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Approaches to information-seeking behaviour in psychology: a comparison of early and contemporary studies

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Abstract

Introduction. The aim of this paper is to explore the investigation of information-seeking behaviour in the literature of psychology, with special reference to the period before 1981, when the term was introduced into information science, and compare the research of that period, with research reported in 2022-2023.

Method. A search of the literature for the term 'information-seeking behaviour' was carried out in Web of Science and Scopus for the period 1900 to 1980 and from January 2022 to May 2023, producing two data sets for analysis.

Analysis. Descriptive analysis of sources and geographic distribution of the papers is presented. This is followed by an analysis of the research themes and approaches.

Results. In the early set of papers the main context of the research was educational and career counselling and the main research perspective social learning theory, with an emphasis on the concept of locus of control. In the later set, the main theoretical interest was in aspects of cognition, with a particular interest in curiosity.

Conclusion. There is much that the information science research can learn and apply from the literature of psychology. In particular, social learning theory, cognitive theory, and the associated research instruments could be of value.

Introduction

In his paper *On user studies and information needs* (1981), Wilson suggested that it would be more useful, from a research perspective, to explore "information-seeking behaviour", rather than "information needs". He suggested that information needs were difficult to determine because they are internal, mental formulations and, therefore, impossible for an outsider to access. Information-seeking behaviour, however, could be observed by a researcher, or recalled by an informant, and the underlying needs could be inferred.

At the time Wilson introduced the term into the information science literature it was unusual for information science researchers to explore research concepts in other fields. Before the Internet and the World Wide Web, a researcher would need to manually search the relevant abstracting journals, locate the printed journals (borrowing through inter-library lending if necessary), and then review the found papers. In other words, the amount of work involved was enough to deter any but the most determined researcher from investigating concepts outside their own field. Consequently, the fact that the term had already been used in psychological research was overlooked.

Over the years, the author has been intrigued by the fact that the "prehistory" of the term *information-seeking behaviour* had not been explored in the 1980s. Therefore, the aim of this paper is to explore that prehistory, to compare its coverage in the psychological literature today, and to consider its relevance for the information science researcher. Consequently, following the methods section, a sample of the literature from before 1981 is reviewed, and this is followed by a review of more recent research. Finally, a comparison of the two periods is discussed and the relevance of this research for information science researchers is explored. We can pose these interests as research questions:

RQ1: What psychological research relating to information-seeking behaviour was carried out before 1981, and what were the main themes of that research?

RQ2: What psychological research relating to information-seeking behaviour was carried out in the period January 2022 to May 2023, what were the main themes of research, and how did they differ from the themes of the earlier period?

RQ3: What is relevance of the research in psychology on information-seeking behaviour to the information science researcher?

Data collection and analysis

To determine the extent of the "prehistory" of information-seeking behaviour a search of Web of Science was carried out, searching the psychological literature for the occurrence of *information-seeking* in the period 1900 to 1985, inclusive. The early date was chosen simply to ensure that no early research was missed, but papers did not actually emerge until the 1960s. The search was restricted to the phrase *information-seeking*, rather than using, in addition, terms such as *information behaviour*, or *human information behaviour*, simply because the author's interest was in the use of that term before Wilson introduced it to information science.

The search revealed thirty-eight papers, of which eighteen were published before 1981. The search was then repeated in Scopus and 206 were found to have been published before 1981. The number revealed by Scopus is so different from that found by Web of Science that there is, presumably, some difference in the way document sources are characterised as being in the field of psychology. This is borne out to some extent by the fact that journals in the field of communication studies are identified in Scopus as psychology.

The distribution over time of the papers retrieved by Scopus shows an increasing interest in the topic:

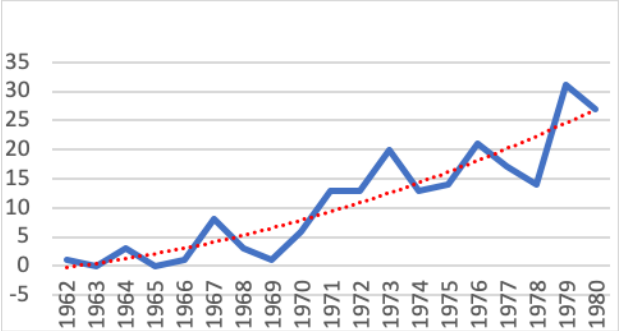

Figure 1. Documents by publication year

Most of these papers were from authors and institutions in the United States:

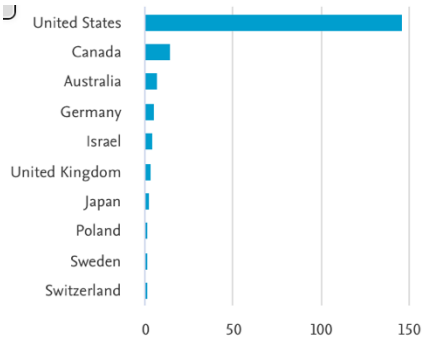

Figure 2. Geographical distribution of the early set of papers

Nine of the eighteen papers published in psychology journals and retrieved with Web of Science also appeared in the Scopus set. The remaining nine were incorporated into the Scopus set in an Endnote file, giving an initial database of 215 papers. Other papers, discovered from the reference lists of the initial set, were added later.

Of the nine papers that appeared only in the Web of Science set, two were defined as out of scope: one concerned community development and the other sports medicine.

The remaining papers were reviewed, first by reading the abstracts and then, if the item appeared to be within the desired scope, by obtaining the document and assessing its suitability. In the course of reviewing the papers, additional studies came to light from the reference lists and these have been included in the research approaches section below.

For the current situation, the process was very similar. A search for *information seeking* was carried out on the Web of Science for the period 1st January, 2022 to 31st May, 2023, restricted to articles and review articles published in journals assigned by the system to psychology. Again, the search was restricted to the use of the term *information seeking*, so that the earlier scope of the search was retained and, in effect, like was being compared with like. To use the term *information behaviour*, for example, would have broadened the scope of the search considerably, since information behaviour includes information creation and information use and well as such activities as misinformation and disinformation.

The time-frame for the search was chosen so that, at the time of writing the paper, the most recent studies could be compared with the early studies. Given the rate of increase of interest in the subject, it was also thought (and subsequently demonstrated) that restricting

the sample in this way would generate a sufficient number of papers to provide a useful comparison with the earlier research.

The search resulted in an output of 260 papers, which amounts to fifteen papers a month, or twenty-seven per year: this compares with the earlier period result of 216 papers for a total of twenty-one years, or ten per year. Thus, the output has more than doubled over the intervening period. Although other concepts have emerged since the 1980s, such as *information behaviour* and *information discovery* (see Wilson, 2022), it was necessary to use the same keyword in the search, since the intention was to compare like with like, rather than to expand the concept. The search was limited to this period because the aim was to assess the absolutely current concerns, and the 'productivity' of the field, in terms of the number of papers satisfying the search criteria compared with the earlier period, suggests that this limitation was appropriate.

