

---

# The daily dose of health information: A psychological view on the health information seeking process

---

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



Vorgelegt im

Mai 2021

von

Oliver Wedderhoff

Gutachter:

Prof. Dr. Nicola Baumann

Dr. Tom Rosman

Dissertationsort: Trier

## Danksagung

Mein Dank gilt zunächst Dr. Tom Rosman, für die Betreuung dieser Arbeit, der freundlichen Hilfe und des konstruktiven Feedbacks, das mir wesentlich in meiner wissenschaftlichen und organisatorischen Arbeit zugutekam. Insbesondere die spontane Übernahme der Betreuung und moralische Unterstützung in einer schwierigen Phase, sowie das entgegen gebrachte Verständnis rechne ich hoch an.

Ich danke Frau Prof. Dr. Nicola Baumann für die unkomplizierte und unerwartete Übernahme der Betreuung als Hauptgutachterin in Zeiten der Unsicherheit.

Ferner danke ich Frau Dr. Anne-Kathrin Mayer für ihren kritischen Diskurs, der mir einen kritischen Zugang zu der Thematik eröffnete, und ihren Beitrag zur Stärkung meiner Autonomie.

Mein außerordentlicher Dank gilt Dr. Anita Chasiotis, ohne deren motivierende Art und Verständnis ein solches Unterfangen niemals hätte gelingen können. Die gemeinsam gemeisterten Probleme und Aufgaben und der gemeinsame Humor haben mir Mut gegeben. Wir konnten jede Schwierigkeit meistern, Interessantes in jedem noch so trockenen Thema finden und jede Dienstreise zu einem Highlight machen.

Tief verbunden bin ich meiner Ehefrau, Nadine, für ihre unglaubliche Unterstützung und Liebe, das Motivieren und Perspektiven finden. Ohne ihre mir bereits im Studium vermittelte Begeisterung und Leidenschaft für die psychologische Forschung und die wissenschaftliche Methode wäre es nie zu dieser Dissertation gekommen. Sie diente mir stets auch als Vorbild. Trotz einiger Umzüge und Jobwechsel, motivationaler Löcher und vieler weiterer Schwierigkeiten konnte ich mich stets auf einen bedingungslosen Rückhalt bei ihr verlassen.

Des Weiteren möchte ich mich bei meinen Freunden Lisa und Dirk Zimmermann für unzählige schöne Momente, Unterstützung und der Selbstverständlichkeit und Einzigartigkeit unserer Freundschaft bedanken. Sie haben mich am Anfang aufgenommen und durch sie wurde Trier für mich zu einem Zuhause. Danke auch an Laila für die ablenkenden Besuche im Büro und das Sortieren der Büroklammern.

Mein ganz besonderer Dank gilt meiner Familie, Barbara, Jürgen und Kirsten Wedderhoff, die mir meinen bisherigen Lebensweg ermöglichten und mich immer gefördert haben.

# Table of Content

Danksagung .....	3
List of authored and co-authored publications .....	5
List of publications included in the cumulative dissertation .....	6
Abstract .....	7
Introduction .....	9
The health information seeking process .....	11
Intention building .....	13
Choice of source(s).....	13
Evaluation and Selection of Information.....	14
Transfer into behaviour .....	14
Aim of the dissertation .....	15
Study I - The Role of Approach and Avoidance Motivation and Emotion Regulation in Coping Via Health Information Seeking (Chasiotis, Wedderhoff, Rosman, & Mayer, 2019b) .....	17
Summary Study I.....	17
Discussion Study I.....	20
Study II - Know Thyself! The Role of Adequate vs. Inadequate Self-Assessment of Relevant Skills in the Preference for Health Information. (Wedderhoff, Chasiotis, Rosman, & Mayer, 2020) .....	22
Summary Study II .....	22
Discussion Study II .....	26
Study III - When Freedom of Choice Leads to Bias: How Threat Fosters Selective Exposure to Health Information (Wedderhoff, Chasiotis & Rosman, submitted) .....	29
Summary Study III .....	29
Discussion Study III .....	33
General Discussion.....	36
General conclusions and future research.....	37
General limitations .....	41
Concluding remarks .....	43
References .....	44
Appendix A – Study I.....	52
Appendix B – Study II.....	64
Appendix C – Study III .....	73

## List of authored and co-authored publications

- Wedderhoff, O., Chasiotis, A., & Rosman, T. (submitted). When Freedom of Choice Leads to Bias: How Threat Fosters Selective Exposure to Health Information. *PLOS ONE*.
- Rosman, T., Kerwer, M., Steinmetz, H., Chasiotis, A., Wedderhoff, O., Betsch, C. & Bosnjak, M. (accepted). Will COVID-19-related economic worries superimpose virus-related worries, reducing nonpharmaceutical intervention acceptance in Germany? A prospective pre-registered study. *International Journal of Psychology*
- Wedderhoff, N., Gnambs, T., Wedderhoff, O., Burgard, T., & Bosnjak, M. (2021). On the structure of affect: A meta-analytic investigation of the dimensionality of the Positive and Negative Affect Schedule (PANAS). *Zeitschrift für Psychologie*, 229(1), 24-37. DOI: 10.1027/2151-2604/a000434
- Kerwer, M., Rosman, T., Wedderhoff, O., & Chasiotis, A. (2020). Disentangling the process of epistemic change: The role of epistemic volition. *British Journal of Educational Psychology*, 91(1), 1-26. <https://doi.org/10.1111/bjep.12372>
- Wedderhoff, O., Chasiotis, A., & Rosman, T. (2020). Know Thyself! The Role of Adequate vs. Inadequate Self-Assessment of Relevant Skills in the Preference for Health Information. *Psychologische Rundschau*, 71(2), 134-142. DOI: 10.1026/0033-3042/a000486
- Chasiotis, A., Wedderhoff, O., Rosman, T., & Mayer, A.-K. (2019). The Role of Approach and Avoidance Motivation and Emotion Regulation in Coping via Health Information Seeking. *Current Psychology*, 1–10. DOI: 10.1007/s12144-019-00488-3
- Chasiotis, A., Wedderhoff, O., Rosman, T., & Mayer, A.-K. (2019). Why do we want health information? The Goals Associated With Health Information Seeking Questionnaire (GAINS). *Psychology & Health*, 35(3), 255-274. DOI: 10.1080/08870446.2019.1644336
- 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*, 3(57). DOI: 10.3389/fcomm.2018.00057
- Gölz, S. & Wedderhoff, O. (2018). Explaining regional acceptance of the German energy transition by including trust in stakeholders and perception of fairness as socio-institutional factors. *Energy Research & Social Science*, 43, 96-108. <https://doi.org/10.1016/j.erss.2018.05.026>

## List of publications included in the cumulative dissertation

### Article I

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>

### Article II

Wedderhoff, O., Chasiotis, A., Rosman, T. (2020). Know Thyself! The Role of Adequate vs. Inadequate Self-Assessment of Relevant Skills in the Preference for Health Information. *Psychologische Rundschau*. <https://doi.org/10.1026/0033-3042/a000486>

### Article III

Wedderhoff, O., Chasiotis, A., Rosman, T. (submitted). When Freedom of Choice Leads to Bias: How Threat Fosters Selective Exposure to Health Information. *PLOS ONE*.

## Abstract

The search for health information is becoming increasingly important in everyday life, as well as socially and scientifically relevant. Previous studies have mainly focused on the design and communication of information. However, the view of the seeker as well as individual differences in skills and abilities has been a neglected topic so far. A psychological perspective on the process of searching for health information would provide important starting points for promoting the general dissemination of relevant information and thus improving health behaviour and health status. Within the present dissertation, the process of seeking health information was thus divided into sequential stages to identify relevant personality traits and skills. Accordingly, three studies are presented that focus on one stage of the process respectively and empirically test potential crucial traits and skills:

Study I investigates possible determinants of an intention for a comprehensive search for health information. Building an intention is considered as the basic step of the search process. Motivational dispositions and self-regulatory skills were related to each other in a structural equation model and empirically tested based on theoretical investigations. Model fit showed an overall good fit and specific direct and indirect effects from approach and avoidance motivation on the intention to seek comprehensively could be found, which supports the theoretical assumptions. The results show that as early as the formation of intention, the psychological perspective reveals influential personality traits and skills.

Study II deals with the subsequent step, the selection of information sources. The preference for basic characteristics of information sources (i.e., accessibility, expertise, and interaction) is related to health information literacy as a collective term for relevant skills and intelligence as a personality trait. Furthermore, the study considers the influence of possible over- or underestimation of these characteristics. The results show not only a different predictive contribution of health literacy and intelligence, but also the relevance of subjective and objective measurement.

Finally, Study III deals with the selection and evaluation of the health information previously found. The phenomenon of selective exposure is analysed, as this can be considered problematic in the health context. For this purpose, an experimental design was implemented in which a varying health threat was suggested to the participants. Relevant information was presented and the selective choice of this information was assessed. Health literacy was tested as a moderator in a function of the induced threat and perceived vulnerability, triggering

defence motives on the degree of bias. Findings show the importance of the consideration of the defence motives, which could cause a bias in the form of selective exposure. Furthermore, health literacy even seems to amplify this effect.

Results of the three studies are synthesized, discussed and general conclusions are drawn and implications for further research are determined.



## Introduction

Our society is characterized by constantly available information on all kinds of conceivable topics as modern information technology and society provides countless ways to seek and gain desired information. The Internet in particular represents a great resource of the most diverse sources and information. Simplified access to information enables laypersons to get and use information that was previously only available to experts. From an early stage, it could be observed that health and health care is a major topic in online searches (Baker, Wagner, Singer, & Bundorf, 2003) and also highly influential on individual health decisions (Walsh, Hamilton, White, & Hyde, 2015). Accordingly, the modern health care system and society adapts to this development by transferring responsibilities for one's own health to the individual (Giustini, 2006). Thus, autonomous searches as well as self-determined selections of health information are crucial as they pave the way for the selection and execution of interventions to maintain or improve one's own health. This development has the potential to enhance patient autonomy and to establish better-informed patients, which are more engaged in caring for their own health. However, due to a lack of appropriate quality assurance it also bears the risk of inaccurate, incomplete, misleading, and contradictory health information (Miah, 2009; Walji et al., 2004). Indeed, the great majority of health-related searches will lead to contradictory information and thus to ambiguous recommendation regarding appropriate behaviour and interventions. For instance, a search for the importance of vaccines will not only display the scientific consent of the effectiveness of vaccines but also incorporates "evidence" and opinions provided from anti-vaccine websites which might induce vaccine-hesitance or even –refusal and thus can lead to severe health consequences for the individual and for the society (Dubé, Vivion, & MacDonald, 2014). Given the potential severe consequences of misleading information and the corresponding maladaptive health behaviour, the understanding of the health information search process is crucial. Two points are particularly important in this respect: First, the design and presentation of the information and second, the identification of personality traits and individual abilities that determine the success or failure of the information search and selection process in terms of one's own health. While the former is already the subject of much scientific work in the field of communication sciences (e.g., Wright, Borbolla, Waller, Del Fiol, Reese, Nesbitt & Segall, 2019), the latter offers great potential to include a psychological perspective and to shape the individual health information gathering process in a beneficial way. More specifically, the greater insight into the when, how, and why of the individual health information seeking as well as associated personality traits and skills might foster the usage of adequate, purposeful

and helpful information, while reducing the risk of using incorrect (and potentially harmful) information. In the following two paragraphs the research done so far will be discussed separately for personality traits and relevant skills.

Although, the importance of a thorough understanding regarding the psychological mechanisms underlying the seeking behaviour have been acknowledged in the literature (Heinström, 2003), only few studies have explored the impact of different personality traits on the general information seeking behaviour. Moreover, most of these studies solemnly focus on the effect of personality traits that are included in the five factor model of personality by Costa and McCrae (1992) (e.g. Al-Samarraie, Eldenfria, & Dawoud, 2017; Kaspar & Müller-Jensen, 2019; Tidwell, 2005). An inclusion of further personality traits apart from the Big Five is relatively rare (e.g., Kim & Lee, 2017; Ek & Heinström, 2011). Additionally, the studies exhibit further limitations, as they are mostly correlative in nature and the examined context of the desired information in these studies usually relate to the areas of education or remain vague in the general area of information search. Especially in the (increasingly) important area of the search for health information, the consideration of personality variables as influencing variables does not seem to have received any attention so far, as Zimmerman and Shaw (2020) state in their comprehensive concept analysis and literature review. It can therefore be said that the inclusion of relevant personality variables as antecedents of health information behaviour so far represents a gap in the literature and that there have only been a few initial approaches in related scientific fields.

As mentioned earlier, beside personality traits, individual skills may also significantly impact the seeking process for health information. In this vein, the construct of health (information) literacy is particularly important, as it represents an umbrella term that summarizes several important skills. In this context, it is very important to take a closer look at the terminology used here, as different definitions have emerged over time. In line with the Medical Library Association (Shipman, Kurtz-Rossi, & Funk, 2009) health information literacy is defined as *“the set of abilities needed to recognize a health information need, identify likely information sources and use them to retrieve relevant information, assess the quality of the information and its applicability to a specific situation, and analyze, understand, and use the information to make good health decisions.”* (p. 294). According to the authors, it is a combination of the two concepts information literacy and health literacy. Whereas the former is unambiguously defined as *“a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use*

*effectively the needed information.*” (American Library Association & Libraries, 2000; p. 2), the latter exhibits many different definitions (e.g., Nutbeam, 2000; Nutbeam & Kickbusch, 2000). Sørensen et al. (2012) have dealt specifically with the problem of the many competing definitions and have combined seventeen definitions identified from the literature into a single one: *“Health literacy is linked to literacy and entails people’s knowledge, motivation and competences to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course.”* (p. 3).

Notably, the individual definitions with regard to health literacy and health information literacy are very similar. For this reason, when the term health literacy (HL) is used in the following, it is also used as a synonym for health information literacy. Although HL covers a wide array of relevant skills for health information seeking, it is far from being exhaustive. For example, while facing a health threat, it is first helpful to get one’s (negative) emotions regulated to be able to apply higher cognitive functions and go into action. For this, the ability of emotion regulation is crucial (van ‘t Riet & Ruiter, 2013). This is further supported by the fact that the different definitions are rather vague and avoid naming skills explicitly (apart from basic reading and writing capabilities).

While there are some studies that identify the relevant personality variables and skills involved in health information seeking, two points are disregarded which may help to provide a better understanding and, thus, may give starting points for future interventions. First, the search for health information can be considered a multi-stage process. As the definitions of HL already tried to include, health information seeking is not a single action. From the perception of a threat to the implementation into behaviour, there are many possibilities for the various abilities and personality traits to shape the process. Second, in the majority of studies concerning health information seeking, personality traits and relevant skills were not considered simultaneously. These two points form a research gap within the broader field of the research of searching for health information and are thus the focal point of this dissertation.

## The health information seeking process

In the literature the process of searching for health information is often referred by and can be subsumed under the term ‘health information seeking’ (HIS). There are various

definitions of HIS with different approaches and focuses on the questions of when, how, and why health information is being sought. In the majority of cases a common feature is that the overall goal of HIS is to obtain specific information on the health-related issue through an planned action and therefore an intentional behaviour (Johnson & Case, 2012). A number of these approaches complement the aspect of an underlying (implicit or explicit) goal orientation of HIS in order to cope with a present health threat (Rees & Bath, 2000). Coping by means of information can be arranged very differently depending on the individual. On the one hand, the threat can be reduced by a better understanding, or appropriate interventions can be researched. Sometimes, however, information is systematically searched for, which essentially serves the purpose of reassurance (Chasiotis, Wedderhoff, Rosman, & Mayer, 2020). Based on the approaches described, it can be stated that HIS can be understood as intentional behaviour in the form of an active search for health information in response to a threat (*when*), with the aim of overcoming or reducing it (*why*). Furthermore, Lambert and Loiselle (2007) contribute to this, by defining the ‘*how*’ by stating that HIS is principally determined by three (measurable) attributes. First, HIS is defined by the ‘amount’, which is simply the absolute quantity of information collected during the search. ‘Type’ is used as the second attribute, which should reflect the heterogeneity of the collected information. The third attribute is the choice of the information source(s). Summarized, “*Health information-seeking behaviour (HIS[B]) is typically defined as the purposive search for health-related information to satisfy a query. When seeking information, individuals select the type, amount, and sources of information they need.*” (Lambert, Loiselle, & Macdonald, 2009, p.12).

An overview of the various definitions shows that in order to better answer the question ‘What is the information search process?’ it can be divided into individual steps which can then be examined/explored in greater detail (see Figure 1).

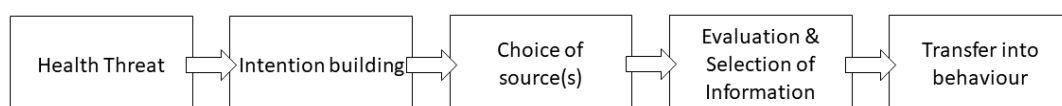


Figure 1: Process model of health information seeking

This sequence of partial steps shows major parallels to the previously introduced construct of health literacy, which comprises several relevant skills required to successfully implement these steps and execute adequate health behaviour (Sørensen et al., 2012). Beside the specific skills needed for each step, throughout the process, individual factors (i.e. personality factors) may also play a major role and impact the adequate implementation and completion of the

four steps. Accordingly, both are integrated in Figure 2. Each sub-step, starting with intention building, is briefly discussed in more detail below.

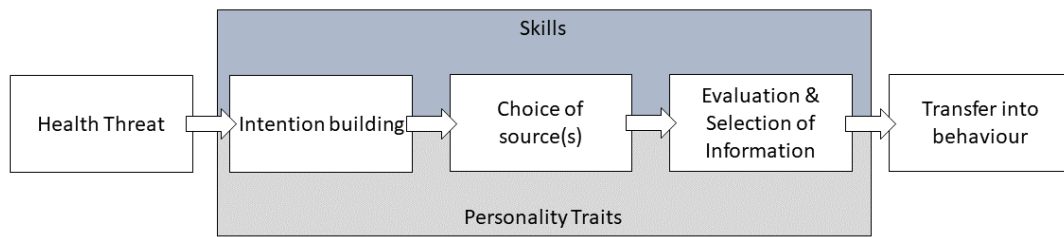


Figure 2: Process model of health information seeking, including relevant skills and personality traits

### Intention building

After a health threat occurred (and is perceived), the first step is to build an intention to obtain the needed information to overcome the health problem. The extent to which an intention is formed may vary resulting in implementation differences. Thus, stronger intentions should lead to a more in-depth (and therefore exhaustive) search for the desired information.

However, initially it has to be considered how this intention is formed and relevant influencing factors. As Kuhl (2010) states, intentions, together with goals and motives, are emotional and cognitive processes, which help to overcome difficulties caused by needs to be satisfied. In this manner, goal setting functions as a self-regulatory determinant of intention building. In contrast to goals and motives, however, intentions represent actions that are difficult or unpleasant to perform. According to Kuhl (2010) intentions support all regulatory competencies and motivational processes to overcome emotional difficulties. Hence, the extent of the intention itself interacts with and depends on factors of personality, for example, by the kind and strength of motivational disposition, as well as skills, like regulatory competencies.

### Choice of source(s)

The second step focuses on the selection of information sources. As outlined in the introduction, this step is crucial for optimal health outcomes since the selection of inappropriate sources can lead to severe health consequences. The choices associated with the selection process are mostly shaped by automated and implicit processes, like in other everyday choices (Diener, Larsen, & Emmons, 1984). Moreover, individuals may seek information from different sources depending on their personality characteristics (Azucar, Marengo, & Settanni, 2018; Motyka et al., 2014). For example, a highly extroverted individual is more likely to seek a direct advice from a physician, whereas an individual low

in extraversion will rely on sources with less interpersonal contact (e.g., internet sources). In the same vein, intelligence shapes the selection of individual information sources. For example, it influences the choice by evaluating which source is best for the given problem and whether one is capable to comprehend it. Besides general personality factors, individual skills affect the selection of sources (Sun & Zhang, 2016), as they determine the amount of sources available and whether one can utilize them for their own purposes.

#### Evaluation and Selection of Information

The third step highlights the evaluation of an information and therefore the final selection of information. Again, personality factors and skills are highly influential. In the literature, many different biases during evaluation and selection can be identified. In essence, the various biases pursue one of three partially conscious goals or implicit motives: regulation (e. g. mere-exposure effect, Zajonc, 2016, loss aversion, Kahneman and Tversky, 1979 ), confirmation (e. g. confirmation bias, Mahoney, 1977, Dunning-Kruger effect, Kruger and Dunning, 1999) or simplification (e. g. halo effect, Nisbett and Wilson, 1977). Kuhl (2010) integrates implicit motives and conscious goals into his comprehensive model of personality, which makes them relevant factors of behaviour and a distinguishing feature of interindividual personality differences. Therefore, goals, implicit or explicit, are an expression of personality when evaluating information. The evaluation itself can be seen as a skill, as it is also part of the combined set of skills under the term health literacy. In this regard, Diviani, van den Putte, Giani, and van Weert (2015) showed in a systematic review the positive association between health literacy (or one of its skill-based proxies like general literacy or educational attainment) and people's ability to evaluate online health information and trust in relevant sources of health information. For example, one study included in the review reports that individuals with low health literacy do not trust governmental information or that the quality of images or the placing of a website in the search results list is used to evaluate the quality.

#### Transfer into behaviour

The adaptation of health behaviour from the selected information as the final step is characterised by the interaction of many different relevant (personality) factors. In principle, however, the intention can be considered as one of the most important influencing factors for the translation into behaviour. This means that, similar to step I, the same processes for forming an intention to implement health behaviour can be assumed, namely essentially motivational dispositions. Yet often the desired behaviour does not occur despite the presence

of an intention. In fact, a meta-analysis exhibits that only 20 - 30% of the variance in behaviour can be explained by the intention (Sheeran, 2002). Accordingly, it is not so much the motivational processes that appear to be problematic, but rather the volition, as defined by Heckhausen (Heckhausen & Heckhausen, 2010) in his Rubicon model. In the volition phase, further relevant variables can be identified that play a role. Among them are action control and abilities of self-regulation (Kuhl, 1986, 2010), such as self-observation (Baumeister, Heatherton, & Tice, 2006) and planning (Gollwitzer, 1999). In this respect, numerous models of health-related behaviour have emerged in the field of health psychology, such as the health action process approach (Schwarzer, Lippke, & Luszczynska, 2011) , which, however, will not be dealt with further here, as this would go beyond the scope of this dissertation and should be part of future research on this topic.

### Aim of the dissertation

In conclusion, it can be said that a variety of personality variables and skills may play a role in the health information seeking process, whereas the latter ones can be subsumed under the construct of HL (Parker et al., 1999). Regarding HL, there are various approaches in the literature, mainly from the communication sciences, to further investigate the health information seeking process (e. g. Nutbeam, 2000; Sørensen et al., 2012). Many approaches focus on the distribution of health (information) literacy skills in different populations (e. g. Paasche-Orlow, Parker, Gazmararian, Nielsen-Bohlman, & Rudd, 2005; Sørensen et al., 2015) and its intercorrelations with health outcomes (see Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011 for a systematic review). However, the simultaneous consideration of specific skills (i.e., health information literacy) and personality factors in the individual steps under a psychological view has yet to be conducted. Furthermore, the relevant skills and personality traits have never been integrated and considered in the HIS process. The aim of this dissertation is to investigate the specific roles and individual impact of relevant information skills in the form of the HL construct and, depending on the individual step of the information search process under assessment, relevant personality factors on important aspects of the single steps in the information search process.

Accordingly, Study I aims to develop and evaluate a model of intention-building for a comprehensive or thorough search for health information, which includes relevant personality factors in the form of motivational dispositions and relevant skills in the form of emotion

regulation competencies. The thoroughness itself is expected to be dependent on information skills (respectively health information literacy) which in reversal will influence subsequent searches, which is taken into account through the considerations of self-efficacy. Study II investigates the next step and take a closer look at the impact of health (information) literacy on the preference of sources in the health information seeking process. This study aims in particular to distinguish influences of personality factors and skills. In addition to health (information) literacy, intelligence was therefore considered and treated as a relevant personality trait, as it is very similar in its definition as the subsumed skills of health (information) literacy. At the same time, in the literature, there is an ongoing debate if intelligence is a personality factor. Contrary to the traditional view of two separate entities, the argument is based on the relationship and common features of intelligence and personality. As personality traits (Caspi, 2000), intelligence follows a relatively stable pattern throughout the whole life (Deary, Whalley, Lemmon, Crawford, & Starr, 2000) as well both seem to be significant predictors of various outcomes like academic achievement (Poropat, 2009), job performance (Barrick & Mount, 1991) and health (Friedman, Kern, & Reynolds, 2010; Gottfredson & Deary, 2016). In addition to that, the distinction between cognitive and non-cognitive traits is very vague because almost all personality traits have cognitive attributes (e.g. Nettle & Liddle, 2008). Finally, Study III assesses the phenomenon of selective exposure as a common bias in the step of evaluation and selection of relevant information. By inducing a health threat, the impact of risk perception and HL on the evaluation and selection of threat relevant information is assessed. An overview of the assessed skills and traits throughout the studies is depicted in Figure 3.

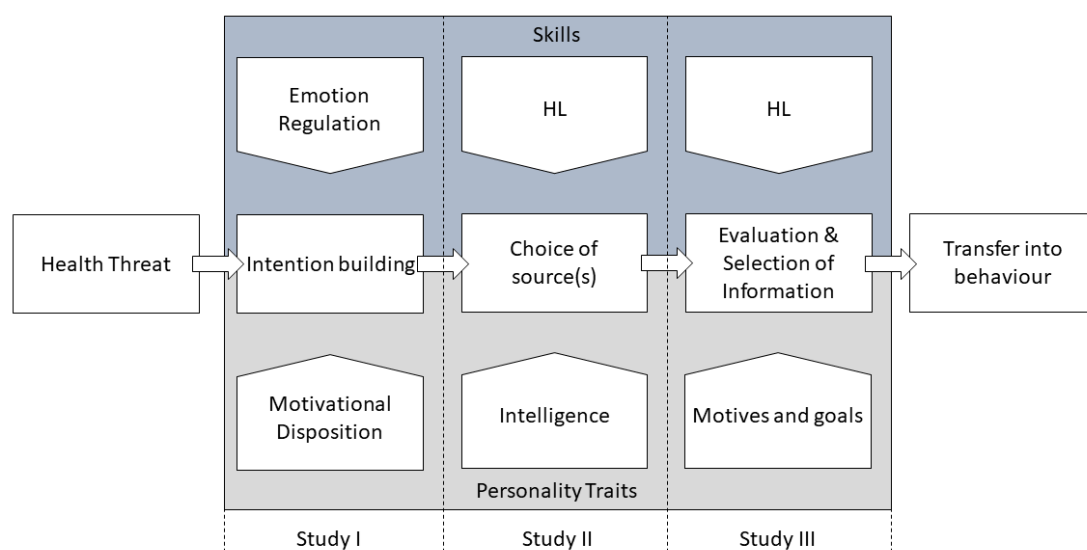


Figure 3: Process model of health information seeking, including relevant skills and personality traits considered in the studies



# Study I - The Role of Approach and Avoidance Motivation and Emotion Regulation in Coping Via Health Information Seeking (Chasiotis, Wedderhoff, Rosman, & Mayer, 2019b)

This article describes the development of a theoretical model of an intention to seek comprehensively for health information. It includes motivational dispositions (approach and avoidance motivation), emotion regulation as a self-regulatory skill, as well as self-efficacy and goals as determinants. The article was accepted on 4th October 2019 and published on 26th October 2019 in *Current Psychology* (Springer Nature).

