

Positive and Negative Role Models in Uncertainty Management Processes about Aging

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Given the growing number of older adults, it is essential to understand how to best facilitate the management of aging-related uncertainties (e.g., the physical, psychological, and social aspects of aging). This study draws on the theory of motivated information management and the communicative ecology model of successful aging to examine uncertainty about aging. Analyses of data from 340 U.S. adults suggested that having negative role models for aging was positively associated with uncertainty discrepancy and the perceived probability of negative experiences related to aging, which independently contributed to feelings of anxiety. Having positive aging role models was associated with higher outcome expectancies and efficacy assessments of information seeking about aging. Efficacy was positively associated with information seeking about aging. The findings of this study underscore the multidimensional nature of uncertainty in aging and highlight the need to consider contextual factors in promoting efficacy beliefs and information-seeking behaviors.

Keywords: environmental chatter, uncertainty, information seeking, successful aging

Aging is associated with inevitable uncertainties about issues such as changes in physical, cognitive, and social functioning, availability and quality of care, levels of financial preparation, and reflections on the meaning and purpose of life as an older adult (e.g., Carstensen, 2009; Gettings, 2018; Pecchioni, Wright, & Nussbaum, 2005). The World Health Organization (WHO) (2018) estimated that the proportion of the aging population (i.e., people more than 60 years old) will nearly double from 12% to 22% between 2015 (900 million) and 2050 (expected to total 2 billion). Reflecting this trend, older adults (65+ years old) are projected to outnumber children (less than 18 years of age) for the first time in U.S. history by 2034 (U.S. Census Bureau, 2018). Given the growing number of older adults around the world and the potential challenges associated with the aging process (see e.g., He, Goodkind, & Kowal, 2016; Nussbaum, Pecchioni, Robinson, & Thompson, 2000), understanding how to effectively manage the uncertainties surrounding aging, in part via communication, is of great importance to the well-being of the “graying” world population.

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Uncertainty exists when an event's probability or outcome is unknown due to insufficient, inconsistent, and/or ambiguous information about an important topic such as aging (e.g., Babrow, Hines, & Kasch, 2000; Brashers, 2001). Specifically, when there is a mismatch between individuals' perceived and desired levels of (un)certainty, or when people believe they are likely to experience the negative effects of aging, emotional (e.g., anxiety) and communicative responses (e.g., information seeking) may be prompted (Afifi & Weiner, 2004; Babrow, 1992, 2001; Fowler, Gasiorek, & Giles, 2015). This study integrates two frameworks that facilitate understanding of the experience of uncertainty in aging and how it motivates communicative behaviors: The theory of motivated information management (TMIM; Afifi & Morse, 2009; Afifi & Weiner, 2004) and the communicative ecology model of successful aging (CEMSA; Fowler et al., 2015; Gasiorek, Fowler, & Giles, 2016).

There are three main goals of this study: (a) to consider the influence of negative and positive role models of aging in one's social environment on uncertainty management and information-seeking processes, (b) to test the utility of the TMIM in regard to information seeking about aging, and (c) to examine alternative conceptualizations of uncertainty (uncertainty discrepancy and perceived probability of negative experiences or PPNE) to better understand older adults' uncertainty perceptions. Garnering additional insight into the multidimensional nature of uncertainty (e.g., Babrow, 2007) and the mechanisms through which different conceptualizations of uncertainty (Gasiorek, Fowler, & Giles, 2019) motivate communication such as information seeking can extend theoretical and practical understandings of the construct of uncertainty and its association with communicative actions. In what follows, we review the literature on uncertainty in the aging context and two theoretical frameworks that explicate the association between uncertainty and communicative behaviors.

Uncertainty in Aging

Even though aging is an inevitable fact of human existence, nearly every aspect associated with aging has an element of uncertainty. Individuals express uncertainty about the ways that aging will influence their health (Skilbeck, Arthur, & Seymour, 2018). But what health challenges, if any, might one face and when? People worry about whether they will experience significant cognitive decline or lose their independence as they age (Eisenberg, 2017). But are there possible ways to mitigate the effects of aging on mental capabilities (Salthouse, 2006)? People are warned about outliving their money, an admonishment aimed at making sure individuals have enough money to last the rest of their lives should they cease to have paid employment (Gettings, 2018). But how long will one live? These questions and many like them typify the nature of uncertainty associated with aging processes and may prompt communication.

As such, scholars from communication and allied disciplines have investigated how individuals make sense of and manage these uncertainties. For example, Ågren (1998) used a longitudinal qualitative study design to explore how individuals adjusted to the increasing uncertainty of existence in life at the age of 85 and, then again, at 92. Analysis of the interview data from the 85-year-old participants revealed seven patterns of adjustment ranging from self-realization to withdrawal. Although similar patterns remained in the interviews with these same participants at 92, there was an increased focus on physical weakening and shortened time perspective in all seven patterns, which led the

participants to engage in multiple strategies to facilitate everyday living (e.g., taking one day at a time). It is perhaps worth noting that concern about the uncertainties associated with aging is not just within the purview of old(er) individuals. Rather, middle-aged individuals have many of the same worries as older individuals, and some studies suggest they may be even more concerned (e.g., Eisenberg, 2017; Neikrug, 2003). Two theoretical frameworks that are well-suited to examine the extent to which people communicate about age-related topics are the TMIM (Afifi & Weiner, 2004) and the CEMSA (Fowler et al., 2015; Gasiorek et al., 2016).