An initial analysis of the papers revealed that many were in health-related journals, rather than in psychology. A sample of these papers was reviewed it was found that, generally, they were not based upon any psychological theory or model. Rather, they tended to be the kind of paper that is found in information management or information systems journals. Consequently, all of the health and medical journals were removed from the sample. This left the psychological journals and four others: *Nature Communications*, *PLOS One*, *Scientific Reports*, and *Patient Education and Counselling* (the last had been retained because of the strong presence of counselling papers in the earlier study).

The papers in these four journals were reviewed and a total of eleven papers were included in the final set, giving an overall total of fifty-eight papers for deeper analysis. This is equivalent to forty-one papers a year, compared with the earlier set's just under four papers a year; a tenfold increase over the period. The details of the two samples are in the relevant sections below.

For comparison with Figure 2 above, the geographical distribution of the originally retrieved contemporary set of papers was obtained from Web of Science. The countries contributing ten or more papers are shown in Figure 3:

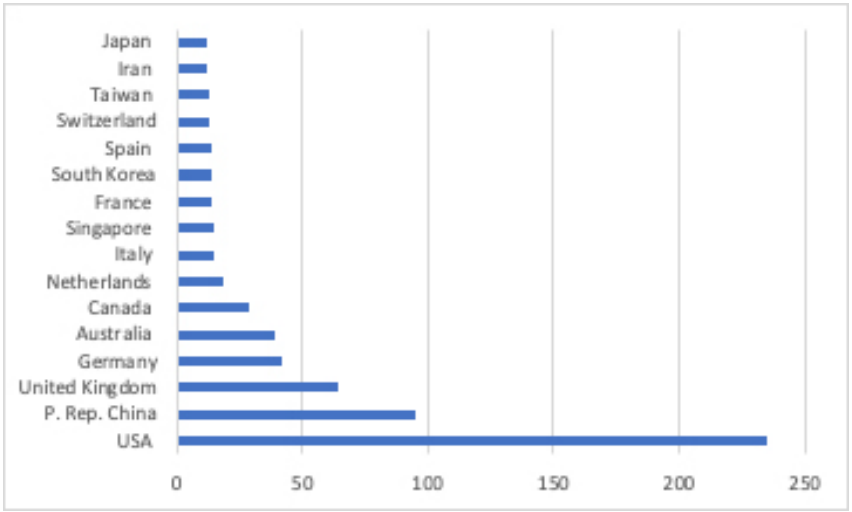

Figure 3. Geographical distribution of contemporary papers

The obvious changes are the rise of China to second place, and of the UK to third: China did not appear at all in Figure 2 and the rise of the UK may well be the result of the various research evaluation exercises that have put pressure on university staff to deliver outputs.

The early period: results

Descriptive data

The analysis of the actual papers resulted in a final set of ninety-one documents, distributed over the various journals as shown in Table 1. Papers were excluded from the final set for several reasons: in some cases, they were reviews of the literature rather than research papers, in other cases, information-seeking was mentioned in a literature review but did not figure as a variable in the research, and in other cases animal studies were involved, or information-seeking was mentioned only in passing and was not pursued in the research.

Journal title	No. of items
Journal of Consulting Psychology	18
Journal of Personality and Social Psychology	8
Journal of Vocational Behavior	7
American Behavioral Scientist	5
Journal of Personality	5
Human Factors	4
Human Communication Research	3
Journal of Applied Psychology	3
Journal of Psychology	3
Journal of Research in Personality	3
Perceptual and Motor Skills	3
Journal of Experimental Social Psychology	2
Journal of Social Psychology	2
Psychological Review	2
Journals contributing one paper	23
Total	**91**

Table 1. Distribution of selected items by journal title

The study population in the research projects discussed in the papers was almost always students at one level or another. University students were the subjects in fifty of the ninety-one papers, high-school students in seventeen papers, and elementary school children in nine papers. Thus, just over 83% of research projects used students as the study population. Given that educational and career counselling was a major theme, this focus on students is not entirely surprising. Other subjects were used in much smaller numbers of papers, for example, one each of surgery patients, US Army personnel, industrial managers, and scientists and engineers.

An Excel database was constructed for the set of papers and index terms were assigned to each paper to specify the theoretical approaches, study populations, and research methods: the distribution of these characteristics is shown in Table 2.

Theoretical framework	Number	Study population	Number	Research method	Number
Attitude theory	4	School children	9	Experiment	75
Co-orientation theory	4	High-school students	17	Questionnaire survey	6
Cognitive theories	9	University students	50	Interview survey	2
Counselling theory	19	Various	6	Observation	1
Decision making	13	Other	9	Workshop	1
Social learning theory	12	Total	91	Various	6
Various	3			Total	91
Other	27				
Total	91				

Table 2. Characteristics of the early period sample

Unsurprisingly, for psychological research, the dominant research method was the laboratory experiment, with three instances of field experiment: together these accounted for 82% of the selected papers. Questionnaire and interview surveys were used to a lesser extent.

The research approaches, or theoretical perspectives adopted in the research, and discussed below, were social learning theory, mainly the concept of *locus of control*, and applied mainly in the context of counselling, decision-making theory, and aspects of cognitive theories. Apart from these there were a small number of other research approaches, including attitude theory, stress-coping theory, and power relationships.

Research approaches

Social learning theory

The selected papers cover a range of topics, from educational and career counselling to decision making and various health-related topics. One of the main research frameworks employed in these studies is social learning theory (Rotter, 1954, 1966), and, within this, the concept of *locus-of-control*. The locus-of-control refers to the extent to which a person believes that the events in their lives are determined to a significant extent by their own will, skills, ambitions, etc., or that they are determined by chance, luck, and other external forces. The former are typically referred to as *internals*, and the latter as *externals*.

Overall, the selected studies indicate that *internals* engage in more information-seeking behaviour compared with *externals*. Thus, one of the earliest studies by Davis and Phares (1967) found that *internals* sought more information by asking a greater number of questions compared to *externals*. Prociuk and Breen (1977) examined the relationship between locus of control and information seeking in an academic setting. They predicted that *internals*, in relation to course requirements, would engage in greater information seeking than *externals*. The results supported the prediction. Pines and Julian (1972) compared the difference between the demands of a task and related information, and the social situation and presence of the experimenter. They found that *internals* were more responsive to (and engaged in more information seeking), while externals were more affected by the social situation.

In relation to health matters Wallston et al. (1976), in two studies found that those *internals* who valued health highly chose more of the pamphlets made available in the experiments compared with *internals* with low health value, or *externals*.

One of the studies (Weinstein, 1979), in which participants were offered the possibility of receiving information on cancer, by the return of the offer letter, concluded "No *significant correlations were found between the locus of control scale and letter return rate, choice of article, belief that the risk of cancer can be reduced, number of foods avoided, or acknowledgment of risk.*" (p. 135). Rather, the data suggested that, "*Neither lack of information nor self-perceived lack of information necessarily leads people to seek out information. Information seeking is motivated by the feeling that the information one has is inadequate…*" (p. 135). This is the only study in the set that found no relationship between locus-of-control and information seeking.