The goal of the article was to theoretically derive a model of the intention for a thorough search for health information facing a health threat and empirically test it. In this regard, relevant determinants of the intention (traits and skills) were identified and put in relation to each other in a structural equation model in the next step.

## Summary Study I

When facing a health threat, individuals have to deal with the problem and cope with it in one way or another. Shiloh and Orgler-Shoob (2006) provide evidence that information seeking is a common coping style in the face of a threat. Accordingly, it is necessary to establish a model that understands information behaviour as a way of coping and integrates suitable predictors. A look at the literature shows that motivational dispositions (as personality traits) in particular can be identified to explain individual differences in coping by means of HIS (Hastall & Wagner, 2018; Hevey & Dolan, 2014; van 't Riet & Ruiter, 2013). Although, many different motivational conceptualisations have been applied in previous studies (e.g., Maslow, 1943; McClelland, 1961), Kuhl and Koole (2008) name approach and avoidance motivation as the two basic underlying dispositional motivations for all other kinds of more specific motivations, like achievement motivation. As the name indicates, approach motivation emphasizes behaviour that makes a positive outcome more likely, or if possible keeps a positive situation going. On the contrary, avoidance motivation supports behaviour which prevents and avoids negative situations, or leads to an end or exit of the situation (Elliot, 2008). Therefore, approach and avoidance motivation are ideal initial variables for the model to predict intention building in HIS in order to cope with a health threat. As these two dispositional motivations are considered independent from each other (Elliot & Thrash, 2002),

they are both included as separate factors in the model. Figure 4 displays the final model based on the two dispositional motivations. As can be seen, additional variables are relevant (i.e., emotion regulation, self-efficacy, problem- and emotion focus). All of these are derived in more detail below.

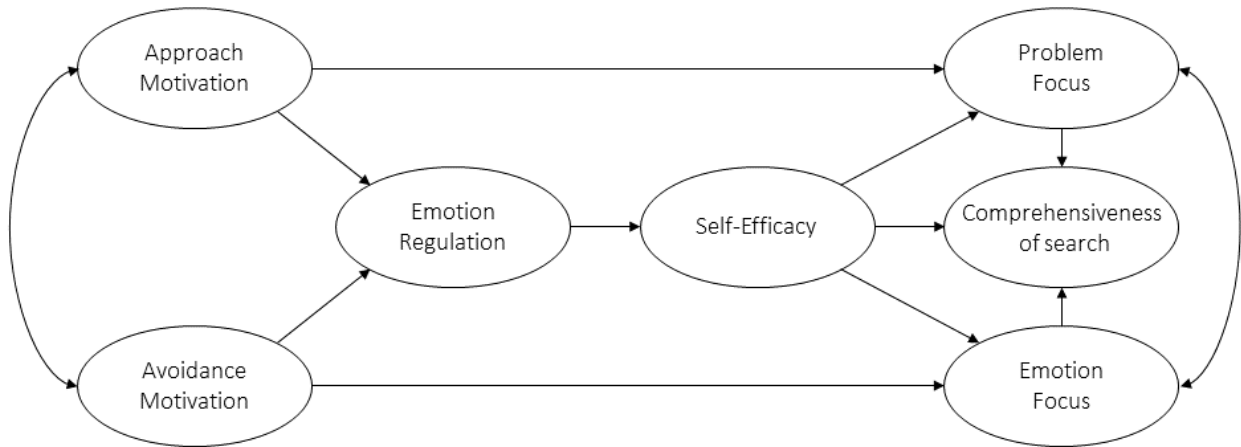


Figure 4. Model of the intention of comprehensiveness of a health information search and its determinants

In threatening situations, especially for the own health, negative emotions like fear and anxiety also have a potential impact on HIS. For example, strong negative emotions may inhibit cognitive processes (e.g., Joormann & Gottlieb, 2009), which are crucial for the implementation of HIS (Lambert & Loisel, 2007). Hence, in situations like these, it is critical to be able to downregulate the negative emotions. Emotion regulation is the ability to alter an emotional state (Baumann & Kuhl, 2002) and is therefore an important skill while undergoing coping of a health threat (van 't Riet & Ruiter, 2013). Tull, Gratz, Latzman, Kimbrel, and Lejuez (2010) provide evidence that avoidance motivation is positively correlated with emotion regulation difficulties, whereas approach motivation is negatively associated with emotion regulation difficulties. With its important role in the intention building of HIS and evidence from the literature of the relationship with the two motivational dispositions, emotion regulation was implemented as a mediator in the model. This was also subject of the first hypothesis, that approach and avoidance motivation have a direct effect on emotion regulation abilities, which would be positive for approach motivation and negative for avoidance motivation.

When studying the literature on emotion regulation, one cannot help but notice that it is associated with general self-efficacy (Pocnet, Dupuis, Congard, & Jopp, 2017). In the present

case of HIS as a form of coping, it is therefore reasonable that the general assumption of the relationship also applies to domain-specific self-efficacy and HIS. If someone is confident in his skills to manage and overcome negative emotions in a threatening situation and during a search, he or she will be also more confident to find helpful information to help with the threat. Hence, HIS self-efficacy is implemented after emotion regulation in the model.

As stated above, HIS is a widespread and well suited copying style. HIS as a form of coping can fulfil two functions in this manner: It can be pursued with a problem or emotion focus (Lazarus & Folkman, 1984). Accordingly, the goal of an emotional or problem-focused approach to coping should be included as an immediate predictor of intention. At this point, however, the question arises as to what extent the different coping foci affect the intention for a comprehensively search. In a previous study, a questionnaire was developed that assessed different goals of the health information search that resulted from the combination of the regulatory and coping focus (Chasiotis et al., 2020). This allows the two coping foci to be included as separate variables in the model. In this sense, problem focus represents the two goals 'understanding' and 'action planning' and emotion focus the two goals 'hope' and 'reassurance'. Placement as direct determinants of intention is consistent with Kuhl's (2010) understanding of the interdependencies of motives, goals, and intentions, as already discussed in the introduction.

On the other hand, self-efficacy functions as a determinant of the problem focus and thus links the motivational dispositions, via the self-regulation ability and problem focus with the HIS intention. In this respect, Rothermund (2011) states, that perceived controllability, which is strongly related to self-efficacy, fosters the uptake of a problem focus in information seeking. Therefore, the second hypothesis states that approach and avoidance motivation have an indirect effect on intended comprehensiveness of search via emotion regulation, HIS self-efficacy, and problem focus.

According to Carver (2016), avoidance motivation includes sensitivity to threat-related emotions. A higher avoidance motivation should therefore lead to more and stronger negative emotions in threatening situations. Thus, the downregulation of the emotions becomes especially important. In order to support the own emotional regulation abilities, relevant information can be actively used (Litman & Lunsford, 2010). With information seeking as a form of regulation and additionally a form of coping, numerous studies have shown that avoidance motivation increases an emotional focus on coping (e.g., Feil & Hasking, 2009). Based on this, the third hypothesis assumes, that there is a direct positive effect of avoidance

motivation on emotion-focused HIS. For exploratory analysis, further direct effects were included in the model.

The derived model including the postulated hypotheses was tested by applying structural equation modelling in a sample of  $N = 283$  university students. The model itself and every factor included was estimated by answers on self-report questionnaires via R using the lavaan package by Rosseel (2012). Path coefficients and covariances are depicted in Figure 5. The model fit was good ( $\chi^2 = 332.58$ ,  $df = 218$ ,  $p < .001$ , CFI = .96, TLI = .96, SRMR = .056, RMSEA = .043) and the proportion of variance in intended comprehensiveness of search explained by the model was  $R^2 = .325$ . With significant path coefficients all hypothesis could be confirmed.

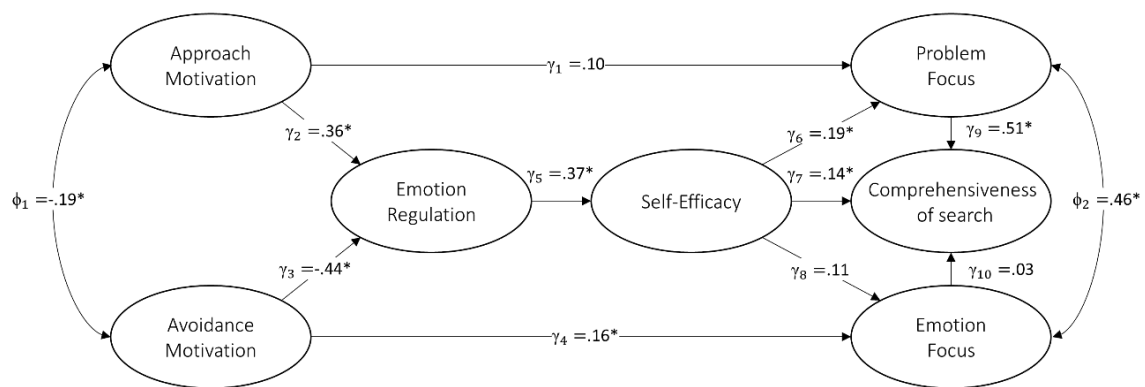


Figure 5. Model of the intention of comprehensiveness of a health information search and its determinants including path coefficients.  $*p < .05$ .

## Discussion Study I

The first article identified relevant personality traits and skills in the form of motivational dispositions and self-regulatory skills as predictors to an intention to comprehensively seek for health information. The intention was the first identified step in the process of HIS, identified in the introduction. The development of the model is based on a comprehensive foundation of work on coping and intention building. With this approach, theoretically derived assumptions regarding potential motivational and self-regulatory determinants of intentional comprehensiveness of HIS could be largely supported. The results showed an effect from the personality trait of dispositional approach and avoidance motivation on emotion-regulation skills, which further inflicts more domain-specific factors (i.e., HIS-related self-efficacy and HIS coping goals), which ultimately influenced the dependent variable of intended search comprehensiveness.

Results confirmed the assumptions of indirect effects of approach and avoidance motivation on intention to seek comprehensively, mediated by emotion regulation, HIS-related self-efficacy and problem focus. The results further exhibited a positive association between problem focus and the outcome. This can be interpreted as trying to find as much helpful information as possible for the health problem, which becomes more likely by searching as comprehensively as possible (Johnson & Knobloch-Westerwick, 2017).

In contrast, no significant effect from emotion focus on the outcome was found. This might lead to the interpretation, that a thorough search is not suitable to fulfil these goals. For example, it is conceivable that the first results already provide reassuring information, while, however, other searches lead to no results or, even worse, threatening information. In this case, the search would have to go on and would thus end in a more thorough search. However, an effect cannot be definitely excluded due to a non-significant result, as it may be also a problem of low power. Accordingly, this should be investigated in subsequent studies with larger samples and with the involvement of possible moderators. Conceivable moderators could be a varying health threat, experience and expectations, as well as state affects (Das, 2012; McKinley & Ruppel, 2014; Nestler & Egloff, 2010).

In summary, the first study showed the impact of personality traits and skills on intention building in HIS. With this model, a framework of dispositional motivation and self-regulatory skills was built, which illustrates the process of formation and dependencies of the intention of a comprehensive search for health information.

## Study II - Know Thyself! The Role of Adequate vs. Inadequate Self-Assessment of Relevant Skills in the Preference for Health Information. (Wedderhoff, Chasiotis, Rosman, & Mayer, 2020)

The second article describes the investigation of congruence or congruity effects of self-evaluations of HL and general cognitive ability on the preference of generalized characteristics of health information sources (i.e., expertise, personal interaction, and accessibility). The article was accepted on 13<sup>th</sup> December 2019 and published on 27<sup>th</sup> April 2020 in *Psychologische Rundschau* (Hogrefe; OpenMind Licence).

### Summary Study II

Adequate health behaviour requires an autonomous informing about possibilities and individual fit of relevant alternatives. Autonomy is to be supported by a broad range of information, but is at the same time being hampered by the large number of possible information sources in the modern information society. A wide range of skills is needed to make effective use of the countless opportunities to obtain information (Berkman et al., 2011). Certain skills can be subsumed under the term HL (see also the introductory chapter). The relatively vague definition including several relevant skills of information search, acquisition, understanding and application led to a critical questioning of the construct HL in the past (e.g., Fawns-Ritchie, Starr, & Deary, 2018). Besides the broader scope of HL, it became apparent that the definition of HL overlaps greatly with the concept of general cognitive ability (Reeve & Basalik, 2014). Looking at the description of HL as a set of skills to obtain, process, and understand basic information and services need to make appropriate health decisions, it consists of typical aspects also assessed by many intelligence tests. General cognitive ability has been defined as the ability to recognize and understand relationships (Spearman, 1904). Or as Gottfredson (2009) put it in other words: “*Intelligence is a very general mental capability that, among other things, involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience.*” (p.71). Accordingly, with regard to its operationalization, general cognitive ability can be measured behaviourally as the ability to obtain, and understand information (i.e., to learn), process information (i.e., reason), and use information to make appropriate

decisions (i.e., solve problems and think abstractly) (Reeve & Basalik, 2014). Comparing the two definitions of HL and general cognitive ability, it almost appears as a paraphrasing of each other, or as HL would be general cognitive ability in a specific scenario. Besides the redundancy of the theoretical determination, the practical implication of the constructs is crucial, especially given the background of applied sciences of the HL construct. However, both constructs exhibit similar patterns of relationship with many health-related variables, leading to further support for the potential redundancy. Both are, for instance, associated with lower depression scores (Der, Batty, & Deary, 2009; Gazmararian, Baker, Parker, & Blazer, 2000), reduced risk of mortality (Baker et al., 2007; Batty, Deary, & Gottfredson, 2007), and increased general health (Der et al., 2009; Dewalt, Berkman, Sheridan, Lohr, & Pignone, 2004). However, this potential redundancy might be attributable to an overlap in measurement instruments, as many previous studies applied tests of reading and writing ability to assess HL (e.g., Reeve & Basalik, 2014). The incremental contribution and impact of HL remains yet to be examined. The benefit of a differentiable effect of HL compared to general cognitive ability in HIS could be used to design specific intervention options, and therefore further strengthen the effects discussed before. Against this background, HL and general cognitive ability were compared.

Besides the actual expression of skill, the self-assessment of these skills is crucial (Freund & Kasten, 2012). Although, both are moderately correlated, major misjudgements can occur in individual cases (Ackerman & Wolman, 2007). Kruger and Dunning (1999) showed that people tend to overestimate their own skills, especially when they score in the bottom quartile of the actual ability (i.e., they are incapable to recognize their own incompetence). Although this overestimation will have negligible consequences in many scenarios, it becomes especially relevant when it comes to decisions concerning health behaviour. For example, if one does overestimate the own capability to evaluate (health) information, he or she may fall for potential harmful misleading information or 'fake news'. For these reasons, both objective performance measures and measures based on self-reports were used and interrelated for both HL and general cognitive ability. Since this has never been done before in the literature, the analyses of potential divergent effects were carried out by means of an exploratory approach.

Looking at the process of HIS, after the initial perception of a health threat and the intention building, the selection of one or more suitable information sources is the first real deliberate choice with a certain degree of freedom. However, it bears an elevated risk, as it determines the outcomes from every following step. The choice of a source determines, for example, how

information is presented. This includes the objectivity of the given information, its simplicity or respectively its comprehensibility, as well as its validity. This makes the choice respectively preference for information sources a logical suitable dependent variable to distinguish the effects of HL and general cognitive ability in HIS. In the literature are many examples where the selection of health information sources is used as outcomes (e.g., Dutta-Bergman, 2004; Rutten, Arora, Bakos, Aziz, & Rowland, 2005). However, there is a wide variety of sources for health information, which makes it impossible to cover every potential source in a multiple choice format, or make an exhaustive selection of representative sources. Hence, it is crucial to consider source immanent features that drive the selection and preference and might also help to explain individual differences in HIS with the consideration of personality traits and skills. Additionally, this approach helps to further explain ‘why’ certain sources are selected over others, due to the consideration of a user perception of source properties. In a study, Wedderhoff, Chasiotis, Rosman, and Mayer (2018) developed a three-dimensional taxonomy of health information sources based on individuals’ source similarity judgements by multidimensional scaling method, namely accessibility, interaction, and expertise. This taxonomy was used as the dependent variables.

$N = 289$  participants from the University of Trier with a mean age of 23.52 years ( $SD = 3.25$ ) could be acquired to take part in the survey. The self-assessment of the HL was conducted by using an adapted version of the Self-Efficacy Scale for Information Behaviour (SES-IB) from Behm (2018). For objective measures of the HL the Health Literacy Knowledge Test (HILK; Mayer, Holzhäuser, Chasiotis, & Wedderhoff, 2018) was used. To assess general cognitive ability the Standard Progressive Matrices (SPM; Raven, 1989) were used. To collect data on the self-estimated cognitive ability, a short self-developed questionnaire was applied consisting of three items. The participants were then asked to rate on a 5-point Likert scale how much they would prefer a certain aspect of the source when facing a health threat and information need on four items for each of the three dimensions by Wedderhoff et al. (2018). To simultaneously assess the effect of self-assessed and objectively measured predictors on each of the three source properties, response surface analysis (see Schönbrodt, Humberg, Nestler, & Carlson, 2018) has been applied via R using the RSA package by Schönbrodt and Humberg (2020). The significant results are presented below. In the following, for pragmatic reasons, only the significant results are presented. In predicting expertise and accessibility by HIL, it was found that only one of the two predictors at a time turned out to be relevant for prediction. As shown in Figure 6, the lower the self-assessed HIL, the more likely accessible sources were preferred (linear effect). Furthermore, there was a positive linear effect of



objectively measured HL on the preference of sources (see Figure 6) that have a high degree of expertise, i.e., the higher the expression in the HL performance test, the more such sources were preferred. There was also a significant interaction of the two predictors concerning HL. An underestimation of one's own HL is associated with a preference for sources that allow interaction with other persons.

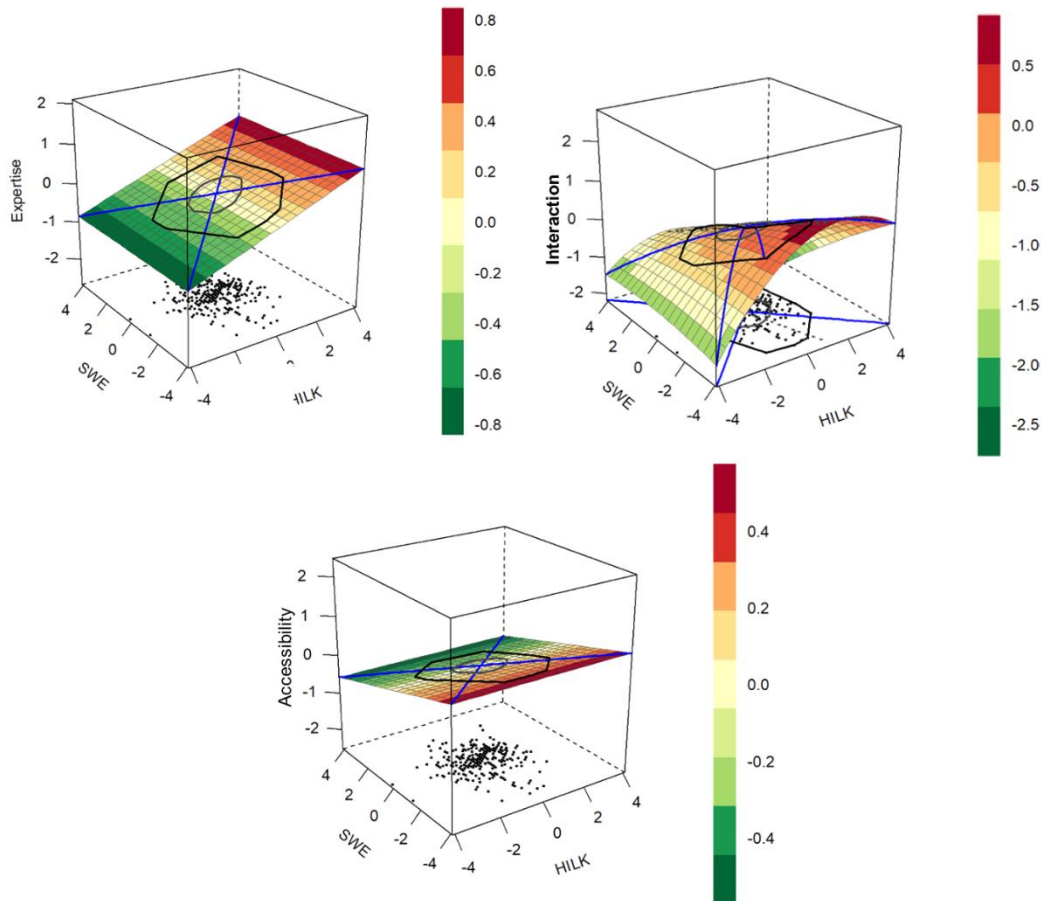


Figure 6. Response surface plots of self-assessed HL and HL performance measure on preference of expertise, accessibility and interaction.

With regard to cognitive ability, a quadratic effect was found (see Figure 7): the lowest preference for accessible sources was found among persons with average (relative to the sample) objectively measured cognitive ability, whereas persons with low as well as persons with high cognitive ability preferred more accessible sources. In addition, it was found that both overestimation and underestimation of one's own cognitive abilities leads to a preference for sources with a low level of expertise (i.e., information conveyed more by laypersons). Conversely, adequate ability assessment leads to preference for sources with a high degree of expertise.

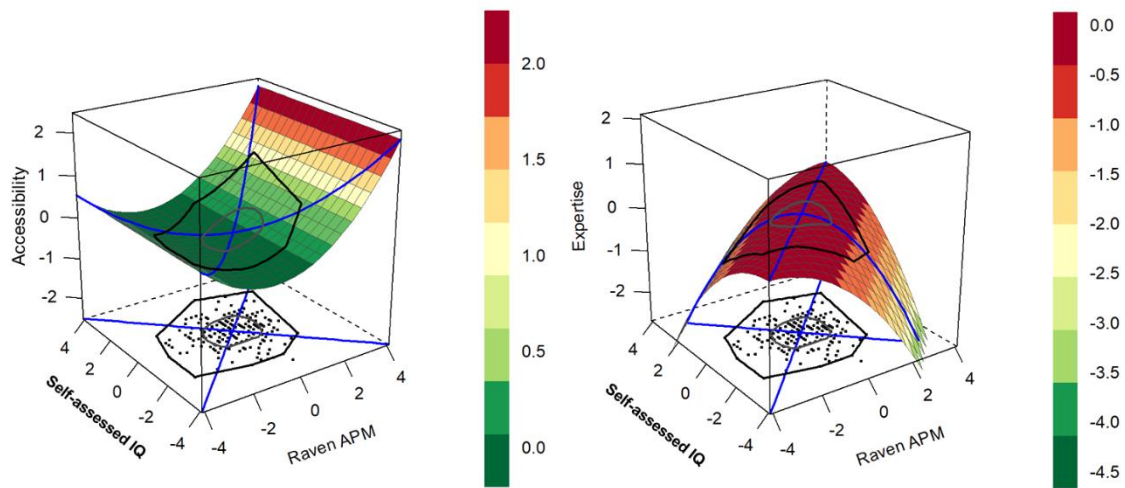


Figure 7. Response surface plots of self-assessed cognitive ability and cognitive ability performance measure on preference of expertise, accessibility and interaction.

## Discussion Study II

The second study exploratory examined the impact of self-assessed and objectively measured relevant skills and personality properties on the preference of health information. HL, as an umbrella term for many relevant skills, showed independent effects from general cognitive ability. This was shown to be regardless of the type of measurement. Hence, both constructs provide unique contribution when investigating source preference as part of HIS. This shows how important it is in this research area to consider skills and personality simultaneously and to distinguish them from each other. Even in the case of theoretically very similar constructs, such as HL and general cognitive abilities, distinguishable predictive contributions can be identified in the present case. Besides the theoretical contribution, these findings may help to improve intervention programs for the promotion of public health. As both constructs have shown to be independent from each other, promoting HL as a learnable and trainable skill seems to be reasonable (see two reviews for an overview of HL-interventions: Jacobs, Lou, Ownby, & Caballero, 2016; Sheridan, Halpern, Viera, Berkman, Donahue, & Crotty, 2011). Furthermore, those programs could be designed and adapted for varying cognitive abilities. Nonetheless, existing knowledge and experiences in dealing with health information, the individual's level of education in combination with cognitive abilities must be considered and appropriate interventions must be designed and applied in a context-sensitive manner. Intervention programs can thus reduce existing social inequality in health literacy levels (see Schaeffer, Vogt, Berens, & Hurrelmann, 2016) and thus contribute to greater social justice in health care.

The study furthermore addressed the question of the distinction between objective and subjective data of both HL and cognitive ability. The data shows that higher objective HL leads to preference of sources with higher expertise. The ability to understand and critically review information may, in the long run, lead to the view that health information provided by experts is most trustworthy (Avery, 2010), which may lead to a preference for such sources (Hesse et al., 2005). Subjective HL, however, proved to have a negative effect on the preference of the accessibility of a source. For people who tend to believe they are not able to find appropriate information or understand complex information, the accessibility of the source seems to be more important than for people who dare to do so (Bernat et al., 2016). For the latter ones, accessibility is of secondary importance, as they see themselves to be able to find and understand suitable information of any kind. Next there is a quadratic effect, which shows that for objectively low and high cognitive abilities, easily accessible sources are preferred. This seems particularly understandable for low values. For those who experience that information is often not understood will henceforth consider accessibility to be more important. In the case of high cognitive abilities, it may be that such individuals have experienced that their preferred sources are accessible, regardless of whether they would generally be classified as complex. Accordingly, they generally have less difficulty in dealing with and classifying different information (Ackerman, 1996).

