitis in your left arm and maybe it'll heal up in six months, but then sometimes it takes longer," I might come home and look up bicep tendonitis and read about it and then I would make a decision as to whether I wanted to go back and see her again about something or ask for a reference to a physical therapist. (P09)

5.4.2. Pessimistic-cognitive

Individuals in the pessimistic-cognitive group took systematic approaches to health information seeking, using multiple sources to find the most pertinent information, like the optimistic-cognitive group. Yet they were less confident about the solvability of the problem. Thus, the main distinction between this group and optimistic-cognitive participants was that they acknowledged and worried about how their information seeking might not solve the given problem. Thus, they often relied on suggestions from others (e.g., doctor, partner) to make final decisions about which information they would act on to fulfill their health information needs.

> Because of reading about that [newer drugs] in a Mayo clinic health letter, then I looked it up and learned about it. … I generally would look up health information when it concerns me or somebody I care about. … I don't feel like I have the credibility myself to solve between reliable and unreliable information. I mean some stuff, yes, you can. (P02)

5.4.3. Defensive-affective

Individuals in the defensive-affective group had an optimistic perspective on solving their problem; however, their strategies were focused more on relieving their concerns rather than solving the problem. When defensive-affective participants perceived the given problem as too challenging to solve alone, they either avoided the situation or treated it lightly with an optimistic view rather than realistic considerations. In the present study, participants who accepted or ignored information based on a simple inspection or instinct were deemed to have an affective instead of cognitive approach to health information seeking.

> I don't necessarily know if it [WebMD] is credible or not, but it gives me the information that I need, and it's easy to read. You know, I'm not a doctor, if I put something, say, having a problem breathing, it will give me a whole list. … Sometimes, it makes me feel better when I know I'm not dying. And sometimes it makes—you can tell what you should do. (P11)

5.4.4. Pessimistic-affective

One participant had a pessimistic and affective attitude toward health information seeking. This person's ELIS was based on affective strategies but differed from the defensive-affective approach. He had no desire to seek information that might solve his everyday problems. He relied heavily on his partner to acquire necessary information, and he was unwilling to search for information by himself.

There's too much information, and everybody has got whatever they're promoting. Everybody has got a promotion. Who knows whether you're getting the truth or not? It may be the three fourths of the truth? … I go to see a doctor and take what the doctor tells me. I live like that … and I ask my girlfriend, she looks a lot. (P06)

As presented in Table 4, those with optimistic attitudes toward a problem-solving situation (i.e., optimistic-cognitive and defensive-affective) spent more hours per week on the web than those with pessimistic attitudes (i.e., pessimistic-cognitive and pessimistic-affective). This finding implies that those with optimistic attitudes were more active in seeking health information on the web, regardless of whether their coping strategies were cognitive (i.e., comparatively analyzing information from multiple sources) or affective (i.e., believing what is convenient or comfortable).

[Table 4 goes here]

5.5. Role allocation in a couple's ELIS

One notable theme emerged from the data was that an older couple's information sharing appeared to be mainly unidirectional, going from one person to the other in the relationship, rather than bidirectional. All participants in a couple relationship ($n = 13$) mentioned that usually they played either the information provider role or the receiver role. Although it is premature to draw generalizable findings regarding factors affecting such role allocation practices among older couples, mastery of life seemed to be a useful concept to understand how they allocated their roles in seeking health information. In the present study, those who played the information provider role tended to be optimistic toward information seeking, whereas the information receivers tended to be pessimistic.

Furthermore, information providers spent more hours searching the internet than their spouse or partner (i.e., information receivers), as presented in Table 5. Except for gender (75% of information providers were female), demographic factors such as age, education, and occupation were not useful in defining these roles in this study.

Regarding three couples who participated in the study together (their IDs are superscripted in Table 5), each couple had the same orientation on the cognitive vs. affective dimension. In other words, both members used either the cognitive or affective strategy to seek necessary information. The role-allocation pattern, therefore, seemed to be based on the optimistic vs. pessimistic dimension (i.e., who has more optimism about solving the problem).

13

As shown in Table 5, those who used the internet more per week tended to be the information provider for their spouse or partner.

