Obtaining Information from Different Sources Matters During the COVID-19 Pandemic

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Abstract

Background and Objectives: Older adults might be less information-seeking in comparison to younger adults. Yet, when a crisis hits, rather than relying on only a few information sources, it is important for people to gather information from a variety of different sources. With more information sources, people are more likely to obtain a more realistic perception of the situation and engagement of health behaviors. This study examined the association between age and information-seeking patterns, and how information-seeking patterns influenced worry about Coronavirus Disease 2019 (COVID-19) and protective measures taken during the pandemic.

Research Design and Methods: This study was conducted from March to May 2020. Ninety younger adults and 105 older adults were recruited in a 21-day daily diary study. Participants reported the types of sources where they received COVID-19-related information, worry from these information sources and protective health behaviors performed each day. Multilevel serial mediation analysis was performed.

Results: Concurrent and time-lagged analyses both revealed that older adults received information from more sources, and more frequently from traditional (e.g., newspaper and TV) and interpersonal sources (e.g., information shared by friends and families), than did younger adults. When receiving information from more sources, older adults were more worried about COVID-19 and performed more protective health behaviors.

Discussion and Implications: These results demonstrated the utility of having more information sources in the context of a public health crisis and offered suggestions for future public communication and community engagement.

Keywords: Information-seeking, aging, health behavior, protective measures, worry

Introduction

Since December 2019, the Coronavirus Disease 2019 (COVID-19) has rapidly spread across the globe (World Health Organization [WHO], 2020a). Given the severity of the situation, there have been wide-ranging efforts from government officials, medical experts and local organizations to promote protective health behaviors among people. Among the public health emergency responses identified by the WHO (2020b) are risk communication and community engagement. One study documented that exposure time to COVID-19-related news increased over time during the pandemic (Losada-Baltar et al., 2020). More exposures to news have direct implications on people's action. For instance, receiving timely and informative communication during a time of uncertainties promotes public cooperation (Hu & Qiu, 2020). However, under typical circumstances, various studies have suggested that older adults might be less information-seeking and less variety-seeking in comparison to younger adults (e.g., Asla, Williamson, & Mills, 2006; Novak & Mather, 2007; Zimprich, Allemand, & Dellenbach, 2009). If such age differences in information-seeking patterns persist in a pandemic, older adults may be less informed and less willing to take the necessary precautions than do younger adults. Therefore, it would be important to understand if older adults might receive information from fewer sources relative to younger adults during the pandemic. This study applied socioemotional selectivity theory (Carstensen 1995, 2006) to the context of COVID-19 in an attempt to understand this potential age difference. In addition, this study investigated how obtaining information from more sources might be associated with psychological and behavioral outcomes relevant to the pandemic.

Information Sources During Crises

Effective communication of information is crucial during public health emergencies like COVID-19 because people's health decisions (e.g., whether one takes relevant precautions) largely depend on their perception of the situation (Slovic, 1987). In the

protective action decision model, Lindell and Perry (2012) explained how external cues shaped people's responses to disasters and hazards. This model posits that external cues, such as information sources, contribute to threat perception and serve as precursors of preventative behaviors. Consistent with this model, a study demonstrated that vaccine uptake (a form of health behavior) was associated positively with information search when physicians or official materials were the primary information sources, but not when television, radio or family and friends were the main sources of information (Walter et al., 2012). This model seems to be applicable to the pandemic. People showed increased awareness of and emotional reactions (e.g., anxiety and worry) toward the pandemic with increased media exposure (Dong & Zheng, 2020). Such emotional reactions may motivate behavioral responses. Several studies found a positive association between COVID-19 risk perception and protective health behavior engagement (Bruine de Bruin & Bennett, 2020; Czaja et al., 2009; Dryhurst et al., 2020). Likewise, a study demonstrated that certain communication styles (e.g., detailed information with positive educational messages) promoted more protective health behaviors (Dai et al., 2020). Taken together, these previous studies highlighted the importance of obtaining information during crises like a pandemic.