The Theory of Motivated Information Management

The TMIM (Afifi & Weiner, 2004) may be a useful framework for understanding uncertainty management processes in aging contexts. The theory proposes that individuals are motivated to address uncertainty related to an important issue when they perceive a mismatch in the current level of (un)certainty (i.e., what they know) and the desired level of (un)certainty (i.e., what they would like to know), referred to as uncertainty discrepancy. Becoming aware of an uncertainty discrepancy can result in a range of emotional responses such as anxiety and hope (Afifi & Morse, 2009). This process represents the first phase in the TMIM framework—the *interpretation* phase. Next, individuals assess the expected outcomes of seeking information that may address the uncertainty discrepancy they experience, as well as their ability to communicate about the issues related, to cope with the information they possibly will receive, and the target source's ability to offer such information. Based on the outcome expectancy (OE) and efficacy assessment in this *evaluation* phase, individuals may choose to seek or avoid information, or cognitively reappraise the uncertain situation in the *decision* phase. A recent meta-analysis synthesizing existing TMIM studies showed support for significant weighted average associations among the TMIM variables, including a positive association between uncertainty discrepancy and anxiety, a negative association between anxiety and OE, as well as a positive association between efficacy and information seeking (Kuang & Wilson, 2021). Importantly, the meta-analysis suggested anxiety may have a direct, positive effect and an indirect, negative effect on information seeking.

Although the TMIM has not been used to examine uncertainty discrepancy directly related to the aging process, it has been tested in several aging-related contexts and received empirical support (e.g., Fowler, Gasiorek, & Afifi, 2018; Gettings & Kuang, 2021). For example, Fowler and Afifi (2011) examined adult children's information seeking from their aging parents regarding caregiving preferences. Their findings suggested that the TMIM accounted for adult children's pursuit of information related to elder care. In a related investigation, Rafferty, Cramer, Priddis, and Allen (2015) applied the TMIM to spouses' discussion about end-of-life preferences and found that uncertainty discrepancy about spouses' end-of-life preferences was positively associated with anxiety, which was associated with more negative expectations about the outcome of information seeking. Their study highlights that, for difficult topics such as end-of-life discussions, it is possible that the TMIM is more predictive of topic avoidance rather than information seeking. In a third germane study, Gettings and Kuang (2021) applied the TMIM to explain married individuals' information-seeking processes about partners' retirement preferences. Findings suggested that the positive association between uncertainty discrepancy and anxiety was stronger for older adults. In addition, when efficacy levels were low, older people were more likely to seek information from their spouses compared with younger participants. Overall, the findings of this

study supported the utility of the TMIM in the retirement context. Following this logic, the theory should operate well in the aging context, which also involves uncertainty discrepancy about issues such as financial planning and future care plans.

Based on the TMIM's theoretical propositions and empirical evidence in previous studies that tested the TMIM framework in aging-related contexts, we propose the following hypotheses (see Figure 1):

- H1: Participants' reported levels of uncertainty discrepancy about aging will be positively associated with their reported levels of anxiety.*
- H2: Uncertainty discrepancy-related anxiety will be negatively associated with (a) OE of information seeking and (b) efficacy assessments, and it will be positively associated with (c) information seeking about aging.*
- H3: Outcome expectancy of information seeking will be positively associated with efficacy assessments.*
- H4: Efficacy assessments will be positively associated with information seeking about aging.*

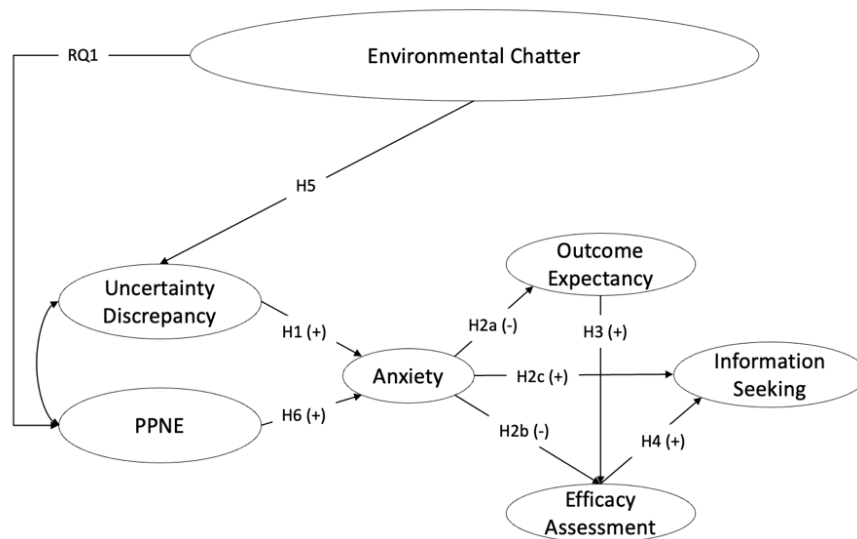


Figure 1. Summary of proposed hypotheses and the research question.