Decision-making theory

The selected literature on the relationship between decision-making and information seeking reveals a variety of factors that affect the relationship. For example, Engländer and Tyszka (1980) in a study of information seeking strategies in decision making, identify four patterns of behaviour:

"*(1) Parallel examination; this… may be accomplished either through asking questions according to particular attributes or according to particular alternatives, or in a mixed way. In all cases the strategy implies a thorough investigation of all alternatives...*

(2) Narrowing down;… The strategy implies that [subjects] first examine almost all alternatives; in the next stage some alternatives are eliminated, and the remaining are further examined.

(3) Confirmation seeking; this is … achieved when various alternatives are examined with a similar number of questions, but the questions are different for different alternatives.

(4) Satisficing; this is a pattern of information seeking…[that] results from the examination of one alternative (or one field) at a time, usually with no return to the previously considered

alternatives, concluding with the choice of the last alternative examined." (p. 172-174)

A study by Levine et al., 1975, and that of Engländer and Tyszka (1980), identify various aspects of information that may influence decision making. These include the availability of resources to acquire information, the reliability and quality of the information itself, the extent to which it is updated, and the amount of information actually available. Levine et al. comment:

"*For each sequentially presented datum, subjects had to decide whether to purchase further knowledge of its content on the basis of information about its diagnosticity. This type of information-selection behavior deserves further investigation. Of particular interest would be the selection strategies that people use in utilizing knowledge of various information parameters (e.g., cost, reliability, diagnosticity, time of arrival) under varied conditions.*" (p. 513)

Engländer and Tyszka (1980) found that decision makers exhibit more confidence in their decisions when they have complete information about the alternatives.

Many situations demanding decisions involve an element of risk: Taylor and Dunnette (1974) found that "*high-risk takers made more rapid decisions based on less information, but tend to process each item of information more slowly*" (p. 422). This study was rather unusual in that it involved industrial managers, rather than university students.

In a study involving university undergraduates Crawford and Haaland (1972) found that:

(*a*) *cooperatively oriented subjects sought more information from one another than did competitively oriented subjects*; (*b*) *the nature of the information received differentially affected search behavior*; (*c*) *the interaction of motivational orientation and event sequence affected the conforming responses of subjects*; *and* (*d*) *the information received had powerful effects upon conforming behavior.*" (p. 117)

In another study, Tjosvold and Johnson (1978), involved controversial discussions on moral issues. The participants would have the chance on winning $15.00 depending upon the outcome of the discussions. The discussions were experimentally manipulated to involve no controversy (the 'trained confederate' took the same position on the issue as the participants), controversy in a cooperative context (in which the $15.00 reward would be awarded when the participants and the confederate agreed on a mutually satisfactory position), and controversy in a competitive context, where the confederate initially took a position opposite to that of the participants, and in which the chances of winning the $15.00 depended upon the participants contribution more ideas to the ultimately agreed solution. The subjects involved in competitive debate "*experienced more uncertainty, [and] engaged in more information-seeking behavior…*" (p. 376).

Streufert and Castore (1971) explored complexity theory in relation to decision making in the context of a game involving managing the military, economic and other affairs of an imaginary state. Their subjects were divided into groups on the basis of the complexity of their conceptual structure (as measured by the Sentence Completion Test (Schroder and Streufert, 1963)). The subjects were provided with the supposed results of their strategies, with an increasing level of failure. The design of the experiment was quite complex, but, overall it was found that the increase in the level of failure brought about a decline in information seeking for both simple and complex subjects, with the simple subjects showing a greater decline. The same results were found for the efficiency of information use, with, again, simple groups showing a greater decline in efficiency than complex groups.

Cognitive theories

A number of papers dealt with various aspects of cognition and cognitive processes, for example, cognitive dissonance, curiosity, and creativity. They are dealt with here as a related group of papers from which a number of factors that affect the relationship between cognition and information-seeking emerge.

Kasperson (1978), in a study involving twenty-nine academic and thirty-six industrial scientists and engineers, analysed the

relationship between information sources and creativity, finding that the creative group exhibited the greatest variety of exposure to information from different scientific disciplines. Earlier, Karlins, M. (1967), in a study of sixty undergraduates, categorized the participants in terms of integrative complexity (i.e., the ability to integrate information inputs) and intelligence. Given a complex problem-solving task, the study found that:

"*Integratively complex subjects, in comparison with integratively simple subjects, (a) exhibit greater breadth in their information search, as reflected in the number of fixed program deck categories they utilize; (b) search more evenly across and within the informational domains ...; (c) ask more questions that indicate a willingness to act upon and explore their environment directly, as adjudged by the infrequency of requests for information pertaining to how other individuals dealt with the problem ("external referents"); and (d) maintain differentiation among classes of information dealing with a complex problem-solving environment...* " (p. 277).

We may regard integrative complexity as related to cognitive complexity (that is the number of categories a person has, in this case, in discriminating among other persons). Nidorf (1968) in a study of undergraduates, found a relationship between cognitive complexity and information-seeking in the case of female subjects, but the data were not statistically significant in the case of the male subjects. In an earlier study Nidorf and Crockett (1964) found that:

"*The results indicate that female [subjects] seek more information than males, that [subjects] seek more ambivalent than univalent information, and that less information is sought when the other person is a woman than when the other is a man.*" (p. 98)

Finch and Montgomery (1973) and Hatano and Inagaki (1976) studied children measured on a scale of reflection and impulsivity. Finch and Montgomery found that, "*Results of the present study indicated that reflective children employed developmentally more mature questions in seeking information than did impulsive children*" (p. 361), which was in accord with previous research by McKinney (1973), Ault et al., (1972), and Adams (1972). They also found that:

"*the reflective children delayed their initial impulse to guess and paused to consider the utility of the possible approaches. They demonstrated an apparent ability to resist the temptation to employ a strategy that might result in an immediate solution but had a low probability of being correct. Rather they chose one that resulted in a high probability of eventual success.*" (p. 361)

Hatano and Inagaki (1976) studied Japanese children (in a very different culture from that of most Western studies) and found similar relationships. They found that reflective children sought more information before making a decision and that they also tended to process information more efficiently.

Cognitive dissonance also emerged as a theoretical concept related to information-seeking behaviour. For example, Festinger (1957) proposed that cognitive dissonance is a state that a person will seek to reduce; consequently information that supports his or her beliefs will be accepted because it reduces the dissonance, while information that opposes those beliefs will be rejected, because the rejection will also reduce dissonance. This theory was subject to critical review by Freedman and Sears (1965), who concluded that there was a lack of evidence to support the basic propositions of the theory. Subsequently, Festinger (1964) modified his theory to include the concepts of *confidence* and *usefulness*, proposing that a person might accept dissonant information if they had confidence in their own beliefs, to the point of being able to refute (to their own satisfaction) the dissonant information. Information that is useful to the person, for example if it draws attention to problems that they may experience in holding a particular view, may also be accepted. Feather (1967) developed these ideas further and explored the extent to which subjects could tolerate ambiguity in their understanding of a situation and found that:

"*a highly intolerant person is more likely to seek out information consistent with his attitude than a less intolerant person. These results also complement previous evidence that a highly intolerant person is more likely to evaluate arguments in a manner consistent with his attitude than a less intolerant person... It appears, therefore, that personality characteristics influence both the seeking-out of information and the evaluation of information once it has been received*" (p. 354).

