International Journal of Information Science and Management
Vol. 24, No. 1, 2026, 111-132
DOI: https://doi.org/10.22034/ijism.2026.2047759.1663 / DOR: https://dor.isc.ac/dor/20.1001.1.20088302.2026.24.1.6.7

Original Research

Uncertainty in Health Information Behavior from the Perspective of Uncertainty Management Theory: A Scoping Review

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Received: 26 December 2025
Reviewed: 01 March 2025
Accepted: 10 December 2025

Abstract

Uncertainty is a common experience, especially in the health field. Individuals use many information behaviors to overcome uncertainty. Among the communication theories, the uncertainty management theory focuses more on information behavior. In this regard, relatively good studies have been conducted in the field of uncertainty management theory. The present study, by reviewing related studies, aims to identify the types and sources of uncertainty, the communication reactions of individuals to experienced uncertainty, the reasons for seeking or avoiding information, and the types of information sought or avoided. The research method of this study is a scoping review. After selecting the appropriate search strategy and inclusion and exclusion criteria, 53 articles from the studies extracted from MEDLINE/PubMed, Scopus, and ISI Web of Knowledge were selected for final review. The results showed that uncertainties in health information behavior occur at both individual and collective levels, and sources and types can be identified according to the context. Also, various strategies are used to deal with uncertainties at these two levels; the most common is seeking and avoiding information in different ways to reduce, increase, maintain, or adapt to uncertainty. In conclusion, this review provides a novel and comprehensive mapping of uncertainty in health information behavior. Unlike previous work, it explicitly delineates the complex reasons and methods underlying information seeking versus avoidance across diverse health contexts. This synthesis offers a foundational framework for developing targeted interventions to improve communication and support for individuals and families navigating health uncertainty.

Keywords: Uncertainty, Uncertainty Management Theory, Health Information Behavior.

Introduction

Life experiences, ranging from illness and pregnancy to aging, are inherently uncertain. In the health context, uncertainty is often described as a cognitive state that emerges when individuals face complex, ambiguous, or insufficient information, leading to feelings of insecurity (Brashers, 2001; Gasiorek et al., 2019). Mishel and Barron (2012) further conceptualize uncertainty as the inability to predict outcomes, noting that it is a significant source of stress for individuals with acute and chronic conditions. It is essential to recognize that not all uncertainty is detrimental; while some forms can provoke anxiety and threaten well-being, others may foster innovation and creativity (Anderson, 2006).

Among communication theories, Uncertainty Management Theory (UMT) offers a particularly relevant framework for understanding how people respond to uncertainty through information-related behaviors. Developed by Brashers (2001), UMT focuses on individuals' communicative responses to experienced uncertainty. Unlike earlier theories that primarily emphasized uncertainty reduction, UMT proposes that people may seek to reduce, maintain, or even increase uncertainty based on their appraisal of the situation. For instance, if uncertainty is perceived as threatening, individuals might seek information or social support to reduce it. Conversely, if uncertainty is appraised as beneficial—such as when it preserves hope—people may avoid information to maintain it (Brashers, 2007; Perez et al., 2019).

The theory underscores that information management is a central component of how individuals cope with uncertainty (Brashers & Babrow, 1996). Responses vary greatly; some may pursue additional information, while others might avoid it, seek emotional support, or learn to adapt to ambiguous circumstances. Uncertainty remains a pivotal concept within health information behavior research. Although substantial work has been conducted, several aspects require further elaboration. Brashers (2007) himself called for more research to elucidate the relationships among uncertainty, information seeking, and information, as well as the mechanisms underlying uncertainty management.

Given that individual, familial, organizational, contextual, cultural, economic, and political factors can all influence information behavior, and considering the complex and multidimensional relationship between types of uncertainty and management strategies, a systematic synthesis of the literature is warranted. The current study aims to address this need by examining the various facets of uncertainty in health information behavior through the lens of Uncertainty Management Theory.

Despite the body of work on UMT, a comprehensive synthesis of the types, sources, and behavioral responses to uncertainty specifically in health contexts is lacking. To address this gap and respond to Brashers' (2007) call for further research on the mechanisms of uncertainty management, this scoping review systematically maps the literature.

Materials and Methods

We conducted **a s**coping review by assembling a research team of medical librarians and information scientists. The scoping review methodology was selected because it is ideal for mapping key concepts, sources, and evidence in an emerging or complex field of research, and for identifying gaps in the existing literature (Arksey & O'Malley, 2005). This approach is particularly suited to our broad research questions, which aim to summarize and conceptualize the landscape of uncertainty management in health information behavior. The methodology of this scoping review is based on the framework outlined by Arksey and O'Malley (2005). The

review included the following five key steps: (1) identifying the research question, (2) identifying relevant studies, (3) study selection, (4) charting the data, and (5) summarizing and reporting the results. A flow diagram showed the flow of articles from search to their final selection according to RISMA 2009.

Research Questions

The question guided this review:

QR1: What are the features of studies that used uncertainty management theory in the health area?

QR2: What are the detected types and sources of uncertainty in these studies?

QR3: What type of information behavior towards uncertainty in these studies?

QR4: What is the reason and how of seeking or avoiding information in these studies when confronting various uncertainties?

Relevant studies

- **Development of Search Strategy:** The search strategy was meticulously developed by a team of medical librarians and information science experts. Key concepts from the research questions were operationalized into search terms.
- **Iterative Refinement:** Preliminary search strings were designed for each database using a combination of keywords and database-specific subject headings (e.g., MeSH, Emtree). These strings were tested and refined over multiple iterations to maximize the retrieval of relevant studies.
- **Final Search Execution:** The definitive search was conducted simultaneously across all four electronic databases (MEDLINE/PubMed, Scopus, and ISI Web of Knowledge) in September 2023.
- **Search Update**: To maintain currency and capture the latest publications, the identical search strategy was repeated in September 2025, before the final data analysis and synthesis.