However, misinformation about COVID-19 circulating on social media has become an increasing concern as it may contribute negatively to older adults' mental health, and lead people to engage in too many or too few precautions (Cuello-Garcia, Pérez-Gaxiola, & van Amelsvoort, 2020; Garrett, 2020; Schroyer, 2021). This problem is especially alarming when one relies on limited number of information sources, which reduces the diversity of information contents. Different sources covering the same issue may provide different perspectives and with different levels of details (Czaja et al., 2009). Allington and colleagues (2020) found that certain information sources (e.g., social media) showed a negative relationship with protective health behaviors and a positive relationship with COVID-19

conspiracy beliefs, while other information sources (e.g., broadcast media) showed a positive association with protective health behaviors. They speculated that certain information sources might contribute to more conspiracy beliefs regarding the pandemic and impede their consumers from engaging in protective health behaviors. This finding illustrated the potential danger of relying on fewer information sources.

Age Differences in Information-seeking Patterns

While everyone is susceptible to COVID-19, people over the age of 60 are considered to be one of the most at-risk groups in terms of higher mortality rate and more severe symptoms (WHO, 2020c). Given this heightened vulnerability, it would be important for older adults to obtain realistic views and relevant knowledge regarding the pandemic. A study found that having different information access alone empowered older adults and increased sense of control in the domain of health (Manafo & Wong, 2012). Yet, older adults may be less information-seeking in general, relative to younger adults. Studies found that, compared to younger adults, older adults were less intellectually curious (Zimprich et al., 2009) and less motivated to seek variety (Novak & Mather, 2007). Qualitative research showed that older adults needed fewer information topics and used fewer information sources (see review by Asla et al., 2006). Various prior findings suggested that older adults were relatively passive in health-related information searches and relied primarily on interpersonal sources (e.g., friends and family members) for relevant information, rather than sources without such social components (e.g., mass media) (Altizer et al., 2014; Chaudhuri et al., 2008). In sum, compared with younger adults, older adults may be more selective in their information search and may rely on fewer information sources. Moreover, information sources that older adults focus on are more likely to be people they know.

Socioemotional selectivity theory (Carstensen, 1995, 2006) suggests that people tend to prioritize emotionally meaningful goals over information-seeking goals with age, as they

perceive future time as increasingly limited. From this theory, we derived two competing hypotheses regarding age differences in information-seeking patterns during the pandemic: On the one hand, older adults may be more selective in information than are younger adults, reflecting older adults' general prioritization of emotionally meaningful goals over information-seeking goals. On the other hand, relative to younger adults, older adults may seek more diverse information sources related to COVID-19 because this topic is more meaningful or relevant to older adults. Indeed, empirical research that applied the theory to examine age differences in cognitive processing suggests that the selectivity phenomenon may be moderated by the relevance or emotional meaningfulness of the information. For example, English and Carstensen (2015) asked participants to make health-related decisions and measured their attention to emotional information relevant to the decisions. They found selective attention (a bias for positive information) among older adults with better health, but no bias among older adults with poorer health. They argued that it was because health-related decisions were more personally relevant for those older adults with relatively poorer health. Similarly, Hess, Queen and Ennis (2013) found selective cognitive processing when older adults made decisions about phone plans (low in personal relevance), but no such effect when older adults made decisions about drug plans (high in personal relevance). A recent conference presentation also revealed that age was positively associated with reviewing more emotionally meaningful information that was present-oriented (Shavit & Carstensen, 2020). Given that COVID-19 may be more personally relevant to older adults because of increased risk of mortality and severe infection (WHO, 2020c), the selectivity in information sources postulated by socioemotional selectivity theory may not occur for COVID-19-related information.

Recent studies showed mixed results regarding older adults' perception of COVID-19 risks. One study by Barber and Kim (2020) found that older adults perceived greater risk of

COVID-19 in comparison to younger adults. In a study by Bruine de Bruin (2020) found that, with age, people perceived a greater risk of dying from COVID-19, but a lower risk of getting COVID-19 and reported a lower level of anxiety and depression, compared to younger adults. Moreover, prior work on prevalence of worry among community-dwelling adults found less excessive worry with advance of age (Golden et al., 2011). Nevertheless, should older adults perceive greater risks, they may find COVID-19 information more personally relevant and thus are less likely to show selectivity in information-seeking.