Other theories

The remaining papers in the set deal with a range of subjects, from attitude theory to stress-coping theory, and power relationships. In the context of attitudes research, dogmatism occurs as the topic in three of the papers. Thus, highly dogmatic (or closed-mind) persons tend to have more confidence in information that is consistent either internally or over time. Open-minded individuals, on the other hand, have more confidence in information that comes from a source that is favourable to the group rather than a source providing a large amount of consistent information (Heslin et al., 1977). Higher levels of dogmatism are associated with lower levels of information search prior to purchasing decisions (Lambert and Durand, 1977). Dogmatism affects trust and message acceptance. Closed-minded individuals reject both the source and message when their expectancies are disconfirmed, focusing on the surface quality of information and the reputation of the source. Open-minded individuals, however, attend to the content and implications of a message (Rotton et al., 1977).

The three papers relating stress and information seeking have diverse conclusions: in an experimental study, Miller (1979) used the threat of an electric shock to determine the subject's preference for monitoring the experimental situation versus being distracted by listening to music. She found that, "*Subjects preferred to monitor rather than distract themselves, particularly when shock was avoidable. Even when shock was not avoidable, some preference for information was found*" (p. 572). In a study of pre-operative fear among patients undergoing abdominal surgery, Sime (1976) found that the hypothesis that increased preoperative information would benefit moderate and limited information seekers more than extensive information seekers was not supported. However, "*Information interacted with level of fear rather than type of coping and benefited most those who experienced high levels of fear preoperatively*" (p. 721). In another health-related study, involving hospitalised tuberculosis patients, Vernon (1971) reported that those cared for by uninformative physicians tended to search for books on tuberculosis and its treatment more frequently than patients of informative physicians.

The research on power relationships and information seeking by Wheeler (1964) hypothesised that, "As the power discrepancy [between two people] increases, the seeking of personal information by the low-power member of the dyad increases" (p. 125). The hypothesis was confirmed in the experiment, in which members of the dyad could ask questions of each other: the low-power members asked more questions.

The early period: conclusion

Our overall conclusion for this section of the paper is that psychologists have had a significant interest in studying various aspects of information seeking. The selected papers cover a range of topics, including social learning theory, decision-making theory, aspects of cognition, counselling, and related subjects. These studies indicate that psychologists are interested in understanding how individuals seek and use information in different contexts and how factors such as locus of control, cognitive complexity, decision-making strategies, and counselling methods influence information-seeking behaviour. However, it is clear that the interest in information-seeking is as it relates to psychological issues, and not as a central research topic.

The current situation: introduction

At the outset we have to acknowledge that the information environment within which information-seeking takes place is now very

different from that of the 1960s. The invention of the personal computer, of networks based on those computers, of the Internet, of the World Wide Web, of electronic publishing, and of social media has changed the process almost beyond recognition. We might expect, therefore, that some interest would be shown in these phenomena by psychologists who take an interest in information-seeking behaviour.

The current situation: results

Descriptive data

Table 3 shows the distribution of the papers by journal title. It will be noted that the only journal to appear in both lists is *Psychological Review*. Of course, some of the journals in both lists may appear as journals contributing only one paper, and some journals, such as *PLOS One*, have come into existence only since the 1960s. However, it is a little surprising that there is such little overlap, and this may affect the kind of paper published by these journals.

Journal title	No. of items
Scientific Reports	7
Current Psychology	3
PLOS One	3
Applied Neuropsychology	2
Journal of Applied Research in Memory and Cognition	2
Journal of Experimental Child Psychology	2
Journal of Health Psychology	2
Nature Human Behaviour	2
Personnel Psychology	2
Psychological Review	2
Journals contributing one paper	31
Total	***53***

Table 3. Distribution of original set of selected items by journal title

Theoretical framework	**Number**	**Study population**	**Number**	**Research method**	**Number**
Affective theories	3	Children	3	Experiment	18
Anxiety theory	2	General population	8	Interview survey	1
Curiosity	9	Patients	2	Online experiment	1
Decision making	3	Sample platforms	5	Online survey	4
Learning theories	3	Teachers	2	Questionnaire survey	4
Uncertainty theory	2	University students	5	Other	4
Other	10	Various	3	Total	32
Total	32	Not applicable	1		
		Other	3		
		Total	32		

Table 4. Characteristics of the sample of recent papers

In this set of papers, as with the first, the experiment was the most common research method, with eighteen out of the thirty-two (56%), the online experiment made an appearance in one case, and the online survey had four cases. One paper reported two studies; one using an online survey, followed by an experiment. There were also five questionnaire or interview surveys. The fact that online methods represented 16% of the total suggests a quite significant move in that direction.

Although the period covered was January 2022 to the end of May 2023, two papers had a 2021 publication date, presumably not actually appearing for indexing until 2022. Nine papers were identified as “in press”, although the journal gave a 2022 or 2023 publication year (most of these were subsequently published in 2023). It was evident, however, that these papers had not been published in the associated print journal, since they lacked volume number, issue numbers, and pagination. As with the methods, this shows the

influence of electronic publication, a mode of delivery not available in the 1960s and 1970s.

Research approaches

The first thing to note is that subject of counselling, so prominent in the early set of papers, does not appear in this set. To be sure of this, the discarded items (226) were searched for the term *counselling*, and nothing was found. This may suggest that the topic is thought to be fully researched, or perhaps that psychologists in particular no longer find it of interest, or that the way the Web of Science assigns journals to disciplines has changed. Whatever the reason, the lack of attention to this topic seemed worthy of note.

We can group this recent set of papers into three categories: cognitive, emotional and motivational approaches. Compared with the first set, this collection of papers included only one that adopted a social learning perspective: Guarana et al., (2023) studied the ambivalence of managers in the USA towards the performance of the teams they led, finding that the results, "*that leaders who experience subjective ambivalence increase team performance because these leaders seek information from subordinates, and in turn, subordinates seek information from one another*" (p. 25). Thus, in these circumstances, increased information-seeking led to improvements in team performance.

Cognitive theories

The most common cognitive issue of interest to these researchers was curiosity, which was dealt with in nine of the thirty-two papers (29%). The starting point is that curiosity is the drive that leads a person to attempts to fill gaps in their knowledge, termed *deprivation curiosity* by Lydon-Staley et al., (2021). Eschmann et al. (2023) found that curiosity was one of the "*key drivers of information seeking in real life*" (p. 6), while van Lieshout et al. (2021), a study in which the subjects participated in a lottery experiment, found that curiosity "*increased with the uncertainty of information*" but that "*the effect of outcome uncertainty on curiosity was not reliably different for gains and losses, indicating that these two effects seemed to operate largely independent of each other*" (p. 15).

Lydon-Staley et al. (2021) go on to suggest two types of information seeker: the hunter, whose information seeking is characterised "*by sampling closely connected concepts*" (p. 327), and the busybody who has "*a preference for sampling diverse concepts*" (p. 327). As a result, "*The busybody's store of information will be more diverse than that of the hunter, but the hunter's information store will contain greater depth on fewer subjects.*" (p. 327).