As a last further point, the study dealt with the congruence of objective and subjective measures and thus with the effects of over- or underestimating abilities and prerequisites (personality traits) in HIS. Results show that underestimating HL leads to preference of sources with high personal interaction. According to Nutbeam (2000), key components of HL are advanced communicative and social skills that allow a person to extract meaning from various forms of communication. A lack of adequacy of self-assessment with relatively higher actual abilities at the same time now leads to the fact that one's own abilities are more likely to be attributed to other people, although the goal-oriented social interaction in the context of the search for health information is only made possible by a higher HL. Testing of congruence effects in cognitive skills showed that both overestimation and underestimation lead to a preference for experts in the search for health information. This is in line with Ackerman and Wolman (2007), who showed that individuals with realistic self-images, compared to individuals with biased self-images, are more capable of making decisions that correspond to their abilities. For example, one who correctly sees herself as incapable of HIS demands, is more willing to ask experts for a desired information. Persons however, who underestimate their cognitive abilities may not dare to interact with experts, or may not think they are able to

use their information. People who overestimate themselves, on the other hand, could be of the opinion that they can already adequately assess the information situation if they take layman's information into account, since they perceive it as equal to expert information and experience that they understand it more easily. According to this, Ehrlinger, Mitchum and Dweck (2016) found that individuals who overestimate their cognitive abilities tend to prefer information and tasks which are more easily to understand. This tendency could in turn again lead to an overestimation of one's own cognitive abilities, since a confrontation with more complex information material does not even occur.

The major criticism of Study II is its solely exploratory approach. The results discussed are therefore purely indicative. Hence, these findings may function as a starting point for future research on this topic, with a confirmatory approach. It is also in the nature of things that the interpretations previously made should be regarded as provisional. An additional point of criticism is using preferences as the dependent variable. Future studies should use actual behaviour, which can then be determined by personality traits and relevant skills, which are also compared in their congruency of objective measures and self-views. The sample of only students also limits the generalizability of the results, which should also be considered in subsequent studies.

Despite the limitations mentioned above, the study provides first indications of the relevance of (1) the simultaneous consideration of HL and cognitive abilities in the second step in the HIS process, the selection of a suitable source of the desired health information, and (2) an adequate self-assessment of these abilities in the search for health information.

## Study III - When Freedom of Choice Leads to Bias: How Threat Fosters Selective Exposure to Health Information (Wedderhoff, Chasiotis & Rosman, submitted)

The third study describes the identification of two defence motives (to confirm the own subjective perception and to protect relevant parts of the self-image, like the physical integrity) and how these motives may bias the final step of HIS, the selection and evaluation of information in the form of selective exposure. It further explores HL as a moderator in this context. The article was submitted 24<sup>th</sup> March 2020 in PLOS ONE.

### Summary Study III

The aim of this article was to gain deeper insight into the next step in the HIS-process, the evaluation and selection of information. In the modern information environment, vast amounts of health information are freely accessible through all kinds of information sources. Sometimes found information can be contradictory or threatening. This raises the question of how and why specific information is taken into account by the user while other (competing) information is denied. This phenomenon is often referred by the term ‘selective exposure’ or ‘confirmation bias’. The answer may help to improve access to helpful, objective, and scientifically proven information.

In comparison to other domains, health information shows some peculiarities. Health information is everybody’s business, strongly researched and yet, highly adaptable to the individual case. Health information can therefore be easily threatening for every person concerning the psychological well-being as well as the physical integrity in various ways. For example, an information may suggest that an unhealthy condition is present, or it may stress the urgency to change beloved everyday routines or rituals to avoid harm to one’s health. Accordingly, when facing a threat, so called defence motives might be triggered in response and strengthen the tendencies to favour or even specifically search for information corresponding to one’s self-image (Kunda, 1990; Sherman & Cohen, 2016). In this vein, Knobloch-Westerwick, Johnson, and Westerwick (2013) identified two relevant motivational processes: self-bolstering and self-defending. In addition to the defence motives, these processes also include consequential motivated behaviour. Self-bolstering encompasses the motivation to maintain the current status quo and thus to be reassured that there is no

significant threat to one's health and physical integrity. For example, wine lovers often quote that the daily glass of wine is good for the cardiovascular system. Self-defending motivation promotes discrediting, ignoring and avoiding information which (potentially) implies a threat to one's health and physical wellbeing. For example, fear-appealing information that suggests an increased risk of developing cancer tends to be avoided by smokers – a classic example of selective exposure triggered by self-defending motivation. In some cases, these motives can also cause a devaluation of information, which is not confirming the self-image or is threatening (Ditto & Lopez, 1992; Edwards & Smith, 1996). These behavioural consequences of the defence motives are contrary to the aspirations of an accurate and complete search (Hart et al., 2009) and lead to bias in the selection, consideration and evaluation process of the HIS-process (Greving & Sassenberg, 2015; Sassenberg & Greving, 2016), often called selective exposure. In this regard, other protective motives come to mind that may be responsible for selective exposure and should also be considered in the health context. For example, defending the own opinion may also play an important role and people may search and select specific health information, which protect their worldview or expectation of a specific topic (Hart et al., 2009). It may also function as a possibility to confirm the self-image as a way of self-affirmation (Munro & Stansbury, 2009). All together, these motives may be underlying the phenomenon of selective exposure and bias in the selection and evaluation of health information. The user may try to protect the self-image, rather than finding out about facts and approaching the 'truth', and therefore adapt adequate health behaviour. Hence, the similarity of these different defence motives lies in the effort to protect parts of the self, may it be the self-image, attitudes, and opinions, or the physical integrity, as a consequence of a potential (health) threat and as a precondition for biased information seeking and/or appraisal (Munro & Stansbury, 2009; van 't Riet & Ruiter, 2013).

As pointed out, threat is an important aspect in triggering defensive motives and can be considered a necessary precondition for selective exposure to information in health contexts. However, threat is highly subjective and dependent on ones perceived risk. For example, leaflets suggesting an increased risk for lung cancer in smokers do not imply a threat for non-smokers. Therefore, non-smokers would not have any motivation to discredit or ignore the leaflets, while smokers, on the other hand, may well try to actively disregard the leaflets. Thus, higher perceived risk should lead to higher perceived threat and therefore, a greater bias in information seeking should occur, as various defence motives come into effect. The perceived threat is only one side of the coin. Additionally, the suggested risk from the information is also crucial. Suggested risk addresses certain individual characteristics that

may be associated with an increased risk of disease. For instance, a campaign may inform that high BMI values have been identified as risk factors for coronary heart disease. Accordingly, the suggested risk depends on the individual BMI of the recipient (high risk for high BMI vs. low risk for low BMI). In addition, there is the previously mentioned perceived risk, based on a self-assessment. In the presented case this may be strongly dependent on similar diseases within the family, or on the source of the high BMI (increased by muscle mass vs. fat). The combination of perceived (low vs. high) and suggested risk (suggested risk or no suggested risk) leads to four possible combinations in individuals who are confronted with health information and may trigger defence motives.

As defined earlier, HL is a crucial skill throughout the HIS-process and accordingly important when it comes to the evaluation and the selection of desired information. It is therefore to be assumed that HL impacts the relationship under investigation. However, the literature does not yet provide any indications of the effect of HL on the phenomenon of selective exposure. Two possibilities are conceivable: (1) Higher HL fosters a balanced search, as many information as possible is taken into account and used for a (good) health decision; or (2) higher HL enables a stronger selection of information according to the objectives of the defensive motives, as Meppelink, Smit, Fransen, and Diviani (2019) showed in their study. Therefore, the analysis of HL was included as an exploratory approach.

To examine the effect of the four groups, resulted of the combination of suggested and perceived risk, on selective exposure, analyses were conducted on a sample of  $N=763$  German-speaking citizens of the Federal Republic of Germany. At the very beginning the participants were told a cover-story, that the study is investigating how the relationship between achievement motivation and heart disease can be explained. The first independent factor 'perceived risk' was measured by a self-developed single item ("My risk of developing a heart disease in the next 5 years...") with six response levels. Dispositional achievement motivation was assessed by the subscale 'achievement motivation' of a German language instrument measuring occupation-related personality variables, the 'Bochumer Inventar zur berufsbezogenen Persönlichkeitsbeschreibung' (BIP; Hossiep & Paschen, 2003). For the second independent factor 'suggested risk', the participants were randomly assigned to one of two conditions, which should induce a threat or no threat. Every participant's real score and result of the BIP were displayed as well as the notion if it was higher or lower than the average. This statement was combined with a text indicating a higher risk or indicating no risk for developing a heart disease (depending on the experimental condition), which also included

a reference to a fictitious research report that makes this assumption. The German, ten-item version of the Positive and Negative Affect Schedule (PANAS, Janke & Glöckner-Rist, 2014) was applied directly before and after the intervention to as a manipulation check. For the dependent variable, a variation of an information selection task used by Adams, Hart, Richardson, Tortoriello, and Rentschler (2018) was given to the participants. In a fictitious Google results page including 16 search results drawing on a combination of the words ‘achievement motivation’ and ‘heart disease’, the participants were asked to select eight results for further inspection. Concurrently, they were asked to rate the entries on a quality rating scale from 1 to 6, with 6 representing the highest quality of information. The search results varied regarding their content, which either suggested an increased or a reduced risk for the respective participant’s development of a heart disease, and whether they were serious or dubious sources (e.g., scientific articles vs. yellow press).

In contrast, only the ‘risk feedback’ group showed a significant drop of positive affect scores between the two measurement points ( $t = 6.18, df = 414, p < .001, M_{T1} = 3.10, SD_{T1} = 0.80, M_{T2} = 2.95, SD_{T2} = 0.82$ ). Hence, it seems that the induction of risk for the corresponding condition has worked sufficiently. The dependent variable was calculated as the difference between the number of selected snippets suggesting a higher risk and the snippets suggesting no risk. A main effect for risk feedback was found with  $F(1, 759) = 52.92, p < .001, \eta^2 = .065$ . Examination of estimated marginal means indicated that participants with feedback of a higher risk selected more snippets which speak of no risk than participants with feedback of no risk ( $M_{noRisk} = -.45, SE_{noRisk} = 2.80$  vs.  $M_{Risk} = 1.06, SE_{Risk} = 2.86$ ). No effects were found for the dependent variable of quality rating. The exploratory analysis concerning moderating effects of HL was conducted using the PROCESS macro by Hayes (2013). A significant interaction was found between risk feedback and HL ( $b = 6.70, p < .001$ ) as predictors of selective exposure. Closer inspection showed that respondents who received feedback on an existing risk tended to select more snippets which deny the possibility of a risk (see Figure 8). In contrast, respondents who received feedback of no existing risk tended to select more snippets which suggest a higher risk. This effect was amplified by HL: While respondents with higher HL showed stronger selective exposure in the consistent feedback condition, lower HL was associated with nearly no selective exposure in both conditions.



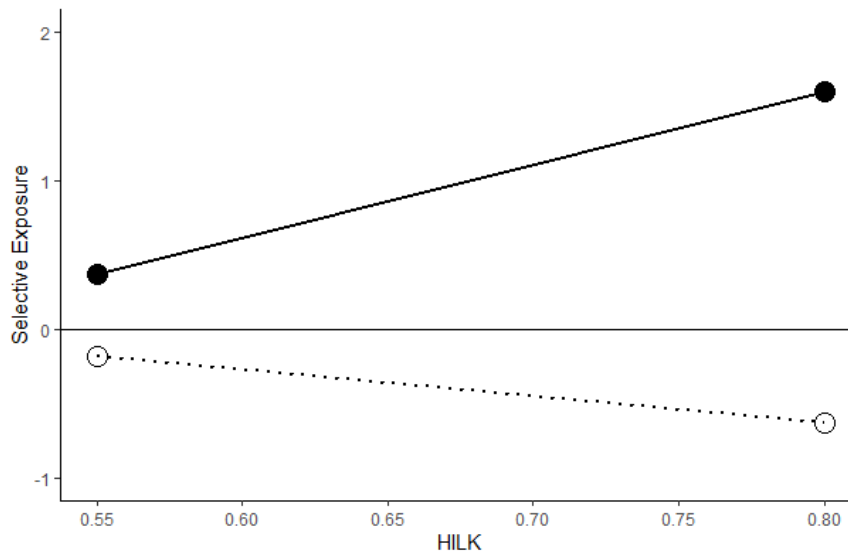


Figure 8. Significant moderating effect of HL on the interaction between risk feedback and selective exposure. Selective exposure is displayed on the Y-Axis, where positive numbers indicate reassuring information. HL is displayed on the X-Axis. The two risk feedback groups are represented by the two line, while the dotted line indicates no risk feedback and the continuous line a risk feedback.

### Discussion Study III

The last study of this dissertation provides further insights in the step of information selection and evaluation of the HIS process, while taking account of skills and personality traits. The phenomenon of selective exposure in the selection and evaluation process considered in the study is attributed to two defence motives, which are theoretically derived and significantly influenced by personality traits. A health threat was experimentally manipulated to potentially trigger defence motives. Findings indicate that a suggested health risk influences selective exposure to health information, while a self-perceived risk seems to have no significant effect in this context.

Analyses showed that a feedback of current higher health risk leads to a stronger bias towards the preference of information, which denies the risk. Additionally, data suggests that the motivation to reassure and deny a health threat is superior to the motivation to defend the own opinion (which would in contrast confirm the health threat). This can be seen in the balanced search found in the group which received a feedback suggesting no risk, even in the case of a high self-perceived risk. Hence, participants in this condition neither tend to confirm their own risk perception, if they see themselves being at higher risk, nor did they try to focus on denying the risk and therefore confirm the ‘no risk’ feedback. Combined with the significant bias of the risk feedback group, the interpretation is therefore reasonable that with such a

highly relevant subject for one's own existence as one's own health, coping with a health threat has a higher implicit value than the need to confirm one's opinion. The defence of one's own views and thus possible accentuation of one's own personality (through motivational dispositions, attitudes or classic personality constructs such as the Big 5), which are reflected in the (implicit) motives and goals, thus seem to play a subordinate role under a health threat.

Other works on coping point in a similar direction. Here it is shown that a stronger bias is observed when individuals are in a negative affective state (Johnson & Case, 2012), which is more strongly caused by an unexpected, sudden risk feedback than by a corresponding self-image that has been prevalent for a long time. This is also in line with findings, which suggest a stronger selective exposure bias when the focus lies more on losses instead of gains (Rothermund, Voss & Wentura, 2008). In the present case, the health threat stands for losing a better health status, while defending the own view could be seen as a gain, as the goal is to be proven correct, which is therefore less susceptible to bias. However, the question remains, how relevant skills may influence such a bias.

It was found that in the presence of a health threat and associated autonomous search for information, defending the own physical integrity is more likely than defending the own opinion. This is achieved by the goal-oriented (and thus biased) selection of information sources, which provide reassuring information. This process is also described in the theory of counter-regulation (Rothermund, 2011). The theory postulates, that negative states, for instance elicited through health threatening information, lead to a "counteract" in the form of actively turning towards positive (e.g., reassuring or unrelated) information. The results concerning the relevant skills further support this assumption. A greater ability to regulate negative emotions is associated with a more biased search for positive information, which can be used to downregulate the negative affect from the threat induction. Additionally, the strength of HL is associated with the strength of the biased selection. In fact, higher ability leads to a consideration of less balanced information, which at first seems to be counter-intuitive. Indeed, HL is in general associated with greater health outcomes in the literature (Berkman, et al., 2011), which does not match with a biased selection of health information. This could be due to the fact that in the present study performance tests were used to assess HL, which measures the abilities to search, acquire and evaluate suitable sources and health information (according to the definition of HL). In contrast, HL often was assessed through self-reports with a focus on challenges with (everyday) health issues. The present case shows that the skills required for an 'ideal' search for information can be 'misused' in terms of one's

own needs, goals and motives. The results of Meppelink, et al. (2019) support this assumption, as they show that participants with higher HL also showed a more biased selection of information, which in this case reflected their own opinion about vaccination (regardless of the line of argumentation, against or in favour). Accordingly, future research and interventions should consider extending the HL construct to include the aspect of a balanced search. Moreover, it should further investigate the relationship between literacy and selective exposure and its possible implications.

Overall, the study provides evidence for selective exposure and bias in a crucial step of the HIS process and how it is influenced by relevant skills. In the presence of an externally suggested threat to their health, individuals tend to reassure themselves, and therefore show a selective exposure to positive information. This may also override a potential motivation to defend one's own opinion (often referred to as confirmation bias) when it is in conflict with the reassuring information. Regulation skills and HL may further impact the selection, by either enabling the specific search for information according to one's own needs and goals and identifying information, which is well suited to downregulate negative affect.

## General Discussion

The studies in the current dissertation represent three important contributions to the field of health information seeking research. Each of the three summarised and discussed studies looks at successive stages in the process of seeking health information and the involvement of relevant skills and personality factors (see Figure 3). Study I concentrated on the building of an intention to seek health information under the consideration of motivational dispositions and self-regulatory skills as determinants. Study II focused on preference and selection of a source for the desired information, affected by HL and general cognitive ability. Study III investigated the phenomenon of pursuing profound motives through selective exposure in the evaluation and consideration of relevant health information, with inclusion of HL as a moderator.

Study I expands the current literature on health information seeking with the simultaneous inclusion of personality factors and skills in a theoretical model of the intention to search comprehensively for health information. The model's starting point is basic motivation dispositions (approach and avoidance motivation), that was shown to affect self-regulatory skills, including more general (emotion regulation) and more specific ones (e.g., HIS-related self-efficacy). Additionally, results suggested a direct effect of the motivational dispositions on emotion regulation, which itself has a direct effect on the HIS-related self-efficacy. HIS-related self-efficacy in turn has a positive effect on the promotion of problem-focused goals, which increase the intention to seek comprehensively. The results emphasise the important part played by self-regulatory skills in combination with personality factors in the implementation of goals and thus the formation of intentions related to coping with a threat. That is, individuals with higher emotion regulation skills are capable to perform 'higher level' coping through downregulating negative affect (Kuhl & Koole, 2008) even if they exhibit high avoidance motivation. It enables an enhanced self-access and integrate (negative) feelings in order to face the threat.

Study II contributes to the dissertation by findings concerning the differentiation of two seemingly very similar constructs and their impact on the next step of the HIS, the choice (or in this case preference) of information sources. This study is one of a few analysing differences of HL and general cognitive ability. In addition, it takes into account research findings which show that self-assessments are usually more relevant to decisions than actual performance (Ackerman & Wolman, 2007) and that persons who maintained more favourable self-views (of their intelligence) were also better adjusted concerning well-being, self-

evaluation, as well as domains of agency and communion (Humberg et al., 2019). Results suggested definable effects between HL and cognitive abilities, and thus underline the importance of distinguishing and considering of skills and personality traits in this step of the HIS process.

Study III broadens our knowledge on the understudied phenomenon of selective exposure in HIS. Selective exposure is the result of hidden defensive motives and goals, measurable as behaviour. It manifests itself in the last step, the critical analysis and selection of information. The influence of HL as a moderator was analysed through logistic regression path analysis modelling. Results suggested that selective exposure is a bias that must be expected when it comes to the dissemination of potentially threatening but important and relevant health information. Furthermore, exploratory analysis revealed that, in such a case, enhanced HL capabilities enable the person concerned to show a stronger bias in the event of a threat. This shows very clearly the importance of (hidden) personality traits in combination with skills, as these can lead to potentially fatal consequences in unfavourable combinations.

The following sections draw general conclusions from the findings based on the three studies. Future research directions are summarized and limitations are discussed.

## General conclusions and future research

Some general conclusions and future directions can be derived from considering the results of all three studies simultaneously. Regarding the scope of the dissertation outlined in the first chapter, the main finding of all studies seems to be that personality traits and skills are of relevant impact in the entire process of HIS. As already discussed, considering and identifying traits and skills on the single steps of a health information seeking process has attracted less attention than the consideration of general HIS or dissemination of HL in different populations. Therefore, it is reasonable to conclude that it is important to focus further on traits and skills and the impact on the search for and handling of health information, which was the aim of this dissertation. The potential to gain further insights to better understand HIS and its further effects and therefore implications for interventions is far from exhausted. Further identification of influencing factors, even beyond traits and skills, is conceivable, as is the consideration of situation-dependent factors. To some extent, this has been addressed in the dissertation by the experimental induction of a threat, but still offers far-reaching and practically relevant starting points for research.

The first study presents a model of intention building for HIS determined by motivational dispositions and regulatory skills. The model contributes substantially to the research and understanding of HIS. Several aspects can be highlighted. In the theoretical derivation of the model, two main theories of intention formation (Heckhausen & Heckhausen, 2010; Kuhl, 2001) were used, which had not previously been considered in the health context, or in the context of the search for information. For this undertaking it was necessary to relate these findings to research on coping and threats, while seeking for health information was considered a form of coping. Additionally, psychological models of health information seeking are expanded. Many of these approaches use a typological approach, like for example, the consideration of monitors and blunters (Miller, 1987), or, like Krohne and Hock's (2011) model of coping modes, a dichotomous conceptualization of dispositional preferences in coping intentions. The presented model focuses more on the motivational and self-regulatory factors responsible for the development of the intention for a thorough search behind it. Another important contribution is the extension and overcoming of the limitations of previous models of health information seeking from the field of communication sciences and public health. Most importantly and in contrast, the derived model considers and includes personality traits and regulatory skills as key predictors of the intention of a thorough search. Future studies may expand this model through an identification of additional potential relevant personality traits, as well as skills. With the identification, more precise indications for practical implementations and interventions can be made. One conceivable research task in this context would be to find out how abilities of emotion regulation can be improved ideally (i.e., efficiently and cost-effectively for the majority of the population), as emotion regulation is one important trainable determinant in the model. In therapeutic practice, for example, it is part of the daily routine to train these skills through techniques such as mindfulness (Leyland, Rowse, & Emerson, 2019), which could serve as a starting point. Through the consideration of personality traits, individually tailored trainings can be developed for the most differentiating traits.

Study II provides deeper insights on how preferences of health information sources are influenced by general cognitive ability and HL. Simultaneously, the study contributes substantially to the debate on the redundancy of HL and cognitive skills (e.g., Reeve & Basalik, 2014), as it shows that HL and cognitive abilities make a distinctive predictive contribution concerning the preference on three underlying property dimensions. Therefore, future research on HL in the context of HIS should consider and operationalize cognitive ability at the same time and vice versa. The results suggested that relevant incremental

findings can be expected through this approach. On this background, intervention programs to promote the dissemination of HL skills, which explicitly consider individual differences in general cognitive ability (see Jacobs et al., 2016) can further be improved. In addition, the relevance of differentiation and simultaneous consideration of self-reporting measures and "objective" tests was shown. Effects of an over- and underestimation (congruence or congruity effects) in this crucial step of HIS were found, as well as independent effects, where only one form of assessment was relevant. This is an ideal starting point for further research, as it is not only skills and personality differences in different aspects of preference that are relevant here, but also the way in which they are measured and the interaction between the two. This is relevant for almost all skills (Ackerman & Wolman, 2007) probably also for personality traits. Further research may identify other skills and traits for this HIS-step and independently of this, pay more attention to congruence effects of subjective and objective measures. The other phases of the HIS could benefit to a similar or even greater extent if the effects of over- and underestimation are examined. An underestimation of one's own abilities, for example, may prevent someone from forming an intention to search for information at all. It is equally important to see how various phenomena of bias are related to congruence effects of relevant skills and traits, not least in the final phase of information selection and evaluation.

Study III investigated the impact of a health threat and subjective vulnerability on respondents' selective exposure to health information. The combination of the two factors allowed two defence motives to be triggered, which were considered simultaneously for the first time. The results allow assumptions to be made to the effect that coping with a health threat has a higher implicit value than the need to confirm one's opinion, as participants with no risk suggestion showed no significant bias, compared to participants with a risk feedback. This is supported by findings from Johnson and Case (2012) who postulate, that a stronger bias can be observed when individuals are in a negative emotional state. Compared to opinions and other self-images, which can be threatened, an unexpected and immediate risk feedback is more likely to cause a more negative emotional state. In this sense, it seems less likely that action-guiding expressions of personality traits, such as those reflected in the intentions of a search for information and the associated bias, play a role when it comes to evaluating and selecting information, at least while facing a threat. Future research should start at this point, and design a study with a health information evaluation and selection task, with no immediate threat present (e.g., controversial and harmless topics from everyday life, such as efficacy of homeopathic drugs or vaccine hesitancy). Then more differentiated personality traits could have a greater impact on the objective or biased view of the

information and not possibly be overlaid by more profound motivational processes of threat reduction, which seem to be equally pronounced in everyone. In a very interesting way, the results also show the influence skills can have in this step of HIS. As Sassenberg and Greving (2016) found, and in line with our findings, an autonomous selection of information may help patients to react to a health threat via consulting reassuring information about their health. In this regard, our results further suggest, that improved skills of seeking and finding desired health information seem to lead to a stronger bias. This seems logical if one considers Rothermund's (2011) theory of counter-regulation. It says that negative states are actively "counteracted" by turning to (as relevant as possible) positive information. Further investigation on this step of HIS in this sense is required, to see if similar effects can be observed without the presence of a threat, with other skills, for example emotion regulation, and how a bias can be prevented without making selective exposure easier for individuals through skill improvement. A possible starting point would be the investigation of the relationship of HL and different forms of bias in this HIS-step and the possible extension of the HL concept to include the aspect of a balanced search.

Another aspect for future research is the combination of the different studies. Since the considered skills like emotion regulation and HL are relevant throughout the whole process of HIS, the postulated model in Study I might explain a substantial part of variance in the selection and evaluation of information. In addition, motivational dispositions might show themselves to be relevant in the interaction with the defence motives, and, therefore, with triggering a selective exposure bias.

Although it was possible to represent the HIS process with the three studies presented here, there are two further important aspects that should not be ignored. One is the precondition for initiating the process, and the other is the impact of the (successful) completion of the process. This is, firstly, the threat and secondly the transfer to health behaviour (see Figure 1). While Study III already tried to involve the consideration of threat through an experimental variation of threat imputation and the assessment of subjective threat perception, the sensation of a health threat deserves closer attention. In this regard, Sassenberg and Scholl (2019) present an interesting approach with an integration of the Biopsychosocial Model (Blascovich & Tomaka, 1995) with the Regulatory Focus Theory (Higgins, 1997). The authors postulate four motivation states in an Integrative Model of Eagerness and Vigilance regulation (IMEV), threat/challenge and promotion/prevention. They further classify these states through latent categories, self-regulation approaches (striving for change vs. applying a strategy) and goal



striving (vigilant vs. eager). They further show how IMEV enables to predict shifting within the two states of the same goal striving. For example, threat perception elicits vigilant self-regulation to overcome higher demands of the situation than resources are available and achieve security. Security needs are within the motivation system activated in a prevention focus (Higgins, 1997), which makes a shift more likely, due to this association between prevention and threat. The same needs underlie both states. Additionally, IMEV allows prediction concerning the outcome of the four states. Due to their motivational qualities, the shifting between the two states of the same goal striving, although sharing the same underlying need should result in opposing outcomes. For example, as the counter-regulation hypothesis states (Rothermund, 2011), a negative emotional state like threat leads to increased attention to positive stimuli and preference for positive information. The motivation state of prevention, with the same need for security, however, is defined as a state with a focused perception on losses vs. non-losses. Therefore, the focus and preference lies on information and stimuli regarding (non-)losses, hence, negative stimuli and information. In conclusion, this means not only the perception of a threat could lead to HIS-behaviour, but also the other motivational states considered in IMEV. Future research might take a closer look on the preconditions that trigger the different motivational states, and how these four states influence the HIS-process. This could usefully be added to the model presented in Study I. Not only could the four motivational states have different predictive effects on the motivational dispositions, but also on the need to activate certain regulative processes. The model itself also already indirectly includes aspects from the Regulatory Focus Theory (Higgins, 1997) in the two goals included, which could be further differentiated. IMEV might also provide further insights when and how selective exposure and other forms of bias occur in HIS. A similar design as in Study III would be conceivable in that the four motivational stages are implemented as quasi-experimental variations. Finally, this approach is also relevant for Study II, as the over- respectively underestimation of the four states could be relevant, not only for the choice of information sources, but also for the whole HIS process. Here, however, occurs the problem of suitable measurement methods, some of which would have to be developed beforehand.

