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Of seekers and nonseekers: Characteristics of Covid-19-related information-seeking behaviors

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Abstract

During health crises like the coronavirus disease 2019 (Covid-19) pandemic, it is crucial that individuals are able and willing to adequately respond to information. Individuals who deliberately seek information have an enhanced capacity to act on it and are capable of informed assessments of risks and self-protective behaviors. In contrast, overexposure to Covid-19 news as well as non-seeking can constitute information-related inequalities and hamper individuals' coping with the health crisis. Having this global health communication challenge in mind, our research aims to understand what characterizes non-, medium, and frequent seekers, considering sociodemographic and socioeconomic factors, health status, affective risk responses, efficacy assessments, trust in information sources, and satisfaction with information. This study is based on data of the second wave of the Health Information National Trends Survey (HINTS) Germany. Among 2602 participants, analysis revealed that 23.3% of the respondents did not actively seek information about Covid-19, while 34.3% of them intensively monitored information. Nonseekers, compared to medium and frequent seekers, were characterized by a lower socioeconomic status, lower affective risk responses, lower perceived information-related self-efficacy, and lower trust in information sources. These findings provide indications for strategic health approaches and can guide initiatives to address adequate use of health information.

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KEYWORDS

Covid-19, frequent seeking, information overload, information seeking, informational inequalities, non-seeking, overexposure

Key Points

- Identifying and characterizing groups differing in their frequency of Covid-19 information seeking is relevant since being able and willing to adequately respond to information is crucial for combating health crises.
- 23.3% of respondents of a German representative study did not actively seek information, while 34.3% intensively monitored information about Covid-19.
- Medium and frequent seekers of Covid-19-related information show similar preference patterns regarding the used sources, with public broadcasting being the preferred source of information about Covid-19.
- Nonseekers, compared to medium and frequent seekers, were characterized by a lower socioeconomic status (SES), lower affective risk responses, lower perceived information-related self-efficacy, and lower trust in information sources.
- Planners of informational interventions, health communicators, as well as health professionals, need to be aware of the profiles of nonseekers as well as frequent seekers to find adequate strategies to overcome barriers and design adequate supportive information.

INTRODUCTION

Health crises like the coronavirus disease 2019 (Covid-19) pandemic are characterized by numerous types of uncertainties associated with limited scientific knowledge, a high death rate, and a worldwide spread of the disease (Karlsen & Kruke, 2018; Rosenthal et al., 1989; Song et al., 2021; Tandoc & Lee, 2020). To combat the crisis, not only are medical interventions and public dissemination of information necessary (Bento et al., 2020) but it is also crucial how individuals deal with the available information, which is the focus of the current study (Garfin et al., 2020; Johnson & Case, 2012; Liu, 2020; Zarocostas, 2020). Modes of information transaction (Atkin, 1973) can be distinguished in strategies such as active information seeking—a purposeful acquisition of information from selected information channels and sources (Brashers, 2001; Johnson & Meischke, 1993; Zimmerman & Shaw, 2020)—or information non-seeking, which is a passive form of inattention to information or nonuse of information sources (Atkin, 1973). Whether individuals actively acquire information or remain passive during the Covid-19 pandemic determines their level of knowledge and comprehension of the crisis, their ability to assess the risk Covid-19 poses to their health, their decision to adopt Covid-19 prevention behaviors like maintaining distance, self-isolating at home, or vaccine decision making (Crowley et al., 2021; Garfin et al., 2020; Johnson & Case, 2012; Liu, 2020; Zarocostas, 2020), and their well-being by fostering their management of uncertainties (Capone et al., 2020; Kim et al., 2020; Tandoc & Lee, 2020).

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On the one hand, active information seeking about the Covid-19 pandemic is perceived as crucial for combating the crisis, and on the other hand, being frequently confronted with news and permanently monitoring information about Covid-19 might be associated with potential risks such as information overload and overexposure, information and health anxiety, a higher probability of being confronted with misinformation, and more negative beliefs and affect (Kim et al., 2020; Roussi & Miller, 2014; Skarpa & Garoufallou, 2021; Soroya et al., 2021; Tull et al., 2020).

Non-seeking of health information, in contrast, might serve as a countermeasure for anxieties and fears triggered by information (Soroya et al., 2021) and the accumulative psychological distress of overexposure to Covid-19 news (Mohammed et al., 2021; Qu et al., 2021). While non-seeking enables individuals to remain calm (Gallotti et al., 2020; Garrett, 2020), it is also associated with missing novel and vital information, underestimating the risks posed by Covid-19, reducing compliance with self-protective behaviors (Siebenhaar et al., 2020), and increased informational, health, and social inequalities (Viswanath & Kreuter, 2007).

Against the larger context of informational and communication inequalities associated with the chosen mode of information transaction during the pandemic (Atkin, 1973; Ramanadhan & Viswanath, 2006), this study aims to understand the prevalence and predictors of non-, medium, and frequent information seeking more deeply and, thus, how the German public manages information about Covid-19. Whereas current research identifies various thematic patterns of information seeking (e.g., Mangono et al., 2021) or predicts information seeking or avoidance (e.g., Kim & Hong, 2021; Link, 2021b; Soroya et al., 2021), our study aims to develop and compare profiles of frequent, medium, and nonseekers. Such a focus on various profiles distinguished by their frequency of information seeking is crucial to assess the outlined risks of overexposure and non-use. The profiles of frequent, medium, and nonseekers during the Covid-19 pandemic in Germany are characterized by predictors proven relevant to explain health information-seeking behaviors (HISBs; Ramanadhan & Viswanath, 2006; Wang et al., 2021; Zimmerman & Shaw, 2020): sociodemographic and socioeconomic factors, individuals' health status and affective risk response, their abilities to search for information, their trust in various information sources, and satisfaction with information. Comparing characteristics along these determinants provides insights for developing appropriate health communication strategies to adequately address different groups, that is, to reach nonseekers and improve individuals' empowerment for decision making. Further, knowledge about the characteristics of non-, medium, and frequent seekers sheds light on the underlying factors contributing to informational inequalities. These are critical efforts in health promotion (Kreps, 2008) and in combating national and global health crises.