The search query was set to the specific needs of each database. Similarly, advanced Google search was used to identify grey literature, including case, thesis, program, or project reports, using the exact keywords. The search will be further streamlined by identifying citations from the reference lists of papers selected in the initial search. For articles not available online, the first author (RMM) will contact the lead author of the publication via email to request a copy of the paper for review.

The evidence will be included if the sources are: primary studies; written in English; use appropriate study designs and methods, including quantitative, qualitative, and mixed-methods designs; and provide information on uncertainty management theory approaches designed specifically for the health era. The evidence will be excluded if the sources are: Published in languages other than English.

Study selection

As detailed in the PRISMA flow diagram (Figure 1), our initial search across all databases yielded 495 records. After removing duplicates, 183 records remained for title and abstract screening. Following this initial screening, 52 full-text articles were assessed for eligibility. Ultimately, after applying our pre-defined inclusion and exclusion criteria (as stated in the Eligibility Criteria subsection), 53 studies were selected for final inclusion in the

scoping review. The additional study was identified through manual searching of reference lists, bringing the final count to 53.

The selection process was conducted independently by two reviewers (RMM and AH), with any discrepancies resolved by a third reviewer (LNA) to ensure consistency and minimize bias. The final number of 53 articles represents all the studies that met our eligibility criteria from the pool of initially identified records. Due to limited translation resources, articles published in languages other than English were excluded. When the same data were reported in more than one publication (e.g., in a journal article and an electronic report), only the article reporting the most complete data set was used.

Data charting process

The data charting process was conducted using a standardized data extraction form developed in Microsoft Excel. The form was pilot-tested on five randomly selected studies and refined accordingly to ensure consistency and comprehensiveness. The following data were systematically extracted from each included study by the first reviewer (RMM):

- General Study Characteristics: Author(s), year of publication, country of study, study aim/objectives.
- Methodology: Study design (e.g., qualitative, quantitative, mixed-methods), data collection methods (e.g., interviews, surveys), study population, and sample size.
- Key Findings Related to Review Questions: The extracted data encompassed key dimensions of uncertainty and its management, including the types and sources of uncertainty (e.g., diagnostic, prognostic, financial, or arising from broader personal and collective contexts), the information behaviors employed in response (such as seeking, avoiding, or sharing information, often targeted at specific content like health or financial details), the underlying reasons and methods for these behaviors (including motivations like reducing anxiety or maintaining hope, and processes like online searches, consulting professionals, or avoiding conversations), and finally, the reported outcomes or consequences resulting from these uncertainty management strategies.

The charting process was iterative. The first reviewer (RMM) performed the initial extraction. A second reviewer (AH) then independently verified the extracted data against the original articles for accuracy and completeness. Any discrepancies or uncertainties in the coding were discussed between these two reviewers until a consensus was reached. If an agreement could not be reached, a third reviewer (LNA) was consulted to make a final decision. This process ensured the reliability and consistency of the data extraction.

Summarizing and reporting the results

The data were compiled in a single spreadsheet and imported into Microsoft Excel 2013 for validation and coding. Fields allowing string values were examined for implausible values. The data were then exported into STATA version 12 (StataCorp, College Station, TX) for analyses. Descriptive statistics were calculated to summarize the data. Frequencies and percentages were utilized to describe nominal data.

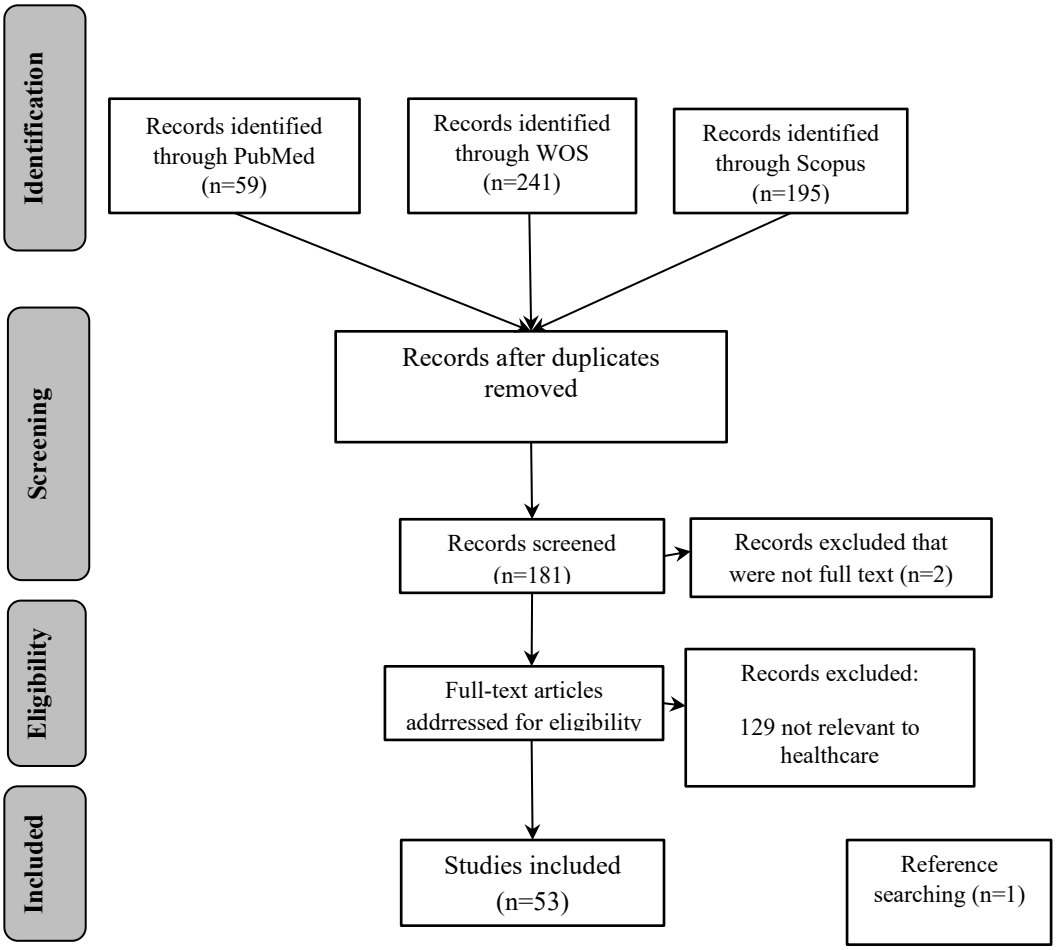

Figure 1: PRISMA Flow chart of scoping review (based on framework by Arksey & O' Malley, 2005)