## General limitations

All studies share a limitation, which is the ecological validity. HIS is performed under the presence of a health threat and mostly defined by observable behaviour. However, this poses

some problems for research, which were also present in the three studies. With health threat as a precondition, the question is, how to appropriately operationalize or induce a health threat. From an ethical point of view, it is out of question to expose participants to a health threat. As a work around, participants can be asked to imagine fictional or past situations with a health threat present, through vignettes or specific instructions in the surveys. Study I and II followed this approach. Another approach would be to manipulate the perception of a threat through different variants of a cover story, as it has been done in Study III. However, both approaches have disadvantages. Self-reported behaviour in fictitious or past scenarios might be biased through various phenomena, like social desirability, self-enhancement or self-bolstering, false memory and many more. A cover-story might not always be believable or realistic, especially in a solely online setting, like in Study III. Even with manipulation checks, it remains questionable, if the perceived threat is comparable to a real situation with a health threat, or if it remains an artificial situation to the participant, not only in the threat induction but also the assessment and operationalization of the independent and dependent measures. A solution to this problem would be a field study or quasi-experimental designs with real patients. Patients with acute symptoms (physical, psychological, or both) offer a higher probability of acutely experiencing a health threat that could also be taken into account in its severity. Another limitation is present in the use of self-reports for the assessment of the dependent variable. Indeed, only Study III used an information selection task for the measurement of the dependent variable. However, this task is also tied to restrictions in the sense of operationalisation, which limits the degrees of freedom of the participants. The next step would be to examine actual behaviour, to improve generalizability of the findings. This could also be done with a sample of real patients, who could be observed in their actual health information seeking behaviour. With this the ecological validity would greatly improve, as findings could allow more general assumptions of real-world settings.

Another limitation of the overall dissertation is, that the model of the HIS-process (see Figure 3) presented in the introduction is not comprehensive enough. The scope of the dissertation was an attempt to integrate many different relevant approaches from different fields of research into a new, comprehensive process model of HIS. Yet the claim of an exhaustive integration of all relevant influencing variables was never intended, which, however, also represents the limitation. Throughout the single steps of HIS, in advance to HIS, as precondition and following the search many more factors could be identified. The model offers the possibility to identify and integrate further useful variables in future studies. The presented findings offer a first look on relevant influencing factors in the process. However,

with the three studies, each step was investigated mostly independent from each other. As discussed before, this limitation could be tackled by future research, which observes the whole process in a single study, while also considering the single steps. This allows to investigate the dependencies of the single steps and identify the first occurrence of biased behaviour and its consequences in the whole process.

### Concluding remarks

The aim of this dissertation was to add knowledge to the field of health information behaviour research by integrating insights from differential psychology, health psychology and communication sciences into a comprehensive model of psychological factors influencing the HIS-process. Despite the above mentioned limitations to the ecological validity of the studies, one can conclude that considering skills and personality factors in the investigation of health information behaviour might help to further improve the promotion of adequate health behaviour. Understanding the factors in which individuals differ in the seeking and use of health information might allow to understanding and address personal aims and needs, while at the same time improving autonomy and self-responsibility of the patient. The findings can help to further improve our understanding of rejection of recommended and acquisition of questionable practices. With insights on the impact of skills and personality factors on biased information search can help to identify patients at risk and help to prevent spreading false information. All three studies are more or less starting points for either the considered step in the process, the operationalization or considered skills and personality traits. More research is needed to investigate if findings can be replicated in adjacent contexts and settings, and to further elaborate the process model of HIS. Varying personality traits and skills can then be function as foundation for practical, economical interventions and to improve health through autonomous health information seeking.

## References

- Ackerman, P. L. (1996). A theory of adult intellectual development: Process, personality, interests, and knowledge. *Intelligence*, 22(2), 227-257.
- Ackerman, P. L., & Wolman, S. D. (2007). Determinants and validity of self-estimates of abilities and self-concept measures. *Journal of Experimental Psychology. Applied*, 13(2), 57–78. <https://doi.org/10.1037/1076-898X.13.2.57>
- Adams, J. M., Hart, W., Richardson, K., Tortoriello, G. K., & Rentschler, A. (2018). Monkey see, monkey do: The effect of social influence on selective-exposure bias. *European Journal of Social Psychology*, 48(6), 850–865. <https://doi.org/10.1002/ejsp.2375>
- Al-Samarraie, H., Eldenfria, A., & Dawoud, H. (2017). The impact of personality traits on users' information-seeking behavior. *Information Processing & Management*, 53(1), 237–247. <https://doi.org/10.1016/j.ipm.2016.08.004>
- American Library Association, A. f. C., & Libraries, R. (2000). *Information Literacy Competency Standards for Higher Education*. Retrieved from <http://hdl.handle.net/10150/105645>
- Avery, E. J. (2010). The role of source and the factors audiences rely on in evaluating credibility of health information. *Public Relations Review*, 36(1), 81–83. <https://doi.org/10.1016/j.pubrev.2009.10.015>
- Azucar, D., Marengo, D., & Settanni, M. (2018). Predicting the Big 5 personality traits from digital footprints on social media: A meta-analysis. *Personality and Individual Differences*, 124, 150–159. <https://doi.org/10.1016/j.paid.2017.12.018>
- Baker, D. W., Wolf, M. S., Feinglass, J., Thompson, J. A., Gazmararian, J. A., & Huang, J. (2007). Health literacy and mortality among elderly persons. *Archives of Internal Medicine*, 167(14), 1503–1509. <https://doi.org/10.1001/archinte.167.14.1503>
- Baker, L., Wagner, T. H., Singer, S., & Bundorf, M. K. (2003). Use of the internet and e-mail for health care information. *JAMA*, 289(18), 2400. <https://doi.org/10.1001/jama.289.18.2400>
- Barrick, M. R., & Mount, M. K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. *Personnel Psychology*, 44(1), 1–26. <https://doi.org/10.1111/j.1744-6570.1991.tb00688.x>
- Batty, G. D., Deary, I. J., & Gottfredson, L. S. (2007). Premorbid (early life) IQ and later mortality risk: Systematic review. *Annals of Epidemiology*, 17(4), 278–288. <https://doi.org/10.1016/j.annepidem.2006.07.010>
- Baumann, N., & Kuhl, J. (2002). Intuition, affect, and personality: Unconscious coherence judgments and self-regulation of negative affect. *Journal of Personality and Social Psychology*, 83(5), 1213–1223. <https://doi.org/10.1037/0022-3514.83.5.1213>
- Baumeister, R. F., Heatherton, T. F., & Tice, D. M. (2006). *Losing control: How and why people fail at self-regulation* (Transferred to digital print). San Diego: Academic Press.
- Behm, T. (2018). *Self-Efficacy Scale for Information Searching Behavior (SES-IB-16)*. Trier: Leibniz-Zentrum für Psychologische Information und Dokumentation (ZPID), Elektronisches Testarchiv.
- Bernat, J.K., Skolarus, T.A., Hawley, S.T. et al. Negative information-seeking experiences of long-term prostate cancer survivors. *J Cancer Surviv* 10, 1089–1095 (2016). <https://doi.org/10.1007/s11764-016-0552-5>
- Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J., & Crotty, K. (2011). Low health literacy and health outcomes: An updated systematic review. *Annals of Internal Medicine*, 155(2), 97. <https://doi.org/10.7326/0003-4819-155-2-201107190-00005>
- Blascovich, J., & Tomaka, J. (1995). The Biopsychosocial Model of Arousal Regulation. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology*: v. 27. *Advances in experimental social*

- psychology* (Vol. 28, pp. 1–51). New York: Academic Press. [https://doi.org/10.1016/S0065-2601\(08\)60235-X](https://doi.org/10.1016/S0065-2601(08)60235-X)
- Carver, C. S. (2016). Impulse and constraint: Perspectives from personality psychology, Convergence with theory in other areas, and potential for integration. *Personality and Social Psychology Review*, 9(4), 312–333. [https://doi.org/10.1207/s15327957pspr0904\\_2](https://doi.org/10.1207/s15327957pspr0904_2)
- Caspi, A. (2000). The child is father of the man: Personality continuities from childhood to adulthood. *Journal of Personality and Social Psychology*, 78(1), 158–172. <https://doi.org/10.1037/0022-3514.78.1.158>
- Chasiotis, A., Wedderhoff, O., Rosman, T., & Mayer, A.-K. (2020). Why do we want health information? The goals associated with health information seeking (GAINS) questionnaire. *Psychology & Health*, 35(3), 255–274. <https://doi.org/10.1080/08870446.2019.1644336>
- Cornelia Pocnet, Marc Dupuis, Anne Congard, & Daniela Jopp (2017). Personality and its links to quality of life: Mediating effects of emotion regulation and self-efficacy beliefs. *Motivation and Emotion*, 2(41), 196–208. <https://doi.org/10.1007/s11031-017-9603-0>
- Costa, P. T., & McCrae, R. R. (1992). Four ways five factors are basic. *Personality and Individual Differences*, 13(6), 653–665. [https://doi.org/10.1016/0191-8869\(92\)90236-I](https://doi.org/10.1016/0191-8869(92)90236-I)
- Das, E. (2012). Rethinking the role of affect in health communication. *European Health Psychologist*, 14(2), 27-31.
- Deary, I. J., Whalley, L. J., Lemmon, H., Crawford, J.R., & Starr, J. M. (2000). The stability of individual differences in mental ability from childhood to old age: Follow-up of the 1932 Scottish Mental Survey. *Intelligence*, 28(1), 49–55. [https://doi.org/10.1016/S0160-2896\(99\)00031-8](https://doi.org/10.1016/S0160-2896(99)00031-8)
- Der, G., Batty, G. D., & Deary, I. J. (2009). The association between IQ in adolescence and a range of health outcomes at 40 in the 1979 US National Longitudinal Study of Youth. *Intelligence*, 37(6), 573–580. <https://doi.org/10.1016/j.intell.2008.12.002>
- Dewalt, D. A., Berkman, N. D., Sheridan, S., Lohr, K. N., & Pignone, M. P. (2004). Literacy and health outcomes: A systematic review of the literature. *Journal of General Internal Medicine*, 19(12), 1228–1239. <https://doi.org/10.1111/j.1525-1497.2004.40153.x>
- Diener, E., Larsen, R. J., & Emmons, R. A. (1984). Person × Situation interactions: Choice of situations and congruence response models. *Journal of Personality and Social Psychology*, 47(3), 580–592. <https://doi.org/10.1037/0022-3514.47.3.580>
- Ditto, P. H., & Lopez, D. F. (1992). Motivated skepticism: Use of differential decision criteria for preferred and nonpreferred conclusions. *Journal of Personality and Social Psychology*, 63(4), 568–584. <https://doi.org/10.1037/0022-3514.63.4.568>
- Diviani, N., van den Putte, B., Giani, S., & van Weert, J. C. M. (2015). Low health literacy and evaluation of online health information: A systematic review of the literature. *Journal of Medical Internet Research*, 17(5), e112. <https://doi.org/10.2196/jmir.4018>
- Dubé, E., Vivion, M., & MacDonald, N. E. (2014). Vaccine hesitancy, vaccine refusal and the anti-vaccine movement: Influence, impact and implications. *Expert Review of Vaccines*, 14(1), 99–117. <https://doi.org/10.1586/14760584.2015.964212>
- Dutta-Bergman, M. J. (2004). Primary sources of health information: Comparisons in the domain of health attitudes, health cognitions, and health behaviors. *Health Communication*, 16(3), 273–288. [https://doi.org/10.1207/S15327027HC1603\\_1](https://doi.org/10.1207/S15327027HC1603_1)
- Edwards, K., & Smith, E. E. (1996). A disconfirmation bias in the evaluation of arguments. *Journal of Personality and Social Psychology*, 71(1), 5–24. <https://doi.org/10.1037/0022-3514.71.1.5>
- Ehrlinger, J., Mitchum, A. L., & Dweck, C. S. (2016). Understanding overconfidence: Theories of intelligence, preferential attention, and distorted self-assessment. *Journal of Experimental Social Psychology*, 63, 94-100. <https://doi.org/10.1016/j.jesp.2015.11.001>

- Ek, S., & Heinström, J. (2011). Monitoring or avoiding health information - the relation to inner inclination and health status. *Health Information and Libraries Journal*, 28(3), 200–209. <https://doi.org/10.1111/j.1471-1842.2011.00947.x>
- Elliot, A. J. (Ed.) (2008). *Handbook of Approach and Avoidance Motivation*. New York: Psychology Press.
- Elliot, A. J., & Thrash, T. M. (2002). Approach-avoidance motivation in personality: Approach and avoidance temperaments and goals. *Journal of Personality and Social Psychology*, 82(5), 804–818. <https://doi.org/10.1037/0022-3514.82.5.804>
- Fawns-Ritchie, C., Starr, J. M., & Deary, I. J. (2018). Role of cognitive ability in the association between functional health literacy and mortality in the Lothian Birth Cohort 1936: A prospective cohort study. *BMJ Open*, 8(9), e022502. <https://doi.org/10.1136/bmjopen-2018-022502>
- Feil, J., & Hasking, P. (2009). The relationship between personality, coping strategies and alcohol use. *Addiction Research & Theory*, 16(5), 526–537. <https://doi.org/10.1080/16066350802025714>
- Freund, P. A., & Kasten, N. (2012). How smart do you think you are? A meta-analysis on the validity of self-estimates of cognitive ability. *Psychological Bulletin*, 138(2), 296–321. <https://doi.org/10.1037/a0026556>
- Friedman, H. S., Kern, M. L., & Reynolds, C. A. (2010). Personality and health, subjective well-being, and longevity. *Journal of Personality*, 78(1), 179–216. <https://doi.org/10.1111/j.1467-6494.2009.00613.x>
- Gazmararian, J., Baker, D., Parker, R., & Blazer, D. G. (2000). A multivariate analysis of factors associated with depression: Evaluating the role of health literacy as a potential contributor. *Archives of Internal Medicine*, 160(21), 3307–3314. <https://doi.org/10.1001/archinte.160.21.3307>
- Giustini, D. (2006). How Web 2.0 is changing medicine. *BMJ*, 333(7582), 1283–1284. <https://doi.org/10.1136/bmj.39062.555405.80>
- Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist*, 54(7), 493–503. <https://doi.org/10.1037/0003-066X.54.7.493>
- Gottfredson, L. S. (2009). Logical fallacies used to dismiss the evidence on intelligence testing. In R. P. Phelps (Ed.), *Correcting fallacies about educational and psychological testing* (1st ed., pp. 11–65). Washington, D.C: American Psychological Association. <https://doi.org/10.1037/11861-001>
- Gottfredson, L. S., & Deary, I. J. (2016). Intelligence Predicts Health and Longevity, but why? *Current Directions in Psychological Science*, 13(1), 1–4. <https://doi.org/10.1111/j.0963-7214.2004.01301001.x>
- Greving, H., & Sassenberg, K. (2015). Counter-regulation online: Threat biases retrieval of information during Internet search. *Computers in Human Behavior*, 50, 291–298. <https://doi.org/10.1016/j.chb.2015.03.077>
- Hart, W., Albarracín, D., Eagly, A. H., Brechan, I., Lindberg, M. J., & Merrill, L. (2009). Feeling validated versus being correct: A meta-analysis of selective exposure to information. *Psychological Bulletin*, 135(4), 555–588. <https://doi.org/10.1037/a0015701>
- Hastall, M. R., & Wagner, A. J. M. (2018). Enhancing Selective Exposure to Health Messages and Health Intentions. Advance online publication. <https://doi.org/10.1027/1864-1105/A000197>
- Hayes, A. F. (2013). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. *Methodology in the Social Sciences*. New York, NY: Guilford Press. Retrieved from <http://lib.mylibrary.com/detail.asp?id=480011>
- Heckhausen, J., & Heckhausen, H. (2010). *Motivation und Handeln* (4., überarbeitete und erweiterte Auflage). *Springer-Lehrbuch*. Berlin, Heidelberg: Springer-Verlag Berlin Heidelberg. Retrieved from <http://site.ebrary.com/lib/alltitles/docDetail.action?docID=10444188>
- Heinström, J. (2003). Five personality dimensions and their influence on information behaviour. *Information Research*, 9(1).

- Hesse BW, Nelson DE, Kreps GL, et al. Trust and Sources of Health Information: The Impact of the Internet and Its Implications for Health Care Providers: Findings From the First Health Information National Trends Survey. *Arch Intern Med.* 2005;165(22):2618–2624. doi:10.1001/archinte.165.22.2618
- Hevey, D., & Dolan, M. (2014). Approach/avoidance motivation, message framing and skin cancer prevention: a test of the congruency hypothesis. *Journal of Health Psychology, 19*(8), 1003–1012. <https://doi.org/10.1177/1359105313483154>
- Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist, 52*(12), 1280–1300. <https://doi.org/10.1037/0003-066X.52.12.1280>
- Hossiep, R. & Paschen, M. (2003). *Bochumer Inventar zur berufsbezogenen Persönlichkeitsbeschreibung (BIP)*. 2. Auflage. Hogrefe, Göttingen
- Humberg, S., Dufner, M., Schönbrodt, F. D., Geukes, K., Hutteman, R., Kүfner, A. C. P., . . . Back, M. D. (2019). Is accurate, positive, or inflated self-perception most advantageous for psychological adjustment? A competitive test of key hypotheses. *Journal of Personality and Social Psychology, 116*(5), 835–859. <https://doi.org/10.1037/pspp0000204>
- Jacobs, R. J., Lou, J. Q., Ownby, R. L., & Caballero, J. (2016). A systematic review of eHealth interventions to improve health literacy. *Health Informatics Journal, 22*(2), 81–98. <https://doi.org/10.1177/1460458214534092>
- Janke, S. & Glöckner-Rist, A. (2014). Deutsche Version der Positive and Negative Affect Schedule (PANAS). *Zusammenstellung sozialwissenschaftlicher Items und Skalen (ZIS)*. <https://doi.org/10.6102/zis146>
- Johnson, J. D., & Case, D. O. (2012). *Health information seeking. Health communication: Vol. 4*. New York, NY: Lang.
- Johnson, B. K., & Knobloch-Westerwick, S. (2017). Steer clear or get ready: How coping styles moderate the effect of informational utility. *Journal of Broadcasting & Electronic Media, 61*(2), 332-350.
- Joormann, J. & Gottlieb, I. H. (2009). Emotion regulation in depression: Relation to cognitive inhibition. *Cognition and Emotion, 24*(2), 281-298. <https://doi.org/10.1080/02699930903407948>
- Kahneman, D., & Tversky, A. (1979). Prospect Theory: An analysis of decision under risk. *Econometrica, 47*(2), 263. <https://doi.org/10.2307/1914185>
- Kaspar, K., & Müller-Jensen, M. (2019). Information seeking behavior on Facebook: The role of censorship endorsement and personality. *Current Psychology, 31*, 211. <https://doi.org/10.1007/s12144-019-00316-8>
- Kim, N. S., & Lee, K. E. (2017). Comparison of Health Anxiety and Health Information Seeking Behavior on the Internet Depending Upon Personality Traits. *Journal of Health Informatics and Statistics, 42*(3), 259–268. <https://doi.org/10.21032/jhis.2017.42.3.259>
- Knobloch-Westerwick, S., Johnson, B. K., & Westerwick, A. (2013). To your health: Self-regulation of health behavior through selective exposure to online health messages. *Journal of Communication, 84*(2), 807-829. <https://doi.org/10.1111/jcom.12055>
- Krohne, H. W., & Hock, M. (2011). Anxiety, coping strategies, and the processing of threatening information: Investigations with cognitive-experimental paradigms. *Personality and Individual Differences, 50*(7), 916–925. <https://doi.org/10.1016/j.paid.2010.08.001>
- Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology, 77*(6), 1121–1134. <https://doi.org/10.1037/0022-3514.77.6.1121>
- Kuhl, J. (1986). Motivation and information processing: A new look at decision making, dynamic change, and action control. In R. M. Sorrentino & E. T. Higgins (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (pp. 404–434). New York: Guilford Press.

- Kuhl, J. (2001). *Motivation und Persönlichkeit: Interaktionen psychischer Systeme*. Göttingen: Hogrefe Verl. für Psychologie.
- Kuhl, J. (2010). *Lehrbuch der Persönlichkeitspsychologie: Motivation, Emotion und Selbststeuerung* (1. Aufl.). Göttingen: Hogrefe Verlag. Retrieved from <http://elibrary.hogrefe.de/9783840922398>
- Kuhl, J., & Koole, S. L. (2008). The functional architecture of approach and avoidance activation. In A. J. Elliot (Ed.), *Handbook of approach and avoidance motivation* (pp. 535–555). New York: Psychology Press.
- Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin*, *108*(3), 480–498. <https://doi.org/10.1037/0033-2909.108.3.480>
- Lambert, S. D., & Loisele, C. G. (2007). Health information—seeking behavior. *Qualitative Health Research*, *17*(8), 1006–1019. <https://doi.org/10.1177/1049732307305199>
- Lambert, S. D., Loisele, C. G., & Macdonald, M. E. (2009). An in-depth exploration of information-seeking behavior among individuals with cancer. *Cancer Nursing*, *32*(1), 11–23. <https://doi.org/10.1097/01.NCC.0000343372.24517.bd>
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping* (11.th ed.). New York: Springer.
- Leyland, A., Rowse, G., & Emerson, L.-M. (2019). Experimental effects of mindfulness inductions on self-regulation: Systematic review and meta-analysis. *Emotion (Washington, D.C.)*, *19*(1), 108–122. <https://doi.org/10.1037/emo0000425>
- Litman, J. A., & Lunsford, G. D. (2010). Incurious motives to seek information about potential threats. *European Journal of Personality*, *24*(8), 639–655. <https://doi.org/10.1002/per.766>
- Mahoney, M. J. (1977). Publication prejudices: An experimental study of confirmatory bias in the peer review system. *Cognitive Therapy and Research*, *1*(2), 161–175. <https://doi.org/10.1007/BF01173636>
- Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, *50*(4), 370–396. <https://doi.org/10.1037/h0054346>
- 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: Pabst Science Publishers.
- Meppelink, C. S., Smit, E. G., Fransen, M. L., & Diviani, N. (2019). "I was Right about Vaccination": Confirmation Bias and Health Literacy in Online Health Information Seeking. *Journal of Health Communication*, *24*(2), 129–140. <https://doi.org/10.1080/10810730.2019.1583701>
- Miah, A. (2009). *The Medicalization of Cyberspace*. Routledge, Abingdon, UK2008. 160 pp. £21.99, ISBN: 978-0-415-39364-5 Soft cover. *Journal of Information, Communication and Ethics in Society*, *7*(2/3), 211–213. <https://doi.org/10.1108/14779960910955918>
- Miller, S. M. (1987). Monitoring and blunting: Validation of a questionnaire to assess styles of information seeking under threat. *Journal of Personality and Social Psychology*, *52*(2), 345–353. <https://doi.org/10.1037/0022-3514.52.2.345>
- Motyka, S., Grewal, D., Puccinelli, N. M., Roggeveen, A. L., Avnet, T., Daryanto, A., . . . Wetzels, M. (2014). Regulatory fit: A meta-analytic synthesis. *Journal of Consumer Psychology*, *24*(3), 394–410. <https://doi.org/10.1016/j.jcps.2013.11.004>
- Munro, G. D., & Stansbury, J. A. (2009). The dark side of self-affirmation: Confirmation bias and illusory correlation in response to threatening information. *Personality & Social Psychology Bulletin*, *35*(9), 1143–1153. <https://doi.org/10.1177/0146167209337163>
- Nettle, D., & Liddle, B. (2008). Agreeableness is related to social-cognitive, but not social-perceptual, theory of mind. *European Journal of Personality*, *22*(4), 323–335. <https://doi.org/10.1002/per.672>