Information seeking and non-seeking during the Covid-19 pandemic

Focusing on the modes of information transaction, Aktin (1973) distinguishes several classes of information exposure and nonexposure. All of them are cognitive and communicative activities (Brashers et al., 2000, 2002; Case, 2007) distinguished by their purposefulness, their costs, that is, the effort to perform a particular behavior, and their expected rewards. For our study, we did not focus on the ratio between effort and reward of various information behaviors, but highlighted the frequency at which individuals seek information about the Covid-19 pandemic. We understand the frequency of information seeking as relevant to acquire up-to-date information during a rapidly developing pandemic and reflect the frequency against the background of challenges such as information overload and knowledge deficits prevalent during the pandemic (Mohammed

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et al., 2021; Skarpa & Garoufallou, 2021; Soroya et al., 2021). Based on the frequency and associated challenges, two classes of information transaction are of relevance: the modes of active information seeking and of information non-seeking, which are further described in the following paragraphs.

Active information seeking is understood as the purposeful acquisition of information from selected information channels and sources to achieve certain goals like knowledge gain, attitude formation, decision making, or coping with uncertainties (Brashers, 2001; Johnson & Meischke, 1993; Zimmerman & Shaw, 2020). Information seeking is an actively determined, effortful behavior with high expected rewards (Atkin, 1973). Current studies in Germany, as our country of reference, as well as in other countries describe information seeking as very prevalent during the Covid-19 pandemic, particularly, during its early phase (Bento et al., 2020; Jurkowitz & Mitchell, 2020; van Eimeren et al., 2020). A German trend study showed for the period between March 2020 and October 2021 that between 52% and 76% of the German Internet users searched often or very often for Covid-19 information (COSMO, 2021).

According to Galarce and colleagues (2011), information seeking can be described as a complex, multistage process, defined by the triggers that cause information needs, the perceptions of which sources and information can contribute to meet these needs, the selection and use of sources, and the outcomes of the information search (Galarce et al., 2011; Link et al., 2021). A key component of the process of information seeking is the choice of a useful information source among a wide range of available interpersonal sources and media channels (Galarce et al., 2011). The source selection is determined by source characteristics such as access to expertise, tailorability, anonymity, or convenience, which are different in various sources (Rains & Ruppel, 2016). The most common sources individuals used during the Covid-19 pandemic include the Internet characterized by high tailorability, anonymity, and access to expertise, traditional media like newspapers and public broadcasting services providing access to expertise in a convenient and anonymous form (van Eimeren et al., 2020), and family and friends characterized by high convenience (Ho et al., 2020; Soroya et al., 2021). First findings on Covid-19 information overload suggest that it is associated with source selection. In particular, individuals who receive information via public broadcasting were more likely to report information overload (Mohammed et al., 2021).

The converse of information seeking is called *non-seeking*, information ignoring, or disinterest in information (Atkin, 1973; Lambert et al., 2009; Narayan et al., 2011; Ramanadhan & Viswanath, 2006). It is a passive form of inattention to information or nonuse of information sources. Non-seeking occurs when information is perceived as not worthy of expending the resources necessary to obtain and process them (Atkin, 1973). Therefore, it is assumed to be driven by a limited interest or by a lack of perceived personal relevance of certain information (Atkin, 1973; Lambert et al., 2009). Non-seeking is distinct from information avoidance, which can also be understood as a type of nonselection. However, information avoidance is a deliberate decision to avoid attention and exposure to certain information (Howell et al., 2014; Sweeny et al., 2010), which is assumed to be less frequent than non-seeking (Atkin, 1973). In contrast to the number of studies focusing on information-seeking behaviors, the state of research on non-seeking behaviors is scarce (Link, 2021a). Concerning the Covid-19 pandemic, recent studies reported that a significant number of individuals needed a break from news about Covid-19 (Siebenhaar et al., 2020; Soroya et al., 2021; Tandoc & Lee, 2020). For a German online sample, it was shown that the proportion of people who never or rather seldomly search for information about Covid-19 varies between 8% and 23% in the period between March 2020 and October 2021 (COSMO, 2021). A German examination of HISB in a broader health context identifies one in five as nonseekers (Link, 2021a), while based on the US sample of the Health Information

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National Trends Survey (HINTS) nearly half of the respondents are categorized as nonseekers of cancer information (Ramanadhan & Viswanath, 2006).

Based on the current state of research, there is a need to examine the prevalence of the three groups of non-, medium, and frequent seekers of information about Covid-19 in the German population. With this study, we address this research gap. Besides the first research objective to describe how frequently German residents access information about the Covid-19 pandemic (research question 1, RQ1), we also ask which sources medium and frequent seekers turn to (research question 2, RQ2). Therefore, we state the following research questions:

RQ1: How prevalent are frequent-, medium-, and non-seeking of information about the Covid-19 pandemic among German residents?

RQ2: Which information sources do German residents use when searching for information about the Covid-19 pandemic, depending on their status as frequent or medium seekers?