> I do use it [the internet] a lot for health information. … I have some mild arthritis. I look that up. For instance, I have plantar fasciitis and I looked up the exercises to do for that and did those and that was very helpful. … I look up stuff for my husband, too. (P15; information provider)

> [My wife] does it all. … I go to [my wife] most of the time anyway. I do some of this [information seeking] on my own, but I usually go and get her advice on what to do. (P16; information receiver)

[Table 5 goes here]

6. Discussion

This section first discusses findings regarding the sources of health information used by older adults, addressing the first research question of the paper, and then discusses the notable characteristics of older adults' health information behavior in the ELIS context, which addresses the second research question.

6.1. Sources of health information

Most participants in the present study ($n = 20$) considered health care providers as the most credible source of health information, as found in past research (Chaudhuri et al., 2013; Gollop, 1997; Hall et al., 2015; Schnall, Liu, & Iribarren, 2018; Taha et al., 2009; Wu & Li, 2016). However, one participant (P21) could not afford health insurance and had to rely on online health information. When she had medical issues, she used the internet to look for ways to take care of herself naturally. Due to the lack of proper care from medical professionals, sometimes she had to go to the emergency room. Research on health disparities has shown that uninsured people receive significantly less care for severe and morbid symptoms, and lacking health insurance is correlated with worse health (Baker, Shapiro, & Schur, 2000; Baker, Sudano, Albert, Borawski, & Dor, 2001). The health disparity issue can be more critical in the U.S. health system or other health systems wherein nationalized health care does not exist or is not fully implemented. Thus, although the finding from the present study regarding the health disparity issue was based on a minor case, it is worth noting that the roles of public agencies such as governments, public libraries, or senior centers in providing access to health information to older adults who cannot afford a doctor are important. Teaching older adults how to seek necessary

health information from reliable online sources is important, because their knowledge, skill, and e-health literacy efficacy can be improved by health literacy intervention programs delivered through public agencies (Xie, 2011).

Married or partnered older adults in the study ($n = 13$) considered their spouse or partner to be a reliable source of health information (referred to as an information provider) or in need of health information (an information receiver). Acknowledging that older couples were only part of the sample used in the study, one notable finding regarding the information receivers' ELIS was that their health information seeking was dependent on their spouse or partner and based on trust accumulated over a long period. Regarding trustworthiness and expertise, the two dimensions of information credibility (Choi & Stvilia, 2015; Hovland, Janis, & Kelley, 1953), information receivers seemed to put more weight on the trustworthiness rather than the expertise of their spouse or partner as a credible source of health information. The information providers' education levels were not necessarily higher than the information receivers, nor were their occupational experiences always related to medical fields (see Table 5).

The spouse or partner's role as the primary information provider, however, may have adverse impacts on the information receiver's health information seeking and health management. Checton et al.'s (2017) study, which examined older patients' health information seeking during office visits, found that informal input or questions from a spouse, partner, or family member hindered their health information seeking during office visits and decreased their perceptions of being able to deal with their health conditions. This finding implies that information receivers, who tend to be less willing or able (or both) to seek necessary health information on their own, may lose potential opportunities to improve their information-seeking skills by relying on their partner or spouse. Therefore, it is necessary to develop educational programs targeting information receivers as a vulnerable group among older adults. As previously mentioned, promising research evidence shows that older adults' health literacy and self-efficacy can be improved by intervention programs (Xie, 2011).

6.2. Older adults' health information behavior in the ELIS context

The nature of hobbies is an important cue reflecting how older adults acquire information as they perform their daily routines (i.e., orienting information seeking; Savolainen, 1995). Research on aging has shown that the variety of older adults' activities is an important predictor of their health and well-being. More specifically, those who perform cognitive activities in their

everyday lives tend to be healthier and live longer, and those who have a wider range of activity types are less affected by loss of a spouse, functional impairment, or poor family support (Adams, Leibbrandt, & Moon, 2010). These findings support the present argument that older adults' way of life (i.e., diversity of hobbies) should be considered a critical attribute characterizing their ELIS, considering that their everyday lives mainly involve nonwork activities. Future research should examine how the type and range of hobbies affect older adults' behaviors in acquiring health information in the ELIS context.