Results

In this section, we present the results of our scoping review. First, we present an overview of the demographic properties of our studies (RQ1). Then, we answer each RQ2, RQ3, and RQ4 in the following subsections:

QR1: What are the features of studies that used uncertainty management theory in the health area?

The analysis of publication trends reveals significant growth in research on uncertainty management theory, from a single publication in 2004 to 27 by 2023. This demonstrates a growing scholarly interest in this theoretical framework over the past two decades. In addition, nearly 44% of articles used the interview method, 36% used the case study method, 8% used the focus group method, and 6% used the laboratory method. The subject area of the retrieved articles, according to Figure 2, could be categorized into seven groups based on article frequency, as follows: 1. Cancer, 2. Illness (e.g., COVID-19, Clubfoot, Type 1 diabetes) 3. Health Information 4. Workplace 5. Family Health 6. Financial struggles 7. Scientific Credibility.

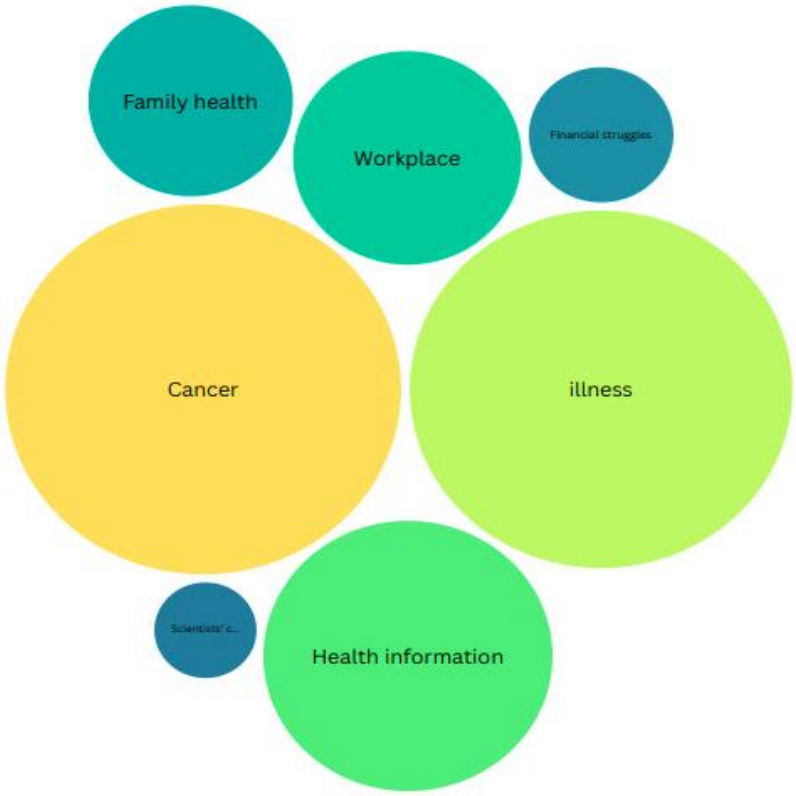

Figure 2: Subject area of retrieved articles

Figure 2 Alternative (Alt) Text: The thematic map of the reviewed articles is shown, which shows seven thematic areas in order of article frequency. 1. Cancer 2. Illness 3. Health information 4. Workplace 5. Family health 6. Financial struggles 7. Scientific credibility.

QR2: What are the detected types and sources of uncertainty in these studies?

In most studies investigated, it has been noted that sources of uncertainty are both direct and indirect. Perez et al. (2019) categorized sources of uncertainty into three categories: social, health, and financial. Senteio and Ackerman (2022) also identified the individual, others, social communication, and context as sources of uncertainty. As detailed in Table 1, the sources and types of uncertainty were complex and multifaceted. Still, they could be categorized into two primary levels: individual (physical and personal characteristics, health and illness status, and financial) *and* collective (social, health and illness status, and financial).

Table 1
Type and source of uncertainty in seeking information behavior

Type of uncertainty	Category	Source of uncertainty	Article(s)
	Individual characteristics	Body image, appearance characteristics	Hughes & Romo, 2020
		Others' inappropriate behavior	Senteio & Ackerman, 2022
		Role ambiguity and economic hardship	Wu et al., 2019
		Genetic Testing, Illness	Fisher et al., 2017; Kastrinos et al., 2021; Rauscher et al.,