Profiles of non-, medium, and frequent seekers

To learn more about non-, medium, and frequent seekers among German residents and to distinguish who is reached or remains unreached by information publicly distributed, we consider predictors proven relevant to explain HISBs (Ramanadhan & Viswanath, 2006; Wang et al., 2021; Zimmerman & Shaw, 2020): sociodemographic and socioeconomic factors, health status and affective risk response, information- and health-related self-efficacy, trust in various information sources, and satisfaction with information. We will elaborate on these factors below.

We consider *sociodemographic and socioeconomic characteristics* such as age, gender, and SES as they are known determinants of HISB (Lambert & Loiselle, 2007; Link et al., 2021; Zimmerman & Shaw, 2020) and provide insights about information disparities regarding the question which groups of people have higher or lower willingness and abilities to engage in HISB. Extant research distinguishing seekers and nonseekers found differences in the profiles of seekers and nonseekers linked to age, gender, and education (Link, 2021a; Ramanadhan & Viswanath, 2006). Individuals with a higher interest in health information are found to be more often female, younger, and highly educated, whereas a lower SES was found to be associated with a higher probability of information overload (Kim et al., 2007).

Health status and affective responses to risk perceptions are also considered to be predictors of HISB (Griffin et al., 1999; Kahlor, 2010). We assume that both determine the personal relevance of information about the Covid-19 pandemic and impact individuals' willingness to engage with information relevant to acquire adequate knowledge and understanding about the pandemic (Lanciano et al., 2020; Magnan et al., 2021; Tull et al., 2020). Whereas research about the role of the individual health status remains heterogeneous, affective risk responses like concerns and worries are an integral predictor in various models like the Risk Information Seeking and Processing Model (Griffin et al., 1999; Wang et al., 2021; Yang et al., 2014). Affective risk responses are experiences of negative or positive feelings triggered by cognitive judgments of the perceived health threats posed (Kahlor, 2010), for example, by Covid-19. Negative risk responses are known to motivate an individual to seek information about the risk, particularly when the threat is likely to be realized (Griffin et al., 1999; Kahlor, 2010; Yang & Kahlor, 2013), and motivate

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actions how to behave on the risk, for example, engage in protective behaviors such as hand washing or social distancing to mitigate the spread of Covid-19 (Magnan et al., 2021).

Efficacy assessments are another integral part of models explaining HISB (Afifi & Weiner, 2004; Rimal & Real, 2003), particularly *information- and health-related self-efficacy*. Information-related self-efficacy describes an individual's perception of possessing the ability to perform health information seeking or complete communication tasks (Afifi & Weiner, 2004), whereas health-related self-efficacy describes an individual's confidence in their ability to take good care of their health. Both are assumed to be relevant to fight and prevent informational, health, and social inequalities as it is known that both perceived competencies lead to more active engagement, higher interest, motivation, and use of health information (Afifi & Weiner, 2004; Anker et al., 2011; Krantz et al., 1980). In contrast, a lack of self-efficacy or a drop of self-efficacy beliefs during the Covid-19 pandemic (Ritchie et al., 2020) might be a reason for non-seeking and may distinguish nonseekers from seekers.

Channel beliefs (Griffin et al., 1999) such as *trust in information sources* are another cognitive factor associated with HISB (Johnson & Meischke, 1993; Ramanadhan & Viswanath, 2006; Wang et al., 2021). During the Covid-19 pandemic, the question of which sources individuals trust is considered particularly critical as trust is associated not only with exposure to certain sources but also with belief in false information (Melki et al., 2021). Moreover, findings show that nonseekers perceive information sources as less trustworthy than information seekers (Ramanadhan & Viswanath, 2006) and indicate that individuals are more likely to consult multiple information sources when they do not trust a single one (Soroya et al., 2021), which could be related to more frequent information seeking. Thus, both non-seeking and frequent information seeking may be expressions of distrust.

Given the enormous amount and partially problematic quality of information on Covid-19 (Eysenbach, 2020), we not only consider individuals' trust in various information sources but also include *satisfaction with the available information* to characterize groups of non-, medium, and frequent seekers. Thus, we also aim to analyze how individuals perceive the available information and the information environment and how this shapes their HISB.

To sum up, our third objective is to identify and examine the profiles of non-, medium, and frequent seekers. Therefore, we developed the following research question:

RQ3: How can non-, medium, and frequent seekers be characterized in relation to sociodemographic factors, SES, health status, affective risk responses, information-related and health-related self-efficacy, trust in various information sources, and satisfaction with the available information?

METHODS

Survey transfer and adaptation

HINTS Germany is a franchise trademark of HINTS US and was started in 2018 as a cooperative project between the Hanover Centre for Health Communication and the Stiftung Gesundheitswissen, Berlin. This way, a close methodological analogy to the HINTS US original was intended, while simultaneously considering national conditions necessitating adaptations.

HINTS Germany is based on the questionnaire of HINTS 5, Cycle 1, which was translated using the TRAPD-framework (Translation, Review, Adjudication, Pretest and Documentation) in a "team translation" approach (for details, see Survey Research Center, 2016). Thereafter, a cognitive pretest ($n = 13$) and a field pretest ($n = 47$) were

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conducted to detect possible comprehension problems. Other than HINTS 5, Cycle 1 using a mail survey as a mode of data collection, we switched to a telephone survey (computer-assisted telephone interviewing [CATI]), since Germany has no central address registry and online panels usually lack representativeness. For further information about HINTS Germany, please see Baumann et al. (2020).

Based on the first wave conducted in 2019, the second wave of HINTS Germany was fielded from May to August 2020. We again used a CATI approach, but made some changes to the questionnaire (e.g., we included four questions adopting general health- or cancer-related questions to Covid-19-related information seeking). In total, 2602 respondents participated in the second wave, where the median interview length was 32 min and the response rate was 19.4%. The mean age was 48.28 (*SD* = 16.98) and 50.1% of the sample were female.

