



 **Universität Trier**

**I Want to Know Everything: Motivational and  
Self-Regulatory Determinants of the Intention to  
Comprehensively Search for Health Information**

Kumulative Dissertationsschrift zur Erlangung der Doktorwürde  
(Dr. rer. nat.) im Fach Psychologie, Fachbereich I, Universität Trier

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*Für meine Mutter*

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*A [...] sign of health is that we don't become undone by fear and trembling, but we take it as a message that it's time to stop struggling and look directly at what's threatening us.*

Pema Chödrön

## Table of Contents

List of authored and co-authored publications.....	6
List of publications included in the cumulative dissertation .....	7
Abstract.....	8
<b>1 Introduction .....</b>	<b>9</b>
<b>2 Theoretical Background .....</b>	<b>13</b>
<b>2.1 Terminology.....</b>	<b>13</b>
<i>2.1.1 Motivational dispositions.....</i>	<i>13</i>
<i>2.1.2 Self-regulation .....</i>	<i>14</i>
<i>2.1.3 Intentions .....</i>	<i>15</i>
<b>2.2 Psychological Models of Health Information Seeking.....</b>	<b>16</b>
<b>3 Unveiling the Subjective Perception of Health Information Sources: A Three-Dimensional Source Taxonomy Based on Similarity Judgements (Wedderhoff, Chasiotis, Rosman, &amp; Mayer, 2018).....</b>	<b>20</b>
<b>3.1 Summary .....</b>	<b>20</b>
<b>3.2 Discussion.....</b>	<b>21</b>
<b>4 Why Do We Want Health Information? The Goals Associated With Health Information Seeking (GAINS) Questionnaire (Chasiotis, Wedderhoff, Rosman, &amp; Mayer, 2019a).....</b>	<b>24</b>
<b>4.1 Summary .....</b>	<b>24</b>
<b>4.2 Discussion.....</b>	<b>26</b>
<b>5 The Role of Approach and Avoidance Motivation and Emotion Regulation in Coping Via Health Information Seeking (Chasiotis, Wedderhoff, Rosman, &amp; Mayer, 2019b).....</b>	<b>29</b>
<b>5.1 Summary .....</b>	<b>29</b>
<b>5.2 Discussion.....</b>	<b>31</b>
<b>6 General Discussion .....</b>	<b>34</b>
<b>7 References .....</b>	<b>40</b>
<b>Appendix A .....</b>	<b>49</b>
<b>Appendix B.....</b>	<b>60</b>
<b>Appendix C .....</b>	<b>82</b>

## List of authored and co-authored publications

Wedderhoff, O., Chasiotis, A., & Rosman, T. (in press). Erkenne dich selbst! Die Bedeutung adäquater vs. inadäquater Selbsteinschätzung relevanter Fähigkeiten bei der Präferenz von Gesundheitsinformationen. *Psychologische Rundschau*.

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Mayer, A.-K., Holzhäuser, J., Chasiotis, A., & Wedderhoff, O. (2018). Assessing health literacy by performance tests: The Health Information Literacy Knowledge Test (HILK). In A.-K. Mayer (Ed.), *Health Literacy Across the Life Span* (pp. 127-145). Lengerich, Germany: Pabst Science Publishers.

Wedderhoff, O., Chasiotis, A., Rosman, T., & Mayer, A.-K. (2018). Unveiling the Subjective Perception of Health Information Sources: A Three-Dimensional Source Taxonomy Based on Similarity Judgements. *Frontiers in Communication*. <https://doi.org/10.3389/fcomm.2018.00057>

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## List of publications included in the cumulative dissertation

### Article I

Wedderhoff, O., Chasiotis, A., Rosman, T., & Mayer, A.-K. (2018). Unveiling the Subjective Perception of Health Information Sources: A Three-Dimensional Source Taxonomy Based on Similarity Judgements. *Frontiers in Communication*.

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### Article II

Chasiotis, A., Wedderhoff, O., Rosman, T., & Mayer, A.-K. (2019a). Why do we want health information? The goals associated with health information seeking (GAINS)

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### Article III

Chasiotis, A., Wedderhoff, O., Rosman, T., & Mayer, A.-K. (2019b). The Role of Approach and Avoidance Motivation and Emotion Regulation in Coping Via Health Information

Seeking. *Current Psychology*. <https://doi.org/10.1007/s12144-019-00488-3>

## **Abstract**

The dissertation includes three published articles on which the development of a theoretical model of motivational and self-regulatory determinants of the intention to comprehensively search for health information is based. The first article focuses on building a solid theoretical foundation as to the nature of a comprehensive search for health information and enabling its integration into a broader conceptual framework. Based on subjective source perceptions, a taxonomy of health information sources was developed. The aim of this taxonomy was to identify most fundamental source characteristics to provide a point of reference when it comes to relating to the target objects of a comprehensive search. Three basic source characteristics were identified: expertise, interaction and accessibility. The second article reports on the development and evaluation of an instrument measuring the goals individuals have when seeking health information: the 'Goals Associated with Health Information Seeking' (GAINS) questionnaire. Two goal categories (coping focus and regulatory focus) were theoretically derived, based on which four goals (understanding, action planning, hope and reassurance) were classified. The final version of the questionnaire comprised four scales representing the goals, with four items per scale (sixteen items in total). The psychometric properties of the GAINS were analyzed in three independent samples, and the questionnaire was found to be reliable and sufficiently valid as well as suitable for a patient sample. It was concluded that the GAINS makes it possible to evaluate goals of health information seeking (HIS) which are likely to inform the intention building on how to organize the search for health information. The third article describes the final development and a first empirical evaluation of a model of motivational and self-regulatory determinants of an intentionally comprehensive search for health information. Based on the insights and implications of the previous two articles and an additional rigorous theoretical investigation, the model included approach and avoidance motivation, emotion regulation, HIS self-efficacy, problem and emotion focused coping goals and the intention to seek comprehensively (as outcome variable). The model was analyzed via structural equation modeling in a sample of university students. Model fit was good and hypotheses with regard to specific direct and indirect effects were confirmed. Last, the findings of all three articles are synthesized, the final model is presented and discussed with regard to its strengths and weaknesses, and implications for further research are determined.

## 1 Introduction

There are lots of situations in which one might consider to seek health information. Where does this headache come from? What exactly does this diagnosis mean which I just received? Self-care, shared decision making and patient empowerment through an enhanced and facilitated access to health information even for laypeople, have become more and more relevant in the health care system of today's so-called "information age" (Johnson & Case, 2012; Lambert & Loiselle, 2007). Individuals may, for example, search for health information to find ways to overcome their health problem, to engage in decision making with regard to a health issue or to become able to change their behavior for the purpose of promoting health and wellbeing (Lambert & Loiselle, 2007). Consequently, a vast amount of definitions of "health information seeking" (HIS) can be found in the literature. Most of the definitions include a description of a certain concept-inherent action, e.g., "obtain[ing] knowledge of a specific [health-related] event or situation" (Barsevick & Johnson, 1990, pp. 3-4). Furthermore, HIS is widely understood of as goal-directed, and thus, as an intentional behavior (Johnson & Case, 2012), instead of as an activity which takes place rather accidentally.

Many definitions include the specific function(s) of which such an intentional action might be the direct consequence. Rees and Bath (2000), for example, define HIS as a "[...] coping strategy sometimes adopted by individuals as a response to threatening situations" (p. 72). In general, it is conceived of as a specific means to practically and/or emotionally deal with a (more or less existential) health threat (Shiloh & Orgler-Shoob, 2006). This means that, on the one hand, HIS may serve a better understanding of the health threat and, as a consequence, in becoming able to participate in medical decisions, or even in alleviating or eliminating the problem. On the other hand, it may serve the purpose to reduce threat-related anxiety and uncertainty and provide some reassurance. Relying on these conceptualizations with regard to the functions of HIS, according to Chasiotis, Wedderhoff, Rosman, & Mayer (2019b; see Chapter 5), it can be understood of as *an intentional behavioral strategy to cope with a health threat, via actively and deliberately searching and retrieving health related information, e.g. about prevention, symptoms and diseases using any kind of information channels.*

According to Lambert and Loiselle (2007), HIS can be characterized using two main information attribute descriptions that are partly non-redundant and thus, interdependent: *amount* and *type*. The "amount" attribute refers to the sheer amount of information which is retrieved. Research on HIS focusing on this attribute includes approaches regarding individual

tendencies to actively avoid any health information at all (e.g., Barbour, Rintamaki, Ramsey, & Brashers, 2012) as well as studies focusing on differences in the (intended) amount of retrieved health information in various health contexts (e.g., cancer; Mayer et al., 2007). The “type” attribute refers to the variability and balance of a search. A search for (health) information can be rather shallow, opinion-driven and self-confirming (see Hart et al., 2009), or rather broad and exhaustive, with the effect of providing “the whole picture” on a health problem rather than some specific aspects of it. A prominent example for a biased search might be a phenomenon called “cyberchondria” (White & Horvitz, 2009). When experiencing a headache, for example, individuals prone to cyberchondria try to get information about the typical symptoms of a brain tumor. Alternatively, they could have initiated a broad search aimed at finding out the many possible causes a headache may have (as the probability of suffering from a brain tumor when experiencing a headache is negligible).

Although not completely redundant, the two attributes of HIS (amount and type of seeking) appear to be closely related and difficult to tell apart when observed in everyday life. Taken together, they can be subsumed under the term “comprehensiveness of search“ (Heinström, 2002)<sup>1</sup>. A comprehensive search for health information is thus characterized by retrieving a considerable amount of balanced information about a specific health topic. A competence construct which can be defined as the ability to carry out such a comprehensive search is health (information) literacy. According to the literature, it is associated with a wide range of positive health outcomes, adaptive health behaviors and with effectively communicating in health care-contexts (e.g., Gray et al., 2005; Ransom et al., 2005; Schulz & Nakamoto, 2013; Zheng et al., 2018). Seeking exhaustively and in a balanced way may thus rather bring about valid search results, which may promote adaptive health-promotion behaviors, whereas a very short and shallow or biased search may merely reproduce precast opinions and fears (Greving & Sassenberg, 2015). In view of the significant function of HIS as a means of coping with a situation which might be perceived of as existentially threatening, focusing on its comprehensiveness as the most important feature in predicting health behavior and health outcomes is crucial. How can interindividual differences in HIS comprehensiveness be explained? What does individuals prompt to seek comprehensively or very shallow when they want to cope with a health problem?

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<sup>1</sup> Heinström (2002) uses the term “thoroughness” instead of “comprehensiveness”. However, to emphasize the result of the search (which is comprehensive) rather than the search process (which might be characterized by thoroughness), here, the latter term is used.

There are many explanatory models, especially from the fields of public health and communication sciences, in which a wide range of influential factors accounting for interindividual differences in various HIS characteristics is taken into account. The Comprehensive Model of Information Seeking (CMIS; Johnson, 1997), a very prominent example for such a model, includes individual “antecedents” like demographics, experience and beliefs as predictors of preferred “information carrier factors” like information source characteristics and utilities. These, in turn, are to predict “actions” of HIS, which constitute a very broad conceptualization of any seeking behavior, like choice of information source. Two other prominent HIS explanatory models are the Risk Information Seeking and Processing Model (RISP; Griffin, Dunwoody, & Neuwirth, 1999) and the Planned Risk Information Seeking Model (PRISM; Kahlor, 2010). These two models include, for example, attitudes toward the search, health risk perception, affective reactions and perceived knowledge about the health issue as intraindividual factors contributing to the prediction of HIS.

What all these models have in common is their lack of consideration of general as well as more specific dispositional motivational and self-regulatory factors. However, in situations where a health problem arises or a real (health) threat is perceived, basic motivational dispositions are suggested to affect self-regulatory processes and motivate behavioral tendencies (e.g., Carver, 2005; 2006; Hevey & Dolan, 2014). Given the often existential nature of such situations, the pertinence of these factors in predicting coping behaviors like HIS, may be even greater (Goldenberg, Kosloff, & Greenberg, 2006). Furthermore, advancing our knowledge with regard to certain motivational and self-regulatory determinants of an adaptive search for health information could not only fertilize more research in a scarcely covered field. Even more so, on a very pragmatic level, it could be of help to clinical practitioners in following a need-sensitive and flexible approach when providing health information (see also Kiesler & Auerbach, 2006).

The aim of this dissertation is to develop and evaluate a theoretical model of (dispositional) motivational and self-regulatory determinants of the intention to comprehensively search for health information. To aid its ecological validity, the model should include relevant motivational and self-regulatory dispositions that are a) conceived of on a generalized level as well as those that are b) very specific to the context of HIS. As we have seen, HIS can be understood of as intentional, goal-directed behavior. Classic theories of goal-directed action like the “Rubicon” model of action phases (Heckhausen & Gollwitzer, 1987) assume that intentions are built as a consequence of various motivational and self-regulatory processes. Finally performing and maintaining the intended action requires, in turn, different self-

regulatory and motivational approaches. Many established models of HIS focus on the *intention building* process to seek in specific ways or to consult particular sources (e.g., the PRISM model; Kahlor, 2010). Focusing on both the process of intention building and initiating a respective action would require two very different research approaches. For this reason, this dissertation focuses on the motivational and self-regulatory processes that precede the *intention* to comprehensively search for health information.

## 2 Theoretical Background

### 2.1 Terminology

In this subchapter, the three central constructs that will be considered in the theoretical model will be defined and briefly discussed: motivational dispositions, self-regulation, and intentions.

#### 2.1.1 *Motivational dispositions*

The term “motivation” refers to psychological processes preparing (e.g., via goal setting and intention building) and executing actions that are directed at satisfying an individual’s needs and/or at avoiding need frustration (Kuhl, 2010). Thus, motivations are evoked in certain situations and do not exist or arise independently from a specific context (Atkinson, 1958). However, persons differ in their proneness to specific motivations across situations. The term “motivational dispositions” refers to this interindividually varying proneness (Carver, 2005; 2006; Elliot & Thrash, 2002). Hence, motivational dispositions are generally understood of as basic, primarily genetically determined individual differences in motivation (Hartig & Moosbrugger, 2003).

There are specific kinds of motivational dispositions that are prominent in psychological research, like achievement or power motivation. However, a more basic distinction between motivational dispositions can be made that underlies all specific forms of motivation (e.g., achievement motivation) and emphasizes those motivational functions that are relevant in situations where an existential subject is salient (like health or death; Elliot, 2008; Goldenberg, Kosloff, & Greenberg, 2006). It is, in fact, based on the two functions mentioned above that a motivation-driven (or motivated) action may have: the distinction between approach (i.e., satisfying a need) and avoidance (i.e., avoiding need frustration; Corr, 2013). According to Kuhl and Koole (2008), these two motivations underlie the whole system of personality on its various levels of functioning. Elliot (2008) defines approach motivation as a process directing and energizing behavior that promotes positive situations and maintains existing ones, whereas avoidance motivation aims at preventing negative situations and escaping existing ones. Carver (2005) emphasizes the sensitivity of both motivational dispositions with regard to certain situations: accordingly, approach motivation can be conceptualized as sensitivity to reward and reward-related emotions like joy, whereas avoidance motivation is sensitive to threat or punishment and threat-related emotions like anxiety. Dispositional approach and avoidance motivation can be conceptualized on

approximately orthogonal dimensions (Elliot & Thrash, 2002; Larsen & Augustine, 2008). It would thus be possible, for example, to be very approach motivated (e.g., very reward-sensitive and prone to experience joy) and also very avoidance motivated (e.g., threat-sensitive and easily frightened) on a dispositional level.

### **2.1.2 Self-regulation**

The term “self-regulation” refers to processes related to monitoring and adjusting emotions, cognitions and behaviors to attain a defined goal or a desired end state (Carver & Scheier, 1998; Marques, Ibanez, Ruiperez, Moya, & Ortet, 2005; Tamir, 2016). There are two profound subcomponents of self-regulation which support goal attainment via monitoring and adjusting processes: emotion regulation and self-efficacy. The first, emotion regulation, describes the ability to downregulate an undesired emotional state (usually negative affect - this is also referred to as “self-calming”; Kuhl, 2001) and to upregulate desired emotional states (usually positive affect; Koole, van Dillen, & Sheppes, 2011). This ability functions as “self-regulatory” by ensuring to regulate emotions in a way which proves to be useful for reaching a certain goal (Koole et al., 2011; Tamir, 2009; 2016). For example, the upregulation of positive affect helps in implementing difficult intentions (Kazén, Kaschel, & Kuhl, 2008; Kuhl, 2001).

The second profound subcomponent of self-regulation, self-efficacy, is also appraised as very central, especially when it comes to monitoring and evaluation processes in pursuing a certain goal (Baumann & Kuhl, 2013; Cervone, Mor, Orom, Shadel, & Scott, 2011; Koriat, Ma’ayan, & Nussinson, 2006; Kuhl, 2001; Maddux & Volkmann, 2010). Self-efficacy encompasses the perceived ability to initiate or maintain certain actions and/or behaviors to reach a defined goal or meet a specific challenge (Cervone et al., 2011; Bandura, 1977). Maddux and Volkmann (2010) describe self-efficacy as a result of “us[ing] past knowledge and experience to form beliefs about future events or states, one’s abilities, and one’s behavior” (p. 320). Thus, self-efficacy generates continuous feedback about one’s perceived performance in attaining a goal (monitoring function; see also Koriat et al., 2006). Furthermore, it provides the necessary foundation to decide whether the goal itself or the strategies that were adopted to reach it have to be adjusted or even relinquished. Self-efficacy is thus not a self-regulatory process itself (unlike emotion regulation), but rather a necessary evaluative instance resulting from past self-regulatory endeavors and affecting future ones (Cervone et al., 2010). It has, for instance, a pertinent impact on persistence and effort when pursuing a goal (Zimmerman, 2000). *Domain-specific* self-efficacy refers to the perceived ability to reach goals within

certain domains. HIS self-efficacy, for example, describes the perceived ability to find and understand health information.

### **2.1.3 Intentions**

According to Kuhl (2010), intentions are actions that a person feels obliged or bound to perform in the future. Individuals form intentions whenever the execution of such actions involves a certain amount of motivation, effort, and willpower (and thus, is difficult or rather unpleasant). Intentions are very similar to goals, and often both terms are used interchangeably, especially in everyday language. However, they are to be distinguished from goals in that the latter can be understood of as mere representations of desired *consequences* of a specific action (Kuhl, 2010). Comprehensively seeking for health information, for example, requires building an intention as it goes along with effortful monitoring, planning and constant evaluative processes (e.g., How should I start my search? Do I now know everything I wanted to? When is my search really comprehensive?).

The renowned “Rubicon model of action phases” (Heckhausen & Gollwitzer, 1987) distinguishes between four phases of pursuing a goal or an intentional action: predecisional, postdecisional, actional, and postactional action phases. The first phase (predecisional) falls within the process of *goal setting* (i.e., intention building). The last three phases describe the motivational, cognitive and behavioral processes that follow the decision to pursue a certain goal (when the execution of the necessary action is not difficult) or the formation of a specific intention (in all other cases). These phases are subsumed under the term *goal striving* (Gollwitzer, 1990). Between goal setting and goal striving, the “Rubicon is crossed”: the intention to perform a certain action is built. The motivational and cognitive processes preceding the formation of an intention are designated as “selection motivation processes” (Kuhl, 1983)<sup>2</sup>. They are, on the one hand, characterized by specific situationally evoked motivations resulting from implicit or explicit motives, needs or desires. On the other hand, these selection motivation processes involve considerations with regard to the usefulness and attainability of a specific goal or intention (or, with regard to attainability, the execution of an intention; Achtziger & Gollwitzer, 2009). Here, self-efficacy (see Chapter 2.1.2), i.e. the perceived ability to carry out the intention, plays a crucial role (Kuhl, 2001). The first of the two modulation assumptions of Kuhl’s (2000, 2001) personality systems interaction (PSI) theory also refers to intention building and subsequent volitional enactment and underlines the

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<sup>2</sup> This stands in contrast to the so called “realization motivation” processes which come *after* an intention is built, in the goal striving phases.

crucial role of self-regulatory processes like regulation of positive affect in this process. Thus, an intention (i.e., the commitment to perform a relatively effortful action) is the result of particular motivational and cognitive processes that involve determining needs as well as desires, and evaluating ways to satisfy them.

## **2.2 Psychological Models of Health Information Seeking**

As we have seen, there already are some prominent explanatory models of HIS, mainly originating from the fields of public health and communication sciences (see Chapter 1). Some of these models even include concepts that are comparable to the intention to seek comprehensively as dependent or target variable, like the Risk Information Seeking and Processing Model (RISP; Griffin, Dunwoody, & Neuwirth, 1999). Most of these models also include not only situational, but also intraindividual factors like perceived health risk and knowledge. However, they lack consideration of dispositional motivational and self-regulatory variables that are known to explain interindividual differences in coping behavior when a (potentially existential) threat is present (Kuhl, 2001; Kuhl & Koole, 2008; Goldenberg, Kosloff, & Greenberg, 2006). Furthermore, the strong focus on situational and societal components is often criticized, if not most in the fields of public health and communication sciences themselves (e.g., Johnson & Case, 2012; Lammers, 2011).

In contrast, theoretical models of HIS that originate from (health) psychological research mainly focus on interindividual differences that result from individual dispositions and include central dispositional motivation and self-regulatory variables. The most prominent three of these models have inspired countless further research as well as practical implementation approaches in the areas of health communication and health (behavior) promotion. The first differentiates between so called “repressors” and “sensitizers” (Byrne, 1961). These categories are suggested to encompass two types of dispositional tendencies individuals may exhibit in their handling (health) information. These tendencies are arranged on two opposing poles of one dimension. According to the theory, repressors tend to avoid and/or deny potentially threatening information, whereas sensitizers approach threatening information and actively seek it out. A similar very prominent distinction that builds upon Byrne’s (1961) approach stems from Miller (1987). Here, two dimensions are suggested to categorize individual information behavior in the face of a health threat: Monitoring and blunting. “Monitoring” describes the dispositional behavioral tendency to actively seek out threatening information with the aim to face a certain danger and overcome it. “Blunting” encompasses the dispositional behavioral tendency to avoid and deny threatening information.

This implies four potential “personality types” of HIS (high and low “blunters”, high and low “monitorers”). The most recent of the three theoretical models heavily builds on the former two. The “model of coping modes” (MCM; Hock & Krohne, 2004; Krohne & Hock, 2011) differentiates between “vigilant (uncertainty-oriented)” and “cognitive-avoidant (arousal-oriented)” coping processes that are conceptualized as dispositional preferences. Very briefly, a vigilant coping process is characterized by actively seeking threatening information, even at the risk of feeling bad thereafter, with the final aim to reduce uncertainty (the underlying motivation is called “fear of danger”). In contrast, the cognitive avoidant coping style aims at reducing arousal, and therefore, threatening information is rather avoided, denied or ignored (the underlying motivation here is “fear of anxiety”).