Type of uncertainty	Category	Source of uncertainty	Article(s)
Individual			2019, 2018
		Personal behavior, lifestyle	Volkman & Silk, 2008
		Personal characteristics, anxiety	Chae, 2016; Romo & Luurs, 2021
		Personal characteristics Work environment concerns	Matta et al., 2020; Wang & Zhou, 2021
		Sexual health	Basinger et al., 2023
	Health and illness	Related aspects of a disease Diagnosis, prevention, and treatment of diseases, diagnostic tests Health Experiencing negative emotions Insufficient information	Basinger et al., 2023; Cooke-Jackson et al., 2023; Darnell & Scott, 2023; Fouché, 2019; Heesen et al., 2013; Hughes & Romo, 2020; Kastrinos et al., 2021; Kerr & Haas, 2014; Kerr et al., 2023a; Leverenz & Hernandez, 2023; Miao et al., 2019; Rains, 2014; Rains & Tukachinsky, 2015a, 2015b; Romo et al., 2022; Tetteh & Akhther, 2021; Watermayer et al., 2020
		Genetic testing, genetic risk of cancer	Dean, 2016; Fisher et al., 2017; Kastrinos et al., 2021; Rauscher et al., 2019, 2018
		Decision-making	Cooke-Jackson et al., 2023; Zimbres et al., 2021
		Perceived contradictions of information and messages Insufficient and contradictory information on many aspects of a disease Information overload	Barbour et al., 2012; Chae, 2016; Rains & Tukachinsky, 2015a, 2015b; Zimbres et al., 2021
		Internet news	Carcioppolo et al., 2016
		Lack of/or misinformation about health services	Prince, 2021; Romo & Luurs, 2021
	Financial	Paying for medical bills	Romo et al., 2022
		Features of drug advertising content, characteristics of drug customers, the drug industry, government laws, and the health system performance regarding drug advertising	Delmore & Huh, 2009
Collective	Social	Environmental risk factors, personal behaviors, lifestyle,e and interpersonal communication	Gameiro et al., 2023; Volkman & Silk, 2008;
		Dyadic or interdependent communication patterns, communication patterns with others, relational communications	Barbour, 2022; Campbell-Salome & Perez et al., 2019; Hughes & Romo, 2020; Kerr et al., 2023b; Miller, 2013; Thau et al., 2007
		Social stigma ethnic attitudes, multicultural	Ah, 2017; Hughes & Romo, 2020; Kerr & Haas, 2014;

Type of uncertainty	Category	Source of uncertainty	Article(s)
		experiences	Kerr et al., 2023b, 2023b
		Family health history, family diseases	Dean, 2016; Fisher et al., 2017; Kuang & Gettings, 2021; Thompson et al., 2023
		Reduced access to face-to-face relations Scientific controversies	Gameiro et al., 2023; Jensen, 2010; Kerr et al., 2023b; Thompson et al., 2022
		Reduced caregiving opportunities of diseased parents, health and wellness of diseased parents in the future, ambiguity in treatment plan for parents, caregiving for parents, disappointment towards either having insufficient or overloading information	Fisher et al., 2021
		Occasional stories of peers' negative health	Romo & Luurs, 2021
	Health and illness	Overload information about a disease Acute condition of a disease Various features of diseases, such as prevention, diagnosis, and treatment. Longstanding effects of COVID-19 Unknown condition of a general disease	Darnell & Scott, 2023; Campbell-Salome & Barbour, 2022; Gameiro et al., 2023; Kerr et al., 2023b; Miller, 2013; Oprescu et al., 2013a, 2013b; Perez et al., 2019; Thompson et al., 2022; Kastrinos et al., 2025; Phillips et al., 2024; Thompsons et al., 2024
		Genetics and inheritance	Campbell-Salome & Barbour, 2022;; Fisher et al., 2017
		Disappointment towards either having insufficient or having too much information	Fisher et al., 2021
		Family health history	Kuang & Gettings, 2021; Thompson et al., 2023
		Prevalence and mortality rates	Thompson et al., 2022
		Deciding on elderly care	Chen, 2015
		Sexual health	Basinger et al., 2023
	Financial	Disease-related costs	Perez et al., 2019

Table 1 shows that sources of uncertainty can be categorized into two levels: individual and collective. In some conditions, a source of uncertainty can be simultaneously considered both as a stimulus parameter and as an increase or decrease in uncertainty at the individual and collective levels. For example, a family health history or a genetic test might provide new information, but some individuals' mental ambiguities remain. On the other hand, some disease symptoms are detected, which increases uncertainty in different areas. In addition, uncertainty causes ambiguity, confusion, fear, etc. at individual, social, health, illness, and financial levels. As an example, the patient's physical appearance due to ostomy disease creates personal, collective, and medical uncertainty.

Regarding type and source of uncertainty, the current study categorized types of uncertainty

as follows: 1) Medical uncertainty: cancer uncertainty, acute uncertainty, health uncertainty, and illness uncertainty. 2) Personal uncertainty: mothers' uncertainty, daughter uncertainty, spouse uncertainty, elderly uncertainty, employees' uncertainty, mental uncertainty, and innate uncertainty. 3) Collective uncertainty: social uncertainty, family uncertainty, and relational uncertainty. 4) Financial uncertainty.

Furthermore, various uncertainty categories were indicated in studies such as: positive, negative, and neutral uncertainty (Kastrinos et al., 2021), collective, health, and illness uncertainty (Thompson et al., 2022), desired and actual uncertainty, post search and pre search uncertainty (Kuang & Gettings, 2021; Rains, 2014; Rains & Tukachinsky, 2015a, 2015b), issue and decision uncertainty (Zimbres et al., 2021), work and Non-work related uncertainty (Wu et al., 2019), institutional, services, logistics, and quality-of-care uncertainty (Romo & Luurs, 2021), active and passive uncertainty (Bennett et al., 2014), raw uncertainty (Rains & Tukachinsky, 2015a, 2015b), accidental, ambiguity, patient-centered, system-centered and informational uncertainty (Fisher et al., 2021), workplace and environmental uncertainty (Wang & Zhou, 2021), unwanted uncertainty (Carcioppolo et al., 2016), Fairness-related uncertainty and Status-related uncertainty (Matta et al., 2020), accidental, probabilistic, informational, and neutral uncertainty (Leverenz & Hernandez, 2023).

QR3: What type of information behavior towards uncertainty is observed in these studies?

In response to the uncertainties outlined above, individuals and collectives employed a range of management strategies, the most prevalent being information seeking and avoidance (see Table 2 for a detailed breakdown). Other methods included seeking emotional support and adapting to uncertainty. Seeking (or avoiding) information is the most common communication response to experienced uncertainty at the personal and social levels. Amid this, active and passive seeking of information, and selective or comprehensive avoidance of information, are subsets of these two strategies. In this section, the methods from the investigated studies for confronting different kinds of uncertainty are presented at the individual and social levels.