Measures

Dependent variable: Frequency of active Covid-19-related HISB

The frequency of Covid-19-related HISB was assessed with one item asking for the number of times the respondents have been searching for Covid-19-related information during the 30 days before the interview. The participants were asked to assess the frequency on a scale ranging from 1 ("never") to 6 ("more than once a day"). To supplement the description of individuals' HISB, respondents were asked to report the *sources of information* they used most frequently when searching for information about Covid-19 (Table 1). Both questions were not adapted from HINTS US, but developed for the second wave of HINTS Germany, which included some items with a specific focus on the Covid-19 pandemic.

Independent variables

As *sociodemographic variables*, we included gender and age. Further, the SES of the respondents was calculated as a function of the weighted household income and the level of education, indicating a low, medium, or high SES.

Adopted from HINTS US, *general health status* was assessed with a validated item asking the respondents to rate their health on a five-point Likert-type scale ranging from 1 ("very good") to 5 ("very bad"). To measure affective risk responses, respondents were asked to rate their level of concern and worry about the risk posed by the Covid-19 pandemic on a five-point Likert-type scale ranging from 1 ("not concerned at all") to 5 ("very concerned"). This item was adopted from the cancer context captured in the HINTS US to the context of Covid-19 relevant in the second wave of HINTS Germany.

The considered types of *self-efficacy* were measured in line with the HINTS US measurements. Per efficacy assessment, a single item was used. Information-related self-efficacy was assessed by asking for the respondents' self-rated confidence in their ability to get information about health or medical topics if they needed it. Participants' health-related self-efficacy was assessed with an item asking for their self-rated confidence in their ability to take good care of their health. The applicability of both self-efficacy statements was measured on five-point Likert-type scales ranging from 1 ("not confident at all") to 5 ("completely confident").

The *trust in health information from eleven sources* (e.g., doctors, family and friends, diverse media sources; see Table 2) was evaluated as in the HINTS US with a single item per source using a five-point Likert-type scale ranging from 1 ("not at all") to 5 ("very strong").

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The level of satisfaction with information about Covid-19 was also assessed using a five-point Likert-type scale ranging from 1 ("very dissatisfied") to 5 ("very satisfied"). This item was also developed for the second wave of HINTS Germany and not adopted from HINTS US.

Data analysis procedures

To examine the prevalence of frequent to non-seeking behavior (RQ1) as well as to describe which sources are preferred by medium and frequent seekers (RQ2), descriptive statistics were computed for all the included variables. To answer RQ3 aiming to characterize frequent, medium, and nonseekers, we calculated the analysis of variance with the types of information-seeking behavior as an independent factor and the characterizing variable as the dependent variable. Due to the widespread absence of homogeneity of variances among the independent variable distinguishing the types of frequent to non-seeking, post hoc tests were conducted with Tamhane's *T*2. All analyses were performed using SPPS® (version 27). Missing values were deleted list-wise and Type I error rate was set to 0.05 across all analyses. To counteract the problem of multiple comparisons, we calculated the Bonferroni–Holm-corrected α-levels (see Table 3). Weights were calculated using data from the 2016 German Mikrozensus on age, sex, level of education, and place of residence. Additionally, these weights were calibrated to population totals by calculating 50 Jackknife replicate weights for each case, to reduce the sampling variance of estimators (Baumann et al., 2020; Westat, 2017).

RESULTS

The prevalence and preferred sources of non-, medium, and frequent seekers

The first research question (RQ1) aimed to describe the prevalence of non-seeking to frequent seeking of information. The mean of Covid-19-related information seeking was $M = 3.40$ ($SD = 1.66$), showing that respondents on average searched between one and several times per week. To distinguish between frequent, medium, and nonseekers, we divided the respondents into three groups. The first was the nonseekers of Covid-19-related information, which comprised a group of 23.3% respondents ($n = 606$). The second group was labeled medium seekers and comprised participants who reported seeking information less than once a week to several times a week. This group was most prevalent, with 42.4% ($n = 1102$). The third group comprised the frequent seekers, who reported monitoring news and actively seeking information daily or several times a day. Frequent seekers accounted for 34.3% ($n = 890$).

To answer the second research question (RQ2) regarding the preferred information sources of medium and frequent seekers, we found similar patterns for both types (see Table 1). Across both groups, public service broadcasting and its online offerings were most often the preferred source for information about Covid-19. More than one respondent in three (37.7%) preferred public broadcasting. Frequent-seekers (44.2%) relied on these offerings more than medium seekers (32.5%). National and weekly newspapers and their online offerings (15.3%), traditional media sources on social media (14.7%), and the Internet and search engines (11.9%) were mentioned by more than 10% of the respondents. The share of individuals preferring newspapers was comparable between medium seekers (15.4%) and frequent seekers (15.3%), traditional media on social media (medium seekers:

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TABLE 1 Preferred information sources by frequency of Covid-19-related HISB

	Covid-19-related HISB frequency		
	Medium seekers, *n* (%)	Frequent seekers, *n* (%)	Total, *n* (%)
Public service broadcasting and its online offerings	356 (32.5)	386 (44.2)	742 (37.7)
National newspapers, weekly newspapers, and their online offerings	168 (15.4)	134 (15.3)	302 (15.3)
Traditional media on social media	180 (16.5)	109 (12.5)	289 (14.7)
Internet in general, search engines	153 (14.0)	81 (9.3)	234 (11.9)
Information from administration, research facilities, politicians, and scientists	113 (10.3)	70 (8.0)	183 (9.3)
Radio stations and their online offerings	62 (5.7)	61 (7.0	123 (6.3)
Other	62 (5.6)	33 (3.7))	95 (4.8)
Total	1094 (100.0)	874 (100.0)	1968 (100.0)

Note: $N = 1968$; associations between Covid-19-related HISB frequency and preferred information source: $X^2 = 48.5$, $p < 0.001$; Cramer's $V = 0.157$, $p < 0.001$.