- Nisbett, R. E., & Wilson, T. D. (1977). The halo effect: Evidence for unconscious alteration of judgments. *Journal of Personality and Social Psychology*, 35(4), 250–256. <https://doi.org/10.1037/0022-3514.35.4.250>
- Nutbeam, D. (2000). Health literacy as a public health goal: A challenge for contemporary health education and communication strategies into the 21st century. *Health Promotion International*, 15(3), 259–267. <https://doi.org/10.1093/heapro/15.3.259>
- Nutbeam, D., & Kickbusch, I. (2000). Advancing health literacy: A global challenge for the 21st century. *Health Promotion International*, 15(3), 183–184. <https://doi.org/10.1093/heapro/15.3.183>
- Paasche-Orlow, M. K., Parker, R. M., Gazmararian, J. A., Nielsen-Bohlman, L. T., & Rudd, R. R. (2005). The prevalence of limited health literacy. *Journal of General Internal Medicine*, 20(2), 175–184. <https://doi.org/10.1111/j.1525-1497.2005.40245.x>
- Parker, R. M., Williams, M. V., Weiss, B. D., Baker, D. W., Davis, T. C., Doak, C. C., . . . others (1999). Health literacy-report of the council on scientific affairs. *Jama-Journal of the American Medical Association*, 281(6), 552–557.
- Pocnet, C., Dupuis, M., Congard, A., & Jopp, D. (2017). Personality and its links to quality of life: Mediating effects of emotion regulation and self-efficacy beliefs. *Motivation and Emotion*, 41(2), 196–208. <https://doi.org/10.1007/s11031-017-9603-0>
- Poropat, A. E. (2009). A meta-analysis of the five-factor model of personality and academic performance. *Psychological Bulletin*, 135(2), 322–338. <https://doi.org/10.1037/a0014996>
- Raven, J. (1989). The Raven Progressive Matrices: A review of national norming studies and ethnic and socioeconomic variation within the United States. *Journal of Educational Measurement*, 26(1), 1–16. <https://doi.org/10.1111/j.1745-3984.1989.tb00314.x>
- Rees, C. E., & Bath, P. A. (2000). Meeting the information needs of adult daughters of women with early breast cancer. *Cancer Nursing*, 23(1), 71–79. <https://doi.org/10.1097/00002820-200002000-00012>
- Reeve, C. L., & Basalik, D. (2014). Is health literacy an example of construct proliferation? A conceptual and empirical evaluation of its redundancy with general cognitive ability. *Intelligence*, 44, 93–102. <https://doi.org/10.1016/j.intell.2014.03.004>
- Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software*, 48(2). <https://doi.org/10.18637/jss.v048.i02>
- Rothermund, K., Voss, A., & Wentura, D. (2008). Counter-regulation in affective attentional biases: A basic mechanism that warrants flexibility in emotion and motivation. *Emotion*, 8(1), 34–46. <https://doi.org/10.1037/1528-3542.8.1.34>
- Rothermund, K. (2011). Counter-Regulation and Control-Dependency. *Social Psychology*, 42(1), 56–66. <https://doi.org/10.1027/1864-9335/a000043>
- Rutten, L. J. F., Arora, N. K., Bakos, A. D., Aziz, N., & Rowland, J. (2005). Information needs and sources of information among cancer patients: A systematic review of research (1980–2003). *Patient Education and Counseling*, 57(3), 250–261. <https://doi.org/10.1016/j.pec.2004.06.006>
- Sassenberg, K., & Greving, H. (2016). Internet searching about disease elicits a positive perception of own health when severity of illness is high: A longitudinal questionnaire study. *Journal of Medical Internet Research*, 18(3), e56. <https://doi.org/10.2196/jmir.5140>
- Sassenberg, K., & Scholl, A. (2019). Linking regulatory focus and threat–challenge: Transitions between and outcomes of four motivational states. *European Review of Social Psychology*, 30(1), 174–215. <https://doi.org/10.1080/10463283.2019.1647507>
- Schaeffer, D., Vogt, D., Berens, E. - M., & Hurrelmann, K. (2016). *Gesundheitskompetenz der Bevölkerung in Deutschland: Ergebnisbericht*. Bielefeld: Universität Bielefeld, Fakultät für Gesundheitswissenschaften. doi:10.2390/0070-pub-29081112

- Schönbrodt, F. D., & Humberg, S. (2020). *RSA: An R package for response surface analysis (version 0.10.1)*. Retrieved from <https://cran.r-project.org/package=RSA>
- Schönbrodt, F. D., Humberg, S., Nestler, S., & Carlson, E. (2018). Testing similarity effects with Dyadic Response Surface Analysis. *European Journal of Personality*, 32(6), 627–641. <https://doi.org/10.1002/per.2169>
- Schwarzer, R., Lippke, S., & Luszczynska, A. (2011). Mechanisms of health behavior change in persons with chronic illness or disability: The Health Action Process Approach (HAPA). *Rehabilitation Psychology*, 56(3), 161–170. <https://doi.org/10.1037/a0024509>
- Sheeran, P. (2002). Intention—Behavior relations: A conceptual and empirical review. *European Review of Social Psychology*, 12(1), 1–36. <https://doi.org/10.1080/14792772143000003>
- Sheridan, S. L., Halpern, D. J., Viera, A. J., Berkman, N. D., Donahue, K. E., & Crotty, K. (2011). Interventions for individuals with low health literacy: a systematic review. *Journal of health communication*, 16 Suppl 3, 30–54. <https://doi.org/10.1080/10810730.2011.604391>
- Sherman, D. K., & Cohen, G. L. (2016). Accepting threatening information: Self-affirmation and the reduction of defensive biases. *Current Directions in Psychological Science*, 11(4), 119–123. <https://doi.org/10.1111/1467-8721.00182>
- Shiloh, S., & Orgler-Shoob, M. (2006). Monitoring: A dual-function coping style. *Journal of Personality*, 74(2), 457–478. <https://doi.org/10.1111/j.1467-6494.2005.00381.x>
- Shipman, J. P., Kurtz-Rossi, S., & Funk, C. J. (2009). The Health Information Literacy Research Project. *Journal of the Medical Library Association*, 97(4), 293–301. <https://doi.org/10.3163/1536-5050.97.4.014>
- Sørensen, K., Pelikan, J. M., Röthlin, F., Ganahl, K., Slonska, Z., Doyle, G., . . . Brand, H. (2015). Health literacy in Europe: Comparative results of the European health literacy survey (HLS-EU). *The European Journal of Public Health*, 25(6), 1053–1058. <https://doi.org/10.1093/eurpub/ckv043>
- Sørensen, K., van den Broucke, S., Fullam, J., Doyle, G., Pelikan, J., Slonska, Z., & Brand, H. (2012). Health literacy and public health: A systematic review and integration of definitions and models. *BMC Public Health*, 12(1), 1. <https://doi.org/10.1186/1471-2458-12-80>
- Spearman, C. (1904). "General Intelligence," Objectively Determined and Measured. *The American Journal of Psychology*, 15(2), 201. <https://doi.org/10.2307/1412107>
- Sun, Y., & Zhang, Y. (2016). Individual Differences and Online Health Information Source Selection. In D. Kelly, R. Capra, N. Belkin, J. Teevan, & P. Vakkari (Eds.), *Proceedings of the 2016 ACM on Conference on Human Information Interaction and Retrieval - CHIIR '16* (pp. 321–324). New York, New York, USA: ACM Press. <https://doi.org/10.1145/2854946.2854989>
- Tidwell, M. (2005). Personality and information seeking: Understanding how traits influence information-seeking behaviors. *Journal of Business Communication*, 42(1), 51–77. <https://doi.org/10.1177/0021943604272028>
- Tull, M. T., Gratz, K. L., Latzman, R. D., Kimbrel, N. A., & Lejuez, C. W. (2010). Reinforcement Sensitivity Theory and emotion regulation difficulties: A multimodal investigation. *Personality and Individual Differences*, 49(8), 989–994. <https://doi.org/10.1016/j.paid.2010.08.010>
- Van 't Riet, J., & Ruiter, R. A.C. (2013). Defensive reactions to health-promoting information: An overview and implications for future research. *Health Psychology Review*, 7(1), 104–136. <https://doi.org/10.1080/17437199.2011.606782>
- Walji, M., Sagaram, S., Sagaram, D., Meric-Bernstam, F., Johnson, C., Mirza, N. Q., & Bernstam, E. V. (2004). Efficacy of quality criteria to identify potentially harmful information: A cross-sectional survey of complementary and alternative medicine web sites. *Journal of Medical Internet Research*, 6(2), e21. <https://doi.org/10.2196/jmir.6.2.e21>

- Walsh, A. M., Hamilton, K., White, K. M., & Hyde, M. K. (2015). Use of online health information to manage children's health care: A prospective study investigating parental decisions. *BMC Health Services Research*, *15*(1), 419. <https://doi.org/10.1186/s12913-015-0793-4>
- 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*, *3*, 1060. <https://doi.org/10.3389/fcomm.2018.00057>
- Wright, M.C., Borbolla, D., Waller, R.G., Del Fiol, G., Reese, T., Nesbitt, P. & Segall, N. (2019). Critical care information display approaches and design frameworks: a systematic review and meta-analysis. *Journal of Biomedical Informatics: X*, *3*. <https://doi.org/10.1016/j.yjbinx.2019.100041>
- Zajonc, R. B. (2016). Mere Exposure: A gateway to the subliminal. *Current Directions in Psychological Science*, *10*(6), 224–228. <https://doi.org/10.1111/1467-8721.00154>
- Zimmerman, M. S., & Shaw, G. (2020). Health information seeking behaviour: A concept analysis. *Health Information and Libraries Journal*. Advance online publication. <https://doi.org/10.1111/hir.12287>

Appendix A – Study I



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

Anita Chasiotis<sup>1</sup> · Oliver Wedderhoff<sup>1</sup> · Tom Rosman<sup>1</sup> · Anne-Kathrin Mayer<sup>1</sup>

© The Author(s) 2019

## 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

✉ Anita Chasiotis  
ac@leibniz-psychology.org

<sup>1</sup> Leibniz Institute for Psychology Information, Universitaetsring 15, 54296 Trier, Germany

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.

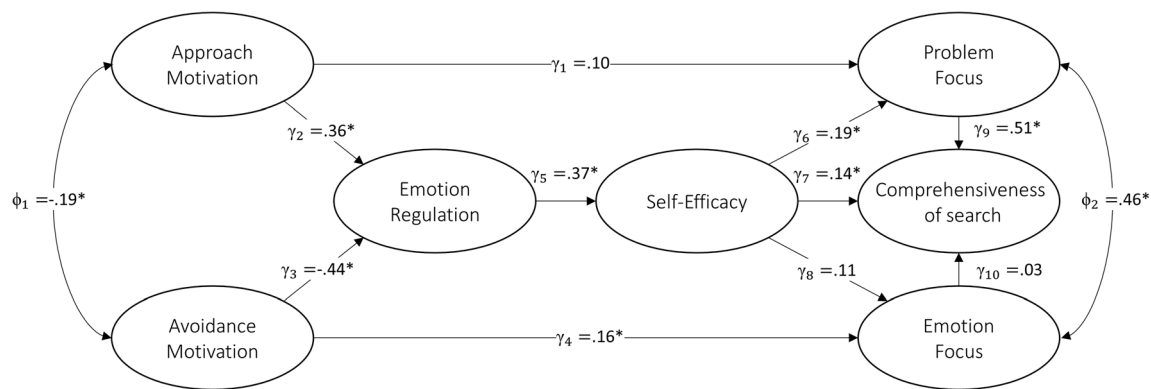
In past studies, there have been valuable approaches to capture individual differences in engagement and disengagement coping styles with regard to information seeking under a (health) threat (e.g., vigilance vs. cognitive avoidance, Krohne and Hock 2011; monitoring vs. blunting, Miller 1987; sensitizing 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 <sub>1</sub> ) <sup>a</sup>	.01*
Avoidance motivation → Comprehensiveness (IDE <sub>2</sub> ) <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.

**Open Access** This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

## References

- Baumann, N., & Kuhl, J. (2002). Intuition, affect, and personality: Unconscious coherence judgments and self-regulation of negative affect. *Journal of Personality and Social Psychology*, 83(5), 1213–1223.
- Behm, T. (2015). Informationskompetenz und Selbstregulation: Zur Relevanz bereichsspezifischer Selbstwirksamkeitsüberzeugungen [information competence and self-regulation: The relevance of domain-specific self-efficacy]. In A.-K. Mayer (Ed.),



- Informationskompetenz im Hochschulkontext [information competence in the higher education context.]: Interdisziplinäre Forschungsperspektiven [interdisciplinary research perspectives]* (pp. 151–162). Lengerich: Pabst Science Publishers.
- Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J., Viera, A., Crotty, K., et al. (2011). Health literacy interventions and outcomes: An updated systematic review. *Evidence Report/Technology Assessment*, 199(1), 1–941.
- Blouin-Hudon, E.-M. C., Gaudreau, P., & Gareau, A. (2016). Coping as a building mechanism to explain the unique association of affect and goal motivation with changes in affective states. *Anxiety, Stress, & Coping*, 29(5), 519–532.
- Booth-Kewley, S., & Vickers Jr., R. R. (1994). Associations between major domains of personality and health behavior. *Journal of Personality*, 62(3), 281–298.
- Braniecka, A., Trzebińska, E., Dowgiert, A., & Wytykowska, A. (2014). Mixed emotions and coping: The benefits of secondary emotions. *PLoS One*, 9(8), e103940.
- Byrne, D. (1961). The repression-sensitization scale: Rationale, reliability, and validity. *Journal of Personality*, 29(3), 334–349.
- Carver, C. S. (2005). Impulse and constraint: Perspectives from personality psychology, convergence with theory in other areas, and potential for integration. *Personality and Social Psychology Review*, 9(4), 312–333.
- Carver, C. S., & Connor-Smith, J. (2010). Personality and coping. *Annual Review of Psychology*, 61(1), 679–704.
- Chang, D.-S., Kang, O.-S., Kim, H.-H., Kim, H.-S., Lee, H., Park, H.-J., et al. (2012). Pre-existing beliefs and expectations influence judgments of novel health information. *Journal of Health Psychology*, 17(5), 753–763.
- Chasiotis, A., Wedderhoff, O., Rosman, T., & Mayer, A.-K. (2019). Why do we want health information? The goals associated with health information seeking questionnaire (GAINS). *Psychology & Health*. <https://doi.org/10.1080/08870446.2019.1644336>.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155–159.
- Das, E. (2012). Rethinking the role of affect in health communication. *European Health Psychologist*, 14(2), 27–31.
- Das, E., & Fennis, B. M. (2008). In the mood to face the facts: When a positive mood promotes systematic processing of self-threatening information. *Motivation and Emotion*, 32(3), 221–230.
- Dennis, T. A. (2007). Interactions between emotion regulation strategies and affective style: Implications for trait anxiety versus depressed mood. *Motivation and Emotion*, 31(3), 200–207.
- Derakshan, N., Eysenck, M. W., & Myers, L. B. (2007). Emotional information processing in repressors: The vigilance-avoidance theory. *Cognition and Emotion*, 21(8), 1585–1614.
- Ebert, D. D., Christ, O., & Berking, M. (2013). Entwicklung und Validierung eines Fragebogens zur emotionsspezifischen Selbsteinschätzung emotionaler Kompetenzen (SEK-ES) [development and validation of a emotion-specific self-report measurement of emotional competences]. *Diagnostica*, 59(1), 17–32.
- Eheman, C. R., Berkowitz, Z., Lee, J., Mohile, S., Purnell, J., Marie Rodriguez, E., et al. (2009). Information-seeking styles among cancer patients before and after treatment by demographics and use of information sources. *Journal of Health Communication*, 14(5), 487–502.
- Elliot, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology*, 72(1), 218–232.
- Eslick, G. D., Jones, M. P., & Talley, N. J. (2003). Non-cardiac chest pain: Prevalence, risk factors, impact and consulting- a population-based study. *Alimentary Pharmacology & Therapeutics*, 17(9), 1115–1124.
- Fass, R., & Achem, S. R. (2011). Noncardiac chest pain: Epidemiology, natural course and pathogenesis. *Journal of Neurogastroenterology and Motility*, 17(2), 110–123.
- Feil, J., & Hasking, P. (2008). The relationship between personality, coping strategies and alcohol use. *Addiction Research & Theory*, 16(5), 526–537.
- Folkman, S. (2010). Stress, coping, and hope. *Psycho-Oncology*, 19(9), 901–908.
- Folkman, S., & Lazarus, R. S. (1980). An analysis of coping in a middle-aged community sample. *Journal of Health and Social Behavior*, 21(3), 219–239.
- Friedman, H. S. (2000). Long-term relations of personality and health: Dynamisms, mechanisms, tropisms. *Journal of Personality*, 68(6), 1089–1107.
- Gerend, M. A., & Shepherd, J. E. (2007). Using message framing to promote acceptance of the human papillomavirus vaccine. *Health Psychology*, 26(6), 745–752.
- Hampson, S. E., Andrews, J. A., Barckley, M., Lichtenstein, E., & Lee, M. E. (2006). Personality traits, perceived risk, and risk-reduction behaviors: A further study of smoking and radon. *Health Psychology*, 25(4), 530.
- Hart, W., Albarracín, D., Eagly, A. H., Brechan, I., Lindberg, M. J., & Merrill, L. (2009). Feeling validated versus being correct: A meta-analysis of selective exposure to information. *Psychological Bulletin*, 135(4), 555–588.
- Hartig, J., & Moosbrugger, H. (2003). Die “ARES-Skalen” zur Erfassung der individuellen BIS- und BAS-Sensitivität [the ARES-scales as a measurement of individual BIS- and BAS-sensitivity: Development of a long and a short questionnaire version]. *Zeitschrift Für Differentielle Und Diagnostische Psychologie*, 24(4), 293–310.
- Hasking, P. A. (2006). Reinforcement sensitivity, coping, disordered eating and drinking behaviour in adolescents. *Personality and Individual Differences*, 40(4), 677–688.
- Hastall, M. R., & Wagner, A. J. M. (2017). Enhancing selective exposure to health messages and health intentions. *Journal of Media Psychology*, 30. <https://doi.org/10.1027/1864-1105/a000197>.
- Heinström, J. (2002). *Fast surfers, broad scanners and deep divers: Personality and information-seeking behaviour*. Abo: Abo Akademi University Press.
- Hevey, D., & Dolan, M. (2014). Approach/avoidance motivation, message framing and skin cancer prevention: A test of the congruency hypothesis. *Journal of Health Psychology*, 19(8), 1003–1012.
- Hundt, N. E., Williams, A. M., Mendelson, J., & Nelson-Gray, R. O. (2013). Coping mediates relationships between reinforcement sensitivity and symptoms of psychopathology. *Personality and Individual Differences*, 54(6), 726–731.
- Johnson, B. K., & Knobloch-Westerwick, S. (2017). Steer clear or get ready: How coping styles moderate the effect of informational utility. *Journal of Broadcasting & Electronic Media*, 61(2), 332–350.
- Kahlor, L. (2010). PRISM: A planned risk information seeking model. *Health Communication*, 25(4), 345–356.
- Kalichman, S. C., Cherry, C., Cain, D., Weinhardt, L. S., Benotsch, E., Pope, H., & Kalichman, M. (2006). Health information on the internet and people living with HIV/AIDS: Information evaluation and coping styles. *Health Psychology*, 25(2), 205–210.
- Kiesler, D. J., & Auerbach, S. M. (2006). Optimal matches of patient preferences for information, decision-making and interpersonal behavior: Evidence, models and interventions. *Patient Education and Counseling*, 61(3), 319–341.
- Koole, S. L. (2009). The psychology of emotion regulation: An integrative review. *Cognition and Emotion*, 23(1), 4–41.
- Krohne, H. W., & Hock, M. (2011). Anxiety, coping strategies, and the processing of threatening information: Investigations with cognitive-experimental paradigms. *Personality and Individual Differences*, 50(7), 916–925.

- Kuhl, J., & Koole, S. L. (2008). The functional architecture of approach and avoidance motivation. In A. J. Elliot (Ed.), *Handbook of approach and avoidance motivation* (pp. 535–555). New York: Taylor & Francis.
- Lalot, F., Quiamzade, A., & Zerhouni, O. (2018). Regulatory focus and self-determination motives interact to predict students' nutrition-habit intentions. *Journal of Experimental Psychology: Applied*. Advance online publication. <https://doi.org/10.1037/xap0000196>
- Lazarus, R. S. (2006). Emotions and interpersonal relationships: Toward a person-centered conceptualization of emotions and coping. *Journal of Personality*, *74*(1), 9–46.
- Litman, J. A. (2006). The COPE inventory: Dimensionality and relationships with approach-and avoidance-motives and positive and negative traits. *Personality and Individual Differences*, *41*(2), 273–284.
- Litman, J. A., & Lunsford, G. D. (2010). Incurious motives to seek information about potential threats. *European Journal of Personality*, *24*(8), 639–655.
- McKinley, C. J., & Ruppel, E. K. (2014). Exploring how perceived threat and self-efficacy contribute to college students' use and perceptions of online mental health resources. *Computers in Human Behavior*, *34*, 101–109. <https://doi.org/10.1016/j.chb.2014.01.038>.
- Miller, S. M. (1987). Monitoring and blunting: Validation of a questionnaire to assess styles of information seeking under threat. *Journal of Personality and Social Psychology*, *52*(2), 345–353.
- Nestler, S., & Egloff, B. (2010). When scary messages backfire: Influence of dispositional cognitive avoidance on the effectiveness of threat communications. *Journal of Research in Personality*, *44*(1), 137–141.
- Pocnet, C., Dupuis, M., Congard, A., & Jopp, D. (2017). Personality and its links to quality of life: Mediating effects of emotion regulation and self-efficacy beliefs. *Motivation and Emotion*, *41*(2), 196–208.
- Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, *48*(2), 1–36.
- Rothermund, K. (2011). Counter-regulation and control-dependency: Affective processing biases in the service of action regulation. *Social Psychology*, *42*(1), 56–66.
- Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online*, *8*(2), 23–74.
- Schutz, P. A., Benson, J., & Decuir-Gunby, J. T. (2008). Approach/avoidance motives, test emotions, and emotional regulation related to testing. *Anxiety, Stress, & Coping*, *21*(3), 263–281.
- Sherman, D. K., Mann, T., & Updegraff, J. A. (2006). Approach/avoidance motivation, message framing, and health behavior: Understanding the congruency effect. *Motivation and Emotion*, *30*(2), 164–168.
- Shiloh, S., & Orgler-Shoob, M. (2006). Monitoring: A dual-function coping style. *Journal of Personality*, *74*(2), 457–478.
- Showers, C. J., & Boyce, K. L. (2008). Secrets of resilience: Approaching negative self-aspects without aversion. In A. J. Elliot (Ed.), *Handbook of approach and avoidance motivation* (pp. 521–534). New York: Taylor & Francis.
- Sweeny, K., Melnyk, D., Miller, W., & Shepperd, J. A. (2010). Information avoidance: Who, what, when, and why. *Review of General Psychology*, *14*(4), 340–353.
- Tamir, M. (2016). Why do people regulate their emotions? A taxonomy of motives in emotion regulation. *Personality and Social Psychology Review*, *20*(3), 199–222.
- Tamir, M., & Diener, E. (2008). Well-being: Approach–avoidance goals and well-being: One size does not fit all. In A. J. Elliot (Ed.), *Handbook of approach and avoidance motivation* (pp. 415–428). New York: Taylor & Francis.
- Tull, M. T., Gratz, K. L., Litzman, R. D., Kimbrel, N. A., & Lejuez, C. W. (2010). Reinforcement sensitivity theory and emotion regulation difficulties: A multimodal investigation. *Personality and Individual Differences*, *49*(8), 989–994.
- Van der Velde, F. W., & van der Pligt, J. (1991). AIDS-related health behavior: Coping, protection motivation, and previous behavior. *Journal of Behavioral Medicine*, *14*(5), 429–451.
- Van't Riet, J., & Ruiter, R. A. C. (2013). Defensive reactions to health-promoting information: An overview and implications for future research. *Health Psychology Review*, *7*, 104–136. <https://doi.org/10.1080/17437199.2011.606782>.

**Publisher's note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Appendix B – Study II

# Erkenne dich selbst!

## Die Bedeutung adäquater vs. inadäquater Selbsteinschätzung relevanter Fähigkeiten bei der Präferenz von Gesundheitsinformationen

Oliver Wedderhoff, Anita Chasiotis und Tom Rosman

Leibniz-Zentrum für Psychologische Information und Dokumentation (ZPID), Trier

**Zusammenfassung:** Die eigenständige Suche sowie das adäquate Verständnis von Gesundheitsinformationen bilden eine wichtige Grundlage für die fundierte Entscheidungsfindung bei gesundheitlichen Problemen. Die hierfür zentralen Fähigkeiten sind die Gesundheitsinformationskompetenz (Health Information Literacy, HIL) und die allgemeine kognitive Fähigkeit (IQ). Die Konsequenzen einer adäquaten oder weniger adäquaten Einschätzung der eigenen Fähigkeiten für alltägliche Entscheidungen können erheblich sein, wurden jedoch im Kontext der Suche nach Gesundheitsinformationen noch nicht untersucht. In dieser Studie wurde zunächst überprüft, inwiefern HIL und IQ einen differenzierbaren Vorhersagebeitrag hinsichtlich der Präferenz bestimmter Eigenschaften von Gesundheitsinformationsquellen (Expertise, Interaktion, Zugänglichkeit) aufweisen. In einer explorativen Analyse wurden anschließend Unterschiede im Vorhersagebeitrag von Selbsteinschätzungs- und Leistungsmaßen von HIL und IQ untersucht. Dabei wurden Auswirkungen einer Über- oder Unterschätzung der eigenen Fähigkeiten im Hinblick auf die Präferenz bestimmter Quelleneigenschaften betrachtet. N = 286 Personen nahmen an der Untersuchung teil. Mit Hilfe von Response Surface Analysen wurde ein differenzierbarer Einfluss von HIL und IQ ermittelt. Spezifische Effekte der selbst eingeschätzten und objektiv gemessenen Fähigkeiten sowie der Interaktion dieser Maße wurden in Form einer Über- oder Unterschätzung identifiziert. Neben der tatsächlichen Fähigkeit spielen somit auch die eigene Einschätzung dieser Fähigkeit sowie eine daraus resultierende Unter- oder Überschätzung eine wichtige Rolle. In Forschung und Praxis Tätige sollten dies bei der Entwicklung und Durchführung von Maßnahmen zur Förderung der fundierten Entscheidungsfindung bei Patientinnen und Patienten berücksichtigen.

**Schlüsselwörter:** Gesundheitskompetenz, Kognitive Fähigkeit, Selbsteinschätzung, Informationssuche

### Know Thyself! The Role of Adequate vs. Inadequate Self-Assessment of Relevant Skills in the Preference for Health Information

**Abstract:** An independent search and the adequate understanding of health information form an important basis for informed decision making in case of a health problem. The fundamental skills coming into effect in this situation are health information literacy (HIL) and general cognitive ability (IQ). The consequences of an adequate vs. less adequate assessment of one's own abilities for everyday decisions are considerable, but have not yet been investigated in the context of health information seeking. We examined if HIL and IQ have unique effects on the preference of certain properties of health information sources (expertise, interaction, accessibility). Furthermore, in an explorative analysis, we examined differences in the effects of self-assessment and performance measures of HIL and IQ. Here, we looked further into the effects of over- or underestimating one's own abilities with regard to the preference of certain source properties. N = 286 individuals took part in our study. Using response surface analyses, we found a differentiable influence of HIL and IQ on the preference of source properties. In addition, we identified specific effects of self-assessed and objectively measured skills and the interaction of these measures (over- or underestimation). In addition to actual ability, the self-assessed ability as well as the resulting under- or overestimation play an important role. Researchers and practitioners should take this into account when developing and implementing measures to promote informed decision making among patients.

**Keywords:** health literacy, cognitive ability, self-assessment, information seeking

Ein gesundes und langes Leben erfordert in unserem Gesundheitssystem größtmögliche Autonomie seitens der Patient\_innen – diese stehen in der Verantwortung, adäquates Gesundheitsverhalten eigenständig zu initiieren und teils kritische Entscheidungen zu treffen (Ubel, Scherr & Fagerlin, 2017). Dementsprechend erfordert ein zweckmäßiges Gesundheitsverhalten ein aktives Informieren über die Möglichkeiten und die individuelle Passung der

Alternativen. Das autonome Handeln soll dabei durch ein umfassendes Informationsangebot unterstützt werden, wird durch die große Menge an Möglichkeiten der Informationsbeschaffung der modernen Informationsgesellschaft aber gleichzeitig erschwert. Es bedarf vielfältiger Kompetenzen, um die unzähligen Möglichkeiten, an Informationen zu gelangen, auch zielführend nutzen zu können (Berkman et al., 2011). Neben technischen sind



vor allem kognitive und sprachliche Fähigkeiten gefordert, um korrekte von fehlerhaften Informationen zu trennen. Informationsquellen, die man im Rahmen der Suche aus einer Vielzahl an möglichen Quellen auswählt und nutzt, sind dabei ein maßgeblicher Faktor dafür, ob man geeignete Informationen erhält.