Current Study

The present study is a 21-day daily diary survey with two main objectives: First, we aimed to examine age differences in number of information sources. As briefly mentioned earlier, we tested two competing hypotheses derived from socioemotional selectivity theory (Carstensen, 1995, 2006): On the one hand, taking the theory literally, we predicted that older adults would receive information from fewer information sources compared to younger adults. The information sources they focus on would likely be familiar social partners (i.e., family and friends). Alternatively, should older adults perceive the pandemic as more personally meaningful or relevant due to disproportionally higher mortality risks in later adulthood, they would not be more selective in information sources compared with younger adults. In fact, older adults might even seek information from more sources. Second, we hoped to understand the consequences associated with such age differences in information-seeking patterns. We predicted that seeking information from more sources would be associated with higher level of worry, which in turn would contribute to performing more protective health behaviors. However, seeking information from fewer sources would be related to lower level of worry, and then associated with fewer protective health behaviors. This 21-day daily diary data allowed us to test our hypotheses using a multilevel serial mediation model with two mediators.

Design and Methods

Participants

This study is part of a project that aims to understand the psychological impacts of the pandemic on older adults (related papers include Tse et al., under review). A priori power analysis for linear multiple regression model was performed using G*Power (Faul et al., 2007) with a small effect size of .10, an alpha level at .05, a power level of .95, 3 tested predictors and 5 predictors. This analysis suggested that at least 176 participants should be included in this study. Data were collected from March to May 2020, which was considered the "peak" of the first wave of COVID-19 cases in Hong Kong. The Hong Kong government issued "the highest warning" regarding COVID-19 outbreak in late January and imposed a 14-day mandatory quarantine for Mainland China travelers to Hong Kong in early February. Many office employees started to work from home. Then, the number of confirmed COVID-19 cases escalated in March, and Hong Kong closed its border to all non-residents. In April and May, non-essential services (e.g., karaoke and nightclubs) were temporarily closed, and social gatherings were limited to a maximum of four people.

In total, 90 younger adults (M_{age} = 22.74; age range = 18-34; 55 females) and 105 older adults (M_{age} = 64.36; age range = 60-84; 66 females) participated in this study. Sample characteristics are presented in *Table 1*. This sample was primarily recruited via the campus-wide mass mailing system of the Chinese University of Hong Kong (CUHK), which reached all the students, staff and alumni of the university. In addition, seven undergraduate students were recruited as part of the younger adult sample using the participant pool of the psychology department. The younger and older participants were not related to one another. All of the participants were (1) able to read and type Chinese, (2) able to access and fill out digital questionnaires for a total of 21 days, (3) within the desired age range (i.e., younger adults aged between 18 and 34; older adults aged above 60), and (4) without diagnosed

psychological or neurological conditions. We compared our sample's demographic characteristics with those of the 2019 census data (released in July 2020) in Hong Kong (Hong Kong Census and Statistics Department, 2020). Our sample included slightly more women (61% in our sample; 55% in census data), slightly more individuals who were completing or have completed postsecondary education (99% in our sample; 92% in census data) and more single individuals (96% in our sample; 71% in census data). To account for these discrepancies, we statistically controlled for sex, education and marital status in data analysis.

Procedures

This study was approved by the Survey and Behavioural Research Ethics Committee of CUHK. Upon receiving participants' informed consent, participants received a personalized reminder with a Qualtrics survey hyperlink through emails and/or Whatsapp every evening for a total of 21 days. During the 21-day study period, researchers made at least three phone calls to follow up on each participant's progress. After completing the last survey, participants were debriefed and reimbursed with $500HKD for their participation.