Another important finding from the present study that deserves further discussion is how older adults obtain unexpected or unsolicited health information passively while interacting with their social networks (e.g., spouse, partner, friends, family). This type of health information seeking can be understood as incidental information acquisition (Williamson, 1998) or accidental information discovery (Wilson, 1977). Participants in the present study most frequently indicated social networking as a daily activity. "People like me," or friends or community members with the same health or wellness issues and concerns, were often mentioned as a valuable source or recipient of health information. These findings indicate that older adults' ELIS can be better understood by considering not only their personal characteristics (e.g., demographics, cognitive and cultural capital), but also their social contact networks (i.e., social capital). Researchers highlighted the importance of having an integrated perspective of both personal and social factors in understanding a person's information behavior (Pettigrew, Fidel, & Bruce, 2001). This point is in line with McKenzie's (2003) idea that by proxy is a significant mode of everyday information seeking in which people contact certain information resources through interpersonal referrals and intermediaries such as family and friends. Therefore, local communities or online forums for specific health conditions where older adults can interact with "people like me" can be effective routes to deliver health information and intervention programs to older adults.

In practical health information seeking, wherein people seek information purposefully to answer questions, address uncertainty, and understand personal health challenges (Case, 2012), mastery of life is a useful concept for understanding their information-seeking styles in terms of two dimensions: whether they have optimism or pessimism toward the solvability of the problem and whether they employ cognitive or affective coping strategies (Savolainen, 1995). An important research direction is operationalizing the two dimensions of mastery of life, so that empirical studies can measure mastery of life and its impacts on a person's ELIS. Existing

personality concepts from psychology such as self-efficacy and coping strategies can guide the operationalization of mastery of life. In particular, self-efficacy, a key element in social cognitive theory (Bandura, 1997), refers to "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). In the context of older adults' ELIS, self-efficacy can be connected to the optimistic vs. pessimistic dimension of mastery of life, which involves individuals' beliefs about how easily they could find necessary health information using accessible sources. Chang and Im (2014) found that computer self-efficacy—defined as beliefs about personal capability to use a computer (Compeau & Higgins, 1995)—was a significant factor affecting older adults' internet usage for health information seeking. As previously mentioned, people in the present study who spent more time on the internet tended to play the role of information provider for their spouse or partner (Table 5).

The other dimension, cognitive vs. affective, can be understood as reflective of coping styles, which refer to how people act and feel when they confront a problematic or stressful experience (Carver, Scheier, & Weintraub, 1989; Folkman & Lazarus, 1980). Existing coping scales differentiate people's coping strategies in different ways; for example, problem-focused vs. emotion-focused strategies (Carver et al., 1989). The more dominant coping type can be assumed to reflect general attitudes toward health information seeking.

6.3. Conceptual model of older adults' ELIS for health and wellness topics

A conceptual model of older adults' ELIS is proposed to articulate the relationships among the findings of the present study (Figure 1). Links *a* and *b* in Figure 1 indicate that older adults' orienting and practical health information seeking are interconnected. As previously mentioned, older adults are exposed to opportunities to acquire unexpected or unsolicited health information as they perform daily activities such as reading newspapers, watching TV, or meeting with friends. If they perceive this health information as interesting or potentially useful, they often seek further information (link *a*). Also, considering the high prevalence of chronic health conditions among older adults, it appears common for older adults to keep monitoring health information for themselves or others in their social networks as part of their everyday lives (link *b*).

Other links in Figure 1 indicate that personal and social factors influence older adults' health information behavior directly (link *c*) and indirectly through way of life (link *d*) and mastery of life (link *e*). Given that older adults' way of life is embedded in their daily routine, the

nature of hobbies has a more obvious effect on orienting health information seeking (link *f*); in practical health information-seeking situations, mastery of life seems to play a significant role (link *g*), as assumed by the ELIS model (Savolainen, 1995). Education level and internet usage are important factors affecting older adults' way of life and mastery of life, which then affect behaviors in searching for and using health information in their everyday lives. For example, older adults with higher education tend to pursue more varied hobbies, including cognitive hobbies (e.g., reading books and newspapers on science, history, and health topics), than those with relatively less education (Table 3, link *d* in Figure 1). In addition, those who are optimistic and cognitive in practical health information-seeking situations tend to spend more hours online than those who are affective and pessimistic (Table 4; link *e* in Figure 1).