Chen et al. (2022), noting that, in adults, "*curiosity induced by uncertainty enhances learning and memory outcomes and that the resolution of curiosity has a special role in curiosity-driven learning.*" (p. 1), explored the role of curiosity in 8-month-old children. The found that:

"*Our results suggest that in young infants curiosity has a broad attention-enhancing effect that is not specific to the object of curiosity. Infants showed enhanced learning for unrelated information encountered while they were in a state of curiosity, and they showed no preference for resolving their curiosity*" (p. 11).

and conclude that there is a developmental change from childhood to adulthood, as a result of which adults "*aim to resolve the uncertainty that elicited the curiosity*" (p. 11).

Losecaat Vermeer, et al. (2022) explored the relationship between curiosity, information-seeking, and wellbeing, during the Covid-19 pandemic and found that, "*individuals' information-seeking for self and curiosity is beneficial for well-being, through reducing loneliness during the lockdown. Moreover, trait curiosity also still predicted well-being independently.*" (Discussion, para. 2)

The relationship of curiosity and learning was explored in several papers, for example, Murayama (2022) reviewed the literature on curiosity and interest (i.e., engagement in a task or in relation to some phenomenon), and developed a framework relating these factors to knowledge acquisition. He adopts the *reward-learning* approach to information-seeking, which proposes that information seeking is motivated by the expected rewards of doing so. The reward-learning approach is

also adopted by Aguirre et al. (2022), who suggested that this is particularly the case of young children.

Researchers also link curiosity and reward to *mesolimbic functional connectivity*, a measure of the extent to which different parts of the brain work together in processing rewards. Thus, Eschmann, et al. (2023) conclude that "*The results of the present study suggest that curiosity and mesolimbic dopaminergic functional connectivity are key drivers of information seeking in real life.*" (p. 6). Kennett, et al. (in press), in a review of the literature also refer to the "*brain's reward system*", and argue that curiosity is a driver of aesthetic experiences and creativity, suggesting that, "*The central role of information-seeking in curiosity may underpin the ability to find and solve problems in creative ways by allowing one to seek new connections between disparate concepts within one's own semantic memory system.*" (p. 10).

Kenett et al. (2023) also review the role of curiosity, especially in relation to aesthetic experiences, and comment:

"*The central role of information-seeking in curiosity may underpin the ability to find and solve problems in creative ways by allowing one to seek new connections between disparate concepts within one's own semantic memory system. Furthermore, relieving curiosity, enjoying works of art, and finding creative solutions all engage the brains' reward system in a similar way by evoking a subjective feeling of relief, satisfaction, pleasure, or "aha" moments*" (p. 10).

"*Curiosity, our internal drive for information, is pervasive in everyday life and is a key driver of behaviour…*", a claim made by Romero Verdugo, et al. (2023), who hypothesised that having choices available to them would enhance their curiosity. They conclude:

"*Our finding that choice increased curiosity generalizes the phenomenon of choice-induced preference change, observed in studies on value-based choice…, to the context of information seeking: Choice might boost the value of information just as it boosts the value of chosen options.*" (p. 107)

Other cognitive factors are given less attention in this body of research; for example, Criado-Perez, et al. (2023), referring to *evidence collection*, rather than information seeking, and reflection on that evidence, find that, "*decision-making accuracy is higher when decision-makers are provided with the relevant evidence instead of actively seeking for it, and that cognitive reflection is an important predictor of decision-making accuracy*" (p. 17). Other work on decision-making includes that by Nizet et al. (2023) who studied the involvement of patients in decision-making on cancer therapies. However, they found no relationship between information-seeking and the desire for collaborative decision-making.

Waite et al. (2023) also studied decision-making in a health context: in this case, parental decisions relating to children with cerebral palsy. Here they found that, "*Predominantly parental information seeking involved using the internet, in two ways; (i) to find specific medical information about SDR from healthcare institutions and (ii) to seek out experiential information from other parents via social media forums*" (p. 388).

In a study of how young children develop a hypothesis testing competency, Köksal and Sodian (2023) suggest that, "*Simply put, hypothesis testing is information seeking and its goal is to generate novel information.*" In experiments involving children aged four- to six-years old, they found a developmental shift at the age of five or six, as a result of which these children

"*When asked to find out whether a given hypothesis was true, they chose the intervention that yielded the necessary information to evaluate the hypothesis. When asked to reproduce an effect, they chose the intervention that they had already observed to produce an effect*" (p. 704),

whereas the four-year-olds and younger five-year-olds did not differentiate between the two requirements.

Psychology of emotions

Emotional factors figured only modestly in this set of papers: Charpentier, et al. (2022) carried out a laboratory study of anxiety in relation to COVID-19. They conclude:

"*We show that anxiety led to increased information-seeking in response to larger changes, rather than to a general increase in the desire for information. This was true even when the cause of the anxiety (e.g., a stressful social situation) was not related to those changes (e.g., changes are financial). This suggests that the influence of anxiety on information-seeking can "spill over" to other aspects of one's life that are not necessarily related to the source of anxiety.*

In addition, results from our ecological study show that participants who reported greater anxiety during the pandemic sought more information about COVID-19, consistent with past studies... The pandemic triggered large changes in the environment and negative valence, which may underlie the increase in information-seeking" (Discussion, para. 1).

Wolenski and Pettit, (in press) studied the existence of anxiety in 250 "emerging adults" (i.e., persons aged 18 to 28 years) and the information sources they used to allay their anxiety. They found that,

"*emerging adults report frequently seeking information regarding mental health, specifically anxiety, on social media. However, the internet (Wikipedia, medical websites, Google), not social media, was the most frequently used information source*" (p. 6).

They found that information from social media was less accurate than information from other Internet sources, such as Wikipedia, Google searches, medical website, etc.

Cyberchondria is defined as an increase in worry and anxiety as a result of over-use of the Internet to search for health-related information: Uysal Toraman, et al. (in press) use the Cyberchondria Severity Scale (McElroy and Shevlin, 2014) and conclude:

"*In answer to our research question, we found that the teachers' coronavirus anxiety levels were positively related to all cyberchondria dimensions. It was seen that coronavirus anxiety levels had a stronger relation to the compulsion and distress subscales of cyberchondria, and a weaker relation to excessiveness, reassurance and mistrust of the medical profession*" (Discussion, para. 4).

Restrepo-Castro et al. (2023) found that when people are unable to escape from or avoid a fearful situation they seek information that will enable them to control their fear and reduce fear levels. They comment, however:

"*Nonetheless, information seeking behaviors may have the paradoxical effect of augmenting uncertainty and fear. This is because such attempts are often ineffective (e.g., monitoring interoceptive activation will probably not prevent the onset of a panic attack), and despite individuals attempt to gain control, they turn out encountering the opposite result*" (p. 5).