Entsprechend lassen sich unter dem Begriff „Health Information Literacy“ (HIL) jene Kompetenzen summieren, derer es bedarf, um (1) relevante Informationen zu finden, (2) diese Informationen zu verstehen, (3) sie kritisch zu hinterfragen, und im Anschluss (4) in ein eigenes Gesundheitsverhalten zu überführen (Baker, 2006; Sørensen et al., 2012).

Wie eingangs erwähnt, müssen zunehmend kritische Entscheidungen auf der Grundlage eigens beschaffter Informationen erfolgen. Dementsprechend stellt HIL einen zentralen Einflussfaktor hinsichtlich psychischer und physischer Gesundheit dar (Berkman et al. 2011). Häufig werden die eigenen Fähigkeiten jedoch falsch eingeschätzt (DeNisi & Shaw, 1977; Paulhus, Lysy & Yik, 1998) – was im Gesundheitskontext insofern problematisch ist, als dass eine Über- und Unterschätzung relevanter Fähigkeiten wie der HIL einen entscheidenden Einfluss auf das individuelle Gesundheitsverhalten haben kann (Dunning, Heath & Suls, 2004). So kann aufgrund einer Überschätzung der eigenen Fähigkeiten schnell populistischen Quellen vertraut werden, die falsche Informationen verbreiten, oder aber bei einer Unterschätzung der Prozess der Entscheidungsfindung und Überführung in tatsächliches Gesundheitsverhalten in die Länge gezogen oder vermieden werden. Aus diesem Grund untersucht die vorliegende Studie Unterschiede zwischen objektiven Leistungsmaßen und subjektiven Selbstberichten der HIL sowie deren Zusammenwirken hinsichtlich der Präferenz grundlegender Eigenschaften von gesundheitsbezogenen Informationsquellen.

## Health Information Literacy, kognitive Fähigkeiten und Selbsteinschätzung

Das Konzept der HIL lässt sich als eine Kombination von „Health Literacy“ und „Information Literacy“ verstehen (Eriksson-Backa, Ek, Niemelä & Huotari, 2012). Nach Sørensen et al. (2012) ist Health Literacy mit allgemeinen Lese- und Schreibfähigkeiten verbunden und bezeichnet das Wissen, die Motivation und die Kompetenzen eines Individuums, Gesundheitsinformationen zu erlangen, zu verstehen, zu bewerten und anzuwenden, um letztendlich gesundheitsbezogene Urteile und Entschei-

dungen im Alltag fällen zu können, die die Bereiche Gesundheitsversorgung, Krankheitsprävention und Gesundheitsförderung umfassen. Dies dient dem Ziel der Erhaltung und Verbesserung der Lebensqualität. Die Definition von Information Literacy der American Library Association (1989) umfasst hingegen die Fähigkeiten, welche erforderlich sind, einen Informationsbedarf zu erkennen und die benötigten Informationen zu finden, zu bewerten und effektiv zu verwenden – entsprechend kann HIL als ein Produkt von Health Literacy und Information Literacy angesehen werden.

In der Vergangenheit kam jedoch Kritik an der Eigenständigkeit und Abgrenzbarkeit des Konstrukts HL (und damit an einem wesentlichen Bestandteil der HIL) auf (z. B. Fawns-Ritchie, Starr & Deary, 2018). So wurden die uneinheitliche und sehr breite Definition sowie die Redundanz zu allgemeinen kognitiven Fähigkeiten bemängelt (Reeve & Basalik, 2014). Tatsächlich scheinen in den Definitionen große Überschneidungen zwischen H(I)L und kognitiven Fähigkeiten zu liegen. So beinhalten die genannten Literacy-Konzepte viele Fähigkeiten, die im Allgemeinen auch in Intelligenztests gemessen werden, wie beispielsweise analytische (Lenox & Walker, 1993) und Problemlösefähigkeiten (Brand-Gruwel, Wopereis, & Vermetten, 2005), sowie zu einem gewissen Anteil kognitive Flexibilität (Stern & Neubauer, 2013). Entsprechend lassen Untersuchungen von Reeve & Basalk (2014) darauf schließen, dass kein inkrementeller Mehrwert der HL gegenüber kognitiven Fähigkeiten bei der Kriteriumsvalidität bezüglich Gesundheitsverhalten und -folgen existiert. Dies mag aber unter Umständen an den betrachteten Messinstrumenten zur Erfassung der HL liegen, die nur die rudimentären Aspekte von Lese- und Schreibfähigkeiten im Gesundheitskontext erheben und nicht die weiter differenzierenden Aspekte. Der spezifische (also von kognitiver Fähigkeit abgrenzbare) Nutzen einer differenzierter erfassten HL bezüglich Vorhersagen des Gesundheitsverhaltens bleibt demnach zu klären. Sollte sich herausstellen, dass HL einen von der kognitiven Fähigkeit abgrenzbaren Vorhersagewert für das Gesundheitsverhalten hat, so ließen sich daraus spezifische Interventionsmöglichkeiten ableiten, die auf individueller ebenso wie auf gesellschaftlich-bildungspolitischer Ebene umsetzbar wären. Aus diesem Grund wurde in der vorliegenden Studie zusätzlich überprüft, ob es abgrenzbare Effekte der HIL zu kognitiven Fähigkeiten gibt.

Für viele wichtige Entscheidungen im Alltag ist nicht nur die tatsächliche Ausprägung einer Fähigkeit entscheidend, sondern auch die Selbsteinschätzung (Ackerman & Wolman, 2007; Freund & Kasten, 2012). Häufig sind dabei die Selbsteinschätzung und tatsächlichen Fähigkeiten moderat miteinander korreliert (Ackermann & Wolman, 2007; Zell & Krizan, 2014), im Einzelfall können sie je-

doch stark voneinander abweichen. Dies ist im Gesundheitskontext besonders relevant: Wer seine Recherchefähigkeiten unterschätzt, wird womöglich gar nicht mit der Recherche nach Gesundheitsinformationen beginnen. Wer seine Fähigkeiten zur Bewertung von Gesundheitsinformationen überschätzt, fällt möglicherweise auf Fehlinformationen herein. In der Psychologie nehmen Vergleiche zwischen Selbsteinschätzungen und tatsächlichen Fähigkeiten eine zentrale Rolle ein, da diese neben ihrer messtheoretischen Relevanz auch inhaltliche Bedeutung haben (Freund & Kasten, 2012). Zu den bedeutendsten Ergebnissen in diesem Bereich zählt eine von Kruger und Dunning (1999) durchgeführte Studie, die zeigte, dass Menschen dazu tendieren, ihre eigene Leistung zu überschätzen – und zwar umso stärker, je geringer ihre objektive Leistung ist. In oberen Leistungsbereichen kehrte sich dieser Effekt allerdings um, sodass im obersten Quartil eher eine Unterschätzung zu beobachten war. Diese Über- und Unterschätzungen können, je nach Kontext und Leistungsmaß, zu maladaptivem Verhalten führen (Ackermann & Wolman, 2007). Die simultane Betrachtung der selbsteingeschätzten und objektiv gemessenen Leistungsfähigkeit ermöglicht es dabei, die Interaktion beider Variablen genauer zu analysieren, was insbesondere beim selbstverantwortlichen Gesundheitsverhalten aus den oben genannten Gründen entscheidend sein kann.

Die gleichzeitige Betrachtung der beiden Maße ist bezüglich der HIL bisher jedoch nicht geschehen, weshalb dies im Folgenden durch ein exploratives Vorgehen erfolgen soll. Ob und inwieweit mögliche Fehleinschätzungen sich auf das gesundheitsbezogene Informationsverhalten auswirken, muss dabei an geeigneter Stelle des Rechercheprozesses erfasst werden. Nach dem Feststellen eines bestehenden Bedarfs für Gesundheitsinformationen ist die Auswahl einer adäquaten Quelle der erste Freiheitsgrad und damit potenziell risikobehaftet. Die Auswahl einer bestimmten Quelle determiniert, wie die gewonnenen Informationen gestaltet sind. Hiervon hängt z. B. ab, ob der Nutzerin objektive oder meinungsbildende Informationen zur Verfügung stehen, wie leicht verständlich diese sind und welche Zielgruppe sie ansprechen, ob Vorabinformationen erforderlich sind und ob sie schlicht „falsch“ oder „richtig“ sind. Da es eine Vielzahl möglicher Quellen bei Gesundheitsthemen gibt, die nicht alle gleichzeitig berücksichtigt werden können, muss die Betrachtung dabei auf einer abstrakteren Ebene erfolgen. Wedderhoff, Chasiotis, Rosman und Mayer (2018) konnten zeigen, dass sich alle denkbaren Gesundheitsinfor-

mationsquellen auf den drei Dimensionen Zugänglichkeit (Höhe des Aufwands zur gewinnbringenden Nutzung), Expertise (Grad der wissenschaftlichen Fundiertheit) und der Interaktion bzw. Relationalität (Ausmaß der persönlichen Interaktion zwischen der Quelle und dem Nutzer) einordnen lassen. Daher soll die Präferenz für diese drei Eigenschaften von Gesundheitsinformationsquellen als relevante Auswirkung der zwei Einflussgrößen *HIL* und *kognitive Fähigkeiten* betrachtet werden.

Aus diesen Ausführungen ergeben sich drei explorative Forschungsfragen, die mit der vorliegenden Studie untersucht werden sollen.

1. Weisen die HIL und die kognitiven Fähigkeiten einen differenzierbaren Vorhersagebeitrag hinsichtlich der Präferenz der Quelleneigenschaften Expertise, Interaktion und Zugänglichkeit auf?
2. Weisen Selbstberichte und Leistungstests einen differenzierbaren Vorhersagebeitrag hinsichtlich der Präferenz der Quelleneigenschaften Expertise, Interaktion und Zugänglichkeit auf?
3. Welchen Einfluss hat die Interaktion von selbsteingeschätzten und objektiv gemessenen Leistungsmaßen (Über- bzw. Unterschätzung) der HIL und kognitiven Fähigkeiten auf die Präferenz der Quelleneigenschaften Expertise, Interaktion und Zugänglichkeit?

## Methoden<sup>1</sup>

Es konnten N = 289 Teilnehmende für die Studie gewonnen werden. Nach Ausschluss von Personen, die unvollständig geantwortet hatten, bestand die finale Stichprobe aus N = 286 Studierenden der Universität Trier im Alter von 18–46 Jahren. Das Durchschnittsalter lag bei 23.52 Jahren (SD = 3.25). 80% (n = 228) der Teilnehmenden waren weiblich. Die Bearbeitung der Fragebögen erfolgte computergestützt im Rahmen von Gruppenerhebungen mit maximal 20 TeilnehmerInnen in den Computerräumen der Universität Trier.

Zur Erfassung der selbsteingeschätzten kognitiven Fähigkeiten wurde ein selbstkonstruiertes Item verwendet. Als Leistungstest der kognitiven Fähigkeiten wurden der Standard Progressive Matrices Test von Raven (1941) verwendet. Die Selbsteinschätzung der HIL wurde über eine auf den Gesundheitskontext angepasste Version des Self-Efficacy Scale for Information Behavior (SES-IB) von Behm (2018) erhoben. Als Leistungstest der HIL wurde der Health Information Literacy Knowledge Test (HILK;

<sup>1</sup> Eine ausführliche Dokumentation der durchgeführten Analysen und Ergebnisse inkl. R-Code und Abbildungen findet sich im Open Data 1 (OD 1) des Artikels in PsychArchives: <http://dx.doi.org/10.23668/psycharchives.2683>

Mayer, Holzhäuser, Chasiotis & Wedderhoff, 2018) Test benutzt. Die Abfrage der abhängigen Variablen der Präferenz spezifischer Eigenschaften von Informationsquellen erfolgte durch Zustimmung auf einer fünfstufigen Likertskala (1 = „stimme überhaupt nicht zu“ bis 5 = „stimme voll und ganz zu“) zu jeweils vier selbst entwickelten Items zu den drei Eigenschaftsdimensionen Zugänglichkeit (z.B. „...nutze ich bevorzugt solche Informationen, die leicht und schnell zu finden sind“), Expertise (z.B. „...bevorzuge ich Informationen von Personen, die durch ihre berufliche Ausbildung Kenntnisse erlangt haben, die für mein Anliegen relevant sind“) und Interaktion (z.B. „...bevorzuge ich es, eigenständig Informationen zu der Situation zu suchen“) nach Wedderhoff et al. (2018).

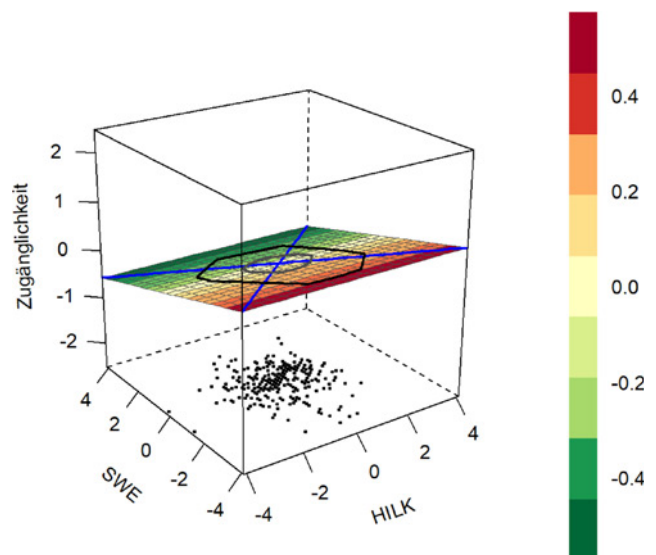
Zur Untersuchung der Forschungsfragen wurden Response Surface Analysen (RSA; Schönbrodt, 2016) mit den Selbstberichten und Leistungstests als Prädiktoren für jede Quelleneigenschaft als Kriterium durchgeführt. RSA eignen sich besonders zur Untersuchung von Diskrepanzen. Im Gegensatz zu Verfahren, die hier auf absolute oder quadrierte Differenzwerte zurückgreifen, sind RSA skalierungsunabhängig sind und überwinden weitere zentrale Probleme „klassischer“ Interaktionsanalysen wie etwa der moderierten Regression (Schönbrodt, 2016).<sup>2</sup>

## Ergebnisse

Eine detaillierte Auflistung der verschiedenen Modellindizes des bestgeeigneten und des nächst besten Modells (gemäß  $\Delta AICc$ , model weight,  $R^2_{adj}$  und  $p_{model}$ ), die zur jeweiligen Auswahl herangezogen wurden, ist in Tabelle 1 zu finden. Der Vergleich der Ergebnisse<sup>3</sup> zwischen HIL und kognitiven Fähigkeiten bezüglich der ersten Forschungsfrage ergab, dass beide Konstrukte jeweils abgrenzbare prädiktive Effekte bezüglich der Präferenz des Expertisegrades, der persönlichen Interaktionsmöglichkeiten und der Zugänglichkeit von Gesundheitsinformationsquellen aufweisen. Bei genauerer Betrachtung zeigten sich Unterschiede in der Gestaltung der Vorhersagemodelle. Während es bei der HIL lediglich bezüglich der Präferenz von relationalen Quellen zu einer Interaktion der Prädiktoren kam und ansonsten nur lineare Effekte eines einzelnen Prädiktors identifiziert wurden, ließ sich bei den kognitiven Fähigkeiten bei der Vorhersage der Präferenz von Relationalität gar kein Effekt finden. Weiter zeigte sich ein quadratischer Effekt bei der Präferenz

von Zugänglichkeit und eine Interaktion der Prädiktoren bei der Vorhersage der Präferenz von Expertise. Somit kann bezüglich der ersten Forschungsfrage geschlossen werden, dass kognitive Fähigkeiten im Vergleich zur HIL potenziell abgrenzbare Vorhersagebeiträge auf die Präferenz der Quelleneigenschaften liefern.

Zur Untersuchung der zweiten Forschungsfrage bedarf es einer differenzierteren Betrachtung der einzelnen Ergebnisse der Response Surface Analysen. Bei der Vorhersage der Expertise und Zugänglichkeit durch HIL war dabei nur jeweils einer der beiden Prädiktoren relevant (siehe Tabelle 1). Es zeigte sich, dass, je niedriger die selbsteingeschätzte HIL war, desto eher zugängliche Quellen bevorzugt wurden (linearer Effekt).



**Abbildung 1.** Response Surface Plot von selbsteingeschätzter HIL und HIL-Leistungsmaß auf Präferenz von Zugänglichkeit. Variablen sind auf den Mittelwert zentriert. Die ‚line of congruence‘ ist die blaue Linie mit dem Ursprung bei  $X = -4$  und  $Y = -4$  und entspricht Fällen für die gesamte Skala, in denen  $X$  und  $Y$  perfekt übereinstimmen. Die ‚line of incongruence‘ ist die blaue Linie, die die  $Z$ -Achse bei  $X = 4$  schneidet. Sie repräsentiert Fälle, bei denen Werte von  $X$  eine negative Entsprechung von  $Y$  darstellen. Die projizierte Punktwolke auf dem Boden des Koordinatensystems stellt die beobachteten Fälle dar. Diese sind auf der Ebene durch den ‚bagplot‘ ebenfalls noch einmal skizziert, wobei der innere Kreis 50% der Fälle beinhaltet. Eine farbige Version der Abbildung ist in der Online-Version dieses Artikels verfügbar.

Des Weiteren zeigte sich ein positiver linearer Effekt von objektiv gemessener HIL auf die Präferenz von Quellen (siehe Tabelle 1), die einen hohen Grad an Expertise auf-

<sup>2</sup> Eine ausführliche Beschreibung und Begründung der Analyseverfahren findet sich im Open Data 2 (OD 2) des Artikels in PsychArchives: <http://dx.doi.org/10.23668/psycharchives.2683>

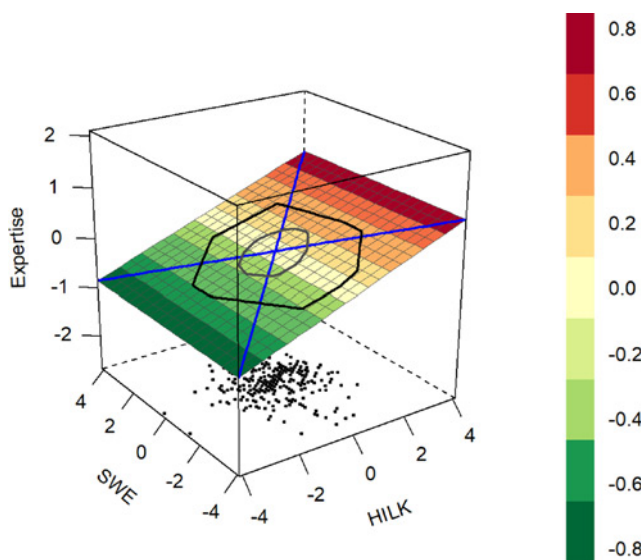
<sup>3</sup> Eine ausführliche Dokumentation der durchgeführten Analysen und Ergebnisse inkl. R-Code und Abbildungen findet sich im Open Data 1 (OD 1) des Artikels in PsychArchives: <http://dx.doi.org/10.23668/psycharchives.2683>

**Tabelle 1.** Modellvergleich der sechs RSA, sortiert innerhalb nach  $\Delta AICc^*$ 

UV	AV	Modell	k	AICc	$\Delta AICc$	Model weight	Evidence ratio	CFI	R <sup>2</sup> <sub>adj</sub>	p <sub>model</sub>
HIL	Zugänglichkeit	only	3	811.01	0.00	.33		1.00	.016	.018
		only2	4	812.22	1.22	.18	1.84	1.00	.015	.04
	Expertise	onlyx	3	804.23	0.00	.41		1.00	.039	.000
		additive	4	805.59	1.36	.21	1.97	1.00	.037	.001
	Interaktion	SRRR	6	806.37	0.00	.23		0.95	.042	.002
		full	7	806.79	0.42	.18	1.24	1.00	.044	.003
KF	Zugänglichkeit	onlyx2	4	805.33	0.00	.53		1.00	.039	.001
		onlyx	3	807.95	2.62	.14	3.71	0.74	.027	.003
	Expertise	SQD	3	808.03	0.00	.32		1.00	.026	.003
		SSQD	4	808.97	0.94	.20	1.60	1.00	.026	.008
	Interaktion	null	2	814.63	0.00	.26		1.00	0	
		onlyx	3	815.73	1.10	.15	1.73	1.00	0	.34

Anmerkungen: UV = Unabhängige Variablenkonstellation; AV = Abhängige Variable; k = Anzahl der Parameter; AICc = corrected Akaike Information Criterion; Evidence ratio = Verhältnis der Modellgewichte des besten Modells im Vergleich zu den anderen Modellen; CFI = Comparative fit index; R<sup>2</sup><sub>adj</sub> = adjustierte erklärte Varianz des Modells; p<sub>model</sub> = p-Wert für die erklärte Varianz des Modells; HIL = Health Information Literacy; KF = Kognitive Fähigkeiten. *Modellabkürzungen*: only = Modell mit einem linearen Haupteffekt; only\_2 = Modell mit einem quadratischem Haupteffekt; additive = Modell mit zwei linearen Haupteffekten; SRRR = Shifted and rotated rising ridge Modell; full = Vollständig polynomiales Modell; SQD = Squared difference Modell; SSQD = Shifted squared difference Modell; null = Intercept-only Modell.

\* Eine ausführliche Dokumentation der durchgeführten Analysen und Ergebnisse inkl. R-Code und Abbildungen findet sich im Open Data 1 (OD 1) des Artikels in PsychArchives: <http://dx.doi.org/10.23668/psycharchives.2683>



**Abbildung 2.** Response Surface Plot von selbsteingeschätzter HIL und HIL-Leistungsmaß auf Präferenz von Expertise. Eine farbige Version der Abbildung ist in der Online-Version dieses Artikels verfügbar.

weisen, d.h., je höher die Ausprägung im HIL-Leistungstest, desto stärker wurden derartige Quellen bevorzugt.

Im Hinblick auf die kognitiven Fähigkeiten zeigte sich ein quadratischer Effekt (siehe Tabelle 1): Die niedrigste Präferenz für zugängliche Quellen ergab sich bei Personen mit (relativ zur Stichprobe) durchschnittlicher objektiv gemessener kognitiver Fähigkeit, während Personen

mit niedriger sowie Personen mit hoher kognitiver Fähigkeit stärker zugängliche Quellen bevorzugten.

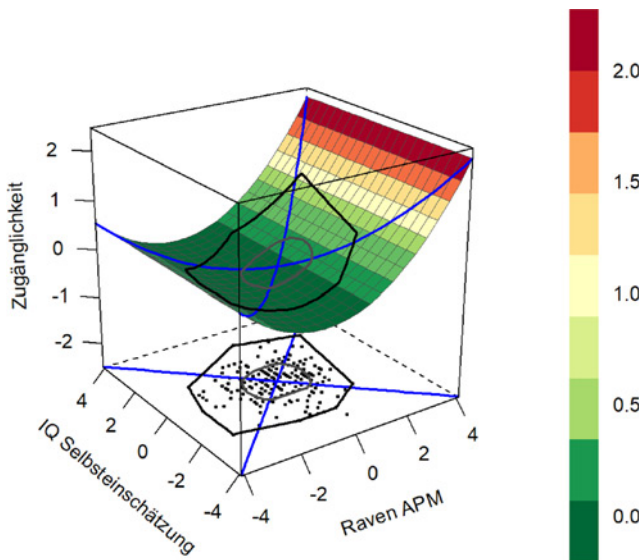
Zur Untersuchung der Auswirkungen einer Über- oder Unterschätzung der eigenen HIL sowie der kognitiven Fähigkeiten (Fragestellung 3) wurden die Interaktionsmodelle der Response Surface Analysen betrachtet (siehe Tabelle 1, SRRR-Modell der UV HIL und SQD-Modell der UV kognitive Fähigkeiten). Dabei zeigte sich, dass eine Unterschätzung der eigenen HIL zu einer Präferenz von Quellen, die eine Interaktion mit anderen Personen ermöglichen, führt.

Zudem zeigte sich, dass sowohl eine Über- als auch eine Unterschätzung der eigenen kognitiven Fähigkeiten zur Bevorzugung von Quellen führen, die einen niedrigen Grad an Expertise aufweisen (d.h. eher von Laien vermittelte Information). Im Gegenzug führte eine adäquate Fähigkeitseinschätzung zur Präferenz von Quellen mit einem hohen Grad an Expertise.

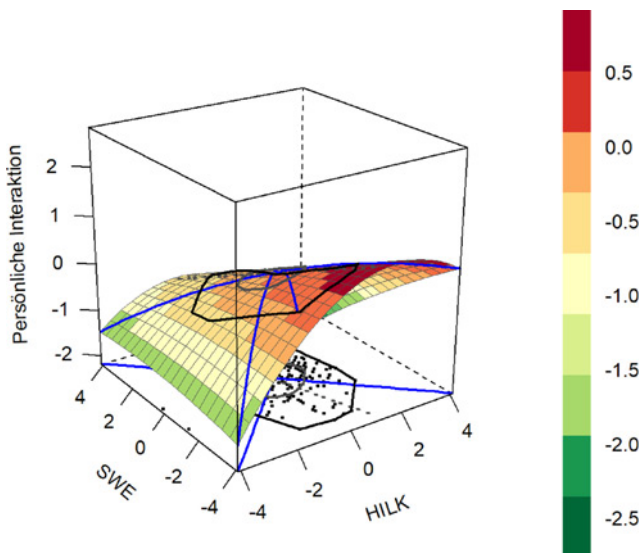
## Diskussion

In der vorliegenden Studie wurden explorativ drei Fragestellungen mit Bezug auf die Bedeutung selbsteingeschätzter sowie objektiv gemessener relevanter Fähigkeiten für die Präferenz von Gesundheitsinformationen untersucht. Im Hinblick auf die erste Fragestellung zeigte sich, dass HIL und kognitive Fähigkeiten unabhängig von





**Abbildung 3.** Response Surface Plot von selbsteingeschätzten kognitiven Fähigkeiten und kognitiven Fähigkeiten im Leistungstest auf Präferenz von Zugänglichkeit. Eine farbige Version der Abbildung ist in der Online-Version dieses Artikels verfügbar.