Table 2
Strategies to confront uncertainty and the reasons why the strategy is used in the process of information behavior

Uncertainty type	Theme	Strategy to confront uncertainty	Seeking-information goal	Avoiding-information goal
Individual	Personality and physical characteristics	Seeking information Avoiding information Avoiding information disclosure Adaptability	Reducing uncertainty Learning personal behaviors	Keeping uncertainty Reducing uncertainty through searching for another tool Reducing stress and anxiety
	Health and illness	Openness and topic avoidance strategies simultaneously Seeking/giving information Avoiding information Information management Information handling Use of information Passive and experimental	Reducing uncertainty Increasing or keeping hope Reducing the differences between actual and desirable uncertainty Uncertainty management Providing general	Keeping hope Keeping uncertainty Avoiding negative emotions Increasing uncertainty Protecting loved ones Uselessness of information disclosure Creating personal emotion Acceptance of limitations of actions

Uncertainty type	Theme	Strategy to confront uncertainty	Seeking-information goal	Avoiding-information goal
		searching Active searching Sharing information Emotions management Seeking emotional support Relation to healthcare providers Counseling and training Trust Relaxation Ask questions Building the provider–patient relationship and ensuring patient understanding Managing patient emotion Providing clinical interpretation Encountering variation in patient health literacy	information to others Health self-efficacy Reducing threatening emotions Cognitive and emotional Outcome expectations Improving social and emotional life Anxiety management	Management of incomplete information Maintain boundaries. Maintenance of life and activities Resisted overexposure
	Financial	Seeking/giving information Avoiding information Seeking emotional support Seeking financial privilege Health sacrificing Adaptability to financial uncertainty	Decreasing financial burden	Avoiding information regarding health and diseases costs Psychological health maintenance
Collective	Social	Seeking information Avoiding information	Deciding on caregiving programs (children and the elderly) Knowing a life partner Learning and increasing knowledge Usage of information in family caregiving programs Reducing uncertainty Managing uncertainty Removal of uncertainty Health improvement Sense of assurance Shared management Reducing stress Learning interpersonal communication	Abidance by the family norms Fear of the future Ambiguity regarding the volume of information Keeping uncertainty Keeping health
	Health and illness	Seeking information Seeking emotional support Avoiding information Turning to the technology Joining the supportive groups Acceptance or adaptability towards limits of performance Resist extreme	Reducing uncertainty Removal of uncertainty Management of uncertainty Removal of uncertainty Improvement of health Sense of assurance Shared management of uncertainty Learning and	Keeping uncertainty Keeping health Fear regarding the future of parental health

Uncertainty type	Theme	Strategy to confront uncertainty	Seeking-information goal	Avoiding-information goal
		confrontation Gathering and exchanging information Seeking social supports Online crowdsourced medicine Sense of affinity towards virtual societies Stressing the threat of uncertainty to the family Highlighting family members' performance to reduce uncertainty Recalling family members' sacrifice Sharing information Attempting to achieve a collective and force coordination for seeking information Building a collaborative work environment Proactive coping Emotional and cognitive coping Welfare support Adapting to adversity	increasing knowledge Reducing stress Deciding on caregiving for the elderly Learning physical and environmental factors	
	Financial	Seeking information Avoiding information Joining supportive groups Turning to new technology	Reducing uncertainty	Keeping uncertainty

Strategies to confront uncertainty on the individual level

Seeking information, avoiding disclosure of information, and acceptability and adaptability with uncertainty are strategies to confront uncertainty that result from individual characteristics such as intrinsic and inherited features, body image and appearance features, personality, etc. (Chae, 2016; Hughes & Romo, 2020;; Senteio & Ackerman, 2022; Wu et al., 2019).

In the context of illness and health, avoiding and seeking information were the most prevalent common strategies included in the studies to confront uncertainty (Barbour et al., 2012; Basinger et al., 2023; Bennett et al., 2014; Carcioppolo et al., 2016; Chae, 2016; Cooke-Jackson et al., 2023; Fisher et al., 2017; Heesen et al., 2013; Hughes & Romo, 2020; Kastrinos et al., 2021; Kerr & Haas, 2014; Kerr et al., 2023b; Rains, 2014; Rains & Tukachinsky, 2015a, 2015b; Rauscher et al., 2019, 2018; Romo & Luurs, 2021; Sairanen & Savolainen, 2010; Senteio & Ackerman, 2022; Zimbres et al., 2021; Kastrinos et al., 2025; Phillips et al., 2024). Rauscher et al. (2019, 2018) identified active and passive strategies, information sharing, information control, and information use regarding diseases such as cancer and cancer risk tests. In the study of Tetteh and Akhter (2021), patients suffering from ovarian cancer, regarding their audience, used openness and topic avoidance strategies in interpersonal communications to confront illness uncertainty. Following that, it was also stated that patients share general information with others but abstain from discussing details of the treatment process and their

emotions regarding disease progression and death, with attention to their audience (children and the elderly). The others confronting reactions to uncertainty that could be pointed out are information disclosure and adapting to uncertainty (Hughes & Romo, 2020), comprehensive avoidance or selective avoidance (Sairanen & Savolainen, 2010), passive- seeking information and seeking experiential-information (Romo & Luurs, 2021), seeking emotional support (Basinger et al., 2023), getting information (Watermayer et al., 2020), trust, relaxation, and asking questions (Prince, 2021), communication-centered psychosocial strategy (Thompsons et al., 2024), building the provider-patient relationship and ensuring patient understanding (Fouché, 2019), encountering variation in patient health literacy, managing patient emotion, and providing clinical interpretation (Miao et al., 2019).