Taken together, these models provide highly valuable approaches to explain interindividual differences in actively seeking versus avoiding potentially threatening health information. Thereby, they (more or less explicitly) consider basic motivational dispositions like approach and avoidance motivation. Furthermore, to an extent, they take into account the fundamental role self-regulation plays when a health threat is present. Avoiding health information, for example, may be understood of as a basic form of emotion regulation (e.g., van’t Riet & Ruiter, 2013). However, if health information is not completely avoided but an active search is conducted, this search can vary, as we have seen, on a wide continuum with regard to its comprehensiveness (see Chapter 1). Thus, models exclusively focusing on all-or-none alternatives in HIS neglect the many potential variations an active search may exhibit. These may include, for example, very shallow searches with the aim to avoid threatening information, or biased searches aiming to find one specific reassuring piece of information. Another limitation that applies to all three models is their rather static, typological, even dichotomizing approach that, moreover, does not take into consideration any situational factors (which may vary, even in a relatively narrow context like HIS). Conceptualizing typologies and dichotomizations help a lot with regard to tangibility, parsimony and accessibility of explanations of behavior (characteristics that a lot of theoretical models in the field of psychology may lack). However, this is borne by the accuracy and validity of such explanations, especially with regard to the interdependence of various dispositional influential factors and how they come into effect in specific situations.

Thus, when aiming at developing a theoretical model that explains how motivational and self-regulatory processes affect the intention to comprehensively search for health information, one needs to take into consideration the varying situational dependency of these dispositions

and consider potential interactions and dependencies between them. Therefore, rather than using a static, typological approach, a complementary, more dynamic and flexible approach which, finally, may exhibit a higher ecological validity, is advisable. When, as in these three models, psychological phenomena are explained by the frequency of their simultaneous occurrence, this is referred to as a “descriptive” or “psychographic” approach (Kuhl, 2010). A so-called function analytic approach, on the other hand, aims at identifying psychological mechanisms that are not directly observable but *underlie* observable phenomena. Using this approach, some flawed assumptions and problematic conclusions that are sometimes inevitable in the psychographic approach are evaded (Kuhl, 2010). Furthermore, it is possible to view personality dispositions as stable behavioral tendencies, which may, however, interindividually vary with regard to the situations in which the dispositions are most markedly operative. Explaining a situation-specific intention like comprehensively seeking health information calls for a model that integrates very broadly framed dispositions that may come into effect in a multitude of situations, as well as very situation specific dispositions that relate to a particular context. Furthermore, the model should consider and build upon valuable theoretical contributions regarding the process of intention building in general (Heckhausen & Gollwitzer, 1987; Kuhl, 2000; 2001). With this, a model is developed that takes into account two main limitations of already established models. On the one hand, this means tackling the wide neglect of the role personality factors play in HIS, which is mainly true for models from the areas of public health and communication science. On the other hand, this means superseding the mainly typological, “all-or-nothing” static modeling which has been applied in psychological research, by a rather function analytic approach which focuses on the underlying mechanisms of developing an intention to search comprehensively.

Besides the significant theoretical contribution of developing such a model, being able to explain how motivational and self-regulatory dispositions function as determinants of the intention to comprehensively search for health information, could inform tailored interventions. Individuals may, for example, differ in their ability to downregulate anxiety. They may then benefit from interventions training them in refraining from so-called “escalating” searches that are driven by specific fears and biased in a way that they tend to confirm these fears. After searching for the term “headache brain tumor”, for example, the results may lead to the wrong conclusion that a headache very often indicates a brain tumor (White & Horvitz, 2009).

In the next three chapters, three published articles are summarized and discussed which build upon each other sequentially, and encompass the process of developing and evaluating the theoretical model.

### **3 Unveiling the Subjective Perception of Health Information Sources: A Three-Dimensional Source Taxonomy Based on Similarity Judgements (Wedderhoff, Chasiotis, Rosman, & Mayer, 2018)<sup>3</sup>**

This article describes the development of a three-dimensional taxonomy of health information sources based on individuals' source similarity judgements. The article was accepted 3<sup>rd</sup> December 2018 and published 13<sup>th</sup> December 2018 in *Frontiers in Communication* (Frontiers).

#### **3.1 Summary**

Health information sources that an individual prefers or seeks out are often used as outcomes of relevant individual and situational predictors of HIS (e.g., Dutta-Bergman, 2004; Rutten, Arora, Bakos, Aziz, & Rowland, 2005). However, knowing that a specific source (e.g., the family doctor) is preferred over another (e.g., a health website) is not sufficient to be able to say *why* this is the case. Furthermore, when interested in crucial characteristics of HIS like comprehensiveness, it is pertinent to know about potential information users' perception of which features basically represent all sources of health information. Therefore, besides considering situational and personality factors, it is crucial to take into account source-immanent features that drive such a preference and might explain individual differences in HIS. There already are some studies which, instead of the preference of concrete sources like doctors, friends or textbooks, investigate the preference of (rather abstract) source features like, for example, quality, usefulness, interactivity, credibility and/or saliency (e.g., Gray, Klein, Noyce, Sesselberg, & Cantrill, 2005; Lu & Yuan, 2010; Zimmer, Henry, & Butler, 2007). These features, however, are merely theoretically derived (albeit empirically evaluated) and vary considerably across studies with different foci and levels of abstraction, which makes the studies less comparable. For this reason, our aim was to empirically identify the most basic underlying source features that individuals (implicitly or explicitly) use to structure the "universe" of health information sources. With this, we strived to build a health information source taxonomy which is universally applicable, highly comparable and based directly on the subjective perceptions of potential users.

Therefore, in our study, we asked  $N = 150$  German-speaking participants over 18 years to rate on a 7-point Likert scale all possible pairs of nine expert-selected health information sources

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<sup>3</sup> See Appendix A.

with regard to their similarity (e.g., “*How similar are physicians to textbooks as sources of health information?*”). The pre-selected health information sources included physicians, other health care professionals, family/friends, textbooks, online search engines, online health portals, online social networks, online lexica, and media libraries/video portals. Thus, a total of 36 ( $9 \times [9-1]/2$ ) comparisons had to be made. On the basis of so-called “distance measures” that were derived from these data, using exploratory non-metric multidimensional scaling (MDS; Torgerson, 1952; Kruskal & Wish, 1990), it was possible to arrange the nine sources on dimensions so that they best fit the data. The number of dimensions was then selected based on statistical and theoretical considerations, and after that, every single dimension of the selected solution could be labelled according to theoretical assumptions (Borg & Staufenbiel, 2007). A three-dimensional solution was identified to provide the “ideal” number of dimensions according to a Scree test which uses a so-called stress-index (Kruskal, 1964) as measure of misfit. “Ideal” here refers to the most parsimonious and, at the same time, best fitting solution. According to this test, the ideal number of dimensions is reached when the stress index stops improving markedly (Cattell, 1988). However, we ensured that this solution was not only statistically or empirically ideal, but also theoretically explainable. The two- and the four-dimensional solution were also inspected and it was agreed on the three-dimensional solution as best to interpret.

On the first of the three dimensions, the sources at the respective dimension endpoints came out to be “physicians”, “other health care professionals” vs. “social networks” and “family/friends”. This dimension was labelled *expertise*. At the endpoints of the second dimension were “family/friends”, “physicians” and “social networks” vs. “online lexica” and “search engines”. We labelled this dimension *interaction*. At the endpoints of the third dimension were “family/friends” and “online health portals” vs. “media libraries” and “physicians”. We labelled this dimension *accessibility*. Thus, we argue that health information sources, from potential users’ point of view, can be most fundamentally classified with regard to their expertise, their interaction potential and their accessibility.

### **3.2 Discussion**

The study reported in the first article functioned as a pilot study. With the aim of developing a model with intended HIS comprehensiveness as main outcome, it was crucial to build upon a solid theoretical foundation as to its nature and to enable its integration into a broader conceptual framework. The development of a taxonomy of health information sources based on subjective perceptions aids this objective by spanning the theoretical space in which a

comprehensive search takes place. As with the help of the taxonomy it is possible to relate to preferred underlying source characteristics rather than discrete sources, it is thereby possible to refer to these characteristics as target objects of a comprehensive search.

Besides this theoretical contribution, as the aim was to identify most fundamental, situation-independent source characteristics, the taxonomy provides a point of reference when it comes to the reasons *why* individuals prefer and use specific sources of health information. Source characteristics like “credibility”, “quality” and “saliency”, which were used as (theoretically derived) basic source features in other studies (Gray et al., 2005; Zhang, 2014) are characteristics which build upon the ones identified in the taxonomy, and come into effect in specific narrow-defined situations. For example, a source may be deemed credible or high quality as a consequence of its expertise, or it may be salient because it has been used often because of its accessibility. This means that the taxonomy of basic subjective source dimensions provides an exhaustive hermeneutic foundation that further source characteristics can be derived from. These would be, however, either context-specific or can be deduced directly from the fundamental characteristics we identified in our study.

Regarding the theoretical integration of search comprehensiveness, a more or less comprehensive search for health information can thus be said to take place against the background of a “universe” of health information sources whose basic characteristics are (a certain degree of) expertise, interaction potential and accessibility. In other words, speaking of a “comprehensive search” would mean speaking of a certain behavioral process of source choice and use which is implicitly or explicitly led by the three basic source characteristics identified in the taxonomy. This means that, when considering the basic characteristics of health information sources, it is possible to infer from the preference of one source over another the preference of certain underlying characteristics. An individual consulting a medical textbook, for example, might deem high expertise more important than high accessibility and interaction. As a consequence, knowledge of basic source characteristics aids in explaining why a certain source is used (i.e., aids in identifying the *reason*).

However, this knowledge does not provide a valid argumentation basis with regard to the *goals* an individual pursues in doing so. Not only do information sources exhibit certain characteristics which are the object of a (more or less comprehensive) search. Health information itself, in view of the searching individual, serves certain functions which may sometimes, directly or indirectly, result from underlying source characteristics (e.g., Johnson & Case, 2012; Lambert & Loiselle, 2007; Shiloh & Orgler-Shoob, 2006). Health information

may, for example, reduce anxiety or provide knowledge about treatments and healing options (e.g., Johnson & Case, 2012; van't Riet & Ruiter, 2013). A genuine understanding of the process of developing the intention to comprehensively search for health information would greatly profit from knowing more about the goals individuals have when seeking for health information. This is because goals can be understood of as desired outcomes of an action and contribute to intention building as important reference points of self-regulation (Kuhl, 2010). Therefore, the second article deals with the development and evaluation of a questionnaire which aims at measuring individual goals associated with health information seeking.

## **4 Why Do We Want Health Information? The Goals Associated With Health Information Seeking (GAINS) Questionnaire (Chasiotis, Wedderhoff, Rosman, & Mayer, 2019a)<sup>4</sup>**

The second article describes the development and evaluation of a questionnaire measuring goals associated with health information seeking ('GAINS'). After a theoretical derivation of four goals individuals may have when seeking for health information, the questionnaire was developed and evaluated in three independent samples. The article was accepted 11<sup>th</sup> July 2019 and published 24<sup>th</sup> July 2019 in *Psychology & Health* (Taylor & Francis; advance online publication). The following elaborations on this article (Chapters 4.1 and 4.2) will particularly focus on the theoretical derivation of the goals and the implications for model development.

### **4.1 Summary**

Previous research on the goals individuals have when seeking health information mainly focused on the relatively broad concept of an "information need" which determines (potential) patients and their relatives to search for information whenever they find themselves in a state of uncertainty (e.g., Lu & Yuan, 2010; Terpstra, Zaalberg, Boer, & Botzen, 2014). This so-called information need is usually conceptualized as unidimensional and unidirectionally quantifiable (you may exhibit a lower or higher information need and thus, may want little or much information). However, this conceptualization impedes identifying the various goals individuals may have when such a need arises. Identifying these goals would improve our understanding of varying seeking behaviors across persons and situations and enable tailoring health information according to respective goals (Young, Tordoff, & Smith, 2017). There might, for example, be the need to cope with feelings of anxiety and helplessness (e.g., Damian & Tattersall, 1991; Rutten et al., 2005) or to find out more about treatment options to deal with a certain disease, e.g., cancer (Mesters, van den Borne, de Boer, & Pruyn, 2001). Hence, HIS can be understood of as a form of *goal-oriented* coping with a (potential) threat (Shiloh & Orgler-Shoob, 2006).

In deriving the goals of individuals seeking for health information, we relied on well-founded theories of coping and self-regulation in goal pursuit. First, based on Folkman and Lazarus' (1980) well-established distinction between problem focused and emotion focused coping, the first of two goal categories of HIS could be identified: coping focus, with problem focused and emotion focused (coping) goals. A problem focus stands for the aim to deal with and

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<sup>4</sup> See Appendix B.

eliminating the (health) threat or problem directly, whereas an emotion focus aims at improving emotional wellbeing, i.e. reducing distress and anxiety. Regulatory focus theory (RFT; Higgins, 1987, 1997) provided the foundation for the second goal category. The theory postulates two opposed motivational systems that either strive to maximize positive outcomes (called “promotion focus”, with the reference-endpoint of a gain) or to minimize negative outcomes (called “prevention focus”, with the reference-endpoint of a loss; Summerville & Roese, 2008). These systems essentially describe preferred strategies in attaining a goal via setting a certain regulatory focus (Strauman & Wilson, 2010). Individual differences in these regulatory foci were found to affect goals and goal-directed behavior (Strauman, 1996). They were also found to be relevant predictors of health message framing effects and health behavior in general (Bergvik, Sorlie, & Wynn, 2010; Dijkstra, Rothman, & Pietersma, 2011; Yi & Baumgartner, 2011). Crossing the two coping foci established by Folkman and Lazarus (1980) with the two regulatory foci postulated by RFT (and presuming the context of a potential health threat), results in four possible combinations that represent four specific goals when seeking for health information. The first goal, representing the first scale in the questionnaire, was labelled ‘Understanding’ and encompasses the aim to identify the causes and consequences of a health issue. It is problem focused and promotion oriented: The goal is to deal with the health problem directly and to enhance understanding and knowledge. The second scale was labelled ‘Action planning’ and describes the goal to determine potential courses of action to prevent a further worsening of the problem (or even its occurrence). It is thus problem focused, but, unlike ‘Understanding’, it is prevention oriented. The third scale was labelled ‘Hope’ and encompasses the goal to increase positive emotional states and wellbeing despite the health problem. With this, it is emotion focused and promotion oriented. ‘Reassurance’ is the last scale and measures the goal to reduce negative, threat-related emotions like anxiety. It is therefore emotion focused and prevention oriented. Considering the four goals and the two goal categories, it is important to note that information seeking goals may arise simultaneously and also do not necessarily exclude one another (Case, Andrews, Johnson, & Allard, 2005). One might, for example, strive to understand the health problem better but also to gain hope with regard to future quality of life.

Based on the four goals, we developed the Goals Associated With Health Information Seeking (GAINS) questionnaire. Its final version is comprised of four scales measuring the respective goals with four items per scale. The sum score across all sixteen items represents a general need for health information, similar to past research approaches in which only a general information need was measured (e.g., Lu & Yuan, 2010). Similar to, for example, the

PANAS scales measuring state and trait positive and negative affect (Watson, Clark, & Tellegen, 1988), the goals can be understood of as dispositional as well as rather situation-dependent and the instruction can be adapted accordingly. In three studies using three independent samples ( $N = 150$ ,  $N = 283$ ,  $N = 502$ ), we evaluated the questionnaire with regard to its psychometric properties (item characteristics, reliability, factorial validity, sensitivity to situational influences, and construct validity). The final version of the questionnaire proved reliable and structurally valid (as was determined in confirmatory factor analyses) as well as sensitive to situational circumstances. Although there was also evidence for construct validity, some of the expected associations of the goals with personality measures were not found in the third study using a large patient sample.

In sum, it is argued that the GAINS constitutes a useful instrument to capture the goals individuals may have when seeking health information. These goals are embedded in a broader theoretical context of coping and self-regulation in goal pursuit.

## 4.2 Discussion

In developing the GAINS, we were able to identify four goals individuals have when seeking health information: understanding, action planning, gaining hope and reassurance. In the first article, we developed a taxonomy of basic underlying characteristics of health information sources, which enables assumptions as to the reasons *why* specific sources are preferred over others (e.g., because of their expertise or high accessibility). With this, we prepared a theoretical foundation for the investigation of a comprehensive search for health information. However, at this point, it is important to differentiate between the *cause* (e.g., a source is accessible) and the *purpose* (or goal) of a specific way of seeking health information, like choosing particular sources and seeking more or less comprehensively.

The GAINS makes it possible to measure the goals individuals may want to achieve with the help of health information. In their functioning as desired outcomes of an action, goals represent an important reference point for self-regulation processes that foster intention building (Kuhl, 2010). Therefore, in line with research on health information need (e.g., Mesters et al., 2001) it is argued that pursuing particular goals will result in specific seeking intentions which then impact actual seeking behavior. In developing the model, it is thus pertinent to explore potential antecedents of these different goals. This is best achieved in analyzing their respective underlying functions and the psychological processes related to them. In the theoretical derivation of the goals of health information seeking, it was found they could be arranged on two independent goal categories: coping focus (problem or emotion coping

focus) and regulatory focus (promotion or prevention focus). The first category, coping focus in HIS, on the one hand, relates to goals to deal with a health threat, with uncertainty or an otherwise burdensome health-related situation via tackling (and, ultimately, diminishing) the problem directly (problem focus). On the other hand, it relates to goals to deal with the threat via upregulating positive threat-related emotional states like hope and downregulating negative threat-related emotional states like anxiety (emotion focus; Carver & Connor-Smith, 2010; Folkman & Lazarus, 1980; Litman & Lunsford, 2010). These coping foci are thus conceptually and functionally closely intertwined with two main components of self-regulation which were discussed before: emotion regulation and self-efficacy (see Chapter 2.1.2). Health information sought with an emotion focus may, accordingly, serve the function of emotion regulation, i.e. to calm down and/or regain hope and trust. Furthermore, self-efficacy is strongly related to a problem focus. According to Rothermund (2011), perceived controllability of a situation, which heavily depends on self-efficacy (Bandura, 1977; Kuhl, 2001), fosters applying a problem focus when seeking information.

The second goal category, regulatory focus, relates to preferred strategies in goal pursuit which differ with regard to their reference end-states, gain or loss (Summerville & Roese, 2008). These regulatory foci are called promotion and prevention focus (Higgins, 1987, 1997; Strauman & Wilson, 2010). They are often used as proxies for dispositional approach and avoidance motivation (e.g., Yi & Baumgartner, 2009; Leone, Perugini, Bagozzi, 2005; Mann, Sherman, & Updegraff, 2004). However, it is important to stress the functional differences between these related concepts. Dispositional approach and avoidance motivation essentially capture basic approach and avoidance tendencies (Carver, 2005) that are closely related to a respective (approach or avoidance) *behavior*. Regulatory focus, on the other hand, captures the preferred strategy when pursuing a goal which may be approach or avoidance-related. I may, for example, pursue an approach goal (I want to become fitter) by applying a prevention regulatory focus (I don't want to miss any training session). This important differentiation is in line with Showers and Boyce (2008) as well as Elliot and Church (1997) who postulate similar distinctions in dispositional approach and avoidance motivation and reference end-points in self-regulated goal striving (see also Kuhl & Koole, 2008). Thus, it can be said that, although there is a considerable conceptual relatedness between dispositional approach and avoidance motivation and regulatory focus, both serve different functions in goal striving and, finally, intention building.

Taken together, the GAINS makes it possible to evaluate goals of health information seeking which are likely to inform intention building on how to organize the search. Theoretical

integration of these goals enables the identification of several important motivational and self-regulatory variables and associated processes that may lead to or are interconnected with them, or else of a specific coping or regulatory focus. Thereby, they may represent important functional parts of a model of determinants of an intention to comprehensively search for health information. Bearing this in mind, when drawing on a function analytic approach (see Chapter 2.2; Kuhl, 2001, 2010), it is important to take into consideration different levels of personality (or dispositional) functioning. This, among other things, includes, on the one hand, considering those variables that are conceptualized as utterly situationally independent. In an attempt to preliminarily identify candidate model variables following the functional analysis of the goals measured by the GAINS, this may include dispositional approach and avoidance motivation or regulatory focus, and emotion regulation. On the other hand, those variables conceptualized as dispositions that are effective merely in a narrowly defined context are also to be taken into account. With regard to the model, this may include self-efficacy relating to a certain situational task or activity (i.e., health information seeking).

The third article describes the final development and a first empirical evaluation of the model, based on the insights and implications of the previous two articles and a preceding rigorous theoretical investigation.

## **5 The Role of Approach and Avoidance Motivation and Emotion Regulation in Coping Via Health Information Seeking (Chasiotis, Wedderhoff, Rosman, & Mayer, 2019b)<sup>5</sup>**

The third article describes the final development and first evaluation of the theoretical model of motivational (including approach and avoidance motivation) and self-regulatory (including emotion regulation, self-efficacy and goals) determinants of an intention to seek comprehensively for health information. The article was accepted 4<sup>th</sup> October 2019 and published 26<sup>th</sup> October 2019 in *Current Psychology* (Springer Nature; advance online publication).

### **5.1 Summary**

In this article, the aim was to develop the final theoretical model of the intention to comprehensively seek for health information. Therefore, firstly, relevant constructs were identified and, secondly, the proposed respective interrelations and effects were analyzed in a structural equation model.

As explained earlier on (see Chapters 1 and 4), when facing a health threat, health information seeking is a prominent way of coping (Shiloh & Orgler-Shoob, 2006). More specifically, it is a form of so-called engagement coping: It is characterized by actively confronting a threat and threat-related emotions instead of denying or avoiding the threat altogether (Carver & Connor-Smith, 2010). Engagement coping, thereby, can be emotion focused and/or problem focused (Folkman & Lazarus, 1980; see Chapter 4). Consequently, the preceding development of the GAINS (see Chapter 4) enabled us to predefine two kinds of coping goals of HIS: A problem focus (featuring the goals ‘understanding’ and ‘action planning’) and an emotion focus (featuring the goals ‘hope’ and ‘reassurance’). Thus, these two coping goal categories were, first of all, set as direct predictors of the dependent variable (i.e., intention) in the model, which is in line with Kuhl’s (2001) as well as Mesters et al.’s (2001) conceptualization of goal setting as an important self-regulatory determinant of intention building (see also Chapter 4.2).

Research on coping has revealed basic motivational dispositions associated with coping behavior across different kinds of threats and situations (e.g., Carver, 2005; Litman, 2006): approach and avoidance motivation (see Chapter 2.1.1). Approach motivation is, in general,

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<sup>5</sup> See Appendix C.