Uncertainty and Information Seeking in the Aging Experience

The CEMSA (Fowler et al., 2015; Gasiorek et al., 2016) is a useful framework that highlights the associations between communication and aging outcomes. It proposes that individuals can exercise agency in shaping their own subjective experience of aging and that communication is one way through

which people can exert control over these experiences. How people talk about aging-related issues is influenced in part by direct or indirect messages about age and aging in their cultural, social, and communicative environments—referred to as environmental chatter (Gasiorek & Fowler, 2020; Gasiorek et al., 2016). For example, many individuals have role models from whom they receive messages about aging (e.g., via explicit talk or through observation). These aging role models can be older family members or friends, celebrities, or even fictitious characters. Individuals who have had positive interactions with older family members or have seen older adults enjoying retirement or time with grandchildren often develop positive expectations about their own old age (e.g., Carstensen, 2009; Harwood & Anderson, 2002). In comparison, others may have seen old age negatively impact family members or witnessed older adults experience struggles with aging (i.e., negative role models). In some cases, individuals may have encountered non-accommodative interactions that contain messages intended to patronize or ignore older adults, thus experiencing them as negative or antisocial (Giles & Gasiorek, 2011). These messages in one's social environment may influence feelings (positive or negative affect) about the aging process, reduce or heighten the extent to which one feels uncertain about aging, impact how people talk about different domains of aging and how capable they feel in coping with aging processes, and ultimately influence the subjective experience of aging. In the CEMSA framework, environmental chatter accounts for the influence of communication from external sources on aging-related experiences.

These propositions of the CEMSA nicely complement the TMIM and can help situate the TMIM framework in a specific social and communicative context. In fact, early CEMSA work explicitly recognized various ways in which the two frameworks can be usefully integrated. For example, Fowler and colleagues (2015) highlighted that the CEMSA model drew from and extended the TMIM through the inclusion of affect and efficacy and by incorporating a wider range of age-related communication processes beyond information management. Although the TMIM explicates the process through which uncertainty discrepancy perceptions can motivate information management strategies, contextual factors that may contribute to perceptions of uncertainty discrepancy have not been taken into consideration. The CEMSA proposes that the messages about aging in one's social environments (i.e., environmental chatter) can influence people's experiences with aging and aging processes, such as how uncertain one feels about aging. In this study, we focus on two sources of environmental chatter: Negative role models and positive role models—"individuals who demonstrate what the process of aging consists of, and how it might be experienced" (Gasiorek & Fowler, 2020, p. 102).

Empirical evidence in the CEMSA literature provides support for the association between role models and aging-related communication behaviors. For example, Gasiorek and Fowler (2020) found that reporting more negative role models for aging was negatively associated with future care planning and positively associated with expressing optimism. Gasiorek and Fowler (2020) discussed that this unexpected finding may reflect individuals' attempts to differentiate themselves from the negative role models or their attempt to help others who are struggling with aging (through expressing optimism). The results also suggest that negative role models may prompt individuals to reflect on their own aging experience and heighten desired certainty, thus amplifying the discrepancy between perceived and desired levels of uncertainty. Having positive role models for aging was positively associated with participants' self-reported planning for future care needs and using new technology. This suggests that having previously interacted with positive aging role models likely will reduce perceived discrepancy between actual and desired levels

of uncertainty about aging, whereas having done so with negative role models will exacerbate uncertainty discrepancy. Therefore, we propose the following hypothesis:

H5: Having negative aging role models will increase uncertainty discrepancy about aging, whereas having positive aging role models will reduce uncertainty discrepancy about aging.

Alternative Conceptualizations of Uncertainty

Another goal of this study is to examine alternative conceptualizations of uncertainty in the aging context. Both the TMIM (Afifi & Weiner, 2004) and the CEMSA (Fowler et al., 2015) theorize the crucial role of uncertainty discrepancy in people's communicative experiences related to the aging process. The CEMSA presumes that the process of aging is inherently uncertain and that the difference between what one knows and what one would like to know (i.e., uncertainty discrepancy in TMIM; Afifi & Weiner, 2004) is associated with both affective (positive and negative) and communicative responses. Notably, Gasiorek and colleagues (2019) tested two conceptualizations of uncertainty, including uncertainty discrepancy in the original formulation of the CEMSA adapted from the TMIM's treatment of uncertainty and an alternative, PPNE, associated with aging. This alternative conceptualization is influenced by insights from problematic integration (PI) theory (Babrow, 1992, 2007).

Specifically, PI theory proposes that individuals form understandings of the world using two broad dimensions: Probabilistic (likelihood) and evaluative (desirability) orientations. On the one hand, individuals form probabilistic understandings of the self, others, ideas, events, places, and so on. On the other hand, people evaluate their understandings of the nature of the world and what they would like to happen. When these two orientations integrate smoothly, such as when something desirable is likely to happen (e.g., one would like to retire and is well prepared to do so in the near future) or when the probability of an undesirable event is low (e.g., when the recurrence/exacerbation of an illness is unlikely), it is relatively easy to form intentions, make decisions, and choose lines of action. However, if a person longs to retire but is not well-prepared financially, for example, integrating probabilistic and evaluative orientations becomes problematic.

Gasiorek and colleagues (2019) drew from this thinking to offer an alternative conceptualization of uncertainty about the aging process—probabilistic beliefs about the undesirable aspects of aging. Specifically, Gasiorek and colleagues (2019) conducted two studies using data from the United States and the United Kingdom and found support for the proposition that uncertainty discrepancy and PPNE contributed independently to attitudes toward aging—PPNE was associated with affective responses to uncertainty (positive and negative), efficacy, and indirectly with successful aging; uncertainty discrepancy was significantly associated with negative and positive affect but not as strongly. Gasiorek and colleagues (2019) concluded that these two conceptualizations focus on different aspects of uncertainty within the aging context—uncertainty discrepancy is related to the extent to which individuals' actual levels of uncertainty diverge from their desired levels of uncertainty, whereas PPNE addresses one's expectations about the likelihood and desirability of future anticipated outcomes. Consistent with these ideas, this study also explores the extent to which uncertainty discrepancy and PPNE independently contribute to the associations as outlined in the TMIM as parallel predictors:

H6: PPNE will be positively associated with anxiety.