[Figure 1 goes here]

There are, however, some limitations in the research data. Although the interview data proved valuable in exploring the target population's health information behavior in the ELIS context, the findings may have limited generalizability due to the limited sample size ($N = 21$) and the qualitative nature of verbal interview data, which were collected based on participants' recall. Also, most of the participants were Caucasian, had high education levels, and had more than five years of internet experience, which should be considered when interpreting the findings. Despite these limitations in the research data, study results could be still useful to understand the challenges and prospects faced by the overall older adult population and future cohorts of older adults, who are going to be more familiar with and have more experience using the internet for health information seeking as part of their everyday lives. For example, the findings of the study show that older adults' social contact networks, which often serve as sources of health information, tend to be limited to their health care providers and close family members such as a spouse or partner. The tendency of social contact networks to shrink among older adults can get worse as they get older (Asla & Williamson, 2015). As previously discussed, this may be a more serious issue to those with pessimistic types of mastery of life (i.e., less confident with or motivated toward information seeking) because they tend to rely heavily on proxy information seeking, mainly receiving information from a few trusted interpersonal sources rather than actively seeking necessary information using multiple interpersonal and online sources on their own. To overcome such challenges, they need to be encouraged to

perform varied types of daily activities, especially social types of hobbies, and participate in health literacy intervention programs.

7. Conclusions

The present study makes practical and theoretical contributions to the literature by exploring older adults' health information behavior in the ELIS context. The findings of the study indicate that except for health care providers, who have been reported as the most reliable interpersonal source of health information in the literature, a spouse or partner and "people-like-me" are important interpersonal sources of health information among older adults. One notable finding regarding older couples' health information behavior is that the members in each couple played different roles in seeking health information, either as the information provider or information receiver. Further research is needed to better understand the roles of spouses or partners in health information seeking in older couples, a topic rarely addressed in the literature. Older adults in this study trusted health information on the websites of nonprofit agencies such as governments, university hospitals, and representative associations or organizations for specific diseases. These findings can inform system developers and service providers about how to design and provide health literacy and intervention programs for older adults. For instance, health literacy programs could provide lists of credible sources of online health information, preferably nonprofit sources such as the websites offered by government agencies, educational institutions, and professional societies and associations for certain diseases. Also, the findings of the study emphasize the necessity of developing systems and services for vulnerable user groups, such as information receivers, among older adults to boost their awareness and ability to self-manage health conditions. The initial route for delivering such systems and services could be trusted social contact networks such as health care providers and spouses or partners.

The interview data also revealed the potential impacts of routinely performed activities or hobbies (i.e., way of life) and general attitudes toward solving problems (i.e., mastery of life) on the health information behaviors of older adults based on a widely accepted model, ELIS (Savolainen, 1995). In general, those who enjoyed cognitive hobbies (e.g., reading books and newspapers, taking online courses) and possessed an active attitude toward information seeking (e.g., spend more hours for web searching) seemed to have more opportunities to be exposed to more varied sources of health information and were more proactive in obtaining necessary health information. The exercise of categorizing types of way of life and mastery of life carried out in

the present study provides a useful approach for future investigations on people's ELIS. In particular, the categorization exercise can guide the construction of research instruments, such as a survey questionnaire or interview protocol, that facilitate theoretical and empirical investigations of associations among way of life, mastery of life, and characteristics of older adults' health information behavior. Considering that the global population is aging and the majority of older adults live with chronic health conditions, it is increasingly important to understand and support their health information behavior in everyday life settings.

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Table 1

Profile of Participants

Age	ID	Sex	Race	Education	Health Condition	Social Contact Networks	Internet Use/Wk
61	P20	F	Black	Master	High blood pressure	Partner; family	7
63	P21	F	Black	Some college	Skin disease	Family	7
64	P1	F	White	Bachelor	Kidney disease	Partner, family	7
65	P17	F	White	Bachelor	Breast cancer, arthritis	Partner; friends	7
65	P18	F	White	Master	-	Family, friends	5
66	P4	F	White	Bachelor	-	Friends, family	6
66	P12	M	White	Doctorate	Arthritis	Family, friends	6
67	P11	F	White	Master	Foot operation	Partner, family, friends	4
69	P8	F	White	Doctorate	High blood pressure	Partner, family	5
69	P10	F	White	Bachelor	Skin cancer	Family, friends	6
70	P9	M	White	Doctorate	-	Partner, family	7
71	P3	M	White	Doctorate	-	Partner, family	6
71	P14	F	White	Some college	Arthritis	Family, friends	6
72	P5	F	White	Some college	Breast cancer	Partner, family, friends	7
72	P7	F	White	Doctorate	Low blood pressure	Partner, family	7
75	P6	M	White	High school	Lung disease	Partner, friends	3
77	P2	F	White	Master	Lung cancer, stroke	Friends	4
77	P19	F	White	Some college	Arthritis	Partner, family	3
78	P16	M	White	Doctorate	Bladder cancer, arthritis	Partner, friends	3
79	P15	F	White	Some college	Skin disease, arthritis	Partner, family, friends	6
80	P13	F	White	Bachelor	-	Community members	5