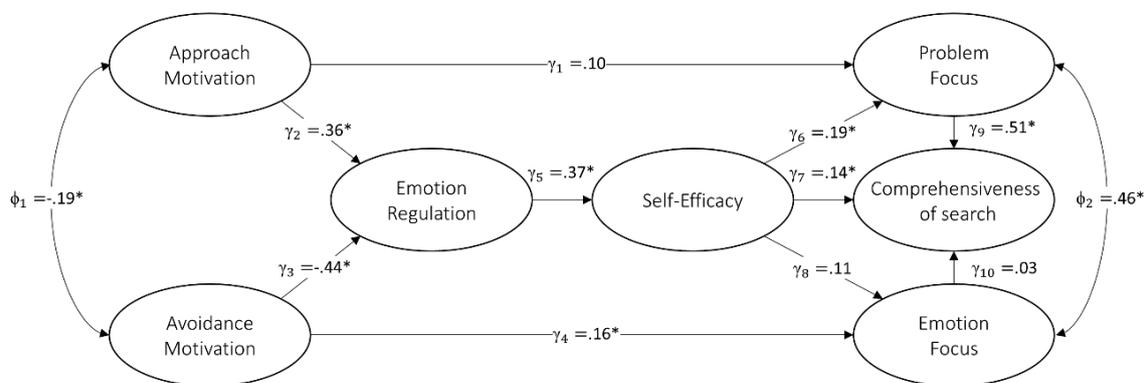
positively correlated with forms of engagement coping behavior, whereas evidence with regard to avoidance motivation is inconsistent. This may be because avoidance motivation, on the one hand, may lead to neglecting the threat as a whole and to trying to distract oneself from it. On the other hand, it may lead to initiating *approach*-related strategies and coping efforts in the attempt to reduce or eliminate (and thus, avoid) the threat itself (Carver, 2005). This would be in line with Elliot and Church (1997), Kuhl und Koole (2008) as well as Showers and Boyce (2008), who postulate similar motivationally affected behavioral processes (see also Chapter 4.2).

In considering the respective impact of approach and avoidance motivation on coping behavior, it is important to take into account threat-emotions like anxiety. Emotion regulation as the ability to downregulate negative affect is one important part of self-regulatory competences and plays a crucial role in determining coping attempts at dealing with a health threat (Van't Riet & Ruiter, 2013). As Kuhl and Koole (2008) point out, this ability enables a 'high level' form of coping via self-access which is essential when dealing with an existential threat. As there is ample evidence as to the relationship between approach and, respectively, avoidance motivation and emotion regulation, our first hypothesis was that approach and avoidance motivation, in the model, would have a direct effect on emotion regulation, which would be positive for approach motivation and negative for avoidance motivation.

The next relevant self-regulatory construct we identified as crucial in intention building for a comprehensive search was self-efficacy in health information seeking. We identified emotion regulation as an important predictor of general self-efficacy (Pocnet, Dupuis, Congard, & Jopp, 2017). However, the perceived ability to downregulate threat-related emotions like anxiety may also have a crucial impact on the perceived ability to seek for health information, and thus, a domain-specific form of self-efficacy: If I will be able to deal with my anxiety during the search, I will be more convinced to be able to find and deal with information to about the health threat. Domain-specific self-efficacy, in turn, was proposed to directly impact a problem coping focus. As Rothermund (2011) points out, perceived controllability, which is strongly related to self-efficacy, promotes the uptake of a problem focus in information seeking: Thinking I will be able to deal with and find the information I am searching for, I am more willing to tackle my problem directly with the help of this information. In addition to these proposed direct effects, we hypothesized respective indirect effects from approach and avoidance motivation on intention via the self-regulatory mediators (i.e., emotion regulation, self-efficacy and problem focus).

As individuals high in dispositional avoidance motivation are more prone to experience negative emotions like anxiety (e.g., Carver, 2005), we supposed that they would generally need more emotion regulation resources compared to low-avoidance motivated individuals in a similar situation. In situations where a health threat is present, this need could lead to a greater reliance on additional external resources to help them regulating their emotions, e.g., with the help of health information (Litman & Lunsford, 2010). In line with this, dispositional avoidance motivation has often been found to predict an emotion coping focus (e.g., Hundt, Williams, Mendelson, & Nelson-Gray, 2013). Thus, our third hypothesis regarding effects captured in the model was a direct positive effect of avoidance motivation on emotion coping focus. Additional direct effects were included in the model for exploratory analyses.

The final theoretical model is depicted in Figure 1. The model was tested in a sample of  $N = 283$  university students via structural equation modeling using the R-package lavaan (Rosseel, 2012). Self-report questionnaires were used exclusively to measure all involved constructs. Model fit was good and the model explained approximately one third of the total variance in intended search comprehensiveness ( $R^2 = .325$ ). All three hypotheses regarding direct and indirect effects were confirmed.



*Figure 1.* Model including motivational and self-regulatory determinants of intended comprehensiveness of health information seeking.  $*p < .05$ .

## 5.2 Discussion

The third article identified motivational and self-regulatory variables that are potentially relevant as determinants of an intention to comprehensively seek for health information. This was, at first, possible because we were able to rely on insights derived from establishing the goals individuals may have when seeking health information (see second article, Chapter 4).

In distinguishing four goals we found approach and avoidance tendencies in regulatory focus as well as emotion regulation and self-efficacy to be potentially relevant personality factors underlying these goals (see Chapter 4.2). Additionally, drawing on a vast body of research literature on coping styles and behavior, the conclusions derived from the development of the GAINS regarding potential motivational and self-regulatory determinants of intentional comprehensiveness of HIS, were mainly supported. As we went on to conceptualize HIS as a form of (engagement) coping, we decided for the coping goal category rather than regulatory focus from the GAINS to represent HIS goals in the model. In the final model (see Figure 1), the respective effects operate beginning from general personality traits that are effective across situations (dispositional approach and avoidance motivation and emotion regulation), to increasingly domain- and situation-specific traits (HIS-related self-efficacy and HIS coping goals). The latter, in turn, have effects on the (very situation-specific) model outcome variable, intended search comprehensiveness. With this, the first attempt to capture the process of intention building in health information seeking is provided using a function-analytic rather than a typological or static approach and taking into account relevant personality variables that differ in their sensitivity to context.

In accordance with our assumptions, we found indirect effects from approach and avoidance motivation on intended comprehensiveness via emotion regulation, HIS-related self-efficacy and problem focus. The positive effect from problem focus on the outcome variable may be explained by the aim to find most useful information to deal with the health problem, which is achieved by a balanced and extensive search (Johnson & Knobloch-Westerwick, 2017).

However, as can be seen in Figure 1, the path coefficient from emotion focus to intended comprehensiveness was not significant. There was also no specific hypothesis formulated with regard to this effect. As explained earlier, we supposed that (higher) avoidance motivation would lead individuals to resort to external resources that might provide reassurance, e.g., health information. However, this does not necessarily mean that a very comprehensive search may be intended, as sometimes the first information one may find could already be reassuring and thus, be enough. At other times, health information might cause increased distress and the need to continue searching may arise to regain a more or less balanced view. Albeit this might be one possible explanation for a non-significant effect, it is not suitable to imply there would be no effect just because in this study, no effect was found. Using a larger sample, interaction analyses, for example with varying health threat, state affect or emotion regulation as moderators would possibly shed light on this matter (see Das, 2012; McKinley & Ruppel, 2014; Nestler & Egloff, 2010). Our findings regarding the

differential effects of the coping foci are also in line with past results regarding the effects of different coping foci on information behavior (e.g., Johnson & Knobloch-Westerwick, 2017; Kalichman et al., 2006).

Besides the theoretical value of the model, these findings also suggest some practical approaches. It might be advisable, for example, to train especially high avoidance motivated individuals in their emotion regulation abilities. Supporting them in dealing with unpleasant threat-related feelings like anxiety could provide them with the necessary means to cope with a health problem in a more problem focused way. Practitioners could be made aware of the need not only to provide balanced and understandable health information, but also to take into account the (different) emotional needs of patients seeking health information.

Briefly, the third article described the final development and a first empirical evaluation of a theoretical model. The model suggests that dispositional motivational and self-regulatory variables which increase with regard to their context sensitivity, constitute an explanatory framework of the intention to comprehensively search for health information. In the next chapter, the findings of all three articles are synthesized, strengths and limitations of the final model are discussed and propositions for further research are made.

## 6 General Discussion

The aim of this dissertation was to establish a theoretical model of motivational and self-regulatory determinants of the intention to search comprehensively for health information. During the last three chapters, three articles were summarized and discussed that, as a whole, covered the development and first evaluation of such a model. The first article reported a pilot study in which a theoretical framework for search comprehensiveness was provided by identifying the subjectively perceived fundamental characteristics of health information sources as search objects. In the second article, the development and evaluation of a questionnaire measuring individual goals of health information seeking was described. Building upon the insights and findings of the first two articles and, additionally, drawing on the literature on coping with (health) threats, the model variables and their interrelations were specified and the model was subjected to an initial empirical evaluation.

The final model (see Figure 1) can essentially be viewed as a means of theoretically capturing the process of intention building in a very specific, potentially existentially relevant, context. Building upon major theories of intention building (and enactment; Heckhausen & Gollwitzer, 1987; Kuhl, 2000, 2001), the model includes motivational as well as self-regulatory variables as relevant dispositional predictors that vary in their situational specificity. The intention building process depicted in the model thereby proposes a unique sequence of effects. Starting with general and basic motivational dispositions (dispositional approach and avoidance motivation), via a general self-regulatory ability (emotion regulation), it gets through to domain- and situation-specific self-regulatory variables (HIS-related self-efficacy and, last, coping goals of HIS) that, in the end, have a direct effect on intention. Furthermore, the outcome of the process depicted in the model, the intention to search comprehensively, has to be understood of against the background of all potentially available health information sources. These sources have particular characteristics (i.e., a certain degree of expertise, interaction potential and accessibility) that constitute the target objects of such a search.

Briefly, the model proposes that, first, dispositional approach and avoidance motivation have a direct (positive and negative, respectively) effect on emotion regulation. The (perceived) ability to deal with one's emotions, in turn, has a direct positive effect on the perceived ability to seek health information (HIS-related self-efficacy). HIS-related self-efficacy enhances the uptake of problem focus goals in health information seeking. The problem focus goals

increase the intention to seek comprehensively for health information, as a comprehensive search enhances the ability to deal with the health problem.

This (indirect) effect from motivational dispositions on intended comprehensiveness via various self-regulatory instances is supported by various accounts on the role of approach and avoidance motivation in (goal-directed) coping behavior (e.g., Carver & Scheier, 1998; Carver, 2006; Kuhl and Koole, 2008). For example, Kuhl and Koole (2008) state that, even when highly avoidance motivated, individuals are able to engage in a sort of ‘high level’ coping if they are able to downregulate negative affect and thereby, have access to a personality system encompassing personal needs, values and memories of past coping attempts (self-access). This ‘high level’ coping via self-access is proposed to be essential in existentially relevant situations. Despite a superordinate avoidance goal (e.g., threat avoidance or prevention), via enhanced self-access, the initiation of adaptive approach behavior can be enabled to deal with the threat directly (e.g., via upregulation of positive affect). This underlines the fundamental role self-regulatory competencies play in building an intention related to coping with a threat (e.g., seeking comprehensively for health information). It is not about neglecting and avoiding threat-related anxiety or worry. It is about being able to integrate these feelings in one’s subjective experience and facing the threat despite being afraid. At this point, emotion regulation helps with enabling an enhanced self-access and realizing one’s potential to do so.

The model, in several aspects, constitutes a fundamental theoretical advancement. First, it transfers and applies two major theories of intention building (and enactment, see above; Heckhausen & Gollwitzer, 1987; Kuhl, 2000, 2001) to the health context, which made it necessary to link these theories with insights from research on coping and dealing with threatening situations. Second, it takes into account and tackles some limitations of different theoretical models of health information seeking. In contrast to prominent models from the fields of public health and communication science (see Chapter 2.2), for example, it explicitly considers personality factors, namely motivational and self-regulatory dispositions, as crucial determinants of seeking intentions. Furthermore, the model includes dispositions that are varyingly conceptualized with regard to their dependency on specific situations, thus essentially allowing for dispositions that come into effect in a particular context. With this, the often neglected potential of dispositions to vary considerably in when they come into effect is taken into account (Kuhl, 2010). Third, it considerably complements prominent psychological explanatory models of (intended) health information seeking (see Chapter 2.2). These models are based on either a typological approach (e.g., differentiating between

“monitorers” and “blunters”; Miller, 1987) or a dichotomous conceptualization of the seeking intention (e.g., a vigilant or cognitive avoidant coping style would lead to an intended comprehensive search or no search at all; Hock & Krohne, 2004; Krohne & Hock, 2011). The present model extends these influential theories in harnessing a more dynamic, rather function analytic approach (Kuhl, 2010) which focuses on the underlying (motivational and self-regulatory) mechanisms of developing the intention for a comprehensive search. For instance, the effect mechanisms and their interrelations depicted in the model may shed light on the underlying processes of how “monitoring” comes into action.

Besides its significant theoretical contribution, the model provides several starting points for targeted interventions. Emotion regulation and HIS-related self-efficacy, for example, may be conceptualized as personality dispositions, which does not mean, however, they cannot be enhanced via particular interventions. Some psychotherapeutic interventions as well as mindfulness based interventions and meditation techniques, for instance, are prominent examples of how emotion regulation abilities can be improved (Berking, Wupperman, Reichardt, Pejic, Dippel, & Znoj, 2008; Brown, Ryan, & Creswell, 2007; Hofmann, Grossman, & Hinton, 2011). As self-efficacy essentially feeds on past experiences and observations (Bandura, 1977; Maddux & Volkmann, 2010), enhancing HIS-related self-efficacy could be achieved by mentor-guided trainings comprised of short learning phases leading to regular achievements. Not least, a vast body of literature points to the many possibilities to enhance self-regulatory competences (e.g., Koole, Meijer, & Remmers, 2016; Kuhl, 2001; Kuhl, Kazén, & Koole, 2006). Increasing emotion regulation abilities and HIS-related self-efficacy would, according to the model, foster the uptake of problem focus coping goals and thereby, promote building the intention to seek comprehensively. Furthermore, the model implies that health practitioners and other providers of health information should be aware of their patients’ differing needs and expectations with regard to health information. By all means, it would be advisable not only to provide accurate and balanced information, but also to keep in mind the potential emotional needs and insufficient self-regulatory capacities individuals may exhibit. Obviously, this is especially true when a severe health threat has to be addressed.

There are some limitations to be addressed that concern the model itself as well as its development and (initial) evaluation. First, the model only applies to a very narrowly defined context, namely, when health information is needed. The model’s generalizability to similar situations in which a (potential) threat is present and the intention to cope in a specific way can be formed, is still unclear and remains a subject for future research. Second, exclusively

explicit self-report measures were used in the studies. Certainly, explicit self-perceptions are crucial when it comes to intention building (e.g., Heckhausen & Gollwitzer, 1987). The subjective perception to be able to successfully deal with unpleasant feelings, for example, was found to increase HIS-related self-efficacy in our study. This is probably because this subjective conviction helps in being more confident with regard to dealing with (potentially) inconvenient health information. Nevertheless, implicit measures of self-regulation as well as motivational dispositions should be considered in future evaluations of the model, including careful theoretical derivations as to their similar or divergent effects. Third, our sample in the initial evaluation study was very small and homogenous with regard to age, sex and education. Moreover, participants were no “real” patients, but overwhelmingly healthy and just pretending to be in a health threatening situation (see third article, Appendix C). Thus, future evaluation studies should include large patient samples or, more precisely, samples of individuals perceiving a health threat and/or a current need for health information. Fourth, as the sample size of the initial model evaluation study was considerably small, it was not reasonable to include potential moderator variables for exploratory analyses in the statistical model. However, certain interaction effects are conceivable. The effect from dispositional avoidance motivation on emotion focused goals, for example, may be moderated by emotion regulation. This is because a high ability to downregulate negative feelings may reduce the need to pursue emotion focused goals in HIS. Fifth, although the model fit was good, even a perfect fit does not necessarily mean that all relevant variables are included in a model. Accounting for about a third of the variance in the outcome variable, the model is able to explain a great deal of varying intentions to seek comprehensively. However, there are almost certainly more variables that would have to be taken into account to explain a greater proportion of outcome variance. Obviously, the model was intended to encompass dispositional motivational and self-regulatory variables. However, situational variables like threat severity and state affect may be very likely to be of importance here (Das, 2012; McKinley & Ruppel, 2014).

Developing a theoretical model of intention building implicates leaving room for a further development which includes the enactment of the intention, and thus, the step(s) from intention building to actual behavior. Actually, the Rubicon model (Heckhausen & Gollwitzer, 1987) and the first modulation assumption from Kuhl’s PSI theory (2000, 2001; see Chapter 2.13) include this pivotal process from intention to action. According to Kuhl (2000, 2001), self-regulatory competencies, and especially the ability to upregulate positive affect, play a central role in overcoming what is usually referred to as “intention-behavior-

gap” (e.g., Sheeran & Webb, 2016). In a recent yet unpublished study, to explore crucial differences in the model when it comes to a comprehensive search *behavioral outcome* instead of an *intention* to seek comprehensively, we tested the model in the course of a comprehensive search paradigm. It encompassed a behavioral measure of a comprehensive search for health information. After having replaced the intention with the behavioral outcome, model fit and path coefficients were analyzed. Model fit was similar to the fit of the intention outcome model. However, all effects on problem and emotion focused goals in HIS that were proposed in the model were, in contrast to our findings in the intention outcome model, not significant. This time, HIS-related self-efficacy had the only significant effect on (behavioral) search comprehensiveness. One might argue that goals are more relevant in intention building, but when it comes to actual behavior, self-efficacy is most crucial. This is, of course, in line with research on the importance of self-efficacy in carrying out rather difficult actions (e.g., Kuhl, 2001). Thus, the next step would be to include *both* the intention as well as a behavioral search comprehensiveness measure (predicted by the intention) in an extended model capturing intention building and seeking behavior.

In the beginning, the crucial functions of a comprehensive search for health information were emphasized. Comprehensively seeking for health information, for example, helps in medical decision-making, in engaging in health promoting behavior, as well as in empowering patients and their relatives, and it was found to bring about positive health outcomes. Notwithstanding these advantageous features, having elaborated on how the intention for such a beneficial behavior is built, in the end, a note of caution seems appropriate. The functionality and reasonableness of an autonomously conducted comprehensive search for health information of course varies strongly across situations. It goes beyond the scope of this dissertation to elaborate on the various contexts in which such a search might take place, including the respective advantages and disadvantages that might come along with it. However, for example, when it comes to needing information after the diagnosis of an incurable disease, it might not be advisable to rely exclusively on an autonomous comprehensive search, as the information is likely to be emotionally overwhelming (regardless of individual emotion regulation capacities). Here, for example, settings in which information is given in smaller pieces, thereby providing enough time to process, and leaving the space to ask questions, were greatly valued by women with advanced breast cancer (van Vliet, Francke, Tomson, Plum, van der Wall, & Bensing, 2013). It should also be noted that, although it is usually associated with an autonomous endeavor involving no one but the seeking individual, a comprehensive

search for health information does by no means imply that no health experts are consulted in the course of the search.

Furthermore, even a most comprehensive search is not guaranteed to lead to an ultimate “truth” or a satisfactory level of certainty. Complete certainty can (almost) never be achieved. A crucial part of seeking comprehensively about a (potentially) existentially relevant topic is thus to accept this limitation and nevertheless, initiate a most balanced and thorough search. Or, as the Buddhist scholar Pema Chödrön puts it: “If you are invested in security and certainty, you are on the wrong planet.”

## 7 References

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## Appendix A

### Article I

Wedderhoff, O., Chasiotis, A., Rosman, T., & Mayer, A-K. (2018). Unveiling the Subjective Perception of Health Information Sources: A Three-Dimensional Source Taxonomy Based on Similarity Judgements. *Frontiers in Communication*.

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# Unveiling the Subjective Perception of Health Information Sources: A Three-Dimensional Source Taxonomy Based on Similarity Judgements

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Although there is a multitude of taxonomies of health information sources, these taxonomies only partly include how information users classify these sources. The present paper complements this research by developing a taxonomy which is based on individuals' subjective perceptions of the "universe" of health information sources. In our study, nine non-redundant sources of health information were presented to  $N = 150$  participants who rated all 36 possible combinations of source pairs regarding their perceived similarity. Results of non-metric multidimensional scaling suggested three basic dimensions underlying the similarity ratings: "expertise" (lay vs. professional), "interaction" (interpersonal vs. impersonal), and "accessibility" (low vs. high). Thus, the wide array of health information sources can be structured by means of the new taxonomy arranging them on three dimensions. This allows researchers to classify each source and with this, to draw on common ground when interpreting the varying use of health information sources.

**Keywords:** health information, health communication, information sources, uses and gratifications theory, multidimensional scaling

## INTRODUCTION

When experiencing a health problem, a fundamental need for health information arises. In today's information society, individuals are confronted with a wide range of potential information sources they can turn to (Johnson and Case, 2012). A vast body of research exists on individuals' health information seeking behavior with regard to the preference for specific sources of health information (e.g., Dutta-Bergman, 2004; Rutten et al., 2005, for a review; Pecchioni and Sparks, 2007; Smith, 2011; Dobransky and Hargittai, 2012). In this line of research, seeker characteristics, such as sociodemographic or personality variables, are at the researchers' main focus. Various prediction models for the perception or use of specific sources have been tested (e.g., doctor, nurse, dietician, and homeopath; Lawson et al., 2011; books, magazines, brochures, and newspapers; Marrie et al., 2013). For example, Blanch-Hartigan and Viswanath (2015) showed that higher education levels are associated with more use of the internet and support organizations as sources of health information.

While this approach undoubtedly provides meaningful insights on a micro-level, it suffers from a few shortcomings. First, to generalize and contrast the results of different studies, a common basis for the objects under observation is required. One way to achieve this could be the same selection of information sources in each study. In the scientific practice, however, this can be

hardly implemented. Since there are countless possibilities to obtain health information, it is nearly impossible to include every existing source. Therefore, researchers are forced to consider a selection of sources or build umbrella terms with varying degrees of abstraction. This selection and chosen abstraction level is often driven by the context determined by the research question (e.g., Lariscy et al., 2010), which is why the range of sources is always somewhat arbitrary. A possible solution would be to look at the sources on a more general level. There have already been various approaches to this, such as Lu and Yuan (2010). However, we argue that these distinctions should rather be based on the user's point of view. Researchers ultimately want to predict the behavior of the user, which is why the subjective perception should be used to differentiate the objects of observation relevant to individual behavior. An additional benefit of such an approach would be the consideration of further research questions, which could not be answered by approaches mostly used so far. In fact, knowing that a specific source of information is preferred does not imply knowing *why* this is the case, i.e., to understand which source-immanent features—besides personality variables, prior experience, or situational context factors—drive this preference and how interindividual differences in preferred source types may be explained. Also, from an application-oriented perspective, it is essential to know why individuals prefer and use specific sources of health information in particular situations in order to be able to provide information tailored to an individual patient's needs.