Jiwa, et al. (2023), presented participants with predictions of lottery outcomes from different sources, aiming to "*to examine the role of the hedonic value of information on information search and belief formation*" (Discussion, para. 1). The first experiment revealed that, "*while accuracy was the strongest motivator of information preference, a large proportion of our participants also showed a preference for positively-biased information despite being presented with a clear, unambiguous measure of source accuracy*" (Discussion, para. 1), and, overall, found that "*Participants not only sampled positively-biased information more readily, but also held the beliefs they formed on the basis of the predictions yielded by positively-biased sources in higher confidence*" (Discussion, para. 2).

Berweger et al. (2023), found that emotions, such as surprise, confusion, and anger, play a role in information-seeking when pre-service teachers had to face-up to misconceptions about education. They conclude that their study:

"*showed that preservice teachers were surprised, curious, confused or angry when they realized that what they believed to be certain educational knowledge was incorrect. Such emotional reactions to cognitive incongruity (except for*

anger) then increased the tendency that students explored additional information on a topic. Furthermore, students felt frustrated when this information did not contribute to reducing the incongruity, but felt enjoyment when more information helped to resolve it. Our findings provide insights in how emotional processes interact with preservice teachers' willingness to revise faulty parts of their knowledge, and with their success in doing so" (p. 3).

Metacognition, the ability to think about our own thinking, includes (according to Schulz et al., 2023) the sense of confidence in our actions. They suggest that a lack of confidence in decision-making can lead to unnecessary information-seeking, and find that their results "*highlight how the ability to monitor errors or general metacognitive sensitivity impact seeking decisions and can generate diverse relationships between action, confidence, and the optimal search for information*" (p. 604).

Motivational theories

We have seen that cognitive and emotional approaches may provide motivation for information-seeking, and some authors draw attention to other concepts that may be relevant in this context. For example, vanLieshout et al. (2021) cited earlier noted that the motivation to reduce uncertainty, and the motivation to maximize positive information represent separate and independent drives. Nizet et al. (2023), also cited earlier, found that individual preferences constituted motivation for information-seeking in the context of patient decision-making.

Stoffel et al. (2022) compared the effect of different *temporal frames* on information-seeking behaviour when the participants were presented with information on the incidence of colorectal cancer (CRC). For example, one group was told that every hour three men, aged forty-five or older were diagnosed with bowel cancer, and other groups were given data for every day, and every year. The researchers found that participants who were given the "every day" information, increased information-seeking behaviour, when compared with framing the disease as occurring every year, but there was no statistical difference when compared with those who were given the "every hour" information.

In relation to the COVID-19 pandemic, Abir, et al. (2022) found that motivation energises people to seek information. The authors note that,

"*specific motivational states are associated with domain-specific differences in personal utility and information-seeking—the directing effect that is the hallmark of goal-rational behavior. However, these motivational states are also associated with the enhanced seeking of information of all content domains—a pattern predicted by an energizing role for motivation*" (p. 6).

The current situation: conclusion

Although we must recognize that the second set of papers is rather small and that, as a consequence, these results can only be considered indicative, it seems that the interest of psychologists in information-seeking has changed somewhat over the intervening period. There is the continuing interest in cognition and cognitive factors, and there is greater interest in emotional and motivational factors, but social learning theory makes virtually no appearance in the research and decision-making theory is almost non-existent. Rather, the diversity of research problems that relate in some way to information-seeking behaviour has changed and even the range of journals in which relevant research is published has changed. Given the fifty-year gap between the two sets of papers, this can hardly be considered surprising.

Discussion and overall conclusion

In information science and psychology we have two bodies of research related to information-seeking, which seem to have little interaction. As explained earlier, the decision to restrict the searches to *information seeking*, was to ensure that comparable sets of papers were studied. To extend the search by using more recent terms, such as *human information behaviour*, would have increased to scope of the samples

beyond the topic of interest, which, again, resulted from Wilson's introduction of the term to information science.

The first set of papers was rather too early to expect any citation of information behaviour research, since such research was in its infancy, and was known, in fact, by the different name, *user needs*. However, the reference lists of the thirty-two papers in the second set were checked and only four citations to information science literature on information-seeking were found. These were: Case and Given (2016) cited by Criado-Perez et al. (2023); Case, et al. (2005) cited by Restrepo-Castro, et al. (2023), Madge (2023) cited by Nizet et al. (2023), and Wilson (2000) cited by Aguirre, et al. (2022).

The reason for the apparent lack of interest in information behaviour research appears to be that, for the psychological researcher, information seeking is simply one of the factors that may emerge from research into psychological states, processes, and disorders, and which may have implications for therapy, whereas, information science researchers are concerned with information seeking as the key phenomenon requiring exploration and explanation,

It is clear, to this author at least, that much of the work reviewed here could be of interest and value to the information researcher. For example, except in the case of information retrieval, the experimental method is little used in information science, and, perhaps as a consequence, little taught in research methods courses. The experimental methods and resources used in psychology, however, could be employed in information research, and could lead, perhaps, to new insights.

Various theories and theoretical concepts might also be used with profit in information research. The most obvious to emerge from the first set of papers is social learning theory and the concept of locus-of-control. The work on decision-making could also be useful, especially where the research is exploring work-related information-seeking. In the second set, the work on curiosity could stimulate the application of ideas found there in information research, and the work on the relationship of anxiety may be useful in a time of uncertainty when pandemics, war, and poverty are generating anxiety worldwide. These concepts could well be introduced into various models and theories of information, such as those of Wilson (1999, 2016). Specifically, psychological approaches to information behaviour in the information science literature are relatively rare, although can point to the work on personality by Heinström (2005) and on the affective factors in information seeking by Nahl and Bilal (2007).

Psychological research also uses a variety of standard, validated instruments, which it might be possible to use without adaptation in information research, and which could help information researchers to gain a wider audience, and greater influence, in related fields such as psychology. The relevant instruments include the Information Preferences Scale (Ho et al., 2021), the Five-Dimensional Curiosity Scale (Kashdan et al., 2018), and the Cyberchondria Severity Scale (McElroy & Shevlin, 2014). It would be worth testing these and similar instruments in research that focused on information-seeking, rather than on some psychological issue.

The evident relevance of this research to researchers in information science suggests that greater collaboration between the two fields could well be productive. On the one hand, the information scientist could learn from the experimental methods and theories of the psychologist, and on the other, the psychologist could more about process of information-seeking and how information sources are selected, and used by the person in need.

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References

Abir, Y., Marvin, C.B., van Geen, C., Leshkowitz, M., Hassin, R.R., & Shohamy, D. (2022). An energizing role for motivation in information-seeking during the early phase of the COVID-19 pandemic. *Nature Communications* 13(1), 2310. https://doi.org/10.1038/s41467-022-30011-5

Adams, W.V. (1972). Strategy differences between reflective and impulsive children. *Child Development*, 43(3), 1076-1080. https://doi.org/10.2307/1127661

Aguirre, M., Brun, M., Couderc, A., Reboul, A., Senez, P., & Mascaro, O. (2022). Knowledge in sight: toddlers plan efficient epistemic actions by anticipating learning gains. *Cognitive Science*, 46(2), e13103. https://doi.org/10.1111/cogs.13103

Ault, R.L., Crawford, D.E., & Jeffrey, W.E. (1972). Visual scanning strategies of reflective, impulsive, fast-accurate, and slow-inaccurate children on the Matching Familiar Figures Test. *Child Development*, 43(4), 1414-1417. https://doi.org/10.2307/1127527.