To confront financial uncertainties, the results of Romo et al.'s (2022) study have introduced three strategies as follows: 1) seeking social support, seeking information, enacting financial concessions, and health sacrificing, 2) avoiding information and taking into account the health costs, and 3) adaptability to acute financial uncertainty. Moreover, searching for information, investigating organizational limits, and seeking government support for direct-to-consumer drug ads by physicians have been proposed as other confronting strategies to address the uncertainty surrounding drug ads (Delmore & Huh, 2009).

Strategies to confront uncertainty on the collective level

Avoiding and seeking information were the most prevalent common strategies included in the studies to confront social and illness uncertainties regarding family, friends, relatives, and finally society level (Ah, 2017; Barbour, 2022; Basinger et al., 2023; Campbell-Salome & Chen, 2015; Fisher et al., 2021; Jensen, 2010; Kerr et al., 2023b; Kuang & Gettings, 2021; Miller, 2013; Oprescuet al., 2013a, 2013b; Perez et al., 2019; Thompson et al., 2022; 2023; Volkman & Silk, 2008).

The results of Campbell-Salome and Barbour's study (2022) mentioned five strategies that family members apply in the management of standard probabilistic and illness uncertainties, such as: stressing the threat of uncertainty to the family, highlighting the efficacy of members to reduce uncertainty, recalling family members' sacrifices, attempting to form a collective, and forcing coordination for seeking information. Perez et al. (2019) mentioned four strategies for financial, social, and illness uncertainties 1. Joining support groups 2, turning to new technology 3. Avoiding information, and 4. Preventing an illness diagnosis. Seeking information, seeking support, and online crowdsourced medicine are strategies to confront long-term and collective uncertainty during COVID-19 (Thompson et al., 2022). Other strategies to confront uncertainty on the collective level are turning to new technology and joining support groups (Perez et al., 2019), adaptability and acceptance of performance limits, and resisted overexposure (Fisher et al., 2021), seeking, acquiring, and exchanging of information, social support seeking, and sense of affinity towards virtual societies (Oprescu et al., 2013a, 2013b), active and passive seeking information (Bennett et al., 2014), building a collaborative work environment, proactive coping, emotional and cognitive coping, welfare support, and adapting to adversity (Gameiro et al., 2023). Seeking and avoiding information, turning to new technology, and joining support groups are mentioned as strategies for confronting uncertainty (Perez et al., 2019).

QR4: What is the reason and how of seeking or avoiding information in these studies when

confronting various uncertainties?

In response to the fourth research question (QR4), the findings are organized into two main strategies for managing uncertainty: information seeking and information avoidance. For each strategy, the reasons, implementation methods, and types of information sought or avoided are presented separately.

Seeking information

Reasons for seeking information

The reasons for seeking information from individuals when confronting various uncertainties are different. Nearly all studies have mentioned that the reasons individuals seek information, whether individually or collectively, have been done with the intention of removing uncertainty, reducing uncertainty, and managing uncertainty (Bennett et al., 2014; Carcioppolo et al., 2016; Chen, 2015; Cooke-Jackson et al., 2023; Delmore & Huh, 2009; Fisher et al., 2021; Fouché, 2019; Gameiro et al., 2023; Heesen et al., 2013; Hughes & Romo, 2020; Jensen, 2010; Kastrinos et al., 2021; Kerr & Hass, 2014; Kerr et al., 2023a, 2023b; Leverenz & Hernandez, 2023; Miao et al., 2019; Miller, 2013; Oprescu et al., 2013a, 2013b; Perez et al., 2019; Rauscher et al., 2019, 2018; Senteio & Ackerman, 2022; Thompson et al., 2022; Volkman & Silk, 2008; Watermayer et al., 2020; Zimbres et al., 2021; Kastrinos et al., 2025; Phillips et al., 2024). Moreover, some other reasons also have been mentioned as: assurance and health improvement (Miller, 2013), reducing financial burden (Romo et al., 2022), shared management of uncertainty (Campbell-Salome & Barbour, 2022), learning and increasing knowledge (Kuang & Gettings, 2021; Volkman & Silk, 2008), making decision towards caregiving programs, knowing life partner, and usage of information in caregiving programs (Kuang & Gettings, 2021), acquiring knowledge regarding a disease, reducing stress (Oprescu et al., 2013a, 2013b), health self-efficacy, reducing threatening emotions, and Cognitive and emotional outcome expectations (Zimbres et al., 2021), improvement of social and emotional life (Senteio & Ackerman, 2022), reducing and managing the gap between actual and desirable uncertainty (Rains, 2014; Rains & Tukachinsky, 2015), making decision (Chen, 2015), increasing hope (Carcioppolo et al., 2016) sense of assurance (Miller, 2013), reducing family risks, supporting family members (Fisher et al., 2017), and acquiring adaptability and emotional support (Thompson et al., 2023), anxiety management (Prince, 2021).

Techniques for seeking information

Seeking information of family members, friends, colleagues, neighbors, healthcare providers, news and social media, internet, and online information (Bennett et al., 2014; Cooke-Jackson et al., 2023; Delmore & Huh, 2009; Fisher et al., 2021; Hughes & Romo, 2020; Kastrinos et al., 2021; Kerr & Haas, 2014; Kerr et al., 2023a, 2023b; Kuang & Gettings, 2021; Leverenz & Hernandez, 2023; Perez et al., 2019; Thompson et al., 2022; Miller, 2013; Oprescu et al., 2013a, 2013b; Prince, 2021; Rains, 2014; Rains & Tukachinsky, 2015a, 2015b; Rauscher et al., 2019, 2018; Senteio & Ackerman, 2022; Thompson et al., 2023; Zimbers et al., 2021; Kastrinos et al., 2025; Phillips et al., 2024), seeking various payment plans, disputing rejected insurance claims, and negotiating costs (Romo et al., 2022), taking genetic tests, arranging an appointment to see a genetic counselor(Campbell-Salome & Barbour, 2022), learning physical and environmental factors, interpersonal communication, and personal behavior (Volkman & Silk, 2008), and asking from parent, health center and other specialist (Fisher et al., 2017; Gameiro et al., 2023; Kerr et al., 2023b; Miao et al., 2019; Prince, 2021; Watermayer et al.,

2020; Kastrinos et al., 2025; Phillips et al., 2024), Communication in shared decision-making (Heesen et al., 2013).