In the field of communication research, the comprehensive model of information seeking (CMIS; Johnson and Meischke, 1993) can be used as a starting point to further investigate the perception of health information sources, as it is one of the most established models of information seeking and source selection. The model distinguishes between two categories that are relevant for the users' selection of a particular health information source: (1) factors associated with features of sources, for example the comprehensiveness and utility, and (2) factors associated with users, for example demographics and psychological needs. Previous approaches largely neglected the interaction between both categories and thus did not consider factors of users and sources simultaneously. In line with this, (Zhang, 2014, p. 913) points out that, “[...] *most studies used the survey method, in which a list of predefined factors or criteria was provided for users to select. Thus, limited information about users' interpretations of the factors and criteria [...] could be gained. [...] As a result, more research is needed to achieve a systematic and comprehensive understanding of consumers' source selection behavior in health information searching.*”

The uses-and-gratification-theory (UAGT; Katz et al., 1973-1974) has also provided a substantial contribution to a deeper understanding of the interaction between media and its users. A central assumption of UAGT is that much initiative in linking gratification and media exposure lies with the user. Consequently, the focus should be shifted even more toward information users and their subjective perceptions, which are highly relevant in the autonomous decision making processes in modern health contexts. Furthermore, UAGT suggests that the reasons of media use should be assessed from the

users' perspective. Accordingly, there are a number of studies on individual needs and reasons for using particular health information sources based on theoretically derived relevant source characteristics, (e.g., Ruppel and Rains, 2012). However, it is pertinent to take into account not only phenomenological source characteristics, but also subjective perceptions of these sources and their role in how individuals themselves categorize the “universe” of health information sources. As it could turn out that specific sources may be very similar on a phenomenological level, but nevertheless perceived differently by the users, this is also of practical relevance. In the worst case, this could lead to recommendations of sources or conceptions of interventions, which are based on inaccurate assumptions of their user's needs.

As previously mentioned, a more generalized view on how individuals perceive different health information sources, by means of a typology of their subjective properties, would address these problems. With this, future research could draw conclusions from data which are comparable since they are based on a common ground. Findings would be more generalizable and study concepts could be replicated in and transferred to varying contexts, without the risk of omitting context specific sources. Moreover, by using a taxonomy, a researcher does not have to make extra assumptions about which sources she wishes to integrate in her study. Another disadvantage of traditional approaches is that new sources may emerge while existing sources can change or may even disappear over time. A taxonomy, in contrast, is largely independent of time. While this argument is also valid for theoretically derived taxonomies, it may be even more so for their empirical counterparts since the risk of different researchers coming to different conclusions on how to classify information sources is reduced. Furthermore, in line with the CMIS, a taxonomy should well-benefit from integrating information users' subjective perceptions. In fact, the CMIS suggests that information carrier factors and seeker-related antecedents are to be taken into account simultaneously, and we strongly agree with this point. Not least, on a methodological level, the identification of such dimensions would enable researchers to make use of more sophisticated statistical procedures because source properties can be conceived as interval-scaled rather than nominal-scaled (as is the case with non-aggregated sources).

Against this background, the basic idea guiding our research is that individuals will prefer certain information sources because of specific source properties that are seen through the “lens” of their individual perceptions. Following this rationale, it should be possible to characterize each information source by the value individuals attribute to it on a limited number of source dimensions. Identifying the relevant source features and assessing the preference of individuals for these features might then help, on a broader level, to explain information users' preferences for specific sources. For example, a relevant generalized source feature might be its “interpersonal” character, i.e., the amount of social interaction the use of a specific source implies (e.g., Zimmer et al., 2007). If, in threatening situations, people report a preference for highly interactive information, one would expect them to prefer sources which enable real interaction (e.g., with family, friends or professionals) or virtual interaction,

e.g., on internet platforms. Therefore, health practitioners might benefit from knowing which basic properties of information sources motivate individuals to choose specific sources, too. Their knowledge would enable them to provide information or recommend specific sources that fit the individual's preferences and needs. If, for example, a person reports a preference for information which is highly accessible, practitioners should recommend information sources which are easy to use, or provide the relevant information directly instead of leaving the process of information seeking to the individual.

Following this line of reasoning, identifying the basic dimensions underlying the subjective perception of health information sources is crucial when striving for a meaningful and comprehensible interpretation of individual preferences for particular sources. On a basic level, information sources have been categorized by surface features such as online/offline or human/computerized. For example, Rains (2007) differentiates between the use of the internet on the one hand, and the use of "traditional" health information sources such as doctors and family on the other hand. Similarly, Hall et al. (2015) compare "users" and "nonusers" of online health information. Redmond et al. (2010) investigate participants' preventive health behavior depending on their use of two groups of information sources: "multimedia" and "interpersonal." However, these categorizations do not take into account individuals' subjective conceptualization of sources. While they are doubtlessly plausible from a phenomenological point of view, it remains unclear whether they correspond to participants' perceptions of the sources.

The same pertains to other existing approaches which have tried to classify health information sources based on theoretical considerations (Gray et al., 2005; e.g., Lu and Yuan, 2010; Zhang, 2014). Most of these approaches, for example, agree that "quality of information" is a dimension of major importance. However, further dimensions vary considerably with regard to number, contents, and level of abstraction, including for example, relevance, usefulness, usability, trustworthiness, credibility, previous experience, and saliency (Gray et al., 2005; Zhang, 2014). Thus, approaches which are mainly based on theoretical considerations bear the risk of low comparability due to differing foci and levels of abstraction. An integrated taxonomy based on subjective perceptions would help to reduce this risk.

Therefore, the present paper aims at developing an empirically based taxonomy of health information sources that takes into account information users' subjective perceptions that they use to structure the "universe" of health information sources. Our study investigated the following research question:

Which are the basic feature dimensions underlying individuals' perceptions of health information sources? In our study, using a rigorous methodological approach, we aim at empirically identifying these subjective dimensions. By asking individuals to rate pairs of health information sources with regard to their perceived similarity, a set of distance measures (where a small distance means two sources are perceived as similar) was created that includes every possible pairwise combination of sources from a predefined set. Based on the perceived distances, sources can then be arranged on various

dimensions. Multidimensional scaling (MDS; Torgerson, 1952; Kruskal and Wish, 1990) is a prominent statistical method to deal with distance measures when aiming to arrange objects (e.g., information sources) on dimensions so that they best fit the data.

Although other studies already provide useful theoretically derived dimensions to classify health information sources (e.g., Gray et al., 2005; Lu and Yuan, 2010; Zhang, 2014), to our knowledge, none has yet derived them on an empirical basis by considering individuals' perceptions of source similarity vs. dissimilarity. Thus, we aimed at complementing theoretical classifications of health information sources by providing empirical evidence for the categories and/or dimensions proposed by them. For this purpose, we implemented exploratory multidimensional scaling to empirically identify basic dimensions of health information sources underlying individuals' judgements about the pairwise similarity of health information sources.

## MATERIALS AND METHOD

### Participants and Procedure

Data were collected in an unsupervised online study on health information behavior. Participants were recruited via a mailing list of a large German university as well as via Facebook groups which aim at recruiting experimental subjects in psychology studies. The final sample included  $N = 150$  participants with an age range from 19 to 60 years ( $M = 27.13$ ,  $SD = 7.27$  years). 66.7 percent of the participants were females. Survey completion took about 90 minutes. Participants received a 15 € (about 18 \$) coupon for an online shop as compensation.

In accordance with the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) guidelines an ethics approval was not necessary (DFG, 2018). All study measures and methods were in compliance with the Declaration of Helsinki and the APA Ethics Code (American Psychological Association, 2002). Since the study was conducted online, no written informed consent could be obtained. However, we provided an information sheet and consent form (for download) and subjects were only allowed to enter the study if they confirmed (by checking a box) that they agreed to the conditions specified in these documents.

### Measurement of Source Similarity

To determine the underlying basic dimensions of health information sources, it is necessary to decide on a selection of sources for the subsequent similarity rating. First, four experts (three authors of the present paper and one additional researcher) in the field of health information literacy named all sources of health information they could think of. (Nearly) identical sources with different labels were merged (e.g., "acquaintances" and "colleagues"). Finally, the remaining sources were summarized into broader entities (e.g., journal papers, medical textbooks and guidebooks were subsumed under the label "textbooks") with the aim of keeping the final pool of relevant sources non-redundant but as diverse as possible. Based on the experts' judgement, we included nine health information source categories in our study (see **Table 1**). To keep the conceptualization of sources as consistent as possible across participants, each of the nine

**TABLE 1** | Health information sources.

Source	Examples
Physicians	Family doctors, radiologists, dentists
Other health care professionals	Nurses, pharmacists
Family/friends	Partner, mother
Textbooks	Specialist books on medicine, medical brochures
Online search engines	Google
Online health portals	jameda.de, netdoktor.de
Online social networks	Facebook, online communities and forums
Online lexica	Wikipedia
Media libraries/video portals	YouTube, vimeo

The sources were presented together with the examples as part of the similarity ratings.

sources was supplemented with at least one specific example (see **Table 1**).

All possible pairwise combinations of the nine health information sources (i.e.,  $n*[n-1]/2$ , thus, 36 pairs) had to be rated on a 7-point rating scale with regard to their perceived similarity (e.g., “How similar are physicians to textbooks as sources of health information?”). Low scale values indicated no or only a slight similarity.

## Statistical Analysis

We used non-metric MDS to identify underlying dimensions of the perception of health information sources. MDS uses similarity data to map the compared objects (i.e., sources) in an  $n$ -dimensional space, aiming at maximizing data fit: The objects are iteratively arranged on  $n$  dimensions to reproduce the similarity ratings as accurately as possible. Thereby, both exploratory and confirmatory approaches are possible, i.e., the number of dimensions (the MDS solution) and their interpretation can be determined in advance or retrospectively (Borg and Groenen, 2005). The decision in favor of a particular MDS solution should be driven by theoretical explanations as well as by statistical indicators (Borg and Staufenbiel, 2007). With regard to the latter, the so called “stress measure” (Kruskal, 1964) is pertinent: It quantifies the deviation of objects arranged on the dimensions in the MDS solution from their “ideal” position in a solution with perfect fit to the data. Thus, the smaller the stress indicator, the better the fit. Kruskal (1964) provides a rule of thumb to facilitate the evaluation of the stress index. Accordingly, an index around 0.20 is regarded as poor, around 0.10 as fair, around 0.05 as good, around 0.025 as excellent and equal to 0 as perfect. With an increasing number of dimensions, the stress measure will decrease (i.e., the fit will improve). In order to assess the ideal configuration, a Scree plot of the stress indexes should be investigated (Cattell, 1986). By determining the point at which the resulting curve begins to level off, the appropriate number of dimensions can be identified.

In the present study, exploratory MDS was used because it was impossible to derive a hypothesis on the number of subjective source dimensions. To determine the visual configuration and the underlying dimensions of the information sources, we used the ALSCAL program by Young et al. (1978) implemented in

SPSS. We first created a dissimilarities matrix by computing the perceived differences between the pairs of information sources. By means of non-metric MDS analysis, these dissimilarities were transferred into Euclidean distances. A rank order of these distances was then arranged for each source.

## RESULTS

**Table 2** depicts the descriptive statistics of the perceived source similarities for each pairwise combination.

In order to determine the ideal number of dimensions, we first conducted a Scree test by plotting the stress indexes for all four configurations (Cattell, 1986). While the stress index of 0.224 for the one-dimensional solution was poor, it dropped to a “fair” value of 0.105 and reached a “good” value of 0.39 for the three-dimensional solution which did not improve markedly for the four-dimensional solution (“stress” = 0.015). Hence, the scree plot suggests a three dimensional classification of health information sources. The three-dimensional configuration of the information sources is depicted in **Figures 1–3**: **Figure 1** displays the first and second dimension, and **Figure 2** represents the second and third dimension. **Figure 3** shows all three dimensions compiled in a three-dimensional graph.

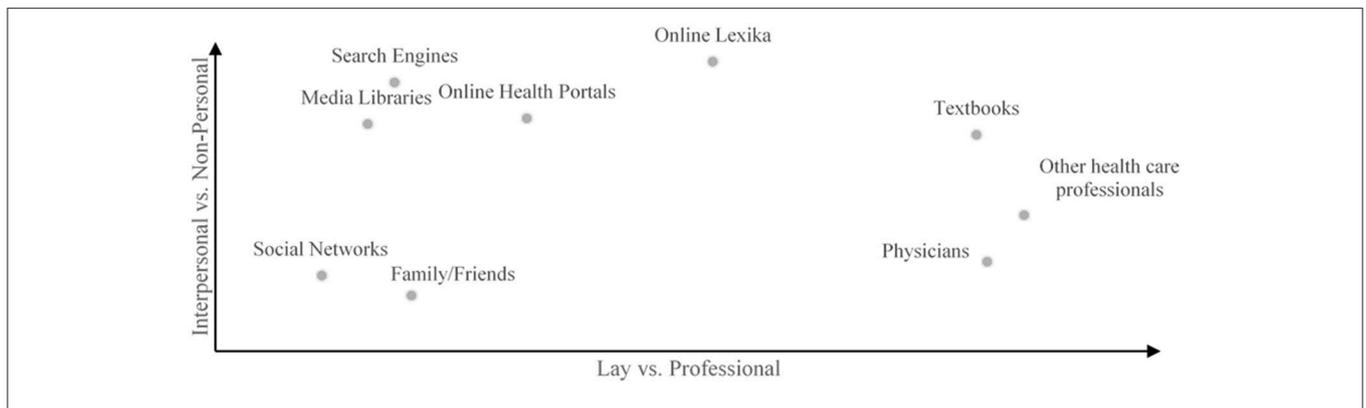
To ensure that the three-dimensional classification is not only empirically adequate but also theoretically interpretable, four judges familiar with the research field of health information seeking discussed the preferred solution in comparison to the two- and four-dimensional solution and agreed on labeling the dimensions. As can be seen in **Figure 1** (horizontal axis), the sources mapped at the end points of dimension 1 (“other health care professionals” and “physicians” vs. “social networks” and “family/friends”) indicate source differences with regard to the level of the professional background. Therefore, dimension 1 was labeled “expertise” and distinguishes between the endpoints “laypeople’s knowledge” vs. “professionals’ knowledge.”

Inspection of the configurations in **Figures 1, 2** suggests to discriminate two groups of sources on dimension 2. One group of sources requires (or enables) face-to-face or computer-mediated social interaction, while the other can (or needs to) be explored all by oneself to get the desired information. Consequently, we chose the label “interaction” for this dimension with the endpoints “interpersonal” and “impersonal.” Concerning dimension 3 (see **Figure 2**), the interpretation was slightly less straightforward. On the end points of this dimension, the sources “family/friends” and “online health portals” stand in contrast to online media libraries and physicians. The main difference between these source types seems to lie in time and effort necessary to consult these information sources when facing a health problem, and, thus, in the accessibility of the specific information needed. Family and friends, for example, as well as online portals are easily accessible and their consultation does not imply barriers like making an appointment (which is the case with physicians). Similarly, extracting and aggregating information from a complex and heterogeneous sample of materials to obtain the desired information in a condensed format (which is the case when searching media channels like YouTube or using

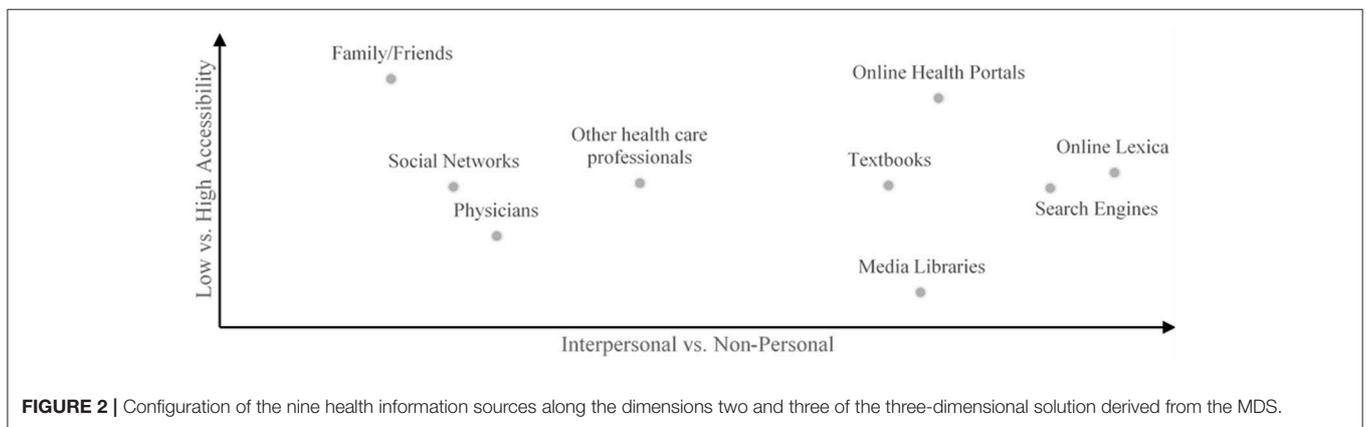
**TABLE 2** | Means and standard deviations of the pairwise similarity ratings of health information sources.

	1	2	3	4	5	6	7	8
1 Physicians								
2 Other health care professionals	5.69 (1.16)							
3 Family/friends	2.75 (1.49)	2.80 (1.37)						
4 Textbooks	4.80 (1.42)	4.60 (1.34)	2.64 (1.30)					
5 Online search engines	2.37 (1.35)	2.74 (1.30)	3.40 (1.54)	3.36 (1.34)				
6 Online health portals	3.25 (1.41)	3.45 (1.36)	3.74 (1.49)	3.73 (1.28)	4.45 (1.50)			
7 Online social networks	1.98 (1.27)	2.14 (1.19)	4.44 (1.76)	2.23 (1.13)	4.15 (1.62)	3.86 (1.47)		
8 Online lexica	3.41 (1.52)	3.64 (1.38)	3.05 (1.30)	4.67 (1.38)	4.31 (1.36)	4.43 (1.26)	2.96 (1.29)	
9 Media libraries/video portals	2.42 (1.23)	2.70 (1.27)	3.39 (1.41)	2.90 (1.25)	4.23 (1.38)	3.96 (1.28)	4.13 (1.39)	3.92 (1.32)

Standard deviations are presented in brackets. Ratings were made on a rating scale from 1 (dissimilar) to 7 (very similar).



**FIGURE 1** | Configuration of the nine health information sources along the dimensions one and two of the three-dimensional solution derived from the MDS.



**FIGURE 2** | Configuration of the nine health information sources along the dimensions two and three of the three-dimensional solution derived from the MDS.

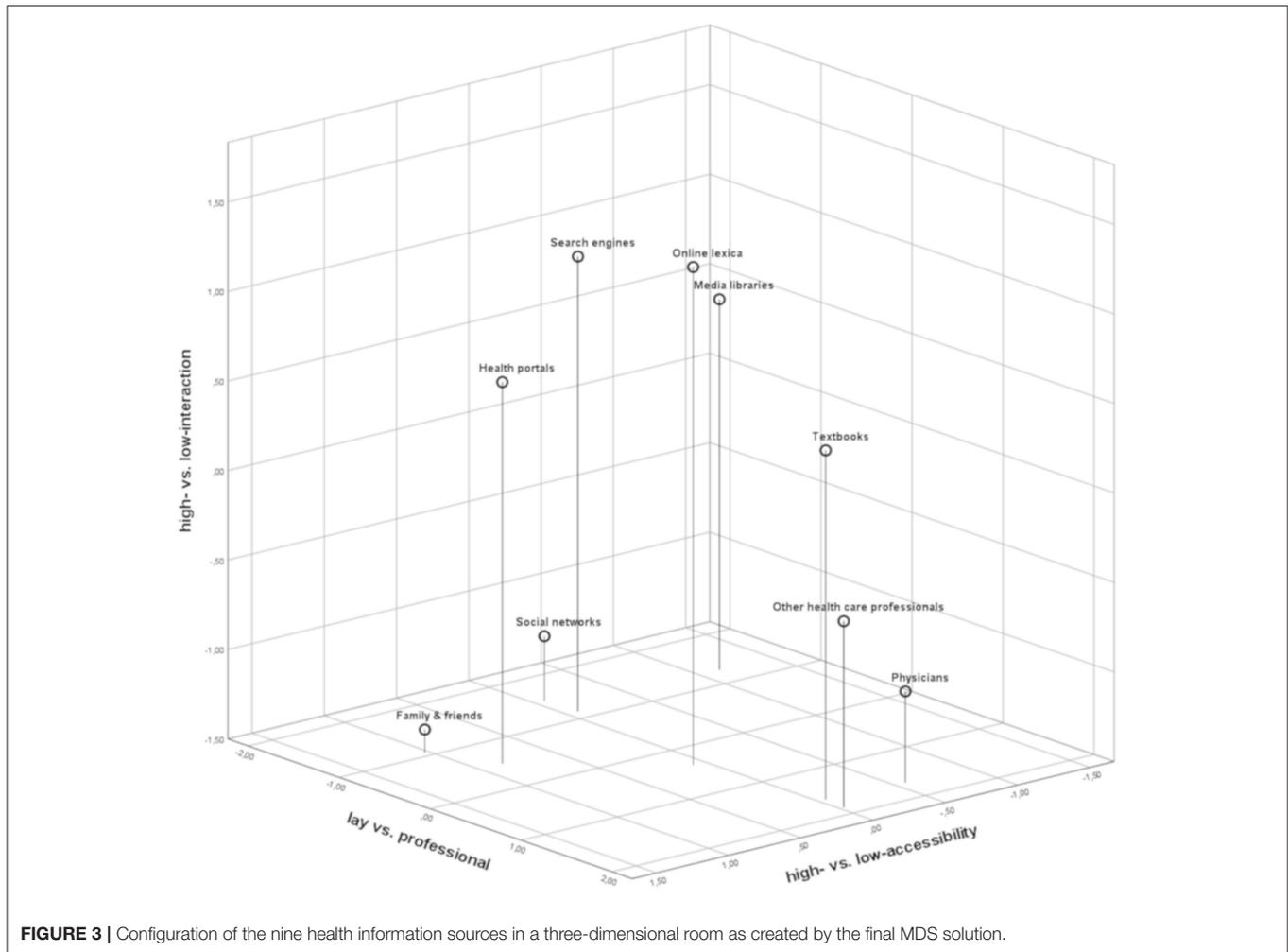
search engines) is not necessary. Accordingly, we labeled this third dimension “accessibility” with the endpoints “high/easy” vs. “low/difficult.”

The corresponding classification, which is based on our participants’ subjective perceptions of the “universe” of health information sources, is depicted in **Table 3**.