H7: Uncertainty discrepancy and PPNE will contribute independently to anxiety as outlined in the TMIM.

Last, in addition to testing the associations between environmental chatter (i.e., negative and positive role models) and uncertainty discrepancy (H5), we also ask whether environmental chatter will be associated with PPNE:

RQ1: Does having negative and positive aging role models predict PPNE? If so, in what directions?

Method

Participants and Procedures

Data were collected in the United States, as it is one of the many countries with large and growing aging populations (U.S. Census Bureau, 2018). Participants were recruited via Amazon Mechanical Turk (MTurk) in July 2020 to complete an online survey after the study received Institutional Review Board approval (#20X152). Given that this study focused on topics associated with aging processes, participants were eligible to participate if they were at least 45 years old (we recruited from the 45–55 and 55+ categories on MTurk)—consistent with previous CEMSA research (e.g., Gasiorek & Fowler, 2020)—were located in the United States, and had a high Human Intelligent Tasks (HITs) approval rate on MTurk. Previous research (e.g., Sheehan, 2018) has highlighted the advantage of using crowdsourcing platforms such as MTurk for data collection from a pool of diverse respondents (compared with college student samples) but also raised concerns regarding issues of data validity and reliability. Therefore, we adopted several strategies to ensure data quality. Specifically, responses were removed if participants (1) failed the attention-check question, (2) took the survey using the same IP address more than two times, (3) reported an improbable age (e.g., 1,000), or (4) submitted an invalid response to the first open-ended question (e.g., text that was copy-and-pasted from a website). Following these quality checks, the final sample was $N = 340$ (from initial $N = 368$) and, on average, 58.46 years old ($SD = 7.29$; range 45–82). Please see Table 1 for additional information on participants.

Table 1. Demographic Information for All Participants.

Gender	Female 62.9% Male 37.1%
Race (participants selected all that applied)	American Indian or Alaska Native 2.1% Asian 3.8% Black or African American 4.7% Native Hawaiian or Pacific Islander 0.3% White 89.1% Other 0.9%
Ethnicity	Hispanic 6.8% Not Hispanic 93.2%
Relationship status	Married or in a domestic partnership 70.1% Divorced 14.0% Single/never married 9.3% Widowed 3.8% Separated 1.8% Other (e.g., “engaged”) 0.9%

Have children?	Yes 76.8%; mean number of children 2.21
Living arrangements	Live with at least one other person 81.5%; Live alone 18.5%
Type of living area ^a	Rural 24.2%; suburban 53.4%; urban 22.4%
Highest level of education achieved ^b	High school 17.9% Associate's 20.3% Bachelor's 34.6% Law 0.9% Master's 21.2% MBA 2.1% PhD 2.4% Other .6%
Employment status	Disabled/unable to work 2.6% Full-time 51.3% Part-time 20.0% Retired 16.7% Unemployed/looking for work 2.4% Unemployed/not looking for work 3.3% Other 2.7%

Note. ^a Participants came from 45 states.

^b For covariate, level of education was recoded into five categories.

Measures

The TMIM measures were adapted from Afifi and Weiner (2006), Dillow and LaBelle (2014), and Fowler and Afifi (2011). For all scales, McDonald's omega (Goodboy & Martin, 2020; Hayes & Coutts, 2020), mean, and standard deviation were calculated and reported in Table 2. Unless otherwise noted, participants rated responses on 7-point Likert scales (1 = *strongly disagree*, 7 = *strongly agree*). Higher scores on a variable indicate higher values for that construct. Confirmatory factor analyses (CFAs) were conducted for scales with four or more items. Indicators of good model fit included (a) comparative fit indices (CFIs) greater than 0.90, (b) root mean square errors of approximation (RMSEAs) below 0.08, and (c) relative chi-square (χ^2/df) of 5 or less (given the large sample size, the chi-square test is limited; Bentler & Bonnet, 1980; Kline, 2016; West, Taylor, & Wu, 2012; Wheaton, Muthén, Alwin, & Summers, 1977).

Table 2. Descriptive Statistics for Study Variables.

	Omega (95% Confidence Interval)	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
Negative role models	.777 (.734, .814)	4.274	1.043	-0.014	-0.316
Positive role models	.872 (.844, .897)	5.100	1.130	-0.806	0.573
Uncertainty	.875 (.844, .903)	4.207	1.469	-0.337	-0.623
PPNE	.899 (.876, .916)	6.277	2.192	-0.302	-0.645
Anxiety	$r = .820, p < .001$	3.347	1.622	0.402	-1.006
OE	.955 (.941, .968)	5.022	1.270	-0.532	-0.248
Communication efficacy	.852 (.796, .891)	5.962	0.665	-0.476	0.518
Target efficacy	.882 (.844, .907)	5.049	0.952	-.954	2.127 ¹
Coping efficacy	.940 (.920, .953)	5.802	1.079	-1.316	2.541
Information seeking	.937 (.932, .950)	4.728	1.272	-0.825	0.481
Issue importance	.922 (.899, .941)	5.703	1.106	-1.495	2.773

Note. McDonald's omega was used as an estimate of internal reliability in place of Cronbach's alpha (see Hayes & Coutts, 2020). All variables were measured on 7-point Likert scales.