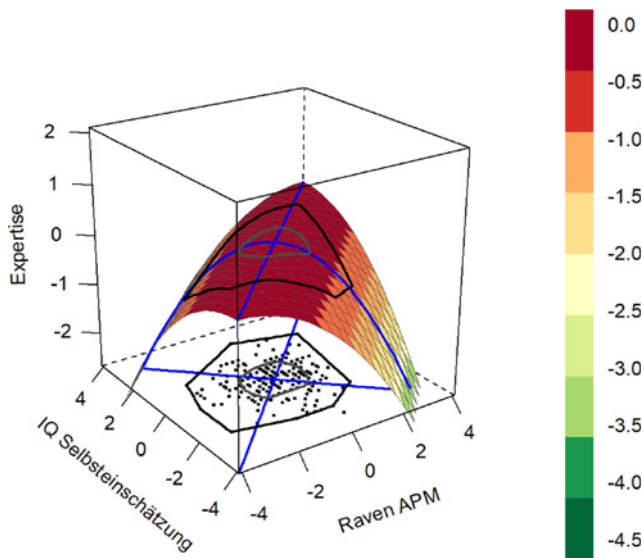


**Abbildung 4.** Response Surface Plot von selbsteingeschätzter HIL und HIL-Leistungsmaß auf Präferenz vom Ausmaß der persönlichen Interaktion. Eine farbige Version der Abbildung ist in der Online-Version dieses Artikels verfügbar.

der Art der Messung einen unterscheidbaren Vorhersagebeitrag hinsichtlich der Präferenz des Grades der Expertise, der Möglichkeit einer persönlichen Interaktion und der Zugänglichkeit von Gesundheitsinformationsquellen leisten. In der aktuellen Diskussion um die (Non-)Redundanz von (Gesundheits-)Informationskompetenz und kognitiven Fähigkeiten (siehe z. B. Reeve & Basalik, 2014) weisen die Ergebnisse darauf hin, dass in der simultanen Berücksichtigung beider Fähigkeiten im Vergleich zu ent-

weder HIL oder kognitiven Fähigkeiten mit einem relevanten inkrementellen Erkenntnisgewinn zu rechnen ist. Dementsprechend haben spezifische Interventionsprogramme zur Steigerung der HIL ihre Daseinsberechtigung (siehe zwei Übersichtsarbeiten zu HL-Interventionen: Jacobs, Lou, Ownby, & Caballero, 2016; Sheridan, Halpern, Viera, Berkman, Donahue, & Crotty, 2011). Die Fokussierung auf kontextspezifische Fähigkeiten kann dabei für jegliche Ausprägungen der individuellen kognitiven Fähigkeiten erfolgen. Nichtsdestotrotz dürfen dabei jedoch unterschiedliche Erfahrungen in der Auseinandersetzung mit Gesundheitsinformationen der individuelle Bildungsgrad und die kognitiven Fähigkeiten nicht unberücksichtigt bleiben und entsprechende Interventionen müssen kontextsensibel konzipiert und appliziert werden. Die Interventionsprogramme können somit die bestehende soziale Ungleichheit im Gesundheitskompetenzniveau (siehe Schaeffer, Vogt, Berens, & Hurrelmann, 2016) verringern und damit zu einer höheren sozialen Gerechtigkeit in der Gesundheitsversorgung beitragen.

Die zweite Fragestellung bezog sich auf den jeweiligen Beitrag, den subjektive oder objektive HIL und kognitive Fähigkeit hinsichtlich der Präferenz von Eigenschaften von Gesundheitsinformationen aufweisen. Der Befund, dass höhere *objektive* HIL zu einer Präferenz von Quellen führt, die ein hohes Experteniveau aufweisen, scheint vor dem Hintergrund dessen, welche Kompetenzen HIL umfasst, naheliegend. Die Fähigkeit, Informationen zu verstehen und kritisch zu hinterfragen, mag auf lange Sicht zu der Ansicht führen, dass Gesundheitsinformationen, die von Expert\_innen angeboten werden, am vertrauenswürdigsten sind (Avery, 2010), was zur Präferenz solcher Quellen führen könnte (Hesse et al., 2005). Weiterhin zeigte sich, dass *subjektive* HIL einen negativen Effekt auf die Präferenz der Zugänglichkeit einer Quelle hat. Dies lässt sich möglicherweise darauf zurückführen, dass für Personen, die sich nicht zutrauen, geeignete Informationen zu finden oder anspruchsvolle Informationen zu verstehen, die Zugänglichkeit der Quelle wichtiger ist als für Personen, die sich dies sehr wohl zutrauen (Bernat et al., 2016). Für Letztere tritt das Kriterium der Zugänglichkeit in den Hintergrund, da sie sich eher in der Lage fühlen, geeignete Informationen jeglicher Art zu finden und auch zu verstehen. Der quadratische Effekt, dass bei objektiv niedriger sowie hoher kognitiver Fähigkeit leicht zugängliche Quellen bevorzugt werden, scheint zunächst nur für eine niedrige Ausprägung der kognitiven Fähigkeiten plausibel: Wer die Erfahrung macht, Informationen häufig nicht zu verstehen, wird, ähnlich wie im Fall subjektiv niedriger HIL, die Zugänglichkeit einer Quelle als wichtig erachten. Im Fall hoher kognitiver Fähigkeiten mag es sich so verhalten, dass solche Personen die Erfahrung gemacht haben, dass von ihnen bevorzug-



**Abbildung 5.** Response Surface Plot von selbsteingeschätzten kognitiven Fähigkeiten und kognitiven Fähigkeiten im Leistungstest auf Präferenz von Expertise. Eine farbliche Version der Abbildung ist in der Online-Version dieses Artikels verfügbar.

te Quellen auch zugänglich sind, da sie generell weniger Schwierigkeiten haben, sich mit verschiedenen Informationen auseinanderzusetzen und sie einzuordnen (Ackerman, 1996).

Im Hinblick auf die dritte Fragestellung, und damit die Bedeutung einer adäquaten Selbsteinschätzung der eigenen Fähigkeiten, ergaben die Analysen, dass eine Unterschätzung der HIL mit der Bevorzugung von Quellen einhergeht, die einen hohen Grad an persönlicher Interaktion ermöglichen. Dieser Befund könnte dadurch erklärt werden, dass gemäß der Definition von Nutbeam (2000) ein wesentlicher Bestandteil von HIL fortgeschrittene kommunikative und soziale Fähigkeiten sind, welche es einer Person erlauben, Bedeutungen aus verschiedenen Formen der Kommunikation zu extrahieren. Mangelnde Adäquatheit der Selbsteinschätzung mit gleichzeitig relativ höheren tatsächlichen Fähigkeiten führt nun dazu, dass die eigenen Fähigkeiten eher auf andere Personen attribuiert werden, obgleich die zielführende soziale Interaktion im Kontext der Suche nach Gesundheitsinformationen erst durch die HIL ermöglicht wird.

Bezüglich kognitiver Fähigkeiten zeigte sich, dass sowohl eine Über- als auch eine Unterschätzung zur Präferenz laienvermittelter Information führt, während eine adäquate Einschätzung die Präferenz von Experten begünstigt. Dieses Ergebnis stützt andere Befunde (z. B. Ackerman & Wolman, 2007), dass Personen mit realistischen Selbstbildern gegenüber Personen mit falschen Selbsteinschätzungen eher in der Lage sein sollten, Entscheidungen zu treffen, die ihren Fähigkeiten entsprechen. Wer sich etwa korrekt als weniger fähig einschätzt, mag bereitwilliger

den Rat von Expert\_innen einholen. Personen hingegen, die sich im Hinblick auf ihre kognitiven Fähigkeiten unterschätzen, trauen sich möglicherweise die Verarbeitung von Experteninformation nicht zu und sehen sich gezwungen, auf Laieninformation zurückzugreifen. Personen hingegen, die sich überschätzen, könnten der Ansicht sein, die Informationslage bereits ausreichend beurteilen zu können, wenn sie eher Laieninformation berücksichtigen, da sie diese als gleichrangig zu Experteninformation wahrnehmen und die Erfahrung machen, dass sie sie leichter verstehen. So fanden Ehrlinger, Mitchum und Dweck (2016), dass Personen, die ihre kognitiven Fähigkeiten überschätzen, zu einer Präferenz leicht verständlicher Informationen und Aufgaben neigen. Diese Neigung könnte außerdem wiederum dazu führen, dass die eigenen kognitiven Fähigkeiten überschätzt werden, da eine Konfrontation mit komplexerem Informationsmaterial gar nicht erst erfolgt.

Einen Hauptkritikpunkt der vorliegenden Studie stellt die rein explorative und somit nicht hypothesengeleitete Untersuchung unserer Fragestellungen dar. Somit bilden die Ergebnisse eine rein induktive Grundlage für zukünftige konfirmatorische Forschung zur Bedeutung individueller Fähigkeiten und deren Selbsteinschätzung beim Umgang mit Gesundheitsinformationen. Außerdem sind die weiter oben vorgenommenen Interpretationen als vorläufig zu betrachten, da kausale Schlüsse mit den vorliegenden Daten nicht möglich sind. Ein weiterer Kritikpunkt betrifft die exklusive Berücksichtigung von Präferenzen bestimmter Quelleneigenschaften, die mit Hilfe eines Fragebogens erfasst wurden. In zukünftigen Studien sollten geeignete Verhaltensmaße, die durch die Eigenschaftspräferenz vorhergesagt werden können, einbezogen werden (z. B. Suchaufgaben). Zudem schränkt die studentische Stichprobe die Generalisierbarkeit der Befunde ein – obwohl dies im Hinblick auf das induktiv geleitete Vorgehen vertretbar erscheint, sollten in zukünftigen konfirmatorischen Studien Patient\_innenstichproben und repräsentative Stichproben der Allgemeinbevölkerung zum Einsatz kommen.

Trotz der genannten Einschränkungen liefert die Studie erste Anhaltspunkte für die Relevanz (1) der simultanen Berücksichtigung von HIL und kognitiven Fähigkeiten bei der Untersuchung von Gesundheitsinformationsverhalten, sowie (2) einer adäquaten Selbsteinschätzung dieser Fähigkeiten bei der Suche nach Gesundheitsinformationen. Nach weiterer empirischer Absicherung unserer explorativ ermittelten Befunde sollte dies bei der Entwicklung und Durchführung von Maßnahmen zur Förderung einer selbstbestimmten und informierten Entscheidungsfindung im Gesundheitskontext Berücksichtigung finden.

## Literatur

- Ackerman, P. L. (1996). A theory of adult intellectual development: Process, personality, interests, and knowledge. *Intelligence*, 22, 227–257.
- Ackerman, P. L., & Wolman, S. D. (2007). Determinants and validity of self-estimates of abilities and self-concept measures. *Journal of Experimental Psychology: Applied*, 13 (2), 57–78. <https://doi.org/10.1037/1076-898x.13.2.57>
- American Library Association (1989). *Presidential Committee on Information Literacy. Final Report*. Chicago, IL: American Library Association.
- Avery, E. J. (2010). The role of source and the factors audiences rely on in evaluating credibility of health information. *Public Relations Review*, 36 (1), 81–83.
- Baker, D. W. (2006). The meaning and the measure of health literacy. *Journal of General Internal Medicine*, 21, 878–883. <https://doi.org/10.1111/j.1525-1497.2006.00540.x>
- Behm, T. (2018). SWE-IV-16 – Skala zur Erfassung der Informationsverhaltensbezogenen Selbstwirksamkeitserwartung (SWS-IV-16). *ZPID (Leibniz Institute for Psychology Information)*. <https://doi.org/10.23668/psycharchives.2334>
- Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J. & Crotty, K. (2011). Low Health Literacy and Health Outcomes: An Updated Systematic Review. *Annals of Internal Medicine*, 155 (2), 97. <https://doi.org/10.7326/0003-4819-155-2-201107190-00005>
- Bernat, J. K., Skolarus, T. A., Hawley, S. T., Haggstrom, D. A., Darwish-Yassine, M. & Wittmann, D. A. (2016). Negative information-seeking experiences of long-term prostate cancer survivors. *Journal of Cancer Survivorship*, 10, 1089–1095.
- Brand-Gruwel, S., Wopereis, I. & Vermetten, Y. (2005). Information problem solving by experts and novices: Analysis of a complex cognitive skill. *Computers in Human Behavior*, 21, 487–508.
- DeNisi, A. S. & Shaw, J. B. (1977). Investigation of the uses of self-reports of abilities. *Journal of Applied Psychology*, 62, 641–644.
- Dunning, D., Heath, C. & Suls, J. M. (2004). Flawed Self-Assessment: Implications for Health, Education, and the Workplace. *Psychological Science in the Public Interest*, 5 (3), 69–106. <https://doi.org/10.1111/j.1529-1006.2004.00018.x>
- Ehrlinger, J., Mitchum, A. L. & Dweck, C. S. (2016). Understanding overconfidence: Theories of intelligence, preferential attention, and distorted self-assessment. *Journal of Experimental Social Psychology*, 63, 94–100. <https://doi.org/10.1016/j.jesp.2015.11.001>
- Eriksson-Backa, K., Ek, S., Niemelä, R. & Huotari, M.-L. (2012). Health information literacy in everyday life: A study of Finns aged 65-79 years. *Health Informatics Journal*, 18 (2), 83–94. <https://doi.org/10.1177/1460458212445797>
- Fawns-Ritchie, C., Starr, J. M. & Deary, I. J. (2018). Role of cognitive ability in the association between functional health literacy and mortality in the Lothian Birth Cohort 1936: a prospective cohort study. *BMJ Open*, 8 (9), e022502. <https://doi.org/10.1136/bmjopen-2018-022502>
- Freund, P. A. & Kasten, N. (2012). How smart do you think you are? A meta-analysis on the validity of self-estimates of cognitive ability. *Psychological Bulletin*, 138, 296–321. <https://doi.org/10.1037/a0026556>
- Hesse, B. W., Nelson, D. E., Kreps, G. L., Croyle, R. T., Arora, N. K., Rimer, B. K. & Viswanath, K. (2005). Trust and sources of health information: the impact of the Internet and its implications for health care providers: Findings from the first Health Information National Trends Survey. *Archives of Internal Medicine*, 165, 2618–2624.
- Jacobs, R. J., Lou, J. Q., Ownby, R. L. & Caballero, J. (2016). A systematic review of eHealth interventions to improve health literacy. *Health Informatics Journal*, 22 (2), 81–98.
- Kruger, J. & Dunning, D. (1999). Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments. *Journal of Personality and Social Psychology*, 77, 1121–1134.
- Lenox, M.F. & Walker, M.L. (1993). Information literacy in the educational process. *The Educational Forum*, 57, 312–324.
- 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: Pabst Science Publishers.
- Nutbeam, D. (2000). Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century. *Health Promotion International*, 15, 259–267.
- Paulhus, D., Lysy, D. & Yik, M. (1998). Self-Report Measures on Intelligence: Are They Useful as Proxy IQ Tests. *Journal of Personality*, 66, 525–554. <https://doi.org/10.1111/1467-6494.00023>
- Raven, J. C. (1941). Standardization of progressive Matrices, 1938. *British Journal of Medical Psychology*, 19 (1), 137–150. <https://doi.org/10.1111/j.2044-8341.1941.tb00316.x>
- Reeve, C. L. & Basalik, D. (2014). Is health literacy an example of construct proliferation? A conceptual and empirical evaluation of its redundancy with general cognitive ability. *Intelligence*, 44, 93–102. <https://doi.org/10.1016/j.intell.2014.03.004>
- Schaeffer, D., Vogt, D., Berens, E.M. & Hurrelmann, K. (2016): *Gesundheitskompetenz der Bevölkerung in Deutschland. Ergebnisbericht*. Bielefeld: Universität Bielefeld.
- Schönbrodt, F. D. (2016). *Testing fit patterns with polynomial regression models*. Retrieved from: [osf.io/3889z](https://osf.io/3889z)
- Sheridan, S. L., Halpern, D. J., Viera, A. J., Berkman, N. D., Donahue, K. E. & Crotty, K. (2011). Interventions for individuals with low health literacy: A systematic review. *Journal of Health Communication*, 16 (sup3), 30–54.
- Sørensen, K., Van den Broucke, S., Fullam, J., Doyle, G., Pelikan, J., Slonska, Z. et al. (2012). Health literacy and public health: A systematic review and integration of definitions and models. *BMC Public Health*, 12 (1). <https://doi.org/10.1186/1471-2458-12-80>
- Stern, E. & Neubauer, A. (2013). *Intelligenz – Große Unterschiede und ihre Folgen*. München: DVA.
- Ubel, P. A., Scherr, K. A. & Fagerlin, A. (2017). Empowerment Failure: How Shortcomings in Physician Communication Unwittingly Undermine Patient Autonomy. *The American Journal of Bioethics*. *AJOB*, 17 (11), 31–39. <https://doi.org/10.1080/15265161.2017.1378753>
- 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*, 3. <https://doi.org/10.3389/fcomm.2018.00057>
- Zell, E. & Krizan, Z. (2014). Do people have insight into their abilities? A Metasynthesis. *Perspectives on Psychological Science*, 9 (2), 111–125. <https://doi.org/10.1177/1745691613518075>

**Open Data**

Zusatzmaterialien zu diesem Artikel werden unter PsychArchives.org <http://dx.doi.org/10.23668/psycharchives.2683> zur Verfügung gestellt:

**OD 1.** (R-Analysen und Grafiken.html): ESM 1: R-Analysen und Grafiken

**OD 2.** (ESM 1\_Wedderhoff\_et\_al.pdf): ESM 2: Ergänzende Methodenbeschreibung

**Oliver Wedderhoff**

Leibniz-Zentrum für Psychologische Information und Dokumentation (ZPID)  
Universitätsring 15  
54296 Trier  
[ow@leibniz-psychology.org](mailto:ow@leibniz-psychology.org)



Appendix C – Study III

# PLOS ONE

## When Freedom of Choice Leads to Bias: How Threat Fosters Selective Exposure to Health Information --Manuscript Draft--

<b>Manuscript Number:</b>	PONE-D-20-08446
<b>Article Type:</b>	Research Article
<b>Full Title:</b>	When Freedom of Choice Leads to Bias: How Threat Fosters Selective Exposure to Health Information
<b>Short Title:</b>	How Threat Fosters Selective Exposure to Health Information
<b>Corresponding Author:</b>	Oliver Wedderhoff Leibniz Institute for Psychology Information Trier, GERMANY
<b>Keywords:</b>	Selective Exposure; Confirmation Bias; Health Information Seeking; threat; risk perception
<b>Abstract:</b>	Selective exposure to online health information can be ascribed to two related defense motives: the motivation to confirm one's subjective perceptions, and the motivation to protect relevant parts of the self-image, such as physical integrity. Our aim was to identify how these motives come into effect in the context of a health threat (risk of developing a heart disease). In a preregistered online study with N = 763 individuals, we analyzed the impact of perceived and suggested risk on the degree of bias in selecting risk-related information on an alleged Google search result page. Applying a 2x2 design with the experimental factor 'risk feedback' and the quasi-experimental factor 'perceived risk', we formulated six hypotheses. First, we expected a main effect of perceived risk on selective exposure to information suggesting no risk and second, we hypothesized a main effect of perceived risk on mean quality rating of information suggesting a risk. Third, we proposed a main effect of risk feedback on selective exposure to information which suggests no risk and fourth, we proposed a main effect of risk feedback on mean quality rating of information suggesting a risk. Fifth, we expected an interaction effect between perceived and suggested risk on selective exposure and sixth, we proposed an interaction effect between perceived and suggested risk in different forms for each of the four conditions on quality ratings. Only the third hypothesis was confirmed: Receiving information which suggested a health risk increased the tendency to select information denying the risk. Additional exploratory analyses revealed a moderator effect of health information literacy on the relationship between risk feedback and selective exposure. In sum, our results underline the crucial role of defense motives in the context of a suggested health threat.
<b>Order of Authors:</b>	Oliver Wedderhoff Anita Chasiotis Tom Rosman
<b>Opposed Reviewers:</b>	
<b>Additional Information:</b>	
<b>Question</b>	<b>Response</b>
<b>Financial Disclosure</b>  Enter a financial disclosure statement that describes the sources of funding for the work included in this submission. Review the <a href="#">submission guidelines</a> for detailed requirements. View published research articles from <a href="#">PLOS ONE</a> for specific	The authors received no specific funding for this work.

examples.

This statement is required for submission and **will appear in the published article** if the submission is accepted. Please make sure it is accurate.

#### Unfunded studies

Enter: *The author(s) received no specific funding for this work.*

#### Funded studies

Enter a statement with the following details:

- Initials of the authors who received each award
- Grant numbers awarded to each author
- The full name of each funder
- URL of each funder website
- Did the sponsors or funders play any role in the study design, data collection and analysis, decision to publish, or preparation of the manuscript?
- **NO** - Include this sentence at the end of your statement: *The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.*
- **YES** - Specify the role(s) played.

\* typeset

#### Competing Interests

Use the instructions below to enter a competing interest statement for this submission. On behalf of all authors, disclose any [competing interests](#) that could be perceived to bias this work—acknowledging all financial support and any other relevant financial or non-financial competing interests.

This statement **will appear in the published article** if the submission is accepted. Please make sure it is accurate. View published research articles from [PLOS ONE](#) for specific examples.

The authors have declared that no competing interests exist.

**NO authors have competing interests**

Enter: *The authors have declared that no competing interests exist.*

**Authors with competing interests**

Enter competing interest details beginning with this statement:

*I have read the journal's policy and the authors of this manuscript have the following competing interests: [insert competing interests here]*

\* typeset

**Ethics Statement**

Enter an ethics statement for this submission. This statement is required if the study involved:

- Human participants
- Human specimens or tissue
- Vertebrate animals or cephalopods
- Vertebrate embryos or tissues
- Field research

Write "N/A" if the submission does not require an ethics statement.

General guidance is provided below. Consult the [submission guidelines](#) for detailed instructions. **Make sure that all information entered here is included in the Methods section of the manuscript.**

This study was approved by the Ethics Committee of the German Psychological Society (DGPs) under the approval number: TR 022019. Written consent was obtained and the data were analyzed anonymously.

## Format for specific study types

### Human Subject Research (involving human participants and/or tissue)

- Give the name of the institutional review board or ethics committee that approved the study
- Include the approval number and/or a statement indicating approval of this research
- Indicate the form of consent obtained (written/oral) or the reason that consent was not obtained (e.g. the data were analyzed anonymously)

### Animal Research (involving vertebrate animals, embryos or tissues)

- Provide the name of the Institutional Animal Care and Use Committee (IACUC) or other relevant ethics board that reviewed the study protocol, and indicate whether they approved this research or granted a formal waiver of ethical approval
- Include an approval number if one was obtained
- If the study involved *non-human primates*, add *additional details* about animal welfare and steps taken to ameliorate suffering
- If anesthesia, euthanasia, or any kind of animal sacrifice is part of the study, include briefly which substances and/or methods were applied

### Field Research

Include the following details if this study involves the collection of plant, animal, or other materials from a natural setting:

- Field permit number
- Name of the institution or relevant body that granted permission

### Data Availability

Authors are required to make all data underlying the findings described fully available, without restriction, and from the time of publication. PLOS allows rare exceptions to address legal and ethical concerns. See the [PLOS Data Policy](#) and [FAQ](#) for detailed information.

Yes - all data are fully available without restriction

A Data Availability Statement describing where the data can be found is required at submission. Your answers to this question constitute the Data Availability Statement and **will be published in the article**, if accepted.

**Important:** Stating 'data available on request from the author' is not sufficient. If your data are only available upon request, select 'No' for the first question and explain your exceptional situation in the text box.

Do the authors confirm that all data underlying the findings described in their manuscript are fully available without restriction?

**Describe where the data may be found in full sentences. If you are copying our sample text, replace any instances of XXX with the appropriate details.**

- If the data are **held or will be held in a public repository**, include URLs, accession numbers or DOIs. If this information will only be available after acceptance, indicate this by ticking the box below. For example: *All XXX files are available from the XXX database (accession number(s) XXX, XXX).*
- If the data are all contained **within the manuscript and/or Supporting Information files**, enter the following: *All relevant data are within the manuscript and its Supporting Information files.*
- If neither of these applies but you are able to provide **details of access elsewhere**, with or without limitations, please do so. For example:

*Data cannot be shared publicly because of [XXX]. Data are available from the XXX Institutional Data Access / Ethics Committee (contact via XXX) for researchers who meet the criteria for access to confidential data.*

*The data underlying the results presented in the study are available from (include the name of the third party*

All data files are available from the PsychArchives repository database (<https://www.psycharchives.org/>) (DOI: <http://dx.doi.org/10.23668/psycharchives.2435>).

<p><i>and contact information or URL).</i></p> <ul style="list-style-type: none"><li>• This text is appropriate if the data are owned by a third party and authors do not have permission to share the data.</li></ul> <p>* typeset</p>	
Additional data availability information:	

---

**Fwd: PLOS ONE: Notification of co-authorship on manuscript - [EMID:3b27718248c98ad7]**

---

Anita Chasiotis <ac@leibniz-psychology.org>  
An: Oliver Wedderhoff <ow@leibniz-psychology.org>

26. April 2021 um 14:18

----- Weitergeleitete Nachricht -----

**Betreff:**PLOS ONE: Notification of co-authorship on manuscript - [EMID:3b27718248c98ad7]**Datum:**24 Mar 2020 11:44:53 -0400**Von:**PLOS ONE <em@editorialmanager.com>**Antwort an:**PLOS ONE <plosone@plos.org>**An:**Anita Chasiotis <ac@leibniz-psychology.org>

PONE-D-20-08446

When Freedom of Choice Leads to Bias: How Threat Fosters Selective Exposure to Health Information  
Mr. Oliver Wedderhoff

Dear Mrs. Anita Chasiotis,

You are receiving this email because you have been listed as an author on a manuscript recently submitted to PLOS ONE, which is entitled "When Freedom of Choice Leads to Bias: How Threat Fosters Selective Exposure to Health Information".

The corresponding author for the submission process is: Mr. Oliver Wedderhoff

The full author list for the submission is: Oliver Wedderhoff; Anita Chasiotis; Tom Rosman

You are not required to confirm your co-authorship of this submission, but if you would like to add an ORCID iD please click the link below to confirm co-authorship and link your ORCID iD.

[Yes, I am affiliated.](#)

Please note that if you would like to link your ORCID iD to the submission, you will need to log in to your Editorial Manager account to do so. If you do not have an Editorial Manager account, you can register here: <http://www.editorialmanager.com/pone/Default.aspx>.

If you are not aware of this submission, or if you should not be listed as a co-author, then please contact the journal office at [plosone@plos.org](mailto:plosone@plos.org). For more information on PLOS ONE's authorship requirements, please visit: <http://journals.plos.org/plosone/s/authorship>.