Abbreviations: Covid-19, coronavirus disease 2019; HISB, health information-seeking behavior.

16.5% vs. frequent-seekers: 12.5%), and the Internet and search engines (medium seekers: 14.0% vs. frequent seekers: 9.3%) were more often preferred by medium seekers than by frequent seekers (see Table 1). Further sources the participants mentioned were information from the administration, research facilities, politicians, and scientists (9.3%) and radio stations and their online offerings (6.3%). Frequent seekers (7.0%) more often reported radio stations to be relevant than medium seekers (5.7%), whereas medium seekers (10.3%) preferred to turn to information from the administration, research facilities, politicians, and scientists, compared to frequent seekers (8.0%).

Profiles of non-, medium, and frequent seekers

Research question 3 (RQ3) was concerned with describing and comparing the profiles of non-, medium, and frequent seekers (see Tables 2 and 3). Comparing the types of seekers with reference to their sociodemographic factors, we found that frequent-seekers ($M = 54.95$; $SD = 15.86$) were about 10 years older than medium seekers ($M = 44.28$; $SD = 16.00$) and nonseekers ($M = 45.75$; $SD = 17.34$). This difference between frequent seekers on the one hand and medium and nonseekers on the other was significant (F (2, 2594) = 115.23, $p < 0.001$, $\eta^2 = 0.082$). The share of females was higher among the medium seekers (52.0%) and frequent seekers (50.0%), compared to the nonseekers (46.8%). Respondents with a low SES were overrepresented in the group of the nonseekers (36.5%), compared to medium seekers (25.6%) and frequent seekers (22.5%). In turn, high SES was seldom found in the group of nonseekers (16.7%).

Regarding the perceived health status, we found that all groups evaluated their health status as good, with nonseekers perceiving it as slightly better ($M = 2.06$, $SD = 0.88$) than frequent seekers ($M = 2.18$, $SD = 0.88$), but the difference was not significant after α-correction. The more situation-bound affective responses to the Covid-19 pandemic were in line with these general perceptions. Nonseekers reported to be less concerned about

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TABLE 2 Descriptive group characteristics and differences by frequency of Covid-19-related HISB

	Covid-19-related HISB frequency			
	Nonseekers, *M* (SD)	Medium seekers, *M* (SD)	Frequent seekers, *M* (SD)	Total, *M* (SD)
Age	45.75 (17.34)[a]	44.28 (16.00)[b]	54.95 (15.86)[a, b]	48.28 (16.98)
Gender (% female)	46.8	52.0	50.0	50.1
SES (% low)	36.5	25.6	22.5	27.1
SES (% medium)	46.8	46.7	47.3	46.9
SES (% high)	16.7	27.7	30.2	26.0
General health status[a]	2.06 (0.88)	2.11 (0.83)	2.18 (0.88)	2.12 (0.86)
Health-related self-efficacy[b]	4.08 (0.89)	4.03 (0.77)[a]	4.14 (0.87)[a]	4.08 (0.84)
Information-related self-efficacy[b]	3.43 (1.05)[a]	3.53 (0.87)[b]	3.65 (0.87)[a, b]	3.55 (0.92)
Affective risk responses[c]	2.51 (1.30)[a, b]	3.06 (1.13)[a, c]	3.54 (1.15)[b, c]	3.10 (1.24)
Trust in health information from				
A doctor[d]	3.98 (1.11)[a, b]	4.14 (0.89)[a]	4.23 (0.89)[b]	4.13 (0.95)
Family and friends[d]	3.15 (1.20)	3.08 (1.02)	3.21 (1.03)	3.14 (1.07)
Newspapers[d]	2.48 (1.15)[a, b]	2.80 (0.98)[a]	2.88 (1.07)[b]	2.75 (1.06)
Other health professionals[d]	3.49 (1.25)[a, b]	3.85 (0.91)[a]	3.84 (1.00)[b]	3.76 (1.04)
The Internet[d]	2.51 (1.10)[a, b]	2.70 (0.97)[a]	2.73 (1.12)[b]	2.67 (1.06)
Social media[d]	1.79 (1.10)	1.85 (0.96)	1.90 (1.10)	1.85 (1.04)
TV[d]	2.62 (1.20)[a, b]	2.89 (1.00)[a, c]	3.09 (1.07)[b, c]	2.90 (1.09)
Books[d]	2.88 (1.26)[a, b]	3.21 (1.18)[a]	3.12 (1.22)[b]	3.10 (1.22)
Public health authorities[d]	3.28 (1.41)[a, b]	3.79 (1.12)[a]	3.79 (1.11)[b]	3.67 (1.21)
Nonprofit organizations[d]	2.74 (1.22)[a, b]	3.16 (0.97)[a, c]	3.03 (1.09)[b, c]	3.02 (1.08)
Health insurance funds[d]	3.29 (1.25)	3.38 (1.05)	3.46 (1.15)	3.39 (1.14)
Satisfaction with information about COVID-19[e]	3.53 (1.25)[a]	3.53 (1.02)[b]	3.69 (1.14)[a, b]	3.59 (1.12)

Note: Data represent means (standard deviations) of the respective five-point scales. Exceptions are gender and SES. Same letters (a, b, c) indicate significant differences ($p < 0.05$) in post hoc tests using Tamhane *T2*.