Positive Role Models

Five items were used to measure the extent to which participants had positive role models of aging in their social environment. Two items were adapted from Gasiorek and Fowler (2020; e.g., "Older members of my family seem to be thriving/seemed to thrive in their later years"), and three additional items were created by the authors based on Gasiorek and Fowler's (2020) recommendation to increase the reliability of the scale (e.g., "My older family members have set good examples for how to thrive as you age"). CFA results indicated acceptable model fit after the correlation of two pairs of error terms that asked about positive role models in general (as opposed to specific family members or parents as positive aging role models), $\chi^2/df = 2.738$, CFI = .994, RMSEA = .072.

Negative Role Models

Three items assessed negative role models as a form of environmental chatter. Two items were adapted from Gasiorek and Fowler (2020; e.g., "I've seen my parents or grandparents really struggle with not being able to do things that they used to be able to"). In addition, we created one additional item (e.g., "There are older people in my life who have faced great challenges as they aged"). Because this scale had only three items, CFA was not conducted.

¹ Non-normal variables including target efficacy and coping efficacy (univariate skewness greater than $+/-1$ and kurtosis greater than $+/-2$) were log transformed to reduce skew and/or kurtosis guided by recommended procedures in Tabachnick and Fidell (2007). Results were similar in analyses that used transformed and non-transformed variables; therefore, results with non-transformed variables are reported here.

Uncertainty Discrepancy

Three items from previous CEMSA research (e.g., Gasiorek et al., 2019) were used to measure uncertainty discrepancy about aging. The items were "I don't know as much as I would like to about how it will feel to grow older," "I am less certain than I would like to be about what my future holds," and "I know less than I would like to about what my life will be like as I get older."

Perceived Probability of Negative Experiences

Perceived probability of negative experiences was assessed using five items adapted from Gasiorek and colleagues (2019). The items asked participants to estimate the probability that they would experience difficulties in each of the following areas: Health, finances, mobility, social connections, and autonomy (e.g., "What is the probability that you will experience significant health problems?"). Consistent with Gasiorek and colleagues' (2019) operationalization of PPNE in the aging context, we also measured the extent to which participants viewed probabilities associated with each of these difficulties as negative and problematic (e.g., "If you experience significant changes in this area as you age, to what extent will it bother you?") on 7-point scales (1 = *It will not bother me at all*, 7 = *It will bother me a great deal*). Scores on all five domains were above the scale midpoint ($M_s = 4.43\text{--}6.07$), confirming that these experiences were perceived to be negative. The five corresponding perceived probability scores were then used as indicators for the latent construct of PPNE. CFA results indicated a good model fit after the correlation of a pair of error terms (health-physical mobility), $\chi^2/df = 2.728$, CFI = .992, RMSEA = .072.

Anxiety

Two items adapted from Afifi and Weiner (2006) were used to measure anxiety. Sample items included "It worries me to think about how little I know about aging (or the aging process)" and "The size of the similarity/difference between how much I know and how much I'd like to know about aging (or the aging process) makes me feel anxious."

Outcome Expectancy

Outcome expectancy was measured with three items (e.g., "Seeking information about aging [or the aging process] would produce _____ outcomes;" responses for all OE items ranged from 1 = *extremely negative* to 7 = *extremely positive*) and formed a reliable scale.

Efficacy

For efficacy, second-order latent factor analyses with the three efficacy measures were conducted. Sample items included "I know how to get information about aging (or the aging process)" (communication efficacy), "I feel that others would be completely honest with me about aging (or the aging process)" (target efficacy), and "I feel I can manage discovering more information about aging (or the aging process)" (coping efficacy). Communication and target efficacy response options ranged from 1 = *strongly disagree* to 7 = *strongly agree*. Coping efficacy responses ranged from 1 = *could not*

cope well to 7 = *could cope perfectly well*. CFAs suggested that second-order latent factor models fit well ($\chi^2/df = 1.851$, CFI = .976, RMSEA = .050), which included communication efficacy (six items), target efficacy (five items), and coping efficacy (five items). Therefore, the three efficacy measures were included in model analyses as second-order latent factors.

Information Seeking

Information seeking was measured using seven items adapted from previous TMIM research (e.g., Afifi, Dillow, & Morse, 2004). Sample items included "I plan to seek out information about aging (or the aging process)" and "I intend to ask others about aging (or the aging process)." The items formed a good fitting, single-factor model, $\chi^2/df = 1.501$, CFI = .998, RMSEA = .038.

Issue Importance

Issue importance was measured with three items (e.g., "It is important that I know about aging (or the aging process)"). As a scope condition of the TMIM, the average level of issue importance was high in this sample, $M = 5.70$, $SD = 1.11$. Therefore, the scope condition was met.

Covariates

Consistent with previous TMIM and CEMSA research, the following demographic variables were included in the model as covariates: Participant age, gender, marital status, health, level of education, and issue importance. Health was measured using the single-item general self-rated health: "How would you rate your general health status?" (DeSalvo, Bloser, Reynolds, He, & Muntner, 2006; Idler & Benyamini, 1997). Responses ranged from 1 = *poor* to 5 = *very good*.