Measures

Information Sources

Previous studies (e.g., Xie et al., 2017) focused on 4 main sources of information, which included medical professionals, interpersonal contacts, mass media and Internet. We adapted this measure to better capture the information sources that people in Hong Kong typically use. Together, a 6-item checklist was utilized to capture whether participants had received COVID-19 information from certain sources each day. We asked participants to "select ALL the information sources that [they] used to receive COVID-19-related information today". Listed sources included "traditional information sources (i.e., newspaper, magazine, radio or TV)", "professionals (in-person)", "family and friends (in-person)",

"online news platforms", "family and friends (online; sharing news via social media)", and "social media (online)". We calculated the sum of the checklist (out of 6) as the total number of daily information sources.

Worry from Information

For the information sources from which participants received COVID-19-related information each day, we measured the levels of worry participants experienced from the received information. Participants responded to the following question for each information source: "how much worry did you experience from the information you received from ____ (information source) today?" Ratings were made on a 7-point Likert scale ranging from 1 (not worried at all) to 7 (very worried). As this question was asked for each of the six information sources, a composite index of worry was calculated by summing the scores of the six items for each participant on each day.

Protective Behaviors

A 14-item checklist that captures a range of protective behaviors against COVID-19 was administered. This checklist was a collection of recommendations from the Hong Kong Government in late February 2020 and some common health behaviors. We asked participants "did [they] engaged in the following behaviors today". Items included "avoid places impacted by COVID-19", "have enough sleep (7 hours or more)", "wear masks", "avoid dining out", "consume healthy food, Chinese herbs or supplements (e.g., vitamin C)", "avoid crowded places", "wash hands more regularly than normal situations (including using hand sanitizers)", "clean and sanitize frequently touched objects or surfaces", "avoid taking public transportation", "avoid bodily contact with other people (e.g., handshakes)", "exercise (15 minutes or longer)", "measure body temperature", "understand pandemic- or health-related information", and "none of the above". We reviewed the items later based on the

WHO recommendations in August 2020 (WHO, 2020d) and decided to retain all items. We took the sum of the checklist to generate a score of protective health behaviors out of 13.

Demographic Information

Various demographic information was collected, including age, sex, marital status, education and income.

Analysis Plan

A total of 4,123 daily questionnaires was collected and R was utilized for data cleaning and analyses. Participants were grouped into younger adults (age 18 to 34 years) or older adults (age 60 years or above) based on their age. We performed two-sample *t*-tests to examine age differences in information sources using the R package "stats" (R Core Team, 2020). We used linear mixed effect modeling from the R package "lme4" (Bates et al., 2015) to determine the overall between-person associations between the key variables (i.e., age groups, information sources, COVID-19-related worry and protective measures). We then conducted a concurrent multilevel serial multiple mediation with two mediators using the R package "lavaan" (Rosseel, 2012) to examine the consequences of having more information sources. In this "2-1-1-1" multilevel serial mediation analysis, age group was entered as the level 2 independent variable, number of information sources as the first level 1 mediator, worry from information as the second level 1 mediator, and protective health behavior as the dependent variable. This analysis allowed us to examine the indirect effect of age group on protective measures through information sources and COVID-19-related worry. We focused on the between-person indirect effects because the independent variable was at level 2. With the multilevel SEM structure, variances were parceled using a latent variable approach rather than a cluster-based centering approach. Since concurrent analysis cannot reveal sequential relationships, we also performed a time-lagged analysis to examine if having more information sources contributed to engaging in more protective health behaviors in the

following time point. This model was the same as the concurrent model (i.e., the independent and mediating variables are all concurrent; n) but we replaced the dependent variable with a time-lagged protective health behavior variable (i.e., n + 1). All reported analyses were performed without covariates. The results remained unchanged even after statistically controlling for sex, education and marital status in the same models.