## DISCUSSION

The aim of the present paper was to examine whether numerous health information sources may be empirically combined

into a parsimonious taxonomy reflecting their subjective similarity. Therefore, we assessed perceptions of similarity with regard to nine relevant and non-redundant sources of health information and used a multidimensional scaling approach to identify dimensions which—from participants’ view—are used to structure the “universe” of health information sources. Our results suggest that individuals implicitly or explicitly categorize health information sources along three basic and independent dimensions. These dimensions allow to distinguish between all types of health information sources with regard to the “expertise” they reflect, the amount of personal “interaction” their use



**FIGURE 3 |** Configuration of the nine health information sources in a three-dimensional room as created by the final MDS solution.

**TABLE 3 |** Classification of health information sources according to the taxonomy.

Source	Expertise	Interaction	Accessibility
Physicians	+	+	-
Other health care professionals	+	+	±
Family/friends	-	+	+
Textbooks	+	-	±
Online search engines	-	-	±
Online health portals	-	-	+
Online social networks	-	+	±
Online lexica	±	-	±
Media libraries/video portals	-	-	-

- , low; ±, intermediate; +, high.

implies, and their “accessibility.” Future research referring to these dimensions would thus be based on an empirically derived differentiation between sources. In this sense, our taxonomy usefully complements existing theoretical models of health information seeking by contributing empirically derived, and thereby subjectively relevant source dimensions, which can be integrated into existing theoretical models. In the CMIS (Johnson and Meischke, 1993; see above), for example, information carrier

factors (i.e., characteristics and utilities), are considered as mediating the impact of seeker characteristics (such as experience and beliefs) on health information seeking actions (scope, depth, persistence). With the help of our taxonomy, it is now possible to specify the characteristics individuals refer to in order to differentiate between information carriers. As a consequence, the resulting information seeking actions encompassed by the model can be predicted and explained more precisely. A source characterized by high accessibility, low expertise and high interaction, for example, may elicit a specific seeking action pattern which is different from seeking behavior induced by another combination of source characteristics. In this case, the search can be hypothesized to be rather shallow and short with a broad scope, dependent on topics the interactive search process may bring up.

Another example is the Risk Information Seeking and Processing Model (RISP; Griffin et al., 1999). Here, perceived source characteristics are also an integral model component, however, only as moderators of the effect of information sufficiency on information behavior and processing. Similar to the possible application of our taxonomy exemplified in the CMIS, in the RISP, the characteristics we identified as individual means of differentiating between health

information sources could be considered separately as such moderators.

The novelty of our study lies in the bottom-up approach of identifying distinctive features from the users' point of view, rather than on a phenomenological basis. In doing so, our aim was not to establish a wholly new taxonomy, but to complement and perhaps confirm already established classifications by taking the users' views into account. This includes, for example, a study by Lu and Yuan (2010), where three source attributes are considered as main factors influencing source selection: quality, accessibility, and a relational vs. non-relational-dimension. Accordingly, in a literature review of theoretically derived characteristics of health information sources that influence source selection, Zhang (2014) identifies four criteria, accessibility, quality, usability, and interactivity. Apparently, these criteria are very similar to the basic dimensions we identified as constituting the "universe" of health information sources based on users' perceptions. In contrast, in another study (Gray et al., 2005), experience, saliency and credibility were identified as the three core characteristics of health information sources from the literature. Evidently, when drawing on relevant source characteristics that have been derived from the literature by studies in which they had been proposed and then empirically tested in a specific context, researchers may come to varying conclusions with regard to the most decisive source characteristics. This is not surprising and in itself not problematic as different contexts and situations elicit different evaluations with regard to the relevance of some characteristics. At this point, our approach enables researchers to integrate these—at first sight—conflicting results. As we considered the users' perspective by implementing similarity judgements, we were able to ensure identifying basic, situation-independent characteristics individuals use to differentiate between health information sources in general. Credibility, saliency, and experience, on the other hand, are characteristics that build upon these basic ones and come into effect and are relevant to individuals in specific, narrowly defined situations. For example, a source might be high in expertise, and therefore, one deems it credible (this does not work the other way round). One also might find it more or less important with regard to a current information need, which results in its actual saliency. Because it is also high in personal interaction and accessible (and these are characteristics one might prefer), one might have considerable experience in using it. Thus, the basic dimensions we identified may constitute a comprehensive hermeneutic foundation that further relevant perceived characteristics are derived from. To sum up, these fundamental characteristics provide a fertile ground for other, equally relevant source properties, which, however, are either context-specific or can be deduced directly from the basic characteristics we identified.

The first dimension, "expertise," has also been theoretically proposed by Morrison and Vancouver (2000), and focuses on differences in perceived level of professional qualification which is reflected by a health information source. People with no medical background (e.g., family/friends) are located at one end of this dimension, whereas healthcare professionals are assigned to the other end. You would not expect your best friend to

be able to explain the medical background and causes for your recently diagnosed diabetes. To acquire this kind of information, affected individuals tend to see a physician or look up the relevant literature (Longo et al., 2010). However, when experiencing rather common and/or chronic symptoms (e.g., lower back problems), it can be helpful to get information from people with similar conditions, e.g., about their ways of coping with the symptoms (e.g., Hartzler and Pratt, 2011; Powell et al., 2011). The empirically driven identification of this subjective dimension might prove useful to predict and explain health information behavior. If, for example, a person scores high on this dimension and for this reason, tends to visit a health professional even when experiencing symptoms that are commonly known as harmless, researchers and practitioners would know one possible reason *why* this is the case (the person wants to receive professional information about the problem). This person could, for example, be helped by providing professional information material that can be accessed at home, ultimately rendering some visits to the doctor for mere information purposes unnecessary.

The second dimension has already been theoretically proposed by Zimmer et al. (2007). It focuses on the necessity to interact with others in order to obtain the desired information, either by direct face-to-face interaction or by the use of miscellaneous information technologies. Communicating with strangers via online social networks still requires social interaction, although perhaps not as much as the direct conversation with a physician during an appointment. On the other hand, it is possible to gather health information without any personal interaction at all (e.g., from a textbook or traditional media). The distinction between sources requiring more or less social interaction is especially valuable with regard to sensitive and potentially "shameful" health issues. It is, for example, much less stressful for someone to look up information about symptoms of a sexually transmitted disease online and anonymously than to consult a physician (Gray et al., 2002; Magee et al., 2012). Furthermore, individuals could be willing to search for information on their own without requiring any interaction because they have been disappointed by previous personal interactions with potential information carriers. Accordingly, Tustin (2010) found that individuals were more likely to browse online for health information the lower they rated the perceived empathy of their physician and the quality of time they spent talking to them. Powell et al. (2011) also found that anonymity was one of the main reasons to search for health information and discuss health issues online, although individuals were mostly aware of some significant shortcomings of accessing information online, like the questionable trustworthiness of some sources. Thus, the possibility to avoid personal face-to-face interaction in some health contexts appears to be relevant. As with the first dimension, the identification of this subjective dimension could prove useful for the prediction and explanation of health information behavior. If, for example, a person experiencing some serious symptoms prefers to acquire health information via online social networks, one might argue that this is because she probably is a "digital native" and likes to surf the internet. However, as this person scored high on the

“interaction”-dimension and might therefore try to connect with others via social networks, one could try to meet the needs of this person by providing (online) personal contact with health professionals. Thereby, perhaps, potential negative attitudes toward professionals that may have emerged because of previous dissatisfying interactions (see above) could be modified. A prominent example in Germany is an online platform called “washabich.de” (“What disease do I have?”) where trained advanced medical students explain diagnoses and medical terms previously submitted by patients.

The third dimension has also already been proposed theoretically by Zimmer et al. (2007). It focuses on variations in accessibility, in terms of the (perceived) difficulties one has to manage before being able to find and use the needed information, either prior to the information searching process or during the process itself. For example, to get information from a physician, several hurdles must be overcome: finding an appropriate physician for the respective health issue, making an appointment, waiting for the appointment, getting to the doctor’s office, etc. These barriers all occur prior to the information gathering process. Furthermore, using sources may also be challenging, regarding aspects like usability of websites, or vocabulary used. Finding the suitable health information in the wide arrays of the internet or understanding the complex language of medical textbooks can be a considerable obstacle (Arora et al., 2008; see Diviani et al., 2015, for a review). In contrast, asking your mother is relatively easy. This subjective dimension is therefore useful for the distinction of health information sources regarding their “practicability” in daily life and the requirements needed to use the source appropriately. The usefulness of this dimension may be illustrated by the prominent “Dr Google” (Lee et al., 2014) issue describing individuals primarily relying on search engine results when it comes to symptoms and health problems. We now may test the hypothesis that people prefer to “consult” Google first: it’s easy to use and highly accessible. Therefore, it is fundamental to provide individuals who score high on this third dimension with easily accessible, clear and comprehensible information.

Not only every single dimension, when regarded separately, provides an independent and significant contribution, but the combination of all three also offers fundamental explanatory content. The combination allows to create specific profiles for various relevant situations or groups of persons. This enables a deeper understanding of the arising information need and potential interactions between persons and situations. On an individual level, combining the three dimensions into information seeking preference profiles would help to offer strategies to provide information to address individual needs. Or in other cases, to uncover the manifold reasons of dissatisfaction with provided information and an unwillingness to seek any information at all (Case et al., 2005; Sweeny et al., 2010; Barbour et al., 2012). This approach would be in accordance with UAGT (Katz et al., 1973-1974) which highlights individual needs and preferences when it comes to choosing specific information sources.

To sum up, by identifying individuals’ preferences on the three dimensions of the new taxonomy, their fundamental reasons to use particular information sources may be uncovered. Thereby,

it is not only possible to research information preferences on a more general basis. Information can also be provided in accordance with individual needs, while at the same time fostering persons’ adaptive information behavior.

## LIMITATIONS

Several limitations have to be considered when interpreting the results of our studies. First, one might question whether the three-dimensional MDS solution is able to map the vast amount of available health information sources sufficiently precisely. As MDS results are heavily dependent on the selection of the objects to be classified, we cannot rule out that additional dimensions exist which we were not able to reveal because important information sources were omitted or specific source types were overrepresented in the pool of comparison objects. To minimize these problems, we took great care to compile a list of health information sources which is comprehensive but also non-redundant; the latter was achieved by categorizing single sources into overarching groups. The downside of presenting source categories instead of single sources is that potential within-category dissimilarities between sources cannot be revealed by the MDS procedure. However, reducing the pool of comparison objects was essential to keep the number of comparison objects reasonable for our participants. We assume that our categories which are based on expert consensus reflect the spectrum of the most important sources, enabling us to identify the central dimensions on which participants’ similarity judgements are based.

Relatedly, one might argue that there are individual differences in the conceptualization of source categories, i.e., that individuals have a different understanding of the specific content of categories. We reduced this problem by supplementing each source type with examples to illustrate what is meant by the respective source label. This does not rule out the possibility of individual differences which result from weighting the examples or interpreting them selectively. However, our sample size seems large enough to compensate for potential individual differences in the interpretation of the source categories.

Finally, one may argue that the interpretation of an MDS solution is always subject to context-specific considerations (Borg and Staufenbiel, 2007), and, thus, labeling the dimensions is somewhat arbitrary: The expertise dimension, for example, might have been labeled “quality” or “trust.” However, we chose labels that were as fundamental as possible and would, due to their very basic meaning, supposedly achieve the highest agreement between individuals independently labeling the dimensions. In this sense, “trustworthiness” (e.g., Gray et al., 2005) and “quality” (e.g., Zhang, 2014) are not as fundamental as expertise; rather, trust and quality might be considered mere consequences of the basic property of the sources, the amount of professional medical knowledge the provided information bears upon. The same principle holds true for the other two dimensions (e.g., “user friendliness” may be the consequence of accessibility, and “emotional support” may be the consequence of personal interaction, but not the other way round). Nonetheless, to further validate our dimensions, future studies might apply an approach by Robinson and Bennett (1995). In their study, participants were

not only asked to rate objects regarding their perceived similarity, but also to state the criteria they used to distinguish between the objects of comparison. Independent judges could then rate the fit of these criteria with regard to the research objects (information sources, in our case). Subsequent regression analyses determine the extent of the judged interrelation between the dimension labels and the distinguishing criteria.

## CONCLUSIONS

In this article, we presented a multidimensional taxonomy for the classification of health information sources, which is based on subjective source perceptions, and thereby, is in line with the basic assumptions of UAGT (Katz et al., 1973–1974). With this, for the first time, basic dimensions of health information sources have been empirically assessed based on information users' perceptions of similarities and dissimilarities between sources. We thereby fruitfully complement research by Ruppel and Rains (2012), for example, who take into account individual reasons for using particular sources based on characteristics that are theoretically derived. The basic dimensions we identified partly correspond to dimensions that have been proposed before (e.g., Lu and Yuan, 2010). Thus, one major insight of this paper is that the subjective view of the differences between health information sources, are mostly in line with already established phenomenological classifications. However, in our opinion, it is an intriguing finding that by indirectly asking individuals to structure health information sources (namely, via similarity ratings), dimensions emerge that are similar to those that have already been proposed by other researchers. Researchers may use this taxonomy, particularly the underlying continuous dimensions of health information sources, to interpret their results with regard to individual reasons for the use of health information sources. Furthermore, already established ongoing surveys like the Health Information National Trends Survey (HINTS) and the Annenberg National Health Communication Survey (ANHCS), which used standard sets of health information sources beforehand, may adapt the taxonomy and include questions concerning source preferences based on individually perceived source dimensions in particular health specific situations. With this, combined knowledge about preferred sources and source properties would enable researchers to identify individual *reasons* for the use of health information sources.

Future research should address potential relationships between source preferences and individual factors. To fully understand why individuals choose inappropriate or biased sources, and to find out how preferences for different sources

and information types in diverse situations can be explained, a sophisticated approach is needed. Above, we exemplarily described some situations in which persons might prefer specific source features over others. When experiencing symptoms associated with a sexually transmitted disease, for example, one might at first prefer information sources where no interpersonal contact is necessary. However, these assumptions were not yet empirically tested. Future studies should aim at providing evidence concerning these practical implications.

Another promising research approach would be to predict the use of a particular source by explicitly asking participants to classify the source with regard to the three dimensions and the perceived utility of the dimensions in a certain situation. In so doing, one would gain a deeper understanding of the underlying reasons why health information seeking behavior varies between persons and health contexts. Independent from context, some individuals might perceive high accessibility as most useful, whereas others might deem source expertise or the possibility of personal interaction as more important (depending on personal characteristics; e.g., Sun and Zhang, 2016). However, in certain contexts, such differences might disappear. For example, there is a significant time pressure in the case of an epileptic seizure, which is why accessibility of health information might be perceived most useful by almost everyone in this situation. Thus, to investigate person\*situation-interactions, personality and contextual factors should be taken into account simultaneously. By this means, we aim to establish a psychological framework, which takes UAGT (Katz et al., 1973–1974) as a basis and aims at explaining and predicting individual preferences for specific health information sources according to individual needs, skills and motivation. We expect such a framework to have considerable value in a research area that has started to thrive only recently, and expect our taxonomy to be a fruitful starting point for such efforts.

## DATA AVAILABILITY STATEMENT

Datasets are available on request. The raw data supporting the conclusions of this manuscript will be made available by the authors, without undue reservation, to any qualified researcher.

## AUTHOR CONTRIBUTIONS

OW, AC, and A-KM conceived of the initial idea, planned and carried out the studies. OW and AC performed the analytic calculations, interpreted the results, and wrote the manuscript in consultation with A-KM and TR, who also contributed to the final manuscript. A-KM supervised the project.

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**Conflict of Interest Statement:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Appendix B

### Article II

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## Why do we want health information? The goals associated with health information seeking (GAINS) questionnaire

Anita Chasiotis, Oliver Wedderhoff, Tom Rosman & Anne-Kathrin Mayer

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## Why do we want health information? The goals associated with health information seeking (GAINS) questionnaire

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### ABSTRACT

**Objective:** Individual goals of health information seeking have been widely neglected by previous research, let alone systematically assessed. The authors propose that these goals may be classified on two dimensions, namely coping focus (problem versus emotion oriented) and regulatory focus (promotion versus prevention oriented).

**Methods:** Based on this classification, the authors developed the 16-item Goals Associated with Health Information Seeking (GAINS) questionnaire measuring the four goals 'understanding', 'action planning', 'hope' and 'reassurance' on four scales, and a superordinate general need for health information. Three studies were conducted to assess the psychometric properties of the questionnaire.

**Results:** In the first two studies ( $N=150$  and  $N=283$ ), internal consistency of the scales was acceptable to very good, and all items had a satisfying discriminatory power. Factorial validity was corroborated by an acceptable model fit in confirmatory factor analyses. In the third study, which included a patient sample ( $N=502$ ), the questionnaire proved to be suitable for its target group and nomological relationships with personality as well as with situational variables providing evidence for construct validity.

**Conclusion:** The GAINS is a reliable and valid assessment tool, which enables researchers and practitioners to identify an individual's goals related to health information seeking.

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health information  
behaviour; goals; coping;  
regulatory  
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## Introduction

Experiencing health-related symptoms, suspecting a health problem, or even receiving a professional diagnosis may lead to feelings of uncertainty, especially if a person feels a lack of information. In this case, an information need arises (Lazarus & Folkman, 1984). This information need can be satisfied by referring to prior (health) knowledge or through the acquisition of appropriate health information from suitable health

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information sources (Garneau et al., 2011). In the latter case, source-inherent features, situational aspects, and especially individual differences are pivotal for the choice of an information source and for the shaping of the information search process (Gray, Klein, Noyce, Sesselberg, & Cantrill, 2005; Lambert & Loiselle, 2007). In other words, the person  $\times$  situation-interaction is crucial in determining the ideal source of information.

Although individuals' information needs have been shown to significantly impact the information search process (Cole, 2011; Lu & Yuan, 2011; Savolainen, 2017; Wilson, 1981), interindividual differences regarding such needs as well as their dependence on situational demands have been widely neglected in the existing research literature. Accordingly, the goals of information seeking behaviour are commonly operationalised uniformly and are mostly assessed as a unidimensional construct in terms of a unidirectionally quantifiable information need (Lu & Yuan, 2011; Moerman, van Dam, Muller, & Oosting, 1996; Terpstra, Zaalberg, Boer, & Botzen, 2014). Some studies apply a more context-sensitive approach and investigate the 'information need' for a specific type of information, such as information about cancer or fibromyalgia (Daraz, MacDermid, Wilkins, Gibson, & Shaw, 2011; Mesters, van den Borne, De Boer, & Pruyn, 2001). Still, individual needs and goals are left out in such approaches, too.

Given the uncertainty that is associated with an information need, the search process can be seen as a certain form of coping. For example, during a threatening situation, adequate health information can support proper coping with feelings of helplessness (Damian & Tattersall, 1991; Muusses, van Weert, van Dulmen, & Jansen, 2012; Rutten, Arora, Bakos, Aziz, & Rowland, 2005). Moreover, depending on personal characteristics, differing information or representations of information may serve specific coping goals (Rutten et al., 2005). For example, individuals who prefer problem-focused coping (Folkman & Lazarus, 1980) directly address the situation by seeking information on direct interceding actions in order to support dealing with the health problem (Carver, Scheier, & Weintraub, 1989). On the other hand, individuals with an emotion-focused coping style (Folkman & Lazarus, 1980) prefer information which, for example, provides reassurance by showing that in the majority of cases, their symptoms can be considered harmless.

Hence, we argue that there is a general neglect of the consideration of coping and individual goals in the research of health-related information behaviour. For this reason, we developed a short self-report instrument, the 'Goals Associated with Health Information Seeking' (GAINS) questionnaire, which measures the specific goals of an individual's information seeking<sup>1</sup>. The GAINS primarily assesses dispositional tendencies to pursue specific goals in the context of health information seeking, which may, however, interact with particular situational circumstances. These goals thereby can be assessed in every considerable health context and may not only vary inter- but also intra-individually, depending on the situation. With this, we rely on prior research regarding performance goal development and goal orientation that explicitly differentiates between dispositional (trait) and situational (state) goal orientations (see Payne, Youngcourt, & Beaubien, 2007, for a meta-analysis). Thus, we imply that in health information seeking, there are general, relatively stable tendencies to pursue certain goals as well as highly situation-dependent goals that can mainly be ascribed to a

specific health context. As with other instruments measuring traits and states (e.g. the PANAS scales measuring state or trait positive and negative affect, Watson, Clark, & Tellegen, 1988), the questionnaire instruction can be adapted accordingly.

Several benefits of the new questionnaire are conceivable. First, on a conceptual level, the questionnaire allows researchers to find out more about health information-related cognitions, needs and motivations. Second, with regard to patient outcomes, patients and their relatives may be offered tailored information with respect to their individual needs (Young, Tordoff, & Smith, 2017). Third, the questionnaire may be used to tailor information literacy interventions to specific patient groups, and finally, it may even take part in improving the overall information design in health contexts (e.g. by providing information that is in line with common needs and goals of information users).

## Theoretical background

To identify the individual goals of information seeking, it is important to consider the context in which the search for information takes place. In health contexts, goal-oriented information seeking may be interpreted as a way of coping with situations that are perceived as threatening (Lambert & Loisel, 2007; Shiloh & Orgler-Shoob, 2006; van der Molen, 1999). The broad and well-known concept of coping encompasses an individual's efforts to prevent or deal with distress, harm, or threat (Carver & Connor-Smith, 2010). When considering different foci of coping behaviour, the well-established distinction between problem- and emotion-focused coping initially proposed by Folkman and Lazarus (1980) is particularly prominent. A problem-focus is characterised by aiming at tackling and eliminating the problem itself, for example, by understanding its causes and making plans of action (Littleton, Horsley, John, & Nelson, 2007). In contrast, emotion-focused strategies primarily aim at improving emotional well-being (e.g. reduce distress caused by the problem).

Hence, on this basis, two potential goal categories of health information seeking can be identified: emotion-related and problem-related goals. One might wonder: Do I need information because I want to feel better about the health problem, or because I want to overcome my health problem, or both? However, further differentiation between potential goals is necessary in order to indicate the goals individuals pursue when confronted with the respective problem and/or emotion they aim to deal with. Regulatory focus theory (RFT; Higgins, 1987, 1997) postulates two opposed motivational systems that, according to one of the two main conceptualisations of the theory<sup>2</sup>, either strive to maximise positive outcomes (promotion focus) or to minimise negative outcomes (prevention focus). A promotion focus constitutes the regulation towards a desirable end-state and away from the absence of such a state. A prevention focus describes a regulation focus directed at taking care of staying away from undesirable states and/or approaching a state that is not undesirable. In this respect, it is important to note that prevention and promotion focus are not merely different designations for behavioural avoidance and approach tendencies. Both regulatory foci may serve avoidance goals as well as approach goals and may also lead to avoidance as well as to approach behaviour (Higgins, 1997); Summerville & Roese, 2008).