Results

Preliminary Analyses

Missing Data

There were limited missing data (less than 1% on all study variables) with only seven of 340 (2.1%) participants with any missing values. A missing completely at random (MCAR; Little & Rubin, 2002) test was conducted in SPSS, $\chi^2(491) = 493.314$, $p = .462$, suggesting MCAR. Therefore, expectation maximization was used to address missing data (Schlomer, Bauman, & Card, 2010).

Normality Assumptions

Study variables were checked for assumptions of normal distributions before model testing (e.g., Mardia, 1970; see Table 2). Non-normal variables (univariate skewness greater than ± 1 and kurtosis greater than ± 2) were log transformed to reduce skew and/or kurtosis guided by recommended

procedures in Tabachnick and Fidell (2007).² Since results were similar in analyses that used transformed and non-transformed variables, results with non-transformed variables have been reported.

Model Testing

All hypotheses were tested in the proposed model using structural equation modeling in AMOS 26 (see Figure 1). Uncertainty discrepancy and PPNE were included as parallel, correlated predictors, such that relationships involving uncertainty in the TMIM framework were specified for both uncertainty discrepancy and PPNE. First, negative role models and positive role models were allowed to predict uncertainty discrepancy and PPNE as hypothesized (see Figure 1). Covariates were kept in the final model if they had significant associations with study variables. This model yielded an acceptable fit, $\chi^2/df = 1.853$, CFI = .916, RMSEA = .050, and showed significant associations between positive/negative role models and uncertainty discrepancy as well as PPNE. Given these results, we also explored the possible effects that role models might have on other components of the TMIM by testing a second model. In this model, positive and negative role models were allowed to predict anxiety, OE, efficacy assessments, and information seeking (i.e., in addition to uncertainty discrepancy and PPNE). The second model yielded an acceptable and improved fit, $\chi^2/df = 1.803$, CFI = .921, RMSEA = .049, and thus these coefficients are reported in the following paragraphs. Overall, the second model (including covariates) accounted for 41.8% of the variance in direct information seeking about the aging processes. Bivariate correlations among the study variables are reported in Table 3. Figure 2 shows the model with standardized path coefficients.

Table 3. Bivariate Correlations Among Study Variables.

	1	2	3	4	5	6	7	8	9	10
1	—									
2	-.141**	—								
3	.305***	.002	—							
4	.400***	.090	.339***	—						
5	.262***	.134*	.573***	.317***	—					
6	.054	.257***	.053	-.001	.212***	—				
7	-.065	.266***	-.308***	-.101	-.304***	.247***	—			
8	.146**	.326***	.071	.088	.162***	.333***	.336***	—		
9	-.015	.248***	-.192***	-.125*	-.262***	.346***	.403***	.252***	—	
10	.217***	.317***	.227***	.124*	.335***	.481***	.202***	.502***	.231***	—
11	.207***	.197***	.236***	.173***	.306***	.446***	.185***	.342***	.147***	.608***

Note. *** $p < .001$; ** $p < .01$; * $p < .05$.

1 = negative role models, 2 = positive role models, 3 = uncertainty, 4 = PPNE, 5 = anxiety, 6 = OE, 7 = communication efficacy, 8 = target efficacy, 9 = coping efficacy, 10 = information seeking, 11 = issue importance.

² Two variables had negatively skewed and leptokurtic distributions: Target efficacy and coping efficacy.

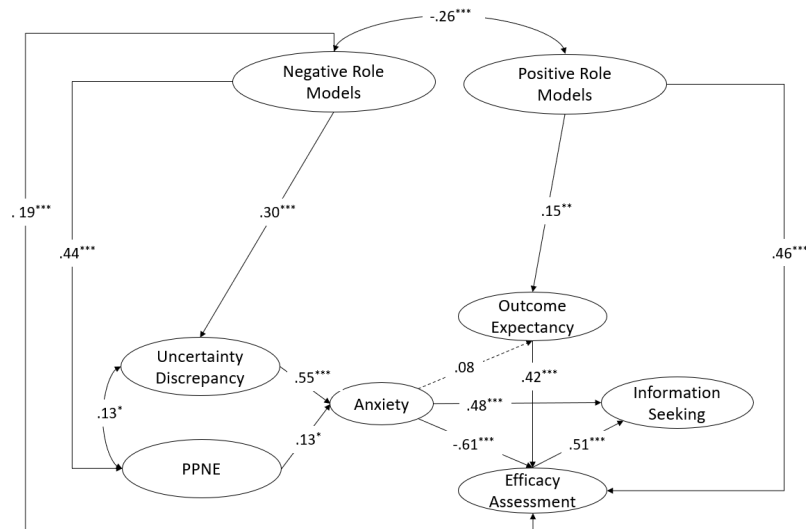


Figure 2. A structural model with standardized path coefficients.

Note. For hypothesized paths, solid lines represent statistically significant paths. Dotted lines represent paths that are not significant at $p < .05$. For exploratory associations, only significant paths are shown in the figure.

*** $p < .001$. ** $p < .01$. * $p < .05$.

Specifically, H1 predicted that participants' reported levels of uncertainty discrepancy about aging and the aging process would be positively associated with their reported anxiety. Results indicated that uncertainty discrepancy was positively associated with anxiety (unstandardized path coefficient $b = .688$, $SE = .073$, $p < .001$). Therefore, H1 was supported.