Abbreviations: Covid-19, coronavirus disease 2019; HISB, health information-seeking behavior.

[a]Scale ranging from 1 ("very good") to 5 ("very bad").

[b]Scale ranging from 1 ("not confident at all") to 5 ("completely confident").

[c]Scale ranging from 1 ("not concerned at all") to 5 ("very concerned").

[d]Scale ranging from 1 ("not at all") to 5 ("a lot").

[e]Scale ranging from 1 ("very dissatisfied") to 5 ("very satisfied").

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TABLE 3 Summary of differences among means of groups of Covid-19-related HISB frequency and effect sizes (ANOVAs)

	ANOVA			Post hoc test: Tamhane *T2*			Effect size	
Variables	***F* (*df*1, *df*2)**	***p***	α_{corr}	**Nonseekers versus medium seekers**	**Nonseekers versus frequent seekers**	**Medium seekers versus frequent seekers**	η^2	ε^2
Age	115.23 (2, 2594)	<0.001	0.003	1.477	−9.191***	−10.668***	0.082	0.081
General health status	3.438 (2, 2561)	0.032	0.025	−0.047	−0.116*	−0.069	0.003	0.002
Health-related self-efficacy	4.771 (2, 2589)	0.009	0.010	0.049	−0.067	−0.116*	0.004	0.003
Information-related self-efficacy	9.817 (2, 2569)	<0.001	0.006	−0.100	−0.212***	−0.112*	0.008	0.007
Affective risk responses	135.789 (2, 2575)	<0.001	0.003	−0.544***	−1.025***	−0.480***	0.095	0.095
Trust in health information from								
A doctor	12.959 (2, 2587)	<0.001	0.006	−0.160**	−0.254***	−0.093	0.010	0.009
Family and friends	3.665 (2, 2567)	0.026	0.013	0.073	−0.057	−0.131*	0.003	0.002
Newspapers	28.095 (2, 2530)	<0.001	0.004	−0.321***	−0.409***	−0.088	0.022	0.021
Other health professionals	27.936 (2, 2570)	<0.001	0.005	−0.362***	−0.353***	0.009	0.021	0.021
The Internet	7.824 (2, 2415)	<0.001	0.007	−0.184**	−0.218**	−0.034	0.006	0.006
Social media	1.863 (2, 2.402)	0.155	0.05	−0.057	−0.111	−0.053	0.002	0.001
TV	34.792 (2, 2556)	<0.001	0.004	−0.274***	−0.475***	−0.201***	0.027	0.026
Books	12.960 (2, 2372)	<0.001	0.005	−0.324***	−0.233**	0.092	0.011	0.010
Public health authorities	41.031 (2, 2544)	<0.001	0.003	−0.506***	−0.513***	−0.008	0.031	0.030
Nonprofit organizations	28.669 (2, 2434)	<0.001	0.004	−0.427***	−0.298***	0.129*	0.023	0.022
Health insurance funds	3.618 (2, 2527)	0.027	0.017	−0.092	−0.164*	−0.072	0.003	0.002
Satisfaction with information about Covid-19	5.483 (2, 2551)	0.004	0.008	−0.004	−0.157*	−0.152**	0.004	0.003

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Abbreviations: α_{corr}, Bonferroni–Holm-corrected α-level; ANOVA, analysis of variance; Covid-19, coronavirus disease 2019; HISB, health information-seeking behavior.

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Covid-19 ($M = 2.51$, $SD = 1.30$) than medium seekers ($M = 3.06$, $SD = 1.13$) and frequent seekers ($M = 3.54$, $SD = 1.15$). These differences among all the three groups were significant and explained a rather high amount of variance, F (2, 1575) = 135.79, $p < 0.001$, $\eta^2 = 0.095$.

Regarding the types of self-efficacy considered to characterize nonseekers to frequent seekers, a linear trend across the frequency of seeking behaviors was supported for information-related self-efficacies. Nonseekers evaluated their competencies as the lowest ($M = 3.43$, $SD = 1.05$), vis-a-vis medium seekers ($M = 3.53$, $SD = 0.87$) and frequent seekers ($M = 3.65$, $SD = 0.87$). The differences between nonseekers/medium seekers and frequent seekers were significant, but rather small (F (2, 2569) = 9.82, $p < 0.001$, η^2 =0.008). The self-assessed health-related self-efficacy was relatively high across all the groups considered. We found a significant, but rather weak difference (F (2, 2589) = 4.77, $p = 0.009$, $\eta^2 = 0.004$), between medium seekers who reported the lowest level of confidence ($M = 4.03$, $SD = 0.77$) and frequent seekers who felt most confident ($M = 4.14$, $SD = 0.87$).

Concerning the amount of trust in health information from different sources, all differences among the three groups reached statistical significance at the 95% level, with the exception of trust in health information from social media and health insurance funds (see Tables 2 and 3). We found similar patterns regarding the ranking of the trustworthiness of the sources, with different levels of trust among non-, medium, and frequent seekers (see Tables 2 and 3). Across all the groups, doctors, other health professionals, public health authorities, health insurance funds, and family and friends were evaluated as the most trustworthy (see Table 2). Doctors, in particular, were reported to be the most trustworthy source for frequent seekers ($M = 4.23$, $SD = 0.89$), medium seekers ($M = 4.14$, $SD = 0.89$), and nonseekers ($M = 3.98$, $SD = 1.11$).