Results

Descriptive Analyses and Main Effects

In the current study, mixed effect modeling revealed that having more information sources (between-person) was positively associated with higher level of worry (β = 4.04, SE = .04, p < .001) and more protective health behaviors (β = .33, SE = .03, p < .001). In addition, higher level of worry (between-person) was significantly associated with more protective health behaviors (β = .06, SE = .01, p < .001). In our sample, older adults obtained COVID-19 information from more sources (β = .89, SE = .15, p < .001) and engaged in more protective health behaviors against COVID-19 (β = 2.40, SE = .37, p < .001) in comparison to younger adults (between-person). Looking more closely, across the 21 days, older adults showed no significant differences from younger adults in receiving information in-person from professionals or from online platforms, such as news sites or social media. However, compared with younger adults, older adults received information more frequently from traditional information outlets (e.g., newspaper, TV, radio and magazine; t(194) = -8.59, p < .001) and from family and friends both in-person (t(194) = -4.44, p < .001) and online (t(194) = -7.62, p < .001). Results are reported in *Table 1*.

Concurrent Multilevel Serial Multiple Mediation with Two Mediators

The between-person results showed a significant partial mediation through the two mediators – that is, the direct effect (β = 1.91, SE = .38, p < .001, 95% bootstrap CI=[1.16, 2.66]), the indirect effect with two mediators (β = .45, SE = .21, p = .03, 95% bootstrap

CI=[.04, .85]) and the total effect (β = 1.91, *SE* = .38, $p < .001$, 95% bootstrap CI=[1.44, 3.27]) were all significant. More specifically, belonging to the older age group was associated with receiving information from more sources, experiencing higher level of worry and engaging in more protective health behaviors. Indirect effects through either mediator alone were not significant. These results remained unchanged after statistically controlling for sex, education and marital status. The detailed results of the multilevel serial multiple mediation are presented in *Figure 1*.

Time-lagged Multilevel Serial Multiple Mediation with Two Mediators

The time-lagged between-person results also suggested a significant partial mediation through information sources and worry in predicting protective health behaviors in the next time point. The direct effect (β = 1.87, *SE* = .39, $p < .001$, 95% bootstrap CI=[1.11, 2.62]), the indirect effect with two mediators (β = .45, *SE* = .21, p = .03, 95% bootstrap CI=[.04, .87]) and the total effect (β = 2.31, *SE* = .47, $p < .001$, 95% bootstrap CI=[1.39, 3.24]) were all significant. Again, the results remained unchanged after statistically controlling for sex, education and marital status. The detailed results of the multilevel serial multiple mediation are presented in *Figure 2*.

Discussion and Implications

Given the importance of having sufficient and accurate information during crises like the COVID-19 pandemic, the present research investigated age differences in the number of information sources one sought. In this study, we tested two competing hypotheses, both originated from the socioemotional selectivity theory: On the one hand, we predicted that older adults would obtain information from fewer sources than younger adults. In this case, we predicted that familiar social partners (i.e., family and friends) would be the primary information source for older adults, but not for younger adults. On the other hand, older adults might perceive the pandemic as more personally relevant due to higher age-related

mortality risks. Thus, we expected these older adults would have similar number of, or even more information sources, than younger adults. We also examined the emotional (i.e., worry) and behavioral (i.e., protective health behaviors) consequences associated with such age differences in information-seeking patterns. Findings revealed that older adults actually received information from more sources than did younger adults, which supported the second hypothesis. Moreover, the partial mediation results indicated that older adults who received information from a wider range of sources tended to experience higher level of worry, which, in turn, contributed to performing more protective health behaviors.

On the surface, our finding on the association between age group and information sources might not be consistent with the postulate of socioemotional selectivity theory that older adults, in general, focus less on information-seeking goals than are younger adults (Carstensen, 1995). However, in accordance to later empirical findings using the same theoretical framework (e.g., English & Carstensen, 2015), selectivity might not occur when the information is personally relevant or meaningful. Given that older adults were identified as one of the most vulnerable groups by WHO (2020c), it was possible that older adults perceived COVID-19 information to be personally meaningful, which motivated information search from more sources. Information regarding COVID-19 may have greater implications for older adults as the virus imposes elevated health risks for people with poorer immunity.