		Coping Focus	
		Problem	Emotion
Regulatory Focus	Promotion	Understanding	Hope
	Prevention	Action planning	Reassurance

**Figure 1.** 2 × 2 matrix of health information seeking goals.

Differences in these regulatory foci (e.g. due to personality or situational influences) were found to predict goals as well as goal-seeking strategies (Strauman, 1996). Therefore, RFT may also provide a useful framework to capture the goals individuals have when they are confronted with a health problem. This is especially true since the theory has already been applied numerous times in the context of health behaviour and health message framing (e.g. Bergvik, Sørli, & Wynn, 2010; Dijkstra, Rothman, & Pietersma, 2011; Yi & Baumgartner, 2009). Bergvik et al. (2010), for example, investigated the prevalence of such regulatory foci in surgery patients and found, among others, evidence that the foci reveal themselves in different goals.

Thus, alongside problem- vs. emotion-focused goals, it is advisable to differentiate between promotion- and prevention-focused goals individuals may pursue when seeking health information. Integrating these two superordinate categorisations of goals into one framework results in a 2 × 2 matrix containing four goal types: problem-promotion, problem-prevention, emotion-promotion and emotion-prevention. Consequently, we derived four scales with which our questionnaire should capture these four goal types (see Figure 1). The first scale, 'Understanding', addresses the goal to identify causes and consequences of a health problem. It is thus problem- as well as promotion-focused, as the goal is to deal with the health problem via enhancing one's understanding and knowledge. The second scale, 'Action planning', measures the goal to determine tangible, situation adequate courses of action to prevent a further worsening of the problem. Hence, it is problem-focused, but unlike the 'Understanding' scale, also prevention-focused: the goal here is to deal with the problem via minimising the likelihood of health deterioration through protective efforts. The third scale is labelled 'Hope' and assesses the goal to activate personal emotional resources. It is therefore emotion- as well as promotion-focused since it aims at dealing with one's emotions via increasing positive emotional states such as hope and trust. 'Reassurance' constitutes the fourth scale measuring the goal to reduce negative emotions like anxiety. It is therefore emotion- as well as prevention-focused as it aims to deal with emotions via reducing distress.

To sum up, the four scales of the GAINS measure four goals individuals may pursue when seeking health information: understanding, action planning, hope, and

reassurance. It is important to note that it is also possible to have more than one goal at a time (Case, Andrews, Johnson, & Allard, 2005). Besides measuring four distinct goals, the GAINS also aims at quantifying an individual's need for health information *in general*. This is achieved by referring to the sum score across all scales.

In this article, we report three studies that investigated the psychometric properties of the GAINS. The first two studies were conducted with the intention of examining the overall suitability of the questionnaire (i.e. item characteristics, internal consistency, structural validity, situational sensitivity). Thus, in Study 1, we focused on item characteristics and selected appropriate items for a final version, and, after that, we analysed the internal consistency of the final scales and examined the proposed factor structure of the questionnaire (four factors representing four goals of health information seeking). In Study 2, we aimed to replicate the factor structure from Study 1 within a larger sample, and to further validate our instrument in terms of sensitivity to situational influences, that is, to a varying degree of threat. In Study 3, we analysed construct validity in a larger sample constituting the questionnaire's target group. Therefore, the sample in Study 3 was approximately representative for the general population with regard to age and sex and consisted of individuals experiencing a health problem who exhibited a resulting information need.

## Study 1

Our first study aimed at the initial development and structural validation of the GAINS. For this reason, the wording of the questionnaire's instructions was very general and independent from a specific health context in this study, as we asked participants to refer to the goals they *usually* had pursued in the past when seeking health information. With this, we were also able to test if the GAINS was suitable to measure dispositional, trans-situational goals. We analysed item characteristics (means, variances and discriminatory power), estimated the scales' internal consistencies, and assessed the questionnaires' factorial structure. According to our theoretical assumptions, we expected a confirmatory factor model with five latent variables (four first order-factors representing the four goals measured by the GAINS and one second-order factor representing a general need for health information) to yield an acceptable or better data fit. Furthermore, we expected this model to fit considerably better than three alternative models. The first two alternative models comprise only two (instead of five) latent factors representing (1) problem- and emotion-focused goals or (2) promotion- and prevention-focused goals. The third alternative model includes one single latent factor representing a general health information need.

## Methods

### Item construction

The initial approach involved the first two authors to formulate basic items for each subscale in collaborative brainstorming sessions, based on the theoretical derivation of the components of the four goals. These items were a starting point for the development of further items, made separately by the authors. By this means, a larger item

pool was assembled, which however included a large number of redundancies. A selection of these items was made through a joint discussion by all four authors as to which items are most likely to represent the theoretical dimensions. Ultimately, this led to an item pool of 19 items. This approach is a mixture of the concepts of intuitive and rational construction (Jonkisz, Moosbrugger, & Brandt, 2012), as the construction of the items is equally based on intuition and experience from the authors, as well as on a deduction from related theories. The 19 items represent the four scales 'Understanding' (four items), 'Action planning' (four items), 'Hope' (six items) and 'Reassurance' (five items).

### **Sample**

According to a Monte Carlo simulation study by Muthén and Muthén (2002), a sample size of minimum  $N=100$  to 150 participants would be sufficient for our purpose. Thus, we decided to recruit 150 participants. Data were collected in an online study on health information behaviour. Participants were recruited via a mailing list of a large German university as well as via Facebook groups aimed at recruiting subjects for psychological studies. The minimum age limit for participation was 18 years. The final sample included  $N=150$  participants, with an age range from 19 to 60 years and a mean age of 27.13 ( $SD=7.27$ ) years. Sixty-seven percent ( $n=100$ ) of the participants were females and with regard to educational level, 93.8 percent ( $n=141$ ) had at least the German high school diploma-equivalent ('Abitur'). Thus, our sample was rather young and highly educated.

### **Materials and procedure**

Alongside other questionnaires related to a different research question, participants completed the newly developed GAINS questionnaire. In the instruction, they were requested to evaluate, on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*), whether they usually had pursued the respective goal when seeking for information concerning health problems in the past. Survey completion took around 90 minutes, and participants received 15 € as compensation.

### **Results**

#### **Item characteristics and confirmatory factor analysis**

For practical reasons, we aimed to reach an equal number of items (i.e. four) per scale. Thus, one item from the 'Reassurance' and two items from the 'Hope' scales had to be eliminated. We thereby decided to exclude the items that would provide the lowest discriminatory power. Accordingly, in the 'Hope' scale, the items with the lowest discriminatory power ('... to regain courage despite the problem.', .74 and '... to remain as carefree as possible despite the problem.', .68) were eliminated. Since the discriminatory power of the two lowest-ranking items in the 'Reassurance' scale was extremely similar (.66), we decided to eliminate the item '... to feel more relieved at the thought of the problem.' because it is redundant to another item with a better discriminatory power and a (subjectively) higher readability ('to be more relaxed about the health problem.'). By retaining the other item, the complexity of the construct as a whole is

also better represented. For the remaining 16 items, item means were moderate to high (2.85 to 4.35 on a 1–5 rating scale) and standard deviations ranged from 0.63 to 1.24. The discriminatory power of all items was satisfactory ( $r_{it} > .50$ ). Internal consistencies of the four scales and the overall scale were acceptable to very good (Cronbach's Alphas: .68 for 'General information need', .80 for 'Understanding', .85 for 'Action Planning', .90 for 'Hope', and .85 for 'Reassurance').

Hence, 16 items were retained and included in the subsequent confirmatory factor analysis, which we conducted using the R-package lavaan (Rosseel, 2012). In a first step, we tested our proposed model (Model 1) with four latent factors representing the four subscales, and one latent second-order factor representing a general need for health information. For theoretical reasons, we allowed covariation between the two problem-focused and the two emotion-focused goals as well as between the two promotion-focused and the two prevention-focused goals in Model 1. This was because there are additional determinants besides the general need for health information that would contribute to their covariation (e.g. personality characteristics associated with a problem- or emotion focused coping style or a specific regulatory focus). Additionally, we assumed the latent goal factors to have a balanced impact on the second-order factor (general health information need), which is why we fixed their respective path coefficients to being equal.

According to the rules of thumb for model evaluation provided by Schermelleh-Engel, Moosbrugger, and Müller (2003), this model provided an acceptable fit ( $\chi^2 = 140.74$ ,  $df = 99$ ,  $p < .05$ , RMSEA = .054, CFI = .97, SRMR = .068, AIC = 5654.93, BIC = 5765.57). The first alternative model (Model 2) had two latent factors representing problem- and emotion-focused goals. These goals were measured by combining the 'Understanding'- and 'Action planning'-items (problem focus) and the 'Hope'- and 'Reassurance'-items (emotion focus) into two factors. The second alternative model (Model 3) had two latent factors representing promotion- and prevention-focused goals. In this model, the 'Understanding'- and 'Hope'-items (promotion focus) and the 'Action planning'- and 'Reassurance'-items (prevention focus) were combined, respectively. The third alternative model (Model 4) was a single factor model representing a general and undifferentiated need for health information that was measured by all 16 items. All three alternative models yielded an insufficient fit, and the magnitude of the AIC and BIC differences from the proposed model suggested its superiority in the present sample (Symonds & Moussalli, 2011; Wagenmakers, 2007). Table 1 depicts the four tested models with their respective fit measures. In sum, the first study provides initial empirical evidence for the reliability as well as for the structural validity of the GAINS.

## Study 2

For one, the aim of Study 2 was to replicate the results of Study 1. Hence, we expected satisfactory internal consistencies of all scales and an at least acceptable fit of our proposed model in a confirmatory factor analysis (structural validity).

Our second aim was to examine if the GAINS would prove sensitive to situational circumstances and thereby could, in addition to assessing rather dispositional goal

**Table 1.** Fit-indices of different factor structure SEM estimations of the GAINS.

Fit Index	Model 1a	Model 1b	Model 1c	Model 2	Model 3	Model 4
$\chi^2$	140.74	217.79	269.06	286.50	561.55	655.28
<i>df</i>	99	99	99	103	103	104
$\chi^2 / df$	1.42	2.20	2.72	2.78	5.45	6.30
RMSEA	.054	.065	.058	.110	.174	.190
TLI	.96	.93	.96	.85	.62	.55
CFI	.97	.94	.96	.83	.57	.48
SRMR	.068	.055	.052	.094	.195	.193
AIC	5654.93	–	–	5792.69	6067.74	6159.47
BIC	5765.57	–	–	5891.38	6166.43	6255.16

Notes: Model 1a: four first-order factors and one second-order factor; Study 1. Model 1b: four first-order factors and one second-order factor; Study 2. Model 1c: four first-order factors and one second-order factor; Study 3. Model 2: two latent factors (problem and emotion focus); Study 1. Model 3: two latent factors (promotion and prevention focus); Study 1. Model 4: one general first-order factor; Study 1. As no non-nested models were compared in Study 2 and 3, the AIC and BIC of Model 1b and 1c are omitted.

orientations, also measure highly situation-dependent goals. Therefore, different from Study 1, participants were now explicitly instructed to refer to the information goals they would have when undergoing a portrayed health problem scenario. Then, we analysed the capability of the instrument to discriminate between individuals depending on the perceived seriousness of the described health problem. We expected that individuals would not differ in their preference for prevention goals depending on the severity of the health threat, but in their preference for promotion goals. This means that individuals confronted with a severe health threat may be more inclined to pursue promotion goals than individuals confronted with a moderate threat. In fact, prevention goals are activated when at least a moderate threat is anticipated (Higgins, 1997; Oyserman, Uskul, Yoder, Nesse, & Williams, 2007). However, because with a moderate danger present they are already highly expressed, we assumed that such goals are unlikely to *further* increase with a growing threat. In contrast, promotion goals like gaining hope or understanding the cause of the threat become much more relevant if the threat is high compared to moderate, as is also reflected in the counter-regulation hypothesis by Rothermund, Voss, and Wentura (2008).

## Methods

### Sample

Data collection was conducted during a study on health information behaviour and carried out at a large Germany university. Participants were recruited via a university mailing list as well as via flyers at the university campus. The minimum age limit for participation was 18 years and participants were required to be enrolled as university students. The final sample included  $N = 283$  participants, with an age range from 18 to 46 years and a mean age of 23.53 ( $SD = 3.25$ ) years. 80.6% ( $n = 228$ ) of the participants were females.

### Materials and procedure

The second study was part of a larger study and was divided into two parts: an online survey (about 30 minutes) and a supervised group session with a maximum of 30 participants. The second part took about 90 minutes and included our experimental study.

As compensation, participants received 30 € in cash. In this study, the final (16-item) version of the GAINS was employed. Internal consistency of the four scales as well as of the overall score were satisfactory to good (Cronbach's Alpha = .74 to .89). Before applying the GAINS, we experimentally manipulated the perceived health threat by randomly assigning participants to one of two experimental conditions. These conditions differed in the severity of a short health scenario which was presented in written form at the beginning of the experiment. Participants were instructed to familiarise with the described situation and fill out the GAINS as if they themselves actually had to live through the portrayed situation. Participants from the first group ('moderate threat') were instructed to imagine that they would experience some unspecific breast pain that, however, would not considerably impact their everyday life and functioning. In contrast, participants from the second group ('severe threat') were presented with a scenario in which they would experience acute breast pain and breathing troubles, resulting in marked constraints for their functioning. As a manipulation check, participants rated the perceived threat of the respective scenario on a scale from 0 (*no threat*) to 100 (*maximum possible threat*). A t-test for independent samples revealed our manipulation to be effective ( $M = 39.01$  and  $SD = 20.57$  in the 'moderate threat' condition vs.  $M = 61.15$  and  $SD = 21.56$  in the 'severe threat' condition,  $t(281) = 8.84, p < .001$ ).

## Results

### Structural validity

In order to further corroborate the structural validity of the GAINS, the factor structure was estimated in the second sample just like in Study 1. Again, we fixed the path coefficients of the first-order latent goal factors on the second-order factor to be equal. Model fit was acceptable ( $\chi^2 = 217.79, df = 99, p < .05, RMSEA = .065, CFI = .94, SRMR = .055$ ; see Table 1, Model 1 b), implying a successful replication of the GAINS' structure in an independent sample.

### Sensitivity to situational influences

To assess the situational sensitivity of the GAINS, we conducted a MANOVA with threat condition (moderate vs. severe) as independent variable and the four goal scales as dependent variables. The multivariate effect was significant with Pillai's trace = .059,  $F(4, 278) = 4.38, p < .01$ . The univariate  $F$ -tests showed that threat severity had a significant positive impact on the promotion goal 'Understanding' ( $F(1, 281) = 5.55, p < .05, \text{partial } \eta^2 = .02$ ). The descriptively positive effect of threat severity on the promotion goal 'Hope' was, contrary to our expectations, not significant ( $F(1, 281) = 3.78, p = .06, \text{partial } \eta^2 = .01$ ). Thus, an increase of threat seems to increase promotion goals – at least with regard to 'Understanding'. As expected, threat severity had no significant impact on prevention goals ('Action planning':  $F(1, 281) = 1.47, p = .23$ ; 'Reassurance':  $F(1, 281) = 0.91, p = .34$ ).

### Study 3

Our third study had two objectives. First, we intended to replicate our findings from the first two studies with regard to item characteristics, internal consistencies and structural validity in a larger sample. To further increase the generalisability of our results, we strived for a sample that would (a) be approximately representative of the general population with regard to age and gender, and (b) consist of individuals who currently experienced an actual health problem and a resulting information need. With this, we would be able to ascertain that the instrument may be applied to its genuine target group.

The second objective of Study 3 was to analyse the GAINS' construct validity. For this reason, we developed hypotheses about the relationship between the GAINS scales and other constructs in a comprehensive nomological network.

First, we predicted all scales to positively correlate with the reported level of worry about the health problem as we assumed that increased worry leads to a higher personal relevance of the goals that health information may serve (Lee & Hawkins, 2016; Myrick, Willoughby, & Verghese, 2016; Yang & Kahlor, 2013).

Second, we expected a single item capturing the current information needed to correlate positively with the GAINS total score – which we meant to represent a general information need.

Third, we assumed that both problem-focused goal scales ('Understanding' and 'Action planning') would be positively associated with the *perceived* ability to find, analyse, understand and use relevant health information (health information literacy; Shipman, Kurtz-Rossi, & Funk, 2009). We will further refer to this perceived ability as 'health information seeking self-efficacy'. With regard to the 'Understanding' scale, this is because individuals who have confidence in their capability to understand and make use of health information (i.e. whose self-efficacy is more pronounced) should more likely be motivated to understand the specific health problem in detail. Accordingly, research consistently finds general and domain-specific self-efficacy being positively associated with persistence and effort (Scholz, Doña, Sud, & Schwarzer, 2002; Zimmerman, 2000). Furthermore, with regard to 'Action planning', individuals who perceive themselves as health literate may be more willing to plan further action with the help of the retrieved information since they believe in their ability to adequately deal with it.

Fourth, the *general* individual disposition for having a promotion or prevention regulatory focus should correlate positively with a situationally sensitive, but dispositionally embedded preference of a corresponding domain-specific goal (namely, a health information seeking goal).

### Methods

#### Sample

Our sample was approximately representative for the general population in Germany with regard to age and gender. It was acquired online via the CINT Access panel, in which participants were invited according to age group and gender quotas that represented the original distribution of these characteristics in the general population in

Germany. The final sample consisted of  $N = 502$  individuals with an age range from 18 to 74 years and a mean age of 45.24 years ( $SD = 13.94$ ). Fifty-six percent were females and 39.8% had at least the German high school-diploma equivalent ('Abitur'), which is a slightly higher proportion than in the general German population (about 32%; German Federal Statistical Office, 2017). A precondition for participation was the experience of a disease or another health problem within the past four weeks (maximum), and, at the same time, a need for information with regard to this issue. The most frequently mentioned health complaints were related to the musculoskeletal system (e.g. back pain, knee problems), mental health (e.g. depression, anxiety and eating disorders) and the cardiovascular system (e.g. hypertension, cardiac insufficiency).

### **Materials and procedure**

The study was designed as an online survey that took about 15 minutes to complete and was conducted by a professional panel-based data collection service. The final (16-item) version of the GAINS was employed. Internal consistency of the four scales as well as of the overall score was good (Cronbach's Alpha = .80 to .89). After completing the GAINS, to examine construct validity, participants responded to several questionnaires and single item questions (see below). Additionally, before administering the GAINS, we included questions about the nature and duration of the health problem, the perceived knowledge regarding the health problem (single item), and diagnosis (if applicable).

**Information need and worry about the health problem.** Information need was measured by a single item asking participants to rate their information need with regard to their health problem on a scale from 0 (very low information need) to 100 (extremely high information need). Mean information need was  $M = 71.95$  ( $SD = 24.90$ ). We also asked how worried participants were about their health problem, which they could rate on a scale from 0 (not worried at all) to 100 (extremely worried). For this item, the mean was  $M = 53.95$  ( $SD = 27.84$ ).

**Health information seeking self-efficacy.** To assess health information seeking self-efficacy, we adapted the Self-Efficacy Scale for Information Searching Behaviour (SES-IB-16) by Behm (2015) with regard to the context of health information. The questionnaire consists of 16 items that are scored on a 5-point Likert scale (1 = *does not apply at all*, 5 = *fully applies*). With Cronbach's Alpha of .91, internal consistency was very good.

**Regulatory focus.** As suggested by Yi and Baumgartner (2009), the individual dispositions for behavioural inhibition (BIS) and behavioural activation (BAS) may serve as a proxy for regulatory focus (see also Leone, Perugini, & Bagozzi, 2005; Mann, Sherman, & Updegraff, 2004). Regulatory focus was thus measured by the short German version of an instrument assessing BIS and BAS established by Carver and White (1994). This version, called ARES-K, was developed by Hartig and Moosbrugger (2003) and contains 20 items, with 10 items measuring BIS or BAS, respectively. The items are scored on a 4-point Likert scale, with 1 indicating strong disagreement and 4 indicating strong

agreement. Cronbach's Alpha of both scales was good to very good, with  $\alpha = .94$  for the BIS scale and  $\alpha = .82$  for the BAS scale.

## Results

### Item characteristics and structural validity

Just like in our initial construction study (Study 1), item characteristics were satisfactory. Item means were moderate to high (3.59 to 4.23 on a 1–5 scale) and the lowest standard deviation was .86. Item discriminatory power (item-total correlation) ranged from .51 to .72 in the general information need scale and from .50 to .81 in the four subscales (i.e. the goal scales).

For the purpose of further corroborating the proposed factor structure of the GAINS, we conducted another confirmatory factor analysis in this third sample. Again, we fixed the path coefficients of the first-order latent goal factors on the second-order factor to be equal. Model fit was acceptable ( $\chi^2 = 269.064$ ,  $df = 99$ ,  $p < .05$ , RMSEA = .058, CFI = .96, SRMR = .052; see Table 1, Model 1c), implying a successful replication of the instrument's factor structure.

### Construct validity

Construct Validity was tested by means of Pearson correlations between the GAINS and the subscales BIS and BAS of the ARES-K, the SES-IB-16 and the two single items measuring worry and information need (see Table 2). As hypothesised, worrying about the health problem positively correlated with all four goals. Moreover, again in accordance with our expectations, information need positively correlated with the GAINS total score. Regarding the SES-IB-16 (health information seeking self-efficacy), as expected, statistically significant and positive correlations were found for the overall score as well as for the problem focus goals 'Understanding' and 'Action planning'. Moreover, in terms of discriminant validity, the two other subscales ('Reassurance' and 'Hope') showed no significant correlations with the SES-IB-16. The expected positive correlation between the prevention goal 'Reassurance' and BIS was significant, just as the correlation between the promotion goal 'Understanding' and BAS. Again, in terms

**Table 2.** Correlations, means and standard deviations of the GAINS scales, ARES-K scales, SES-IB, Worry and Information Need in Study 3.

	1	2	3	4	5	Mean	SD
1 Total Score						3.87	0.73
2 Understanding	.85**					3.89	0.81
3 Action Planning	.78**	.68**				4.14	0.75
4 Reassurance	.88**	.64**	.53**			3.66	0.90
5 Hope	.87**	.58**	.52**	.75**		3.79	0.99
ARES-K							
BIS	.12**	.03	-.03	.18**	.19**	2.52	0.76
BAS	.15**	.19**	.28**	.03	.06	3.04	0.48
SES-IB	.08	.14**	.16**	-.00	.01	3.45	0.60
Worry	.32**	.24**	.21**	.28**	.34**	53.95	27.84
IN	.46**	.46**	.41**	.37**	.35**	71.95	24.90

Notes: Total Score = Information need represented by GAINS total score (scale 1–5). BIS = Behavioural inhibition system (scale 1–4). BAS = Behavioural activation system (scale 1–4). SES-IB = Health information seeking self-efficacy (scale 1–5). Worry = Worry about health problem (single item; scale 0–100). IN = Information need (single-item; scale 0–100). \*\* $p < .01$ .

of discriminant validity, we found no statistically significant correlations between 'Reassurance' and BAS and 'Understanding' and BIS. However, contrary to our expectations, the second prevention goal, 'Action Planning', did not correlate with BIS (but with BAS), and the second promotion goal, 'Hope', did not correlate with BAS (but with BIS).