Focusing on the levels of trust, our findings consistently showed that nonseekers reported the lowest levels of trust among 10 out of 11 sources and differed significantly, albeit weakly from medium and frequent seekers (see Table 3). Nonseekers perceived Covid-19-related information from doctors, newspapers, other health professionals, the Internet, books, public health authorities, and nonprofit organizations as less trustworthy than medium and frequent seekers (see Table 2). Only regarding trust in health information from family and friends, nonseekers scored slightly higher ($M = 3.15$, $SD = 1.20$) than medium seekers ($M = 3.08$, $SD = 1.02$), but still lower than frequent-seekers ($M = 3.21$, $SD = 1.03$). Considering the corrected α-levels, the difference was not significant (F (2, 2567) = 3.67, $p = 0.026$, $\alpha_{corr} = 0.013$, η^2 =0.003).

Frequent seekers showed the highest scores regarding trust in health information from newspapers ($M = 2.88$, $SD = 1.07$), the Internet ($M = 2.73$, $SD = 1.12$), and TV ($M = 3.09$, $SD = 1.07$), compared to the other two groups (see Table 2). Medium seekers showed the highest trust scores in information from health professionals besides doctors ($M = 3.85$, $SD = 0.91$), books ($M = 3.21$, $SD = 1.18$), and nonprofit organizations ($M = 3.16$, $SD = 0.97$), compared to the other two groups (see Table 2). Both medium seekers ($M = 3.79$, $SD = 1.12$) and frequent seekers ($M = 3.79$, $SD = 1.11$) reported equally high levels of trust in health information from public health authorities, while nonseekers expressed lower trust levels ($M = 3.28$, $SD = 1.41$).

Regarding satisfaction with the available information about Covid-19, we found small, but significant differences among the three groups (F (2, 2,551) = 5.48, $p = 0.004$, $\eta^2 = 0.004$). The post hoc test showed that frequent seekers, who showed the highest satisfaction with the available information about Covid-19 ($M = 3.69$, $SD = 1.14$), significantly differed from nonseekers ($M = 3.53$, $SD = 1.25$) and medium seekers ($M = 3.53$, $SD = 1.02$).

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DISCUSSION

Based on the assumption that information seeking plays a critical role not only in coping with health risks and uncertainties and health promotion (Brashers, 2001; Ramanadhan & Viswanath, 2006) but also in combating health crises like the Covid-19 pandemic (Garfin et al., 2020; Liu, 2020), the objective of this study was to examine information-seeking behaviors during the Covid-19 pandemic. We paid particular attention to identifying and characterizing groups differing in their frequency of actively seeking information about Covid-19. We compared non-, medium, and frequent seekers, which is crucial as they differ in their level of attention to information and emerging challenges such as information overload and knowledge deficits relevant for combating health crises such as the Covid-19 pandemic (Skarpa & Garoufallou, 2021; Soroya et al., 2021).

Our first research question (RQ1) sought to ascertain how prevalent frequent-, medium-, and noninformation-seeking about Covid-19 were in Germany. Supplementing the current state of knowledge by first representative German findings (COSMO, 2021; Link et al., 2021), our analysis revealed that 23.3% of the respondents did not actively seek information about Covid-19 at all, while 34.3% intensively monitored information about the pandemic. Compared to the COSMO study conducted via an online-access panel (COSMO, 2021), our scores suggest that previous studies overestimated the proportion of seekers and underestimated the proportion of nonseekers during the Covid-19 pandemic. Rather, the proportions of nonseekers are comparable to findings on general HISB (Link, 2021a). However, more than one-fifth not seeking information during a health crisis can be evaluated as a relatively high share of the population, considering that the Covid-19 outbreak is a global emergency posing potentially life-threatening risks to everybody. Not keeping abreast of information on the topic can increase the risk of missing important news and information related to the pandemic, of biased processing of information one receives incidentally, as a result of biased risk assessment (Crowley et al., 2021; Siebenhaar et al., 2020; Soroya et al., 2021). However, it is not only non-seeking that should be critically reflected upon but it is also essential to question whether a very frequent engagement and monitoring of information can negatively impact individuals coping with the pandemic. The share of 34.3% who monitored information about the pandemic several times a day are more at risk for a decrease in well-being, sensing information overload or information anxiety, impeding successful coping and functional decision making (Roussi & Miller, 2014; Tull et al., 2020).

RQ2 focused on information seekers and sought the preferred source of information about Covid-19 among medium and frequent seekers. We found similar preference patterns in both groups. Consistent with previous German studies (van Eimeren et al., 2020), public broadcasting was the preferred source of information about Covid-19, but its role was more dominant in the group of frequent seekers, which should be interpreted against the background that the use of public broadcasting was found to be associated with higher information overload (Mohammed et al., 2021). In contrast, the medium seekers more often preferred traditional media on social media, the Internet, and information from administrations, research facilities, politicians, and scientists. The difference may be explained by a greater affinity for online sources associated with the 10 years age difference between the two groups. Another explanation is the source characteristics (Rains & Ruppel, 2016). In particular, the Internet provides the medium seekers with an opportunity to search for information in a very targeted and goal-oriented way and provides access to expertise (Rains & Ruppel, 2016). In contrast, the frequent seekers may acquire information that is less goal-oriented, but may concentrate on a few sources they routinely access several times a day, offering continuous monitoring and surveillance.

To answer the third research question (RQ3) about profiles of non-, medium, and frequent seekers, we aim to interpret our findings in the broader context of health and social

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inequalities associated with informational inequalities (Ramanadhan & Viswanath, 2006; Viswanath & Kreuter, 2007). We identified some factors associated with less frequent information seeking about Covid-19. Compared to the other two groups, nonseekers were characterized by a lower SES, lower affective risk responses, lower perceived information-related self-efficacy, and lower trust in information sources, which is in line with previous findings (Ramanadhan & Viswanath, 2006).