Hypothesis 2 predicted that uncertainty discrepancy-related anxiety would be negatively associated with (a) OE of information seeking and (b) efficacy assessment, and it would be positively associated with (c) information seeking about aging and the aging process. Results suggested that anxiety related to uncertainty discrepancy about aging and the aging process was negatively associated with efficacy ($b = -.156$, $SE = .021$, $p < .001$) and positively associated with direct information seeking ($b = .308$, $SE = .051$, $p < .001$). However, the association between anxiety and OE was not significant ($b = .060$, $SE = .043$, $p = .159$). Therefore, H2b and H2c were supported but H2a was not.

Hypothesis 3 predicted that OE of information seeking would be positively associated with efficacy assessment. Results indicated that the expected outcomes of seeking information about aging were positively associated with efficacy assessment ($b = .135$, $SE = .023$, $p < .001$). Therefore, H3 was supported.

Hypothesis 4 predicted that efficacy assessment would be positively associated with information seeking about aging and the aging process. Results showed a positive association between efficacy assessment and direct information seeking ($b = 1.280$, $SE = .235$, $p < .001$). Therefore, H4 was supported.

Hypothesis 5 predicted that negative and positive aging role models would be significantly associated with uncertainty discrepancy. Research question 1 asked whether having negative and positive role models would predict PPNE. Results suggested that having negative role models was significantly and positively associated with uncertainty discrepancy ($b = .334, SE = .078, p < .001$) and PPNE ($b = .757, SE = .127, p < .001$). With regard to positive role models, results suggested having positive role models of aging in participants' social environments was not significantly associated with uncertainty discrepancy ($b = -.019, SE = .071, p = .785$) or PPNE ($b = .078, SE = .107, p = .462$). Therefore, H5 was partially supported.

In addition, regarding the exploratory paths included in the second model, results suggested that having positive aging role models was positively associated with OE ($b = .176, SE = .062, p = .005$) and efficacy ($b = .173, SE = .028, p < .001$; see Figure 2). Having negative role models of aging also was positively associated with one's efficacy assessments of communicating about and coping with aging-related information ($b = .069, SE = .025, p = .005$).

Hypothesis 6 proposed that PPNE would be positively associated with anxiety. Results indicated a significant positive association between PPNE and anxiety ($b = .102, SE = .042, p = .016$). Therefore, H6 was supported.

Hypothesis 7 predicted that uncertainty discrepancy and PPNE would contribute independently to anxiety, as outlined in the TMIM. As the results for H1 and H6 suggested, uncertainty discrepancy and PPNE were significantly associated with anxiety after accounting for the correlation between the two ($r = 0.13$) and the other construct's influence on anxiety, indicating that the two conceptualizations of uncertainty were related but distinct and contributed independently to anxiety. Therefore, H7 was supported.

Discussion

Building on the TMIM and the CEMSA, this study focused on understanding the associations among sources of environmental chatter, uncertainty, and information seeking. Findings suggest that having negative role models for aging was positively associated with both conceptualizations of uncertainty (i.e., uncertainty discrepancy and PPNE) and efficacy, whereas positive role models led to more positive OEs and higher efficacy assessments. Uncertainty discrepancy and PPNE functioned as independent sources of influence on anxiety, which inhibited efficacy assessment. Consistent with previous TMIM research, efficacy was positively associated with information seeking. Together, these results offer both theoretical and practical implications.

Theoretical Contributions

First, this study integrated theoretical insights from the TMIM and the CEMSA to explain how messages and interactions within individuals' social and communicative environments may influence uncertainty about aging and subsequent emotional, cognitive, and communicative responses. Findings extended the TMIM by identifying a possible predictor (i.e., environmental chatter) of uncertainty discrepancy. A recent meta-analysis of TMIM studies (Kuang & Wilson, 2021) supports the utility of the theory in explicating the effects of uncertainty discrepancy on direct information seeking in a wide range of contexts, for example, family health information

(Hovick, 2014) and end-of-life preferences (Rafferty et al., 2015). However, previous research has rarely examined predictors of uncertainty discrepancy, limiting theoretical understandings of uncertainty management processes to the three phases identified in the original framework (i.e., interpretation, evaluation, and decision). Examining contextual factors such as environmental chatter and how they heighten or attenuate uncertainty discrepancy extends the TMIM mechanism and allows researchers to systematically account for situations when individuals become aware of an uncertainty discrepancy (or not).

In this study, findings suggest that different sources of environmental chatter may influence uncertainty management processes in distinct ways. For example, having negative role models contributes to uncertainty perceptions both in terms of amplifying the mismatch between actual and desired uncertainty as well as PPNE related to aging. In comparison, having positive role models does not influence uncertainty perceptions directly but can enhance one's OEs of communicating about aging. Notably, consistent with previous findings, individuals who have had more positive aging-related experiences (e.g., having positive role models, observing older family members enjoying retirement) not only develop positive expectations about their own old age (e.g., Carstensen, 2009; Harwood & Anderson, 2002) but also have higher efficacy assessments in terms of their ability to seek and cope with information about aging. It is important to note, however, that the association between environmental chatter and individuals' uncertain feelings about the aging process may not be unidirectional. That is, although having positive and negative role models of aging likely influences one's actual and desired levels of uncertainty about aging, it is also possible that individuals who are uncertain, anxious, and actively curious about their own aging may perceive the aging experience of the people around them differently compared with those who are not. Future research should continue to examine environmental chatter that activates perceptions of uncertainty discrepancy and the subsequent evaluation processes and information management decisions, as well as how perceived uncertainty might influence individuals' perception of environmental chatter (and whether there might be any feedback loops between environmental chatter and uncertainty discrepancy).