Types of seeking information

As a total, it could not be distinguished between the information sought and the information avoided. Because, depending on conditions and available sources, individuals either avoid or seek specific types of information, this behavior might occur simultaneously; for example, an individual who has a child suffering from diabetes might seek either clear and definite information about the disease and caregiving or, at the same time, avoid extra information. Naturally, most people avoid specific information, such as negative or stressful information, but it is not possible to clearly distinguish a boundary in other studies. In most studies, individuals have sought complete, comprehensive, truthful, experimental, vital, specific, accurate, helpful, and new information related to health, diagnosis, treatment, prevention, and risk factors of diseases (Basinger et al., 2023; Bennett et al., 2017; Campbell-Salome & Barbour, 2022; Carcioppolo et al., 2016; Cooke-Jackson et al., 2023; Delmore & Huh, 2009; Fouché, 2019; Gameiro et al., 2023; Hughes & Romo, 2020; Kastrinos et al., 2021; Kuang & Gettings, 2021; Miller, 2013; Oprescu et al., 2013a, 2013b; Perez et al., 2019; Prince, 2021; Rains, 2014; Rains & Tukachinsky, 2015a, 2015b; Rauscher et al., 2019, 2018; Romo & Luurs, 2021; Senteio & Ackerman, 2022; Tetteh & Akhther, 2021; Thompson et al., 2022; Thompson et al., 2023; Watermayer et al., 2020; Zimbres et al., 2021; Kastrinos et al., 2025; Phillips et al., 2024; Thompsons et al., 2024). Moreover, the following information has also been seeked: information related to health costs (Romo et al., 2022), nutritional information (Zimbres et al., 2021), environmental risks (Volkman & Silk, 2008), online information (Fisher et al., 2021), fairness and justice information (Thau et al., 2007), disease symptoms and time of occurrence (Kerr & Haas, 2014; Kerr et al., 2023b), health services (Prince, 2021), personal and family risk (Fisher et al., 2017; Thompson et al., 2023), and scientific information (Gameiro et al., 2023).

Avoiding information

Reasons for avoiding information

Maintaining and increasing uncertainty in investigated studies are the most common reasons for avoiding information (Carcioppolo et al., 2016; Chae, 2016; Hughes & Romo, 2020; Kastrinos et al., 2021; Miller, 2013; Perez et al., 2019; Kastrinos et al., 2025). Moreover, other reasons have also been mentioned. For example, avoiding negative emotions and keeping hope (Barbour et al., 2012; Kastrinos et al., 2021), avoiding unnecessary information (Sairanen & Savolainen, 2010), maintenance of health (Miller, 2013; Romo et al., 2022), protection of loved ones, the futility of information disclosure, and making personal sense towards cancer (Tetteh & Akhther, 2021), employees' misconduct towards patients (Senteio & Ackerman, 2022), fear regarding the future of parental health (Fisher et al., 2021), fear about test results (Basinger et al., 2023), acceptance of performance limits, management of incomplete information, maintain boundaries continue with life or activities, and resistance against too much information (Barbour et al., 2012), fear of recounting information, Ambiguity regarding the volume of providing information, and Abidance to the family norms (Kuang & Gettings, 2021).

Techniques for avoiding information

In the following, the methods mentioned in the investigated studies by which information

was avoided are listed as: learning financial new skills and ignoring negative uncertainty (Romo et al., 2022), avoiding of disease diagnosis, avoiding of certain and online information (Perez et al., 2019), abstaining from expressing details related to the process of treatment, avoiding expressing emotions towards disease progression and death of children or elderly (Tetteh & Akhther, 2021; Kastrinos et al., 2025), avoiding of specialized healthcare centers or hospitals, no signing up for transplant waitlists (Senteio & Ackerman, 2022), avoiding listening to others' negative experiences, avoiding expressing to others about diseases, no attending in supportive groups after a treatment, no using of internet, and no study of others' experiences (Miller, 2013), Controlling the Conversation (Barbour et al., 2012; Kuang & Gettings, 2021), avoiding harmful news and negative emotions (Kastrinos et al., 2021), avoiding information about COVID-19 regarding parental health (Fisher et al., 2021), avoiding insufficient information (Carcioppoko et al., 2016), avoiding external information and using personal information, avoiding negative information (Hughes & Romo, 2020), avoiding watching TV, listening to the radio, ignoring all messages regarding cancer (Chae, 2016), withdrawing from social situations in which confrontation with unwanted information occurs, abstaining from thinking, accessing information sources selectively, avoiding health care professionals, and unwilling to see photographs of medical operation (Sairanen & Savolainen, 2010), removing or ignoring stimuli (Barbour et al., 2012), refusing to seek healthcare services (Romo & Luurs, 2021), avoiding medical care, avoiding sexual relationships, and avoiding frightening or difficult conversations and awkward interactions (Basinger et al., 2023), avoiding discussing, and creating emotional and physical distance in the relationship (Thompson et al., 2023).

Types of avoiding information

Types of information avoided that have been mentioned in investigated studies were: avoiding of providing private and detailed information about diseases (Basinger et al., 2023; Tetteh & Akhther, 2021; Kastrinos et al., 2025), information regarding health costs (Romo et al., 2022), family private information (Kuang & Gettings, 2021), health and experimental information (Romo & Luurs, 2021; Sairanen & Savolainen, 2010), avoiding insufficient, false, unnecessary, invalid, negative, incomplete, upsetting, stressful, contradictory, unwanted, and extra information (Barbour et al., 2012; Carcioppolo et al., 2016; Chae, 2016; Hughes & Romo, 2020; Kastrinos et al., 2021), online information (Miller, 2013; Perez et al., 2019), and family health history (Thompson et al., 2023).