Concerning individuals' SES and information-related self-efficacy, differences between nonseekers and frequent seekers highlight the importance of perceived capabilities and resources to complete communication tasks (Afifi & Weiner, 2004; Viswanath & Kreuter, 2007). The lack of resources and capacities is a known barrier to becoming empowered and taking an active role in one's health prevention and care (Viswanath & Kreuter, 2007).

The role of affective risk response reveals that medium and frequent seeker are more concerned about Covid-19 than nonseekers. This finding suggests that being more or less concerned about Covid-19 could be either the cause or the consequence of frequent or non-seeking, and this could initiate reinforcing spirals that may lead to consequences such as information overload or knowledge deficits (Gallotti et al., 2020; Garrett, 2020; Lambert et al., 2009; Siebenhaar et al., 2020).

We also found that nonseekers perceived information sources as generally less trustworthy—the difference was most evident by comparing non- and frequent seekers and relevant to journalistic outlets as well as experts or health authorities. This result supports the former findings of Ramanadhan and Viswanath (2006) but contradicts the assumption that distrust can serve as a cause to turn to multiple sources associated with more frequent HISB. However, one exception to this tendency of skepticism towards sources among nonseekers seems noteworthy: Nonseekers did not trust less in their family and friends than medium and frequent seekers. These findings highlight the relevance of social support and the mediating role of social networks in distributing information and reaching nonseekers. Engaging peers may be an avenue to reach nonseekers and support their knowledge gain.

Limitations and resulting tasks for future research

Some possible limitations of the current study need to be considered. First, during health crises like the Covid-19 pandemic characterized by the vast amount of information and the fast spread of misinformation, it is not only relevant to examine the frequency of HISB and the preferred sources but also which information is selected, processed, and which conclusions people draw from them. The current study cannot depict the consequences of more or less frequent information seeking such as information overload, knowledge deficits, or compliance with self-protective behaviors at all. Longitudinal study designs might particularly help analyze the thin line between the positive and negative consequences of seeking and non-seeking behaviors and parse causal relationships.

Second, the distinction between medium and frequent seekers was made on an empirical basis only, whereas a theoretically derived criterion justifying a classification is missing.

Third, we were interested only in purposeful information seeking but did not consider that in times of high ubiquity of available information (Tandoc & Lee, 2020) receiving incidental information and information scanning might be very prevalent, provide nonseekers with a sufficient amount of knowledge, and enable them to adapt to the situation.

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Fourth, the relatively small effect sizes of the single determinants under study stress the need to consider more relevant factors to distinguish between non-, medium, and frequent seekers and explore the barriers of information distribution more broadly. According to models of HISB (e.g., Afifi & Weiner, 2004; Griffin et al., 1999), sociocultural factors like social norms, outcome expectancies, or a more differentiated view on self-efficacies and competencies could be considered to better understand non- and frequent-seeking behaviors.

Main conclusion and practical implications

The findings of the present study extend the evidence base on Covid-19-related information seeking, by describing the prevalence of non-seeking to frequent seeking in the general public and shedding light on the profiles of non-, medium, and frequent seekers. Our approach highlights differences among these groups, providing indications for strategic health communication approaches and information dissemination, and may guide initiatives to fight informational inequalities caused by inattention to health information or information overload. We consider nonseekers paying no attention to health information as a challenging target group for interventions aimed at enhancing awareness and knowledge gain, attitude and behavior change relevant for combating health crises, and health promotion, prevention, and informed decision making in general. Against the background of the potentially negative consequences of non-seeking like lower health knowledge, increased information inequalities, and lower levels of empowerment for informed decision making (Viswanath & Emmons, 2009), our findings guide us to identify particularly vulnerable target groups, such as individuals with lower socioeconomic status, lower affective risk responses, lower information-related self-efficacy, and lower trust scores in information sources. This points to the need for (digital) health literacy interventions which help to improve the people's knowledge, motivation, and competencies to access, understand, appraise, and apply health information from different sources (Sørensen et al., 2012).

Health literacy interventions can also be a countermeasure to prevent information overload and information and health anxiety that might be a result of the overexposure to information about the Covid-19 pandemic (Qu et al., 2021; Tull et al., 2020) as well as the exposure to information of questionable quality (Eysenbach, 2020). Against the background of potential negative outcomes of overexposure to Covid-19 news, health institutions should increase the awareness of symptoms of information overload and provide the general public with strategies to handle health information (Mohammed et al., 2021).

To sum up, our findings act as a guide to overcoming barriers to health information provision and thereby enhance health promotion. Planners of informational interventions, health communicators as well as health professionals need to be aware of the profiles of nonseekers as well as frequent seekers to find adequate strategies to overcome barriers and design adequate supportive information (Lambert et al., 2009), and in doing so, potentially reduce negative consequences of non-seeking, such as information inequalities, and frequent seeking, such as increased negative beliefs and emotions (Roussi & Miller, 2014). Our findings suggest that it could be promising to design communication campaigns using social network diffusion strategies and initiating interpersonal communication to foster adequate risk perception and affective risk responses relevant to triggering "positive engagement" with information. Further, health interventions should address abilities like information-related self-efficacy or health literacy, focusing on individuals with low socioeconomic status.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

ETHICS STATEMENT

Our type of data collection operates in accordance with the German General Data Protection Regulation (GDPR) and the Declaration of Helsinki. Informed consent is guaranteed, only unidentifiable data of the participants are provided, and the participants are free to cancel participation or refuse to answer questions. All data of HINTS Germany will be accessible free of charge to researchers; while data of the first wave are already open access (www.hints-germany.de), data of the second wave are announced to be accessible by the end of 2021.

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