Furthermore, many traditional information sources that are less utilized by younger adults may be familiar or have emotional meaningfulness to older adults. In our study, older adults received information from close social partners (i.e., family and friends either online or in-person) more frequently than did younger adults. They also received information from traditional media (i.e., TV, radio, magazines and newspapers) more than younger adults, probably because those sources are more familiar to the older generations. Based on our results, in situations where older adults perceive greater relevance or meaning, older adults

may seek information from equivalent, if not more, information sources compared to younger adults. Further studies should directly examine the impacts of perceived information meaningfulness on older adults' information-seeking patterns.

Importantly, receiving information from more sources may have emotional costs as it is associated with a higher level of worry; yet such negative emotion seems to motivate older adults to engage in more protective health behaviors in the context of the COVID-19 pandemic. In a recent conference presentation by Shavit and Carstensen (2020), they found that, while age was associated with less change in opinion regarding activities, older adults were more likely to engage in activities after learning more information regarding these activities' benefits. Together, receiving information from more sources may be adaptive for older adults in the context of the pandemic, and it can be utilized as a strategy to promote healthy behaviors during the pandemic among older adults.

This study has several limitations. First, our participants were recruited via convenient sampling, so the demographic characteristics might not be entirely comparable to the population in Hong Kong. The present study statistically controlled for demographic characteristics that differed from the general Hong Kong population, including sex, education and marital status. However, there may be other confounds, so results should be interpreted with caution. Second, the perception of the COVID-19 pandemic might differ across cultures (Dryhurst et al., 2020). Given that the current study was conducted in Hong Kong, it is possible that people from Asian cultures may perceive greater risk from COVID-19 information than people from western cultures. Third, the COVID-19 pandemic is an event with many unique characteristics, including its relatively long duration and disproportionate influence on certain groups, so future studies should examine if our findings generalize to other situations. Moreover, having more information sources does not guarantee diverse information content. Human biases in information search, such as confirmation bias and

selective exposure, have been extensively researched in social psychology. These phenomena illustrate that people tend to prefer information that supports their existing beliefs (see review by Nickerson, 1998; Sears & Freedman, 1967). Although the current study cannot completely exclude the possibility that people may look for similar information from different sources, having different types of information sources offers opportunities for alternative interpretations and additional knowledge in comparison to having fewer information sources.

There are additional issues that future studies and service providers may consider. For example, researchers have raised the issue of repeated media consumption and its implication on people's psychological well-being (Dong & Zheng, 2020; Holmes et al., 2020; Kivi, Hansson, & Bjälkebring, 2020). The concern is that over-exposure to pandemic-related information may amplify people's distress and anxiety, contributing to excessive worrying. Moreover, some researchers pointed out that certain information sources might be inaccessible to some people and thus created disproportionate information distribution (Jacobs, Amuta, & Jeon, 2017). These researchers found that older adults, especially those with lower education and lower computer self-efficacy, had less access to web-based information. While both of these issues are beyond the scope of the current study, they call for further research and extra considerations when conveying health-related information to older adults during health emergencies.

To the best of our knowledge, this study is the first study that examined age differences of information sources and the influence of information sources on pandemic-related emotional and behavioral outcomes. There are several implications for future research and information dissemination during public health emergencies. First, this study found a context in which older adults demonstrated more information-seeking tendencies than younger adults. Specifically, when information is more relevant and present-oriented, older adults exhibit similar, if not more, information-seeking tendencies than do younger adults.

Further research should test whether this finding is generalizable to contexts other than the COVID-19 pandemic. Second, as mentioned earlier, people are susceptible to misinformation. Hu and Qiu (2020) pointed out that social media-based news dissemination appeared to be particularly effective during the pandemic in China. While the government and responsible organizations should build stronger partnerships with third-party news outlets to ensure information quality, this study offers a relatively simple and promising solution to combat misinformation and promote protective health behaviors – that is, to broaden one's information source options. As the COVID-19 pandemic continues, it is especially important for people to stay informed about the current situation to persevere with prevention efforts. Future efforts to disseminate important health-related messages should ensure that information is accessible to people of all ages from multiple information sources.