Discussion

Our synthesis confirms that uncertainty in healthcare is a multi-level phenomenon, stemming from individual (e.g., personal health status, financial worries) and collective (e.g., familial health history, social stigma) sources. This aligns with and extends the work of Perez et al. (2019) and Senteio & Ackerman (2022), demonstrating that the ecosystem of uncertainty is dynamic, with sources often being intertwined and contextual.

The most prevalent management strategies identified were information seeking and avoidance. However, our review crucially delineates that these are not binary opposites but part of a repertoire of strategies used interchangeably or even simultaneously. For instance, an individual might actively seek information about treatment options (to reduce diagnostic uncertainty) while deliberately avoiding prognostic statistics (to maintain hope). This nuanced finding underscores the core tenet of UMT—that the goal is not always uncertainty reduction

but its management to achieve desired emotional and cognitive states.

A critical insight from our review is the role of appraisal. The decision to seek or avoid information is not random; it is a calculated response based on whether one believes more information will be helpful or harmful. This aligns with the findings of Rains (2014) and Zimbres et al. (2021), who noted that individuals manage the gap between their actual and desired level of uncertainty. Our review consolidates evidence that this appraisal is influenced by factors such as personality, culture, the specific health context, and, crucially, the perceived valence of the uncertainty (positive, negative, or neutral).

Our findings strongly support and add granularity to Brashers' (2001) original proposition. While much of the earlier literature focused on uncertainty reduction, our scoping review captures the broader spectrum of management strategies, highlighting avoidance and adaptation as equally rational and strategic responses. This is particularly evident in contexts such as genetic testing for hereditary cancers (e.g., Rauscher et al., 2018, 2019) and chronic disease management (e.g., Perez et al., 2019), where information cannot always eliminate uncertainty but must be managed to support long-term well-being.

However, the field shows a significant gap. Many studies focus on describing strategies within specific, often severe, health contexts (e.g., cancer, rare diseases), leaving a relative lack of evidence on managing uncertainty in more common, everyday health decisions. Furthermore, the cultural and economic dimensions of uncertainty management, while identified as factors, are underexplored. Most included studies were conducted in Western contexts, limiting the generalizability of findings. The work of Ahn (2017) on cultural competence is a step in this direction, but more cross-cultural comparative studies are needed. Our review also highlights a methodological gap: a predominance of qualitative studies; future research could benefit from quantitative methods to test and measure relationships among uncertainty types, appraisals, and chosen strategies.

Implications for Practice

The findings of this review have direct and actionable implications for clinical practice, health communication, and system design:

- **For healthcare providers:** Clinicians should move beyond a one-size-fits-all approach to information disclosure is essential; this involves actively assessing a patient's or family's current uncertainty appraisal and their desire for information, which can be achieved by asking patients about their information preferences (e.g., "Some people want to know all the details, and others prefer a broader picture. What is your preference today?"), normalizing information avoidance as a valid coping strategy rather than a sign of disengagement or denial, and providing information in manageable chunks to allow patients to control the pace and depth of information receipt, thereby preventing overload and supporting a more patient-centered approach to care.
- **For health system and technology designers:** Systems should be designed to support active uncertainty management rather than just passive information delivery. Patient portals and health apps should allow users to customize the types and depth of information they receive (e.g., allowing patients to "hide" prognostic data or lab results until they are ready). Decision aids should be designed to help patients manage the uncertainty inherent in choosing between treatments, rather than assuming the goal is to eliminate it.
- **For health educators and communicators:** Public health campaigns should

acknowledge uncertainty rather than present information as absolute. Messages can be framed to build tolerance for ambiguity and equip individuals with strategies to manage it, rather than solely providing facts.

Conclusion

This scoping review provides a novel and comprehensive synthesis of Uncertainty Management Theory (UMT) applications in health contexts, moving beyond the simplistic view of information-seeking as a mere tool for uncertainty reduction. By systematically mapping evidence from 53 studies, we developed a structured framework that delineates the multifaceted sources (individual vs. collective) and types of uncertainty, the complex strategies (seeking, avoiding, adapting) individuals employ to manage it, and the nuanced reasons behind these choices.

Our most significant contribution is to highlight that the core goal in health information behavior is not always uncertainty reduction, but rather its active management to achieve desired emotional and cognitive states. This finding underscores the need for a paradigm shift in clinical practice—from a one-size-fits-all approach to information provision towards tailored uncertainty support.

While this review offers a foundational framework, its findings are primarily based on qualitative studies and contexts from Western countries, which may limit their generalizability. To advance this field, future research should:

- **Intervention Studies:** Develop and test interventions based on UMT principles (e.g., coaching patients on uncertainty management strategies) and measure their impact on psychological well-being, decision-making quality, and health outcomes.
- **Quantitative Validation:** Create and validate scales to quantitatively measure the different types of uncertainty appraisals (threat vs. opportunity) and the efficacy of various management strategies.
- **Cross-Cultural Research:** Conduct comparative studies across diverse cultural and socioeconomic settings to understand how norms and access to resources shape uncertainty management behaviors.
- **Role of Technology:** Investigate how emerging technologies like AI-driven health chatbots or virtual health assistants can be harnessed to support individuals' uncertainty management preferences and needs effectively.

Ultimately, acknowledging uncertainty as a central component of the health experience, rather than a problem to be eliminated, paves the way for more empathetic, patient-centered care and communication.

Acknowledgement

We would like to thank the staff of the Medical Sciences Library at Iran University of Medical Sciences for their help in gathering the data and articles.

Funding: None.

Conflict of Interest

The authors disclose that they have no competing interests.

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