Berweger, B., Kracke, B., & Dietrich, J. (2023). Preservice teachers' epistemic and achievement emotions when confronted with common misconceptions about education. *Journal of Educational Psychology*, 115(7), 951-968. https://dx.doi.org/10.1037/edu0000792

Case, D.O. and Given, L.M. (2016). *Looking for information: a survey of research on information seeking, needs, and behavior*. Emerald Group Publishing Limited.

Case, D.O., Andrews, J.E., Johnson, J.D., & Allard, S.L. (2005). Avoiding versus seeking: The relationship of information seeking to avoidance, blunting, coping, dissonance, and related concepts. *Journal of the Medical Library Association*, 93(3), 353-362

Charpentier, C. J., Cogliati Dezza, I., Vellani, V., Globig, L. K., Gädeke, M., & Sharot, T. (2022). Anxiety increases information-seeking in response to large changes. *Scientific Reports*, 12(1), 7385. https://doi.org/10.1038/s41598-022-10813-9

Chen, X., Twomey, K. E., & Westermann, G. (2022). Curiosity enhances incidental object encoding in 8-month-old infants. *Journal of Experimental Child Psychology*, 223, 105508. https://doi.org/10.1016/j.jecp.2022.105508

Crawford, J.L., & Haaland, G.A. (1972). Predecisional information seeking and subsequent conformity in the social influence process. *Journal of Personality and Social Psychology* 23(1), 112-119. https://doi.org/10.1037/h0032870

Criado-Perez, C., Jackson, C., Minbashian, A., & Collins, C. G. (2023). Cognitive reflection and decision-making accuracy: examining their relation and boundary conditions in the context of evidence-based management. *Journal of Business and Psychology*, 1-25. https://doi.org/10.1007/s10869-023-09883-x

Davis, W.L., & Phares, E.J. (1967). Internal-external control as a determinant of information-seeking in a social influence situation. *Journal of Personality* 35(4), 547-561. https://doi.org/10.1111/j.1467-6494.1967.tb01447.x

Engländer, T., & Tyszka, T. (1980). Information seeking in open decision situations. *Acta Psychologica* 45(1-3), 169-176. https://doi.org/10.1016/0001-6918(80)90029-3

Eschmann, K. C., Pereira, D. F., Valji, A., Dehmelt, V., & Gruber, M. J. (2023). Curiosity and mesolimbic functional connectivity drive information seeking in real life. *Social Cognitive and Affective Neuroscience*, 18(1), nsac050. https://doi.org/10.1093/scan/nsac050

Feather, N.T. (1967). An expectancy-value model of information-seeking behavior. *Psychological Review*, 74(5), 342-360. https://psycnet.apa.org/doi/10.1037/h0024879

Festinger, L. (1957). *A theory of cognitive dissonance.* Stanford, CA: Stanford University Press.

Festinger, L. (1964). *Conflict, decision, and dissonance.* Stanford, CA: Stanford University Press.

Finch, A.J., & Montgomery, L.E. (1973). Reflection-impulsivity and information seeking in emotionally disturbed children. *Journal of Abnormal Child Psychology* 1(4), 358-362.

Freedman, J.L., & Sears, D. O. (1965). Selective exposure. In L. Berkowitz (Ed.), *Advances in experimental social psychology*, Vol. 2. (pp. 57-97). New York, NY: Academic Press.

Guarana, C.L., Rothman, N.B., & Melwani, S. (2023). Leader subjective ambivalence: enabling team task performance via information-seeking processes. *Personnel Psychology*, 76, 913-944. https://doi.org/10.1111/peps.12516

Hatano, G., & Inagaki, K. (1976). Reflection-impulsivity in perceptual and conceptual matching tasks among kindergarten children. *Japanese Psychological Research* 18(4), 196-203.

Heinström, J. (2005). Fast surfing, broad scanning and deep diving: the influence of personality and study approach on students' information-seeking behavior. *Journal of Documentation*, 61(2), 228-247.

Heslin, R., Rotton, J., & Blake, B. (1977). Conf idence in information: Source and dogmatism effects. *Journal of Research in Personality* 11(2): 227-236.

Ho, E.H., Hagmann, D., & Loewenstein, G. (2021). Measuring information preferences. *Management Science*, 67(1), 126–145.

Jiwa, M., Cooper, P. S., Chong, T. T., & Bode, S. (2023). Hedonism as a motive for information search: biased information-seeking leads to biased beliefs. *Scientific Reports*, 13(1), 2086. https://doi.org/10.1038/s41598-023-29429-8

Karlins, M. (1967). Conceptual complexity and remote-associative proficiency as creativity variables in a complex problem-solving task. *Journal of Personality and Social Psychology* 6(3), 264-278.

Kashdan, T.B., Stiksma, M.C., Disabato, D.J., McKnight, P.E., Bekier, J., & Kaji, J. (2018). The five-dimensional curiosity scale: capturing the bandwidth of curiosity and identifying four unique subgroups of curious people. *Journal of Research in Personality*, 73, 130–149.

Kasperson, C. J. (1978). An analysis of the relationship between information sources and creativity in scientists and engineers. *Human Communication Research*, 4(2), 113-119.

Kenett, Y.N., Humphries, S., & Chatterjee, A. (2023). A thirst for knowledge: grounding curiosity, creativity, and aesthetics in memory and reward neural systems. *Creativity Research Journal.* 35(3), 412-426. https://doi.org/10.1080/10400419.2023.2165748

Köksal, Ö., & Sodian, B. (2023). The origins of hypothesis testing: Young children's developing understanding of information seeking compared to effect production. *European Journal of Developmental Psychology*, 20(4), 694-708.

Lambert, Z.V., & Durand, R.M. (1977). Purchase information acquisition and cognitive style. *Journal of Psychology: Interdisciplinary and Applied*, 97(1): 3-13.

Levine, J.M., Samet, M.G., & Brahlek, R.E. (1975). Information seeking with limitations on available information and resources. *Human Factors*, 17(5), 502-513.

Liew, S.X., Embrey, J.R.R., & Newell, B.R.R. (2023). The non-unitary nature of information preference. *Psychonomic Bulletin & Review*, https://doi.org/10.3758/s13423-022-02243-5

Losecaat Vermeer, A.B., Muth, A., Terenzi, D., & Park, S.Q. (2022). "Curiosity for information predicts wellbeing mediated by loneliness during COVID-19 pandemic." *Scientific Reports* 12(1), 7771.

Lydon-Staley, D.M., Zhou, D., Blevins, A.S., Zurn, P. & Bassett, D.S. (2021). Hunters, busybodies and the knowledge network building associated with deprivation curiosity. *Nature Human Behaviour* 5(3), 327-336.

McElroy, E., & Shevlin, M. (2014). The development and initial validation of the cyberchondria severity scale (CSS). *Journal of Anxiety Disorders*, 28(2), 259-265. https://doi.org/10.1016/j.janxdis.2013.12.007

McKinney, J. D. (1973). Problem-solving strategies in impulsive and reflective second graders. *Developmental Psychology*, 8(1), 145.