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Conflict of Interest

None reported.

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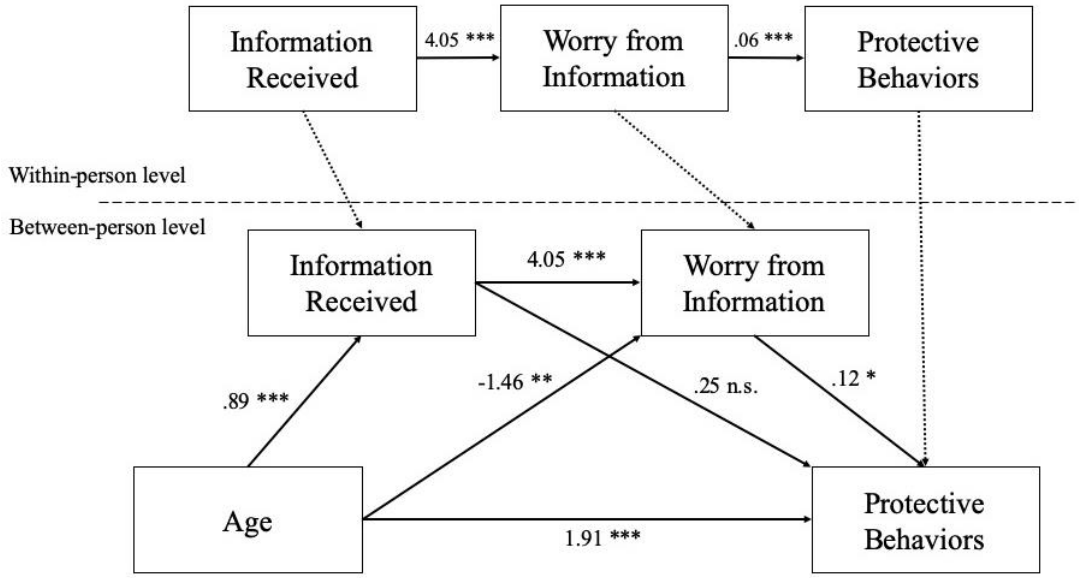
Table 1: Means and standard deviations of key variables by age groups

Variables	Younger adults (*n*=90)	Older adults (*n*=105)	*t*/β	*p*-value
Sex				
Male	35 (38.89%)	39 (37.14%)		
Female	55 (61.11%)	66 (62.86%)		
Education				
Elementary school	0	8 (7.62%)		
High school	1 (1.11%)	56 (53.33%)		
Postsecondary or above	89 (98.89%)	41 (39.05%)		
Marital status				
Single	56 (62.22%)	15 (14.29%)		
Married	4 (4.44%)	81 (77.14%)		
Has a boyfriend/girlfriend	30 (33.33%)	1 (.95%)		
Apart/Divorced	0	2 (1.90%)		
Widowed	0	4 (3.81%)		
Other	0	2 (1.90%)		
Monthly Family Income #				
Less than $3,000	3 (3.33%)	8 (7.62%)		
$3,001 – 8,500	5 (5.56%)	6 (5.71%)		
$8,501 – 14,000	4 (4.44%)	11 (10.48%)		
$14,001 – 20,000	12 (13.33%)	11 (10.48%)		
$20,001 – 29,999	25 (27.78%)	15 (14/29%)		
$30,000 – 59,999	30 (33.33%)	29 (27.62%)		
$60,000 – 99,999	9 (10.00%)	10 (9.52%)		
$100,000 or more	1 (1.11%)	5 (4.76%)		
Not applicable	1 (1.11%)	10 (9.52%)		
Age	22.74 ± 4.21	64.36 ± 4.41	-67.12	< .001
Averaged number of information sources per day	1.56 ± .86	2.46 ± 1.16	-6.00	< .001
Averaged frequency of information sources across 21 days				
TV, radio and newspapers	9.00 ± 7.14	16.86 ± 5.66	-8.59	< .001
Professionals (in-person)	.11 ± .59	.26 ± .78	-1.52	.13
Family and friends (in-person)	2.03 ± 3.25	5.33 ± 6.37	-4.44	< .001
Online news platforms	9.52 ± 7.53	11.25 ± 8.00	-1.54	.12
Family and friends (online)	3.08 ± 4.07	9.76 ± 7.43	-7.62	< .001
Social media (online)	8.97 ± 6.85	8.11 ± 7.36	1.20	.23
Perceived risk for same age group	37.48 ± 22.84	34.18 ± 22.75	-10.18	.002
Worry from information	7.20 ± 4.83	9.35 ± 5.72	2.15	.005
Protective health behaviors	6.30 ± 2.22	8.00 ± 2.97	2.40	< .001