## General discussion

The GAINS questionnaire aims to measure individual goals of health information seeking on the four scales 'Understanding', 'Action planning', 'Hope' and 'Reassurance', as well as a general need for health information (mean score across the scales). In three independent studies, we analysed the psychometric properties of the instrument. Study 1, an online study using a generally formulated, situation-independent instruction, showed that all items had a satisfactory discriminatory power, and provided first evidence for the reliability of the instrument. Furthermore, the proposed factor model yielded an acceptable fit and was clearly superior to three alternative models. These results were corroborated in Study 2, which included a university student sample and used a situation-specific instruction referring to an experimentally manipulated health threat. Here again, adequate scale reliabilities and an acceptable fit of the proposed factor structure were found. In Study 3, we analysed a sample from the target population of the GAINS which was approximately representative for the German general population with regard to age and gender. This sample constituted of individuals who currently suffered from a health problem and had a resulting information need. Here, too, our analyses revealed adequate item characteristics and internal consistencies, as well as a satisfactory fit of the proposed factor model.

While the questionnaire proved reliable and structurally valid in all three studies, we also found evidence for its construct validity in Study 3. Worrying about one's health problem(s) correlated significantly with all scales, and a single item capturing participants' current information need was positively associated with the GAINS total score (which we proposed to measure a general information need). Moreover, the problem-focus scales correlated with self-efficacy beliefs regarding health information seeking. This supports construct validity since individuals who have confidence in their information seeking capability are more likely to adopt an (usually more challenging) problem-orientated search. The very low (even insignificant) correlations of self-efficacy beliefs with both emotion-focus scales further corroborate construct validity in terms of discriminant validity - which is in line with our expectations since the regulation of one's emotions is only very loosely connected to an achievement-oriented variable such as self-efficacy. Furthermore, in accordance with our theoretical assumptions, the promotion-focus goal 'Understanding' significantly correlated with our measure for a predisposition promotion focus (BAS), and the prevention-focus goal 'Reassurance' correlated with the prevention equivalent (BIS). Finally, the GAINS was, overall, sensitive to experimental variations of the perceived health threat (Study 2).

However, contrary to our expectations, there were no associations between 'Action planning' and BIS, and 'Hope' and BAS, but instead between 'Action planning' and BAS and 'Hope' and BIS (see [Table 2](#)). This might be due to theoretical reasons: As

Strauman and Wilson (2010) point out, BAS and BIS on one side, and a specific regulatory focus (prevention vs. promotion) on the other side, should be conceived on different levels of approach and avoidance motivation. BAS and BIS represent dispositional, fundamental approach and avoidance temperaments (Carver, 2005) and are therefore more closely related to actual *behaviour* (Elliot & Thrash, 2002). Regulatory focus, on the other hand, predicts the preference for a specific strategy when pursuing an approach or avoidance *goal* (with the strategies differing in their respective reference points in goal regulation; Summerville & Roese, 2008). Hence, it is conceivable that a prevention focus may lead to approach behaviour if this serves the superordinate goal of reducing a threat. For example, in the case of 'Action planning', the prevention focus (averting danger) may direct approach behaviour such as initiating specific actions in dealing with the danger. Thus, essentially, behavioural approach and avoidance tendencies (as captured by the BIS and BAS measures), regulatory focus and approach/avoidance goals may be interrelated, but cannot be regarded as interchangeable designations of the same construct- which might explain why not all our expectations regarding the respective correlations were supported by our data. While we were relying on the literature suggesting BIS and BAS as valid proxies for prevention and promotion foci (e.g. Yi & Baumgartner, 2009; Mann et al., 2004), we therefore must conclude that in our case, a more sophisticated approach to validate prevention and promotion focus might have been indicated, especially since a clear distinction between approach/avoidance behavior, goals, and promotion/prevention regulatory focus is crucial for our purposes. Hence, concerning the further analysis of construct validity, future studies additionally should assess the relationship between the GAINS scales and regulatory focus directly, for example, via message framing experiments (Hevey & Dolan, 2014) and by using more appropriate questionnaires (see below).

A direct consequence of the denoted issue is that, overall, our results concerning construct validity mainly support differentiating between coping foci, but not necessarily between regulatory foci in health information seeking goals. However, the four factor-solution exhibited a much better fit than the two factor-solution that would come into question when dropping the regulatory focus dimension. In addition, all four scales are theoretically well-founded with regard to their unique meaning in health information seeking (see, e.g. Dickerson, Boehmke, Ogle, & Brown, 2006 about gaining hope as motivation in searching for information about cancer care). Thus, the theoretical framework of the GAINS represented by a  $2 \times 2$  matrix (see Figure 1) could be adapted by eliminating the regulatory focus dimension while keeping all four scales. However, before taking this step, the framework first has to be tested more appropriately with regard to regulatory focus (as discussed above) to base this decision on more solid grounds. We therefore decided to nevertheless retain the regulatory focus dimension, but advise caution regarding its insufficient empirical testing.

One further limitation concerns (the lack of) additional reliability and validity testing. Although internal consistencies were satisfactory in all three studies, future studies should investigate the test-retest reliability of the GAINS to corroborate reliability. Additionally, criterion validity has yet to be assessed. To date, it is unclear if the GAINS can predict actual information behaviour or the actual pursuit of certain goals. For further evaluation of criterion validity, a relevant external criterion (e.g.

observed information behaviour) has to be included in subsequent studies. As for concurrent validity, a possible solution would be to assess positive and negative affect before and after information seeking, and compare a potential emotional shift with the results of the GAINS. In terms of prognostic validity, actual behaviour and change in affect after a given time could be an appropriate implementation for future research.

In addition to the connection to actual behaviour, better instruments for the associated validation constructs, in terms of their contextual and theoretical fit, would be useful for further validation efforts. Thus, in future studies, we plan to include additional questionnaires measuring coping tendencies, such as the COPE inventory (Litman, 2006), as well as questionnaires measuring dispositional promotion and prevention regulatory focus using a reference-point definition (Summerville & Roesse, 2008), like the general regulatory focus measure (GRFM; Lockwood, Jordan, & Kunda, 2002). Furthermore, scrutinising the relationship between the GAINS scales and actual health problems would significantly contribute to the analysis of construct validity. We would expect varying grades of markedness of every single information seeking goal depending on the perceived severity of and mere susceptibility to a health problem. Here, conducting a quasi-experimental investigation with varying severity of and susceptibility to a health problem (e.g. using a  $2 \times 2$  design) would constitute a promising approach to further investigate construct validity. Subsequently, to integrate our approach into a broader theoretical framework of health behaviour, relationships between the GAINS and questionnaires measuring cognitive and/or behavioural aspects of health behaviour could be established. Regarding the Transtheoretical Model of Behavior Change (TTM; Prochaska & DiClemente, 1983), for example, one could explore mediating effects by the GAINS scales with regard to the association between the 'contemplation' and the 'preparation' or 'action' stages: Depending on their preferred information seeking goal(s), individuals may come to different conclusions with regard to the kind of potential changes in their health behavior they may adapt.

Another future research direction concerns our aspiration to measure dispositional as well as situation-specific health information seeking goals by adapting the instruction accordingly, depending on the respective focus of interest. In the three studies reported in this article, we introduced both approaches, using a generally phrased instruction in Study 1 (relating to *usually* pursued goals) and situation-related instructions in Studies 2 and 3. However, there is more research needed as to the justification of differentiating between trait and state goals in the area of health information seeking, and thus, of using different instructions when applying the GAINS. Longitudinal designs in which the GAINS is applied with different instructions (trait vs. state) across varying experimental conditions may constitute a promising approach in this respect.

In sum, the GAINS questionnaire was demonstrated to be a reliable and empirically valid instrument that makes a unique contribution to the interdisciplinary fields of health psychology, health communication, and medical psychology. The new questionnaire allows a comprehensive assessment of the goals that individuals pursue when searching for health information. The specific goals captured by the GAINS have a solid theoretical foundation and show the best statistical fit if they are estimated

independently in a structural model. With regard to research applications, this makes the questionnaire an excellent choice for analysing individual differences in coping through health information seeking. The individual goal dimensions may aid the field in explaining variance in relevant outcomes, as well as in increasing the understanding of information search processes. Furthermore, at the interface between research and practice, the GAINS may help to design and improve specifically tailored information for various patient groups. Ultimately, identifying specific goals in health information seeking may even improve the coping and understanding process in patients, and lead to better health outcomes. Hence, the GAINS can be considered as an instrument of high value in a relatively broad field of application to a new and not yet wholly covered topic.

## Notes

1. The questionnaire can be found in the original German version with an unverified English translation in a publicly accessible repository in the publicly accessible repository PsychArchives (<https://www.psycharchives.org/handle/20.500.12034/560.2>).
2. Higgins (1997) introduces two conceptualisations of prevention and promotion regulatory foci which Summerville and Roese, (2008) term 'self-guide definition' and 'reference-point definition'. Throughout this article, when relating to the RFT, we refer to the reference-point definition, which distinguishes between the two regulation foci characterised by one of two possible reference end-states ('gain' or 'loss').

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## Data availability statement

Datasets are available on request. The raw data supporting the conclusions of this manuscript will be made available by the authors, without undue reservation, to any qualified researcher.

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## Appendix C

### Article III

Chasiotis, A., Wedderhoff, O., Rosman, T., & Mayer, A.-K. (2019b). The Role of Approach and Avoidance Motivation and Emotion Regulation in Coping Via Health Information Seeking. *Current Psychology*. <https://doi.org/10.1007/s12144-019-00488-3>



# The Role of Approach and Avoidance Motivation and Emotion Regulation in Coping Via Health Information Seeking

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## Abstract

When dealing with a health threat, health information seeking (HIS) is a prominent way of engagement coping. Yet, there is only limited research as to its motivational and emotion regulatory antecedents. We present a theoretical model integrating approach and avoidance motivation, emotion regulation, HIS self-efficacy, and problem and emotion coping focus as predictors of HIS. We propose that, in the context of HIS, (1) approach and avoidance motivation have a direct effect on emotion regulation ability (positive and negative, respectively), (2) approach and avoidance motivation have indirect effects on intended comprehensiveness of search via emotion regulation, HIS self-efficacy and problem coping focus, (3) avoidance motivation has a direct effect on emotion coping focus. Our model was tested by means of structural equation modeling in a sample of university students ( $N = 283$ ). Model fit was good, and all three hypotheses were supported. We show that emotion regulation ability is essential to explain the effects of approach and avoidance motivation on HIS as it fosters self-efficacy and a problem coping focus. The direct effect of avoidance motivation on emotion focus may represent an alternative way of coping with a health threat for those individuals who are highly sensitive to threat-related emotions.

**Keywords** health behavior · coping · emotion regulation · self-efficacy · structural equation modeling

Experiencing a health threat challenges individuals in two ways. Not only do they have to cope with the health problem itself. They are also required to deal with aversive emotions like anxiety and worry. These essential processes in dealing with threatening situations have been referred to as emotion and problem focused coping (e.g., Lazarus 2006). With regard to these two basic ways of coping, other authors have further distinguished between engagement coping and disengagement coping (Carver and Connor-Smith 2010). Disengagement coping encompasses a diverse set of strategies to deal with a threat and with resulting aversive emotions by avoiding and denying the threat as a whole (e.g., Derakshan et al. 2007). Engagement coping, in contrast, is characterized by actively facing up to the threat or the threat-related aversive emotions. When facing a health threat, a prominent engagement coping strategy which can be pursued with a problem or emotion focus, is health information seeking (Shiloh and

Orgler-Shoob 2006). We define health information seeking (HIS) as actively and deliberately searching and retrieving health related information, e.g. about prevention, symptoms and diseases using any kind of information channels. Hence, not only searching the internet for information about recently occurred symptoms, but also visiting the family doctor for a check-up or asking friends and colleagues are possible ways of HIS.

Helping individuals to adequately cope with a (health) threatening situation via information seeking by considering their needs and preferences requires research focusing on motivational and affective dispositions which impact coping behavior (Lazarus 2006). Past research has identified motivational and affective dispositions as most pertinent in explaining interindividual differences in HIS (Gerend and Shepherd 2007; Hastall and Wagner 2017; Hevey and Dolan 2014; Van't Riet and Ruiters 2013). For example, in an experimental study, Hastall and Wagner (2017) found that low-anxious individuals who were highly avoidance-motivated selected more loss-framed (compared to gain-framed) health information articles for reading. Furthermore, in a comprehensive literature review, van't Riet and Ruiters (2013) point out that differing levels of emotion regulation ability affect the exposure to health-promoting information. In the present

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study, we strive for a better understanding of how these dispositions impact HIS via simultaneously identifying relevant mediators and unique modes of effects. This is, on the one hand, fruitful for future research on the relationship between personality and health information behavior. On the other hand, scrutinizing the impact of these dispositions on HIS provides clinical practitioners with professionally relevant insights concerning interindividually differing information needs of their patients.

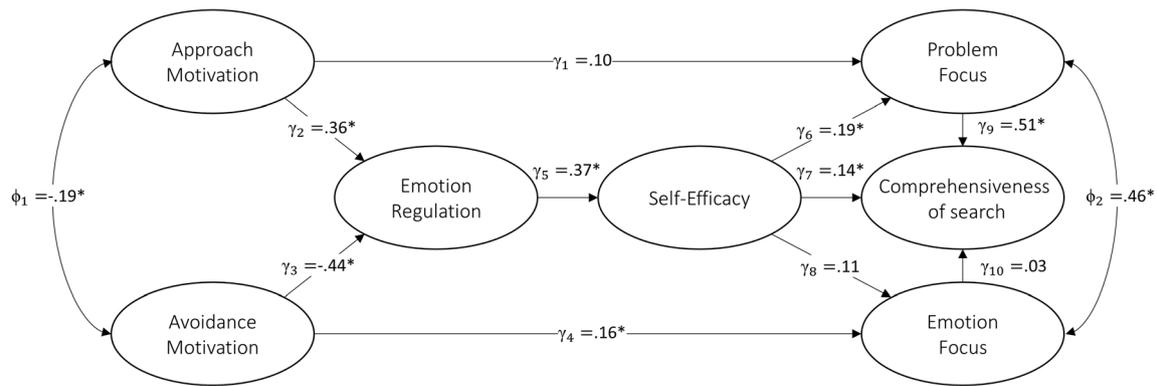
In past studies, there have been valuable approaches to capture individual differences in engagement and disengagement coping styles with regard to information seeking under a (health) threat (e.g., vigilance vs. cognitive avoidance, Krohne and Hock 2011; monitoring vs. blunting, Miller 1987; sensitizing vs. repressing, Byrne 1961). These concepts of coping styles essentially capture behavioral tendencies that are mainly attributed to dispositional preferences (Krohne and Hock 2011). According to these and similar conceptualizations of coping styles, the dispositional preference to cope with a threat via avoiding and neglecting the threat itself, for example, would lead to behavioral avoidance and neglect of threat-relevant information (as is the case with so called “blunters” or “repressors”). Correspondingly, the main focus of this research was to investigate individual differences in two opposing, dichotomously conceptualized coping styles: (1) in *actively seeking* (e.g., monitoring) or (2) in *avoiding* (e.g., blunting) potentially threatening information. If potentially threatening information is not avoided and thus, an active search for information is conducted, it can vary on a wide continuum with regard to its comprehensiveness. Individuals may conduct an exhaustive search, taking into account many perspectives and facets of a topic. They may also, however, conduct a rather shallow or biased search which is mainly driven by the motivation to find reassuring or confirming (rather than accurate) information (Hart et al. 2009). Thus, research on HIS exclusively focusing on interindividual differences in choosing between all-or-none alternatives (avoiding vs. seeking) neglects possible variations in the realization of an active search. Up to now, only little is known about the personality factors that are responsible for these interindividual differences in *actively seeking* health information (Litman and Lunsford 2010). Shedding light on such factors, however, is crucial for future research on interventions to help patients meet their information needs and become more responsible for their own health and wellbeing (Berkman et al. 2011). Existing research identified motivational and affective dispositions to be particularly relevant for HIS (see above). If we increase our knowledge with respect to the direct and mediated effects of these factors on HIS, corresponding interventions could be tailored to individuals differing in their motivational and affective dispositions. For example, individuals regularly experiencing difficulties in downregulating threat-related emotions such as anxiety may

benefit from interventions that prevent them from confirming their fear through threat-directed searches (e.g., searching for “headache brain tumor” when suffering from a headache; White & Horvitz, 2009). Furthermore, awareness in how far patients differ with regard to motivational and affective dispositions can aid clinical practitioners in following a need-sensitive and flexible approach when providing health information (see also Kiesler and Auerbach 2006).

In the present study, we aim at developing and testing a theoretical model which for the first time integrates relations between motivational and emotion regulatory processes as well as emotion and problem foci in HIS. In the model, we also consider the differential impact of emotion focused vs. problem focused HIS on the intended comprehensiveness of the search (as a proxy for actual seeking behavior). Intended comprehensiveness is characterized by exhaustively seeking balanced information which may contradict one’s own opinion (e.g., about vaccination). In the following section, we develop our final model (see Fig. 1) based on the existing evidence and derive specific hypotheses.

## Model Development

As mentioned above, motivational dispositions play a crucial role when it comes to coping with threat. These motivational dispositions are generally understood of as basic, primarily genetically determined individual differences in motivation (Hartig and Moosbrugger 2003). Litman (2006) found that dispositional approach motivation, essentially capturing sensitivity to rewards and reward-related emotions like joy (Carver 2005), positively predicted engagement coping. Still, it remains unclear by which mechanisms this association is established. As for dispositional avoidance motivation, i.e., sensitivity to threat and threat-related emotions like anxiety, there were no associations with engagement coping. However, according to Carver (2005), there are essentially two ways in which avoidance motivation fosters action aiming at averting a threat. Reactive control refers to the avoidance of a threat by *neglecting* it, whereas effortful control refers to the avoidance of a threat by *reducing* or *eliminating* it. More specific, reactive control responds to danger via direct avoidance of the threatening cue. Here, the primary goal is to reduce anxiety and stress by evading the threat or the threatening information as a whole. Reactive control therefore serves a more emotion-focused and disengagement coping style. Effortful control, on the other hand, encompasses the initiation of approach behavior by superseding initial avoidance impulses, to serve a superordinate avoidance goal. This is in line with Showers and Boyce (2008) as well as Elliot and Church (1997) who postulate similar processes of motivated behavior. In the context of a health threat, this means that potentially threatening information is actively sought to help deal with the threat. For



**Fig. 1** Model including approach and avoidance motivation, emotion regulation, health information seeking self-efficacy and coping focus in health information seeking, and their effects on intended comprehensiveness of search.  $*p < .05$

example, undertaking a cancer screening entails the immediate experience of inconvenient emotions like anxiety and worry, but essentially, early detection might increase chances of recovery. Threat prevention may thus serve both a problem focused and an emotion focused coping purpose as dealing with a threat directly also reduces anxiety in the long run (Folkman 2010). Thus, the lack of an association between avoidance motivation and engagement coping might be the result of two interfering mechanisms, with the underlying decisive conditions as to which mechanism will prevail being still largely unknown.

In considering the differential impact of approach and avoidance motivation on coping foci in HIS and the impact of these foci on intended information behavior (e.g., the intended comprehensiveness of a search), it is pertinent to take into account threat-related emotions like anxiety. In fact, such emotions may inhibit the initiation of higher order cognitive processes like effortful control (Carver 2005). Hence, in threatening situations, it might be necessary to downregulate these emotions, or to upregulate other, more adaptive emotions (e.g., worry instead of diffuse anxiety; Tamir 2016). As many researchers have pointed out, the concept of *emotion regulation* is to be distinguished from emotional *sensitivity* as it essentially captures the ability to leave or alter an emotional state, whereas the latter describes how quickly an emotional state is entered (Baumann and Kuhl 2002; Koole 2009; Tull et al. 2010). Thus, there is broad consensus in the literature that emotion regulation abilities are a precondition for the adaptation of a problem focused coping style (e.g., Blouin-Hudon et al. 2016; Das and Fennis 2008; Kuhl and Koole 2008). In fact, according to Kuhl and Koole (2008), the downregulation of negative affect enables a form of ‘high level coping’ via enhanced access to personal needs, values, and memory of past coping attempts (self-access). This enhanced self-access is essential in dealing with an existential threat. Despite a superordinate avoidance goal (threat prevention), self-access facilitates the initiation of adaptive approach behavior (e.g., via the additional upregulation of positive affect)

to deal with the threat directly. Thus, a functioning emotion regulation ability facilitates the adaptation of problem focused coping. If, however, threat-related negative emotions cannot be dealt with sufficiently, less adaptive systems of personality dominate the coping process and facilitate behavioral avoidance and distraction processes. In this case, individuals would seek ‘external’ reassurance, with averting distress as their primary goal (Sweeny et al. 2010). This could mean, for example, that they reach out to other persons or engage in activities that allow them to find reassurance or mere distraction (both in contrast to actively addressing their health problem or unhealthy behavior; Van't Riet and Ruiter 2013).