Madge, O.-L., Marincaș, A. M., Daha, C., & Simion, L. (2023). Health information seeking behaviour and decision making by patients undergoing breast cancer surgery: A qualitative study. *Health Information & Libraries Journal*, 1– 12. https://doi.org/10.1111/hir.12480

Miller, S. M. (1979). Coping with impending stress: psychophysiological and cognitive correlates of choice. *Psychophysiology* 16(6), 572-581.

Murayama, K. (2022). A reward-learning framework of knowledge acquisition: an integrated account of curiosity, interest, and intrinsic-extrinsic rewards. *Psychological Review* 129(1), 175-198. https://doi.org/10.1037/rev0000349

Nahl, D., & Bilal, D. (Eds.). (2007). *Information and emotion: the emergent affective paradigm in information behavior research and theory*. Medford, NJ: Information Today, Inc..

Nidorf, L. (1968). Information-seeking strategies in person perception. *Perceptual and Motor Skills* 26(2), 355-365

Nidorf, L. J., & Crockett, W. H. (1964). Some factors affecting the amount of information sought about others. *The Journal of Abnormal and Social Psychology*, 69(1), 98–101. https://doi.org/10.1037/h0044837

Nizet, P., Grivel, C., Rabeau, P., Pecout, S., Evin, A., Labarthe, S. P., Navas, D., Feuillet, F., Bourdon, M., & Huon, J. F. (2023). Patients' preferences in therapeutic decision-making in digestive oncology: a single centre cross-sectional observational study. *Scientific Reports*, 13(1), 8534.

Pines, H.A., & Julian, J.W. (1972). Effects of task and social demands on locus of control differences in information processing. *Journal of Personality* 40(3), 407-416

Prociuk, T. J., & Breen, L.J. (1977). Internal-external locus of control and information-seeking in a college academic situation. *Journal of Social Psychology* 101(2), 309-310.

Restrepo-Castro, J. C., Labrador, F.J., Gantiva, C., Camacho, K., & Castro-Camacho, L. (2023). The effect of information seeking behaviors in fear control. *Journal of Behavior Therapy and Experimental Psychiatry* 78, 101797. https://doi.org/10.1016/j.jbtep.2022.101797

Romero Verdugo, P., van Lieshout, L.L., de Lange, F.P., & Cools, R. (2023). Choice boosts curiosity. *Psychological Science*, 34(1), 99-110. https://doi.org/10.1177/09567976221082637

Rotter, J.B. (1954). *Social learning and clinical psychology*. Englewood Cliffs, N J: Prentice-Hall.

Rotter, J.B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs*, 80(1, Whole No. 609).

Rotton, J., Blake, B.F., & Heslin, R. (1977). Dogmatism, trust, and message acceptance. *Journal of Psychology: Interdisciplinary and Applied*, 96(1), 81-88.

Schroder, H.M., & Streufert, S. (1963). *The measurement of four systems of personality structure varying in level of abstractness: sentence completion method.* Princeton, NJ: Princeton University. (ONR Technical Report No. 11).

Schulz, L., Fleming, S. M., & Dayan, P. (2023). Metacognitive computations for information search: confidence in control. *Psychological Review*, 130(3), 604-639. https://doi.org/10.1037/rev0000401

Sime, A. M. (1976). Relationship of preoperative fear, type of coping, and information received about surgery to recovery from surgery. *Journal of Personality and Social Psychology* 34(4), 716-724.

Stoffel, S. T., Hvalica Coldwell, A., von Wagner, C., & Herrmann, B. (2022). Testing temporal frames of colorectal cancer risks: evidence from randomized online experiments. *Psychology Health & Medicine* 28(2): 375-389. https://doi.org/10.1080/13548506.2022.2061716

Streufert, S., & Castore, C.H. (1971). Information search and the effects of failure: a test of complexity theory. *Journal of Experimental Social Psychology* **7**(1), 125-143.

Taylor, R.N., & Dunnette, M.D. (1974). Influence of dogmatism, risk-taking propensity, and intelligence on decision-making strategies for a sample of industrial managers. *Journal of Applied Psychology* 59(4), 420-423.

Tjosvold, D., & Johnson, D.W. (1978). Controversy within a cooperative or competitive context and cognitive perspective-taking. *Contemporary Educational Psychology*, 3(4), 376-386.

Uysal Toraman, A., Kalkim, A., & Korkmaz, E. K. (in press). Coronavirus anxiety and cyberchondria among teachers during the COVID-19 pandemic: an online survey. *Current Psychology*, 1-7. https://doi.org/10.1007/s12144-022-03382-7

van Lieshout, L.L.F., Traast, I.J., de Lange, F. ., & Cools, R. (2021). Curiosity or savouring? Information seeking is modulated by both uncertainty and valence. *Plos One* 16(9), e0257011. https://doi.org/10.1371/journal.pone.0257011

Vernon, D. T. (1971). Information seeking in a natural stress situation. *Journal of Applied Psychology* 55(4): 359-363.

Waite, G., Chugh, D., Cawker, S., Oulton, K., Wray, J., & Harniess, P. (2023). 'Wnting no regrets': parental decision making around selective dorsal rhizotomy. *Child Care Health and Development* 49(2), 382-391. https://doi.org/10.1111/cch.13056

Wallston, K. A., Maides, S., & Wallston, B.S. (1976). Health-related information seeking as a function of health-related locus of control and health value. *Journal of Research in Personality* 10(2), 215-222. https://doi.org/10.1016/0092-6566(76)90074-X

Waters, E. A., Kiviniemi, M. T., Hay, J. L., & Orom, H. (2022). Dismissing "don't know" responses to perceived risk survey items threatens the validity of theoretical and empirical behavior-change research. *Perspectives on Psychological Science*, 17(3), 841-851.

Weinstein, N.D. (1979). Seeking reassuring or threatening information about environmental cancer. *Journal of Behavioral Medicine*, 2(2), 125-139. https://doi.org/10.1007/BF00846662

Wheeler, L. S. (1964). Information seeking as a power strategy. *Journal of Social Psychology* 62(1), 125-130.

Wilson, T.D. (1999). Models in information behaviour research. *Journal of Documentation*, 55(3), 249-270.

Wilson, T.D. (2000). Human information behavior. *Informing Science*, 3, 49– 56. http://doi.org/10.28945/576

Wilson, T.D. (2016). A general theory of human information behaviour In *Proceedings of ISIC, the Information Behaviour Conference, Zadar, Croatia, 20-23 September, 2016: Part 1. Information Research*, 21(4), paper isic1601. http://InformationR.net/ir/21-4/isic/isic1601.html

Wilson, T.D. (2022). *Exploring information behaviour: an introduction.* T.D. Wilson. https://informationr.net/ir/Exploring%20information%20behaviour.pdf

Wolenski, R., & Pettit, J.W. (in press). Social media usage is associated with lower knowledge about anxiety and indiscriminate use of anxiety coping strategies. *Psychology of Popular Media.* https://doi.org/10.1037/ppm0000456