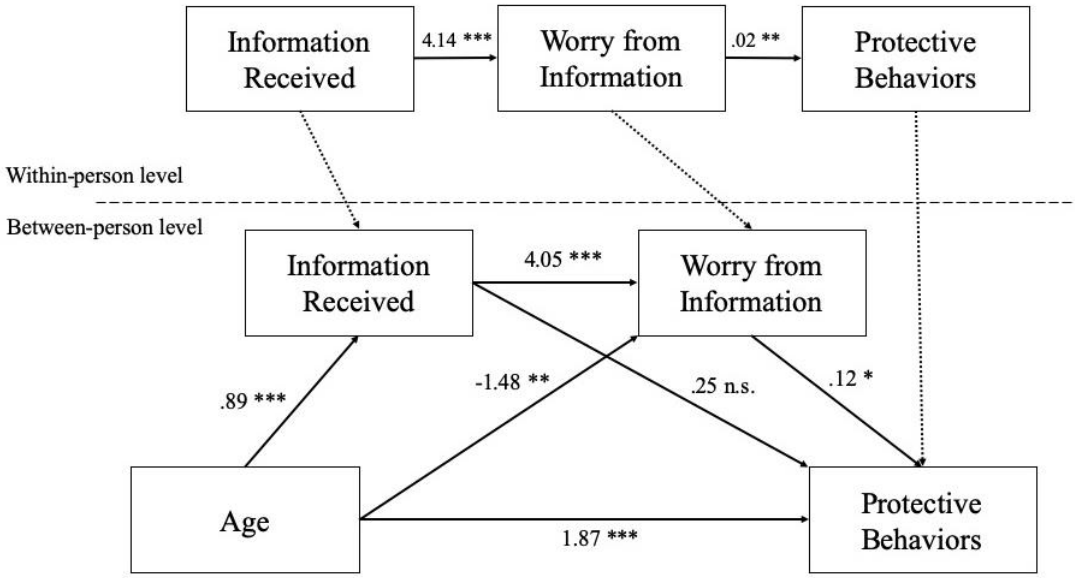
Note. Data are presented as n (%) or mean ± standard deviation and compared by *t*-test.
Income was measured in Hong Kong dollars (HKD) and the exchange rate during the time of data collection was 1 USD to ~ 7.75 HKD.

Figure 1. Results of the concurrent multilevel serial mediation model with two mediators where the effect of age on protective behaviors was partially mediated through information sources received and worry from the information.



Notes. * $p < .05$. ** $p < .01$. *** $p < .001$ n.s. not significant. The dashed line separates within-person level variables from between-person level variables. The solid arrows represent the direction of association in the mediation model (i.e., the direct and indirect pathways), whereas the dotted arrows represent the level 1 responses loading onto the latent level 2 variables.

Figure 2. Results of the time-lagged multilevel serial mediation model with two mediators where the effect of age on protective behaviors was partially mediated through information sources received and worry from the information.



Notes. * $p < .05$. ** $p < .01$. *** $p < .001$ n.s. not significant. The dashed line separates within-person level variables from between-person level variables. The solid arrows represent the direction of association in the mediation model (i.e., the direct and indirect pathways), whereas the dotted arrows represent the level 1 responses loading onto the latent level 2 variables.