It should be noted, however, that emotion regulation is not about completely eliminating feelings of discomfort or anxiety. Rather, it is about downregulating feelings of distress to a level where they are not detrimental to the initiation of adaptive behavior anymore, or can maybe even prove useful due to a resulting state of higher alertness (Braniecka et al. 2014; Tamir 2016). Accordingly, in their review of the literature, van't Riet and Ruiter (2013) point out that individuals, when confronted with threatening information, first have to get rid of potentially overwhelming negative feelings. Thus, they may, on the one hand, directly avoid dealing with the information and engage in distractive behavior, or simply deny its relevance. On the other hand, they may use more sophisticated emotion regulation strategies like cognitive reappraisal, which allow them to actively deal with the information by engaging in healthier behaviors. However, a prerequisite for this problem focused way of coping is the downregulation of negative emotions which facilitates actively dealing with a potential health threat (e.g. via engaging in a health behavior proposed by the respective piece of information). With respect to the relationship between approach and avoidance motivation and emotion regulation abilities, Tull et al. (2010) found that avoidance motivation was correlated positively with emotion regulation difficulties, whereas approach motivation was negatively associated with emotion regulation difficulties. A possible explanation for these results might be a motivation-

specific ‘affective vulnerability’ (Dennis 2007; Tamir and Diener 2008): highly avoidance motivated individuals experience anxiety and negative emotions more often, which might lead them to the assumption that they are not very skilled when it comes to effective emotion regulation. On the other hand, highly approach motivated individuals experience excitement and joy more often and therefore may come to the conclusion that they are competent in dealing with (negative) emotions (Dennis 2007; Tamir and Diener 2008). Therefore, our first hypothesis is:

*Hypothesis 1: Approach and avoidance motivation have a direct effect on emotion regulation abilities. This effect is positive for approach motivation and negative for avoidance motivation.*

Until now, we have expected that approach and avoidance motivation predict emotion regulation. The latter, i.e. confidence in one’s ability to downregulate threat-related distress, is known to predict general self-efficacy (Pocnet et al. 2017). Therefore, we would expect the same to be true for a more domain-specific form of self-efficacy, namely, self-efficacy related to HIS. Knowing that I will be capable of dealing with anxiety and stress during my search, I will be more convinced to find information I can use to deal with the health threat. Furthermore, as Rothermund (2011) points out, perceived controllability, which is strongly related to self-efficacy, fosters the uptake of a problem focus in information seeking. Confident in my ability to deal with and find the right health information for my purpose, I will find myself to be able to address my problem directly with the help of useful information. For this reason, we expect domain-specific self-efficacy to have an effect on problem focused information seeking which, in turn, should also have a positive effect on the intended comprehensiveness of search. Confident in my abilities to initiate a fruitful search, I may adapt a problem focus and with this, I aim at finding as much and preferably balanced information as possible (see also Litman and Lunsford 2010). Consequently, we expect approach and avoidance motivation to have an indirect effect on intended comprehensiveness of search via the interposed self-regulatory instances (i.e. emotion regulation and self-efficacy). Therefore, our second hypothesis is:

*Hypothesis 2: There is an indirect effect of approach motivation as well as avoidance motivation on intended comprehensiveness of search via emotion regulation, HIS self-efficacy, and problem focused HIS.*

As avoidance motivation, unlike approach motivation, captures sensitivity to threat and threat-related emotions like anxiety (Carver 2005), it can be supposed that individuals high in avoidance motivation are more prone to

experience anxiety in a health threatening situation. One could thus expect these individuals to be in higher need of emotion regulation capacities compared to low-avoidance motivated individuals in the same threatening situation. A way to deal with threat-related emotions independent from and complementing individual emotion regulation ability, is with the help of external resources (i.e., health information), which may provide reassurance and calming (Litman and Lunsford 2010). In accordance with this, a vast body of evidence shows that dispositional avoidance motivation leads to a stronger emotion coping focus in various contexts, such as, for example, testing situations (Feil and Hasking 2008; Hasking 2006; Hundt et al. 2013; Schutz et al. 2008). For this reason, we expect avoidance motivation to positively predict an emotion focus in HIS. Therefore, our third hypothesis is:

*Hypothesis 3: There is a direct positive effect of avoidance motivation on emotion focused HIS.*

On the one hand, it is conceivable that an emotion focus in HIS leads to a short and rather superficial search that is discontinued as soon as any reassuring information is found. On the other hand, it could result in an extraordinarily extensive search (if one wants to be *really* sure). Owing to this ambiguity, the effect of an emotion focus in HIS on intended search comprehensiveness will be subject to an exploratory analysis.

The final linear structural model which we developed in accordance with these theoretical considerations and to test our hypotheses regarding specific direct and indirect effects is depicted in Fig. 1.

## Materials and Methods

### Participants

The study took place at a large university in Germany. Participants were recruited via student mailing lists, leaflets and flyers distributed on the campus, and direct acquisition during lectures. All participants agreed on an informed consent statement which was presented at the beginning of the study. The initial sample consisted of  $N = 316$  participants. From this initial sample,  $n = 33$  individuals had to be excluded because they only participated in the first of two obligatory data collection modules (online survey and supervised group survey; see below). The final sample included  $N = 283$  students from all fields, with an age range from 18 to 46 years and a mean age of 23.53 ( $SD = 3.25$ ) years. Eighty-six percent ( $n = 228$ ) of the participants were females.

## Materials and Procedure

Data were collected at two different times to prevent symptoms of exhaustion. First, participants completed an online survey (about 30 min). In the two weeks following the completion of this survey, they additionally participated in a supervised group survey. Attending the group survey was not possible without participating in the online survey and all participants from the online survey were allowed to participate in the group survey. The supervised group survey enabled us to ensure that participants were uninterrupted exposed to a depicted health scenario they had to empathize with. Thus, they were not able to distract themselves from the scenario (this may well have happened in an online setting). There were no inclusion or exclusion criteria following the online survey for participants to take part in the supervised group survey. Compensation for participation in both sessions was 30 € in total (approx. 34 \$).

During the online part, approach and avoidance motivation were assessed by means of the 20 item-short version of the Action Regulation Emotion Systems questionnaire (ARES-K; Hartig and Moosbrugger 2003). The questionnaire measures approach and avoidance motivation on two scales (ten items per scale). Statements were captured on a 4-point Likert scale (1 = *strong disagreement* to 4 = *strong agreement*). For both scales, internal consistency was found to be good to very good, with Cronbach's  $\alpha = .90$  for the BIS-scale and  $\alpha = .83$  for the BAS-scale. Emotion regulation ability was determined by the mean of the three 12 item-scales "anxiety regulation", "stress regulation" and "regulation of positive emotions" from the Self-report for the Assessment of Emotion-Specific Regulation Skills (SEK-ES; Ebert et al. (2013). The items are scored on a 5-point Likert scale (1 = *not all*, 5 = *always*). Internal consistency of the merged scales version (36 items in total) was very good (Cronbach's  $\alpha = .92$ ). In the second part of the study, among other questionnaires related to a different study, questionnaires assessing the remaining variables were applied. Self-efficacy was measured by the Self-Efficacy Scale for Information Behavior (SES-IB; Behm 2015) with a slightly adjusted instruction relating to a health context. The questionnaire consists of 16 items that are scored on a 5-point Likert scale (1 = *does not apply at all*, 5 = *fully applies*). Internal consistency of this scale was very good (Cronbach's  $\alpha = .91$ ). To assess HIS emotion and problem focus, the Goals Associated with Health Information Seeking questionnaire (GAINS; Chasiotis, Wedderhoff, Rosman, & Mayer, 2019) was used. In this questionnaire, the scales 'Reassurance' and 'Hope' constitute an emotion focus in HIS (eight items in total), whereas the scales 'Understanding' and 'Action Planning' measure two different aspects of a problem focus in HIS (eight items in total). Items are scored on a 5-point Likert scale (1 = *does not apply at all*, 5 = *fully applies*). Internal consistency for both merged scales was good

(Cronbach's  $\alpha = .88$  for emotion focus and Cronbach's  $\alpha = .87$  for problem focus). Intended comprehensiveness of HIS was assessed by the six item-Thoroughness of Search (TOS) scale developed by Heinström (2002). The items are scored on a 5-point Likert scale (1 = *does not apply at all*, 5 = *totally applies*). Internal consistency was satisfactory (Cronbach's  $\alpha = .76$ ).

Before completing the questionnaires, participants were instructed to imagine themselves being in a specific health-threatening situation (experiencing chest pain) and answer the questionnaires accordingly. This was done in order to put the participants in a state of perceiving a threat to their own health, which may elicit more realistic self-reports of intended information behavior. We chose chest pain as a scenario topic because it is a symptom possibly indicating a life-threatening cause, and because the annual prevalence of chest pain is very high in the general population as well as, specifically, in younger individuals (18–29 years; Eslick et al. 2003; Fass and Achem 2011). We expected that this would aid our participants in relating to the depicted scenario. As manipulation check, participants rated the perceived threat of the scenario on a scale from 0 (*no threat*) to 100 (*maximum possible threat*; see also Chasiotis et al. 2019). According to this scale, perceived threat was moderate ( $M = 50.12$ ,  $SD = 23.77$ ). It can therefore be assumed that the test persons were aware of a (fictitious) health threat when answering the questions. All variables were normally distributed. Descriptive statistics of the model variables including their respective correlations are presented in Table 1.

## Analysis

In order to test the hypothesized relationships, Structural Equation Modeling (SEM) was conducted via R using the lavaan package by Rosseel (2012). We chose SEM because it allows to simultaneously analyze the model paths and test the goodness of fit of the whole model. To test the specific hypotheses about effects within the model, specific model parameters can be consulted. For direct effects from one latent factor to another, the corresponding path coefficient is regarded. For indirect effects, new parameters are defined as the product of the involved path coefficients. Maximum likelihood estimation was used to estimate the model parameters.

Figure 1 depicts the linear structural model which we developed in accordance with theoretical considerations and to test our hypotheses. Besides the specific effects reflected in our hypotheses, we included two additional paths. First, we allowed an effect from approach motivation on problem focus (path  $\gamma_1$ ) to test if the indirect effect via emotion regulation and self-efficacy postulated in Hypothesis 2 is indeed the only possible way in which approach motivation impacts HIS. Second, we included an effect from HIS self-efficacy on intended comprehensiveness of search (path  $\gamma_7$ ) to analyze

**Table 1** Correlations Between Model Variables (Cronbach's Alpha in Italics)

Model variable	1	2	3	4	5	6	7
1 Approach Motivation	.83						
2 Avoidance Motivation	-.21**	.90					
3 Emotion Regulation	.47**	-.41**	.92				
4 Self-Efficacy	.11	-.14*	.31**	.79			
5 Problem Focus	.13*	.02	.08	.19**	.87		
6 Emotion Focus	.06	.15*	.02	.06	.42**	.90	
7 Comprehensiveness of Search	.08	-.08	.09	.17**	.43**	.21**	.76
<i>M</i>	3.28	2.64	3.74	3.61	8.08	6.68	3.55
<i>SD</i>	0.44	0.61	0.48	0.49	1.43	1.68	0.64

\* $p < .05$ . \*\* $p < .01$ 

Values between .10 and .30 may be significant but represent small effects (Cohen 1992)

the importance of this effect in the presence of an indirect effect of self-efficacy via problem focus as postulated in Hypothesis 2. Furthermore, in accordance with theory, we allowed covariations between approach and avoidance motivation (Hartig and Moosbrugger 2003) and between HIS problem and emotion focus (Chasiotis et al., 2019). We did not include the direct effects from approach and avoidance motivation on intended comprehensiveness of search in addition to the postulated indirect effects that we derived from theory (see Hypothesis 2). This was because there is not enough theoretical support for the corresponding assumption of direct effects operating independently from all other included variables (e.g., coping focus).<sup>1</sup> Additionally, since there was a certain amount of variability in how threatening participants perceived the scenario, we controlled for the degree of perceived threat in an additional model. However, this did not impact path coefficients or general model fit. For reasons of parsimony, we therefore did not include perceived threat as a covariate in our final model.

## Results

Results can be found in Table 2 and Fig. 1. The factor loadings of the indicator variables on their respective latent variables were all significant ( $p < .001$ ). This supports the assumption that the observed variables adequately represent their associated constructs. The proportion of variance in intended comprehensiveness of search explained by the model was  $R^2 = .325$ . The overall fit of the estimated model was good ( $\chi^2 = 332.58$ ,  $df = 218$ ,  $p < .001$ ,  $CFI = .96$ ,  $TLI = .96$ ,  $SRMR = .056$ ,  $RMSEA = .043$ ; see Schermelleh-Engel et al. 2003). Therefore, a further investigation of the model parameters is valid with respect to the formulated hypotheses.

<sup>1</sup> In accordance with this, exploratory analyses of these direct paths yielded no significant effects.

In accordance with Hypothesis 1, avoidance motivation had a negative effect on emotion regulation ( $\gamma_3 = -.44$ ,  $p < .05$ ), whereas approach motivation had a positive effect on emotion regulation ( $\gamma_2 = .36$ ,  $p < .05$ ).

The inspection of the indirect effects shows that approach motivation ( $IDE_1 = .01$ ,  $p < .05$ ), as well as avoidance motivation ( $IDE_2 = -.01$ ,  $p < .05$ ) had a small, albeit significant indirect effect on intended comprehensiveness of search, mediated by emotion regulation, HIS self-efficacy, and HIS problem focus. The direct effect of approach motivation on problem focus was not significant, indicating that the indirect effect of approach motivation on intended comprehensiveness of search via emotion regulation and self-efficacy is the only one with a significant impact. Thus, Hypothesis 2 is also supported.

In accordance with Hypothesis 3, the regression weight of the direct path from avoidance motivation on emotion focus in HIS was significant ( $\gamma_4 = .16$ ,  $p < .05$ ). Our exploratory analysis concerning the path from HIS emotion focus on intended

**Table 2** Fit Indices and Hypothesized Indirect Effects of the Structural Model

Fit index/IDE	Coefficient
$\chi^2$	332.58
$df$	218
$\chi^2/df$	1.53
CFI	.96
TLI	.96
SRMR	.056
RMSEA (90% CI)	.043 (.034–.052)
Approach motivation → Comprehensiveness ( $IDE_1$ ) <sup>a</sup>	.01*
Avoidance motivation → Comprehensiveness ( $IDE_2$ ) <sup>a</sup>	-.01*

<sup>a</sup> = indirect effect (IDE) via emotion regulation, health information seeking (HIS) self-efficacy and intended problem focus of HIS

\* $p < .05$

comprehensiveness of search showed no significant effect ( $\gamma_{10} = .03, p = .72$ ).

## Discussion

In this study, we included motivational variables together with emotion regulation and HIS self-efficacy in a model with coping foci and intended behavior related to a specific form of engagement coping, health information seeking. The model fit was good, and all our three hypotheses were supported. Approach motivation had a positive effect on emotion regulation, whereas avoidance motivation had a negative effect on emotion regulation (Hypothesis 1). There also was a significant indirect effect from approach and avoidance motivation (positive and negative, respectively) on intended comprehensiveness of search via emotion regulation, HIS self-efficacy and problem focus (Hypothesis 2). For approach motivation, there was no significant direct effect on problem focus (path  $\gamma_1$  in Fig. 1) and thus, no indirect effect on intended comprehensiveness of search mediated by problem focus only (paths  $\gamma_1$  and  $\gamma_9$  in Fig. 1). This suggests that associations between approach motivation and engagement coping, as observed in other studies (e.g., Litman 2006), may be the result of intermediary effects of emotion regulation and self-efficacy, which seems to be true at least for HIS. The perceived ability to emotionally deal with a threat (emotion regulation) and the conviction that one is able to deal with potentially threatening information (HIS self-efficacy) may increase the perceived controllability of a situation. This, in turn, may enable the adoption of a problem coping focus (Folkman and Lazarus 1980; Rothermund 2011). Furthermore, the adaptation of a problem coping focus, meaning the intention to directly tackle and overcome the health problem, facilitates an extensive and balanced search. This may be because the results of such an inquiry are supposedly most useful to aid in dealing with the problem (Johnson and Knobloch-Westerwick 2017).

As for avoidance motivation, consistent with our third hypothesis, there was a direct effect on emotion focus which in turn had no effect on intended comprehensiveness of search. This unique effect of avoidance motivation on an emotion focus in HIS might be explained by the high sensitivity to threat and threat-related emotions captured by avoidance motivation (Carver 2005) which is particularly strong when confronted with a (potentially existential) health threat. For this reason, we suppose that (higher) avoidance motivation demands additional, external means which complement the individual emotion regulation capacities to downregulate these threat-related emotions. In case of a health threat, HIS serves this purpose: health information is accessed to deal with one's unpleasant emotions and, for example, to find reassuring explanations for a health problem.

The absent effect from emotion coping focus on intended comprehensiveness of search suggests that a careful and

thorough search is not imperative to fulfil this purpose. Sometimes, the first reassuring information one finds might be enough, and other times, one piece of information, contrary to expectations, might have increased experienced distress. In this case, the search would have to go on and might come forth more thorough. However, it is not suitable to imply that there is no effect only because none was found in our study. Therefore, these considerations are merely speculative. Nonetheless, our findings regarding the differential effects of coping foci are in line with past results on the impact of different coping foci on information behavior (e.g., Johnson and Knobloch-Westerwick 2017; Kalichman et al. 2006; Van der Velde and van der Pligt 1991).

Our study corroborates earlier research on the impact of personality dispositions on various kinds of health behavior (e.g., Booth-Kewley and Vickers Jr 1994; Friedman 2000; Hampson et al. 2006), as well as research more specifically focusing on the impact of motivational and affective dispositions on health information behavior (e.g., Gerend and Shepherd 2007; Hastall and Wagner 2017; Hevey and Dolan 2014; Lalot et al. 2018; Sherman et al. 2006). Therefore, with regard to clinical practice, our findings imply the necessity to anticipate divergent health information seeking behaviors and preferences between patients even when they are in the same situation (e.g., before cancer treatment; Ehemann et al. 2009). Depending on motivational dispositions, emotion regulation abilities and HIS self-efficacy, health information seeking serves different coping foci and varies in its comprehensiveness. Especially individuals that are prone to experience anxiety (i.e., highly avoidance-motivated) and have emotion regulation difficulties may need support in dealing with their unpleasant feelings to enable a more problem-focused and thus, more comprehensive and balanced search (see also Van't Riet and Ruiter 2013). This is because an emotion focused search may exhibit certain problems, e.g., preferring the reassuring potential of a source over its quality. Avoidance of threatening but accurate information (Litman and Lunsford 2010), or "getting astray" in the search because a satisfying level of reassurance is never achieved, are additional potential problems of an emotion focused search. Thus, training especially avoidance-oriented individuals in their emotion regulation abilities and supporting them in dealing with feelings of stress and anxiety might provide them with the necessary means to cope with a health threat in a more problem focused way. Furthermore, health information providers (e.g., clinical practitioners, patient advisory groups) should be aware that there are interindividually differing approaches to health information. Hence, in an effort to prevent dysfunctional information behavior, they might try to supply a body of balanced and comprehensive information, while, at the same time, keeping in mind that patients have differing emotional needs that need to be addressed.

In this line of research, further analyses of the implications of our model might be fruitful. By observing actual information behavior, differences between individuals who tend to be more problem focused and/or emotion focused in their

information search could be assessed. One possible research question could be if individuals with an emotion focused coping style are more vulnerable to an unfounded escalation of concerns about common symptoms based on their review of search results. This is also known as cyberchondria (White & Horvitz, 2009) and is becoming a growing concern among healthcare practitioners.

Another starting point for future research would be the analysis of further influential factors on intended comprehensiveness of search in the context of a health threat. Despite our model explaining about a third of the variance in our outcome variable (which constitutes a substantial proportion), the question as to the nature of other potentially relevant explanatory variables arises. In line with this, it can be assumed that situational and dispositional factors would interact in unique ways that warrant further scrutiny. For example, according to the literature, preexisting beliefs and/or perceived severity of the health threat seem plausible factors that could meaningfully complement our model (Chang et al. 2012; McKinley and Ruppel 2014). There are some indications in the literature that the latter may interact with avoidance motivation. For example, Nestler and Egloff (2010) found that the degree of threat in a health message moderated the effect of dispositional avoidance on attitudes towards the health information and intentions regarding health promoting behavior. Furthermore, transient and highly situational specific factors like one's current mood may exhibit significant effects on search comprehensiveness in the presence of a health threat (Das 2012).

## Limitations

We concede that the conclusions derived from our analysis are somewhat limited, because we exclusively assessed *intended* information behavior. This is in line with many theoretical models of information seeking featuring behavioral intention as outcome variable (see Kahlor 2010, for a prominent example). However, to be able to extend our conclusions to actual behavior, follow up studies should focus on behavioral outcomes, such as, for example, direct observation of information behavior during a specific search task.

Furthermore, the cross-sectional design of the present study only allows assumptions about the associations between emotion and problem focus. However, by implementing a longitudinal design with multiple points of assessment within a search process, the potential variability and prioritization of the coping foci and the corresponding seeking behavior could be analyzed. For example, as Carver and Connor-Smith (2010) discuss, it is conceivable that over time, the focus may shift from initially calming oneself through information to gaining a deeper insight into the problem itself.

A further limitation concerns the generalizability of our findings. Our sample consisted of university students and thus,

participants were above average young and educated, predominantly female, and most likely rather healthy. In order to address this issue, additional studies drawing on broader samples should be conducted. Furthermore, though we aimed at approximating a 'real life-health problem situation' through confronting our study participants with a health problem scenario, real patient samples are of particular interest to further validate our theoretical model.

## Conclusion

We showed that approach and avoidance tendencies and emotion regulation abilities together constitute a motivational-emotional framework of coping via HIS. We demonstrated unique courses of effects between these variables and therefore, we provide new insights regarding the impact of dispositional motivational and emotional variables on engagement coping. These insights usefully complement classic theories dealing with information seeking styles in the face of a threat which essentially differentiate between actively seeking and completely avoiding (health) information (e.g., monitoring vs. blunting, Miller 1987). Our approach enables the analysis of interindividual differences within the former, i.e. of the varying comprehensiveness of an active search for health information. Thus, with this study, we provide a fruitful starting point for further research focusing on the interplay of motivational dispositions, emotion regulation abilities, and coping behavior.

## Compliance with Ethical Standards

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Conflict of Interest** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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**Stellungnahme zu den Arbeitsanteilen an den Inhalten der kumulativen Dissertation nach § 9 (3) der Promotionsordnung des Fachbereichs I der Universität Trier**

Konzeptualisierung und Planung des in der kumulativen Dissertation untersuchten Forschungsgegenstandes erfolgte durch Anita Chasiotis, unterstützt durch Feedback von Oliver Wedderhoff und Dr. Anne-Kathrin Mayer.

Die Datenerhebungen für alle drei in der Dissertation enthaltenen Artikel wurden von Anita Chasiotis und Oliver Wedderhoff gemeinsam unter der Anleitung von Dr. Anne-Kathrin Mayer und Dr. Tom Rosman durchgeführt.

Die Idee und Konzeptualisierung des ersten Artikels stammen von Oliver Wedderhoff und Anita Chasiotis, die gemeinsam die Daten ausgewertet und den Artikel geschrieben haben. Oliver Wedderhoff fungierte als Korrespondenzautor, die Überarbeitung der Artikel im Rahmen des Begutachtungsprozesses der Fachzeitschrift wurde von Oliver Wedderhoff und Anita Chasiotis gemeinsam vorgenommen. Dr. Anne-Kathrin Mayer und Dr. Tom Rosman gaben Feedback zu mehreren Versionen des Artikels und im Begutachtungsprozess.

Die Idee und Konzeptualisierung des zweiten und dritten Artikels stammen von Anita Chasiotis. Die Daten werteten Anita Chasiotis und Oliver Wedderhoff gemeinsam aus. Die Artikel wurden federführend von Anita Chasiotis geschrieben. Oliver Wedderhoff trug erheblich zu den ersten Versionen der Artikel bei. Vor der ersten Einreichung gaben Dr. Anne-Kathrin Mayer, Dr. Tom Rosman und Prof. Dr. Nicola Baumann Feedback zu den Artikeln. Feedback in den jeweils anschließenden Begutachtungsprozessen der Fachzeitschriften gab Dr. Tom Rosman.

Ich versichere die Richtigkeit der vorangegangenen Stellungnahme und bin mir der strafrechtlichen Folgen einer Falschaussage bewusst.

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