Interestingly, both positive and negative role models were positively associated with participants' assessments of their ability to talk about and cope with aging-related issues (i.e., efficacy assessments). Here, the constructs of positive and negative role models in the CEMSA warrant additional discussion. In this study as well as in previous CEMSA research, role models refer to those who demonstrate what the process of aging consists of and how it might be experienced (Gasiorek & Fowler, 2020). In other words, by observing how others (e.g., role models) experience aging positively, individuals can learn from or "replicate" the aging process (e.g., the modeling hypothesis; Floyd & Morman, 2000). Meanwhile, people who are exposed to negative role models and witness challenging experiences of aging may attempt to "compensate" for those possibilities by taking more proactive actions to avoid negative aging experiences (e.g., the compensation hypothesis). Therefore, having positive and negative role models in the social environment itself may not influence the aging experience. Rather, it is one's identification with the role models and the social learning and modeling process (e.g., Bandura & Walters, 1977) that underly the mechanism through which the role models' behaviors have an impact on their subsequent cognitions and actions about aging. Future work on role models of aging should investigate what the role models are doing and saying (i.e., the communicative processes of modeling) and unpack how this particular component of environmental chatter influences perceptions about aging and the aging process.

Finally, consistent with the findings of Gasioerek and colleagues' (2019) study, uncertainty discrepancy and PPNE emerged as two parallel, independent predictors of anxiety in our model. Findings suggest that people who saw others having negative experiences of aging perceived higher levels of uncertainty discrepancy and higher probabilities of negative experiences of aging. Uncertainty discrepancy and PPNE were both significantly associated with anxiety after accounting for the correlation between the two conceptualizations of uncertainty and the effect of negative and positive role models. However, different from Gasioerek and colleagues' (2019) observation that PPNE functioned as a stronger predictor of individuals' affective reactions to *aging* in the CEMSA framework, the results of this study suggest that uncertainty discrepancy was a stronger predictor of *uncertainty*-related anxiety in the TMIM framework. In general, people may have positive and negative affective responses toward the aging processes while experiencing related but distinct emotional responses about the *uncertainty* surrounding aging-related issues. In some cases, it is not uncommon that people experience mixed feelings about aging (e.g., anxious about changes in physical and cognitive functions but excited about prospects of retirement; Ersner-Hershfield, Mikels, Sullivan, & Carstensen, 2008). Future researchers should work to identify the sophisticated sources and layers of discrete emotions (e.g., Roseman, Wiest, & Swartz, 1994) involved in the context of aging.

Practical Implications

Practically, the findings of this study indicate that older adults' perceptions of aging-related uncertainty may involve not only the mismatch between what they know and what they want to know but also their perceived probabilities of negative experiences. Therefore, in facilitating effective uncertainty management in the aging context, it is critical to design initiatives that can reduce perceived uncertainty discrepancy and help older adults cope with the expected negative experiences of aging. For older adults who expect negative outcomes of seeking aging-related information and those who perceive themselves as incapable of seeking or coping with information about aging, it may be beneficial to increase their exposure to positive role models in their social environment through interpersonal interaction and/or media exposure. In some cases, it could be useful (although perhaps counterintuitive) to expose individuals to negative role models about aging to motivate subsequent information-seeking behaviors. This strategy could be effective to the extent that negative emotional responses to uncertainty such as anxiety do not inhibit efficacy assessments so much that information seeking is discouraged. In addition, insights from both the TMIM and the CEMSA as well as the empirical evidence in this study support the benefit of information seeking about aging as a way to facilitate uncertainty management. Therefore, organizations and communities can offer older adults (e.g., employees and community members) access to different sources of information about aging and aging-related processes such as health care and retirement planning (e.g., Eisenberg, 2017).

Limitations and Future Research

As is the case with all research, the findings from this study should be considered with its limitations in mind. First, the study used cross-sectional data collected via MTurk to test how information management processes unfold. Thus, it is not appropriate to make causal claims about how the constructs are related. Moreover, although using a crowdsourcing platform can result in high-quality data (e.g., Casler, Bickel, & Hackett, 2013), and we took multiple steps to ensure data quality in this study, we still are unable to confirm that the participants in our study are exactly who they say they are (Wessling, Huber, & Netzer, 2017). We

encourage future researchers to address these concerns by conducting similar studies using alternative means of recruitment and, perhaps, by collecting data at more than one point in time.

A second limitation is that the present sample is relatively homogenous in terms of race and ethnicity. As demonstrated in previous scholarship, views of aging, uncertainty, and information management can vary by cultural, ethnic, national, and other forms of difference (e.g., Fung, 2013) as well as health and socioeconomic status (e.g., Unson, Trella, Chowdhury, & Davis, 2008). In addition, it is projected that 80% of older people will be living in low- and middle-income countries by 2050 (WHO, 2018). Thus, it is critical for future research to advance the understandings about aging-related uncertainty and communication and investigate how the TMIM or the CEMSA function across these boundaries.

Conclusion

Given the inevitability of uncertainty about aging and the general “graying” of the world’s population, a better understanding of these intersections and how we communicate about them is important. This study integrated two frameworks—the TMIM and the CEMSA—to address these issues, suggesting that individuals’ social environments may influence uncertainty about aging as well as expected outcomes and efficacy assessments about age-related communication.

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