Note: Weekly Internet usage: 1 = "never;" 2 = "less than one hour a week;" 3 = "between 1 hour and 5 hours a week;" 4 = "between 6 hours and 10 hours a week;" 5 = "between 11 hours and 15 hours;" 6 = "16 hours and 20 hours a week;" 7 = "more than 20 hours a week".

Table 2

Coding Scheme based on the ELIS Model (Savolainen, 1995)

Theoretical Concept	Codes and Examples
Way of life: order of things; the choices that individuals make in everyday life (e.g., hobbies)	- Cognitive hobbies (e.g., reading books on cultural and scientific topics, reading newspapers, taking courses) - Affective hobbies (e.g., watching TV shows and movies, listening to music, playing games) - Social hobbies (e.g., email, SNS, in-person socializing)
Mastery of life: keeping things in order; typical ways of approaching everyday problems (e.g., general attitudes and coping styles toward problem-solving)	- Optimistic-cognitive: People who are optimistic about the solvability of a given problem based on their familiarity and confidence in seeking information using IT technologies, *AND* use multiple sources to seek for necessary information - Pessimistic-cognitive: People who use their cognitive abilities and multiple sources to seek necessary information, *BUT* acknowledge the possibility that the given problem may not be solved; they are relatively less confident in information seeking than optimistic-cognitive people. - Defensive-affective: People who are optimistic toward problem-solving situations, *BUT* their information seeking strategies are based on affective, rather than cognitive, means; they often have wishful thinking or avoid the situation - Pessimistic-affective: People who do not appreciate the value of systematic and cognitive information seeking, *AND* heavily rely on their social contact networks to seek necessary information (e.g., friends, partners, doctors)
Individual Factors	- Social capital: social contact networks (e.g., family members, spouses, partners, friends) - Cultural/cognitive capital (e.g., educational background, occupational experience, extra training experience)

Table 3

Types of Hobbies by Education Level

Type	Examples Mentioned	Education Level	
		Some college or lower, *n* out of 6	College or higher, *n* out of 15
Cognitive	• Reading newspapers and online articles • Reading books • Watching TED Talks	2 (33.3%)	12 (80%)
Affective	• Playing games • Watching movies and TV shows • Listening to music	5 (83.3%)	14 (93.3%)
Social	• Email • SNSs (e.g., Facebook) • In-person social	5 (83.3%)	15 (100%)

Table 4

Mastery of Life Type by Internet Usage

Mastery of Life	*n* (%)	Weekly Internet Usage	
		Mean	Median
Optimistic-Cognitive	11 (52.4)	6.2	6
Pessimistic-Cognitive	7 (33.3)	4.7	5
Defensive-Affective	2 (9.5)	5.5	5.5
Pessimistic-Affective	1 (4.8)	3	3

Table 5

Elderly Couples' Role Allocation in Health Information-Seeking

ID	Age	Education	Occupation	Sex	Internet Use/Wk	Mastery of Life	Role
P05 [c1]	72	Some college	-	F	7	D-A	Provider
P06 [c1]	75	High school	-	M	3	P-A	Receiver
P09 [c2]	70	Doctorate	Attorney	M	7	O-C	Provider
P08 [c2]	69	Doctorate	Artist	F	5	P-C	Receiver
P15 [c3]	79	Some college	Researcher	F	6	O-C	Provider
P16 [c3]	78	Doctorate	Attorney	M	3	P-C	Receiver
P01	64	Bachelor	Writer	F	7	O-C	Provider
P03	71	Doctorate	Professor	M	6	O-C	Provider
P11	67	Master	-	F	4	D-A	Provider
P17	65	Bachelor	Government	F	5	O-C	Provider
P20	61	Master	Government	F	7	O-C	Provider

Note: The IDs with superscripts, c1, c2, and c3, indicate the three couples who participated in the study together. The "information providers" are shaded in grey. The acronyms used in the Mastery of Life column indicate as follows. O-C: optimistic-cognitive; P-C: pessimistic-cognitive; D-A: defensive-affective; P-A: pessimistic-affective.