Kind regards,

PLOS ONE

<https://www.editorialmanager.com/pone>

---

*In compliance with data protection regulations, you may request that we remove your personal registration details at any time. ([Remove my information/details](#)). Please contact the publication office if you have any questions.*





## 10 Abstract

11 Selective exposure to online health information can be ascribed to two related defense motives:  
12 the motivation to confirm one's subjective perceptions, and the motivation to protect relevant  
13 parts of the self-image, such as physical integrity. Our aim was to identify how these motives  
14 come into effect in the context of a health threat (risk of developing a heart disease). In a  
15 preregistered online study with  $N = 763$  individuals, we analyzed the impact of perceived and  
16 suggested risk on the degree of bias in selecting risk-related information on an alleged Google  
17 search result page. Applying a 2x2 design with the experimental factor 'risk feedback' and the  
18 quasi-experimental factor 'perceived risk', we formulated six hypotheses. First, we expected a  
19 main effect of perceived risk on selective exposure to information suggesting no risk and second,  
20 we hypothesized a main effect of perceived risk on mean quality rating of information suggesting  
21 a risk. Third, we proposed a main effect of risk feedback on selective exposure to information  
22 which suggests no risk and fourth, we proposed a main effect of risk feedback on mean quality  
23 rating of information suggesting a risk. Fifth, we expected an interaction effect between  
24 perceived and suggested risk on selective exposure and sixth, we proposed an interaction effect  
25 between perceived and suggested risk in different forms for each of the four conditions on  
26 quality ratings. Only the third hypothesis was confirmed: Receiving information which suggested  
27 a health risk increased the tendency to select information denying the risk. Additional  
28 exploratory analyses revealed a moderator effect of health information literacy on the  
29 relationship between risk feedback and selective exposure. In sum, our results underline the  
30 crucial role of defense motives in the context of a suggested health threat.

## 31 **Introduction**

32 Health information plays a major role in everyday life. It not only predetermines, for  
33 example, how you shape your nutrition, how and how often you brush your teeth, and the  
34 amount of sleep you try to get. It also helps you to recognize potential alarm symptoms, and it  
35 may shape your opinion on political agendas (e.g., on vaccination programs or on coronavirus  
36 quarantining) and the interaction with and the view on other people. Nowadays, vast amounts of  
37 health information are freely accessible through all kinds of information sources, especially the  
38 internet with its increasing use [1]. Health information is often multifaceted and can be very  
39 contradictory, too. Therefore, the question of how and why specific information is considered by  
40 the seeker while other information is denied, is of utter importance to improve the access to  
41 helpful, objective, and scientifically proven information material.

42 Many explicit and implicit intentions play a role due to the self-responsibility of an  
43 independent information search and the peculiarities of the health domain, which, for example,  
44 can threaten psychological well-being as well as physical integrity. So called defense motives are  
45 triggered in response to threatening information and foster to favor and specifically search for  
46 information corresponding to one's self-image [2–4]. Sometimes, defense motives can also  
47 engender a devaluation of non-conforming or threatening information [5,6]. These defensive  
48 mechanisms, which emerge as behavioral consequences from defense motives, oppose  
49 aspirations of a holistic, accurate and complete search [7,8]. Correspondingly, bias within the  
50 information selection, consideration and evaluation process are increasingly observed [9–11]. As  
51 threat plays a huge role in triggering defense motives, the present paper investigates the  
52 relationship between different intensities of an induced health threat and the selection of health  
53 information. In order to induce threat, fictitious connections between a personality disposition

54 and a health issue were suggested. In the literature, the phenomenon of a biased selection of  
55 information (primarily with a preference for non-threatening information that serves one's self-  
56 image) is often referred to by different terminologies, such as 'confirmation bias' [12] or  
57 'motivated reasoning' [2]. However, we will use the term 'selective exposure' [13] for every bias  
58 related to the selection and consideration of information, as we think it suits best as a generic  
59 term for these phenomena.

### 60 **Defense Motives and Selective Exposure**

61 Health information can be threatening in various ways. For example, it may implicate  
62 that a health condition is present, or it may suggest a necessity of changing beloved everyday  
63 routines to maintain sufficient health. Different defense motives may be triggered by different  
64 kinds of threats. In this context, Knobloch-Westerwick, Johnson and Westerwick [14] distinguish  
65 two motivational processes that are relevant for our research purposes. These encompass not  
66 only defense motives, but also the consequential motivated behavior: self-bolstering and self-  
67 defending. Self-bolstering encompasses the motivation to maintain the current status quo and  
68 thus to be reassured that there is no significant threat to one's health and physical integrity. For  
69 example, wine lovers often quote that the daily glass of wine is good for the cardiovascular  
70 system. Self-defending motivation promotes discrediting, ignoring and avoiding information  
71 which (potentially) implies a threat to one's health and physical wellbeing. For example, fear-  
72 appealing information which suggests an increased risk of developing cancer tends to be avoided  
73 by smokers – a classic example of selective exposure triggered by self-defending motivation.  
74 While the defense motives described by Knobloch-Westerwick et al. [14] are specific for the  
75 health context, more general motives for selective exposure may be considered, too. For  
76 example, one may selectively search for and select information to confirm one's opinion or

77 expectation about a specific topic [7], or one may try to confirm one's specific self-image as a  
78 way of self-affirmation [15]. In line with this is the motivation to devalue and downplay  
79 information that disconfirms opposing attitudes and opinions. These different motives may be  
80 responsible for biased approaches to (health) information seeking fulfilling a specific goal that is  
81 not related to finding out about facts and approaching the 'truth', but to protect an intact self-  
82 image and to fend off any threats to self-integrity [7]. One crucial similarity can be identified in  
83 these different motives: They strive to protect parts of the self, may it be the self-image,  
84 attitudes, and opinions (general motives), or the physical integrity (health-specific motives), as a  
85 consequence of a potential (health) threat and as a precondition for biased information seeking  
86 and/or appraisal [15,16]. Thus, in health information seeking, defense motives aiming at  
87 protecting the self-image, especially with regard to subjective opinions and physical integrity,  
88 come into effect as a result of a potential health threat.

89 Threat, however, is highly subjective and dependent on one's perceived risk. For  
90 example, leaflets suggesting an increased risk for lung cancer in smokers do not imply a threat  
91 for non-smokers. Therefore, non-smokers would not have any motivation to discredit or ignore  
92 the leaflets, while smokers, on the other hand, may well try to actively disregard the leaflets.  
93 Thus, a threat can be regarded as a necessary precondition for selective exposure to information  
94 in health contexts. Therefore, perceived risk for a certain disease should be taken into  
95 consideration as a principal basis to appraise health information as threatening or not. In this line  
96 of reasoning, the higher the perceived risk, the higher should be the perceived threat and thus, a  
97 greater bias in information seeking should occur, as various defense motives come into effect.

98 Taking "risk" into account as a precursor for selective exposure however requires a  
99 differentiated look at the concept of risk. While perceived risk represents a potential precondition

100 to perceiving a threat, suggested risk (i.e., by an information leaflet) must also be taken into  
101 account. A suggested risk implies that a certain individual characteristic like, for example, the  
102 Body Mass Index (BMI), is suggested to be associated with an increased risk of suffering from a  
103 health impairment (e.g., in an information leaflet on high BMI as a risk factor for cardiovascular  
104 disease). Depending on your individual BMI, this message might thus involve a threat (if your  
105 BMI is high) or not (if your BMI is low). Moreover, you may have perceived a high risk for  
106 cardiovascular diseases in the first place or not. Hence, with suggested as well as perceived risk  
107 taken into account, several scenarios which may or may not trigger defense motives (and  
108 selective exposure) are conceivable. In fact, combining perceived and suggested risk (or risk  
109 feedback) leads to four possible combinations in individuals who are confronted with health  
110 information: *perceived risk* (low or high) crossed with *risk feedback* (suggested risk or no  
111 suggested risk).

112 Hence, the present study aims to investigate the effects of defense motives on selective  
113 exposure to health information when a threat is induced via risk feedback – depending on an  
114 individual's perceived risk. Based on our theoretical considerations from above, we distinguish  
115 between the following two types of defense motives that may be triggered by threatening  
116 information (e.g., risk feedback): Type 1, the general motive to defend one's opinion and  
117 attitudes by approaching confirming information and avoiding disconfirming information (which  
118 we denote as 'self-confirming motivation'; see 7); and type 2, the more (health-)specific motive  
119 to defend one's self-image with regard to health and physical integrity, as referred to by  
120 Knobloch-Westerwick et al. [14] by the term 'self-bolstering' and 'self-defending' motivation.  
121 Although generally acknowledged as two central precursors of a biased search for information,

122 both types of defense motives have – to our knowledge – never been considered in one study  
123 simultaneously, let alone in the context of health information seeking

#### 124 **The present study**

125 Our study, including research design, study hypotheses and statistical analyses, was pre-  
126 registered in an user-friendly online disciplinary public open access free of charge digital  
127 research objects repository for psychology with 21 different publication types (preprints,  
128 primary, and secondary publications), research data, tests, preregistrations, multimedia and code  
129 before data collection [17]. We applied a 2x2 design with one experimental factor ‘risk  
130 feedback’ (suggested risk vs. no suggested risk, yes vs. no in short) and one quasi-experimental  
131 factor ‘self-assessed risk’ (high vs. low). With this, we tested the notion that feedback of a higher  
132 health risk (threat to self in the form of health/physical integrity; [14]) and feedback mismatching  
133 the self-assessed health risk (threat to self in the form of opinion or attitude) [7] lead to selective  
134 exposure to health information. Crossing the two factors results in four different groups, each of  
135 which implies different conditions for showing selective exposure. The first group (*No* risk  
136 feedback and *Low* risk perception = NL; see Figure 1) is characterized by the absence of an  
137 experimentally suggested risk and consists of participants who perceive themselves at low risk.  
138 Thus, in this group, there is an accordance between self-assessment and risk feedback, which is  
139 why the defense motive type 1 may not be triggered. Type 2 should not play a role either, as no  
140 risk feedback is given here. No risk feedback is also given to another group (NH), which is,  
141 however, characterized by the fact that risk self-assessment (high risk) does not correspond to the  
142 given feedback (no risk). In this case, a type 1 defense motive would be conceivable, since  
143 potentially long established beliefs about the self are challenged and the participants want to  
144 protect their own beliefs. Conversely, this also results in two groups receiving risk feedback. In

145 one of these two groups (risk feedback: *Yes*, self-assessed risk: *High*; YH), the reported risk  
146 corresponds to one's own perception, which is why type 1 has no relevance here. However, for  
147 the protection of one's own physical integrity, as a reaction to the risk feedback, type 2 may be  
148 relevant. While type 2 maintains relevant in the last group (YL), type 1 also becomes relevant.  
149 This group is characterized by risk feedback, while one's own perception assumes a rather low  
150 risk. Therefore, a conflict between risk self-assessment and risk feedback arises, which is the  
151 precondition for type 1. For an overview of the four resulting groups see Figure 1.

152 **Fig 1. Groups.** The four resulting groups crossing risk perception and risk feedback (NL  
153 = No risk feedback and low risk perception; NH = No risk feedback and high risk perception;  
154 YH = Risk feedback and high risk perception; YL = Risk feedback and low risk perception)

155 The dependent variables are the amount of one-sided information chosen in an  
156 information selection task and the quality ratings of every piece of information at disposal. Based  
157 on this, six hypotheses were formulated, one for each main effect of the two factors on each of  
158 the two dependent measures for selective exposure, and respectively, one for the interaction  
159 between the two factors. To ensure that a health threat is experienced by the participants, a  
160 scenario that is realistic, relevant and understandable is essential. We decided to suggest an  
161 increased risk for the development of a heart disease due to a specific degree of achievement  
162 motivation to half of the participants. This ensures a certain level of comprehensibility: the  
163 background is understandable and credible, while, at the same time, purely fictitious (without the  
164 participants being aware of it). Moreover, from an ethical standpoint, an experimental  
165 manipulation based on the suggestion of a risk is not as problematic as a more direct induction of  
166 a health threat (e.g., by means of a fake medical exam suggesting that participants indeed *have* a  
167 health condition). The suggested risk functions as a threat in two ways, which can trigger the two



168 defensive motives: First, it may be a threat to physical integrity (related to the suggested risk  
169 induced by the experimental condition). Second, it may be a threat to the self-image as it  
170 contradicts one's opinion about the individual risk (i.e., perceived risk) – at least in certain  
171 experimental groups. This leads to the following hypotheses regarding main effects:

172 H1. We expect a main effect of the perceived heart disease risk on selective exposure  
173 to information which suggests no risk.

174 H2. We expect a main effect of the perceived heart disease risk on mean quality rating  
175 of information which suggests a risk.

176 H3. We expect a main effect of the risk feedback on selective exposure to information  
177 which suggests no risk.

178 H4. We expect a main effect of the risk feedback on mean quality rating of  
179 information which suggests a risk.

180 Concerning the four groups resulting from the combination of the two factors, we expect  
181 different outcomes in the amount of selective exposure, as different motives may be addressed  
182 varying across conditions. While the condition of a low perceived risk and high-risk feedback,  
183 for example, may trigger both defense motives (type 1 and type 2), the condition of high  
184 perceived risk and high-risk feedback should only trigger the defense motive of bodily integrity  
185 (type 2). Therefore, the following hypotheses for an interaction effect are also assumed.

186 H5. We expect an interaction effect between the perceived and the suggested risk of  
187 heart diseases in different forms for each of the four conditions on selective exposure.

188 H6. We expect an interaction effect between the perceived and the suggested risk of  
189 heart diseases in different forms for each of the four conditions on quality ratings.

190

## Materials and Methods

### 191 Sample

192 To determine the sample size, we conducted a power analysis in GPower 3.1 [18]. With  
193 power set to .80 and alpha to .05, a sample size of  $N = 800$  is required to detect a small effect  
194 size ( $f = .10$ ) in our experimental design. Overall, 847 German-speaking citizens of the Federal  
195 Republic of Germany, aged between 30 and 65 and with no medical history of heart diseases,  
196 participated in the study. Eighty-four participants failed to complete the study or showed  
197 conspicuous response patterns (e.g., they needed less than half the median of the processing time,  
198 used the same response implausibly frequently, or stated that they “just clicked their way  
199 through” and did not read the instructions in open ended questions, etc.) and were removed from  
200 the analysis, which resulted in a final sample of  $N = 763$  (52.2 % females;  $M_{age} = 51.17$ ,  $SD_{age} =$   
201 10.42). The distribution of educational attainment levels was representative for the population of  
202 Germany. The sample was recruited through a panel, administered by a professional agency, and  
203 data collection was performed solely online.

### 204 Procedure and materials

205 Ethical clearance for the study was obtained through the Ethics Committee of the German  
206 Psychological Society (DGPs). After an informed consent form and a check on whether the  
207 conditions for the sampling restrictions were fulfilled, participants were told that current research  
208 is investigating how the relationship between achievement motivation and heart disease can be  
209 explained. This was followed by an explanation that the study ties in and investigates how  
210 achievement motivation is distributed among the population and how people assess their risk of  
211 heart disease. After this introduction, potential moderators were measured. Health information  
212 literacy (HIL) was assessed by a slightly adapted version of the Health Information Literacy

213 Knowledge Test (HILK; [19]), and self-efficacy was measured by the Self-Efficacy Scale for  
214 Information Searching Behavior [20] using an instruction adapted to the search for health  
215 information. Additionally, for potential exploratory analyses, behavioral inhibition and  
216 behavioral approach system sensitivity [21] were assessed by a short-form of the ARES (Action  
217 Regulating Emotion Systems [22]) scales. Furthermore, a self-report instrument for the  
218 assessment of emotion-specific regulation skills (SEK-ES; [23]) was administered. To control  
219 whether the threat induction worked, the Positive and Negative Affect Schedule (PANAS; [24])  
220 were applied before and after the induction, which would allow to detect potential affective  
221 changes. Next, the independent factor ‘perceived risk’ was measured by a self-developed single  
222 item (“*My risk of developing a heart disease in the next 5 years...*”) with six response levels  
223 (1=“... *is much lower compared to other people my age.*” to 6=“... *is much higher compared to*  
224 *other people my age.*”). Dispositional achievement motivation was assessed by the subscale  
225 ‘achievement motivation’ of a German language instrument measuring occupation-related  
226 personality variables, the ‘Bochumer Inventar zur berufsbezogenen Persönlichkeitsbeschreibung’  
227 [25]. After completing the questionnaire, a 50-second loading screen was presented along with  
228 the explanation that the inputs are processed, analyzed and compared with a norm sample. This  
229 was to ensure a higher fidelity of the upcoming threat intervention. The participants were then  
230 automatically randomly assigned to one of two conditions of the experimental factor ‘risk  
231 feedback’, which should induce a threat or no threat. Every participant’s real score and result of  
232 the BIP were displayed as well as the notion if it was higher or lower than the average. This  
233 statement was combined with a text indicating a higher risk or indicating no risk for developing a  
234 heart disease (depending on the experimental condition), which also included a reference to a  
235 fictitious research report that makes this assumption. Besides the PANAS, three self-constructed

236 items were presented an additional manipulation check, which assessed subjective feelings of  
237 threat and the corresponding information need (e.g.: “*I find the information disturbing.*” and “*I*  
238 *need more information on the subject.*”) with five response levels each (1= “*Strongly disagree*”  
239 to 5= “*Strongly agree*”). Finally, participants completed a selection task to assess the dependent  
240 variable selective exposure. The task is a variation of the task used by Adams, Hart, Richardson,  
241 Tortoriello and Rentschler [26], and was framed as an opportunity to obtain additional  
242 information about the relationship between heart disease and achievement motivation. They were  
243 presented with a (fictitious) Google results page including 16 search results drawing on a  
244 combination of the words ‘achievement motivation’ and ‘heart disease’, from which they were  
245 asked to select eight results for further research. At the same time, they were asked to rate each  
246 search result concerning the quality of the information it provides (values from 1 to 6, with 6  
247 corresponding to the highest quality). The search results included a title and short text snippets  
248 and were as realistic as possible in length and wording as well as in visual appearance, thus  
249 reminding of an actual Google page. The results differed in that they suggested either an  
250 increased or a reduced risk for the respective participant’s development of a heart disease, and,  
251 furthermore, whether they were serious (e.g., scientific articles, universities, public submissions)  
252 or dubious (e.g., yellow press, individual reports) sources. They represented the best selection  
253 from a twice as large pool of snippets, which were checked for credibility and comprehensibility  
254 in a preliminary pilot study ( $N = 56$ ). After completion of the task, participants were asked to rate  
255 the perceived authenticity of the snippets and were presented with the last page containing a  
256 comprehensive debriefing.

257

**Results****258 Preliminary Analyses**

259 To test whether the manipulation of induced risk through the feedback of potential risk  
260 for a heart disease worked, the mean score of the variables for the subjective feeling of threat  
261 was investigated. The score ranged between 1 (“no threat”) and 5 (“high threat”). The two  
262 groups ‘no risk feedback’ and ‘risk feedback’ differed significantly in their perception of threat ( $t$   
263 = -11.53,  $df = 735$ ,  $p < .001$ ). The average score for the ‘no risk feedback’ group was  $M = 1.55$   
264 with 58% of the participants having a score of 1. In the ‘risk feedback’ group the average score  
265 was  $M = 2.40$  with 28% of the participants having a score of 1. Concerning the PANAS scores,  
266 only the ‘risk feedback’ group showed a significant ( $t = 6.18$ ,  $df = 414$ ,  $p < .001$ ,  $M_{T1} = 3.10$ ,  
267  $SD_{T1} = 0.80$   $M_{T2} = 2.95$ ,  $SD_{T2} = 0.82$ ) reduction of positive affect between the two measurement  
268 points. Therefore, it seems that the induction of risk for the corresponding condition has worked  
269 sufficiently. Additionally, all prerequisites (independence of groups, normal distribution of the  
270 dependent variable and homogeneity) for further analyses were tested and were fulfilled.

**271 Confirmatory Analyses**

272 To examine the impact of self-perceived risk (high vs. low) and risk-feedback (yes vs.  
273 no) on respondents’ selective exposure, univariate analyses of variance were conducted with  
274 these two factors. The difference between the number of selected snippets suggesting a higher  
275 risk and the snippets suggesting no risk was used as one of two dependent variables, whereas the  
276 average quality rating of these two kinds of snippets constituted the other dependent variable.  
277 Numbers above zero indicate a bias towards snippets speaking of no risk, whereas numbers  
278 below zero indicate a bias towards snippets speaking of higher risk for the respondent. A score of

279 exactly zero suggests a balanced selection of snippets, as it indicates that four snippets of each  
280 kind had been selected.

### 281 **Effects on selective exposure**

282 A main effect for risk feedback was found with  $F(1, 759) = 52.92, p < .001, \eta^2 = .065$ .  
283 Examination of estimated marginal means indicated that participants with feedback of a higher  
284 risk selected more snippets which speak of no risk than participants with feedback of no risk  
285 ( $M_{noRisk} = -.45, SE_{noRisk} = 2.80$  vs.  $M_{Risk} = 1.06, SE_{Risk} = 2.86$ ), thus supporting hypothesis H3.  
286 Neither the hypothesized main effect of self-assessed risk ( $F(1, 759) = .182, p = .67$ ), nor the  
287 postulated interaction between self-assessed risk and risk feedback became significant ( $F(1,$   
288  $759) = .71, p = .40$ ). Hypotheses H1 and H5 thus were not confirmed.

### 289 **Effects on quality rating**

290 There were no significant results for the dependent variable quality rating. Thus, the  
291 hypotheses H2, H4, and H6 could not be confirmed.

### 292 **Exploratory Analyses**

293 Since the regarded topic is extremely complex and largely unexplored in the context  
294 under consideration, we decided, also against the background of the non-significant hypotheses,  
295 to carry out further explorative analyses. We thereby aimed to gain further insight into factors  
296 that moderate how the two independent factors (perceived risk and risk feedback) influence the  
297 dependent variables of selective exposure and quality assessment. In this regard, two influential  
298 and often mentioned constructs come into mind: HIL [27] and emotion regulation [16,28]. As we  
299 had found a significant main effect of risk feedback on selective exposure, we investigated the  
300 corresponding interactions for the risk feedback factor. Hayes' PROCESS macro [29] was used

301 to test for the potential moderation of both HIL and emotion regulation on the relation between  
302 risk feedback and selective exposure and quality rating (see Table 1).

### 303 *Health Information Literacy*

304 HIL is defined by the Medical Library Association, as “*the set of abilities needed to*  
305 *recognize health information need; identify likely information sources and use them to retrieve*  
306 *relevant information; assess the quality of the information; and analyze, understand, and use the*  
307 *information to make good health decisions*” [30, p. 294]. Although the notion ‘set of abilities’ is  
308 a bit unspecific, HIL is necessarily involved in every health information gathering process.  
309 Hence, HIL should also play an important role when it comes to the phenomenon of selective  
310 exposure, as it supports searching and selecting specific information. However, it is left unclear  
311 how exactly HIL influences the incidence of selective exposure. Two possibilities are  
312 conceivable: (1) A more pronounced HIL promotes a balanced search, as all relevant information  
313 is considered and used for good health decisions; or (2) with higher HIL, the well-developed  
314 ability to search and evaluate information enables a stronger selection of information according  
315 to the objectives of the defensive motives [27]. Empirically, we found a significant interaction  
316 between risk feedback and HIL ( $b = 6.70, p < .001$ , see Table 1) as predictors of selective  
317 exposure, while the direct effect of risk feedback also remained significant. Closer inspection  
318 showed that respondents who received feedback on an existing risk tended, overall, to select  
319 more snippets which deny the possibility of a risk (see Figure 1). In contrast, respondents who  
320 received feedback of no existing risk tended to select more snippets which suggest a higher risk.  
321 This effect was amplified by HIL: While respondents with higher HIL showed stronger selective  
322 exposure in the consistent feedback condition, lower HIL was associated with nearly no selective  
323 exposure in both conditions. For quality ratings, no significant results were found.

324 **Table 1. PROCESS results for moderator analyses with selective exposure as outcome**

Model	Variable	R	coefficient	t	p
1		.31			.000
	Constant		.80	.99	.32
	(X) Risk Feedback		-3.13	-2.90	.000
	(W) HIL		-1.79	-1.57	.12
	Interaction		6.70	4.38	.000
2		.28			.000
	Constant		-.65	-.91	.36
	(X) Risk Feedback		-.21	-.21	.83
	(W) Emotion Regulation		.06	.29	.77
	Interaction		.49	1.83	.06

325 *Note:* Results are from concurrent regression analyses. The resulting coefficients are

326 unstandardized B parameters; X = independent variable; W = moderator; HIL = Health

327 Information Literacy.

328 *Emotion Regulation*

329 Emotion regulation is the ability to leave or alter an emotional state [31,32]. In a state

330 where a health threat is present, the discussed defensive motives aim to minimize negative

331 feelings through reassuring or confirming information [7], which may be in contrast to a

332 comprehensive search. In previous studies, a negative affective state was found to explain

333 interindividual differences and to predict health information seeking behavior [33]. A neutral or

334 less negative affective state should therefore promote a more balanced and comprehensive

335 search. In relation to this, it is important for an adequate search while facing a threat, that one has

336 a certain ability to regulate potentially negative emotions that may arise [28]. Accordingly, van ‘t

337 Riet and Ruiter [16] state that emotion regulation ability affects the exposure to various kinds of

338 health-promoting information. Hence, we also assume a moderating effect on the relation of the

339 regarded factors with selective exposure and quality rating. As negative emotions have a higher

340 relevance for defense motives [34], we only considered emotion regulation for negative

341 emotions. However, only a marginally significant effect on the interaction of risk feedback and



342 emotion regulation to predict selective exposure was found ( $b = .49, p = .06$ , see Table 1), and,  
343 interestingly, the main effect of risk feedback that was found before disappeared when including  
344 the interaction term. While these results must be considered with some caution since the  
345 interaction (closely) missed the  $p < .05$  criterion, a closer inspection revealed that the participants  
346 in the risk feedback condition tended to select more information which denies a threat (i.e.,  
347 higher selective exposure) with increasing emotion regulation ability (see Figure 2). In contrast,  
348 participants in the no risk-feedback condition seemed not to be affected by different levels of  
349 emotion regulation ability, as they did not differ in their selective exposure results.

### 350 **Discussion**

351 The present paper aimed to gain further insight into the effects of two defense motives – a  
352 self-confirming and a self-defending motive – on respondents' selective exposure to health  
353 information. Overall, our findings indicate that a suggested health risk influences selective  
354 exposure to health information, while a self-perceived risk seems to have no significant effect in  
355 this context. As predicted in our preregistration, we found that risk feedback leads to a stronger  
356 bias toward the preference of information which denies the risk: Receiving feedback which  
357 suggests a potential health risk shifted task performance from a rather balanced selection of  
358 snippets to a biased selection of snippets which deny a particular risk. Furthermore, it seems that  
359 in the context of one's own health, the motivation to defend from a threat (i.e., type 2 defense  
360 motive; see above) is superior to the motivation to confirm one's opinion (i.e., type 1 defense  
361 motive). This is because, in the condition of no risk feedback, respondents showed no significant  
362 bias in either direction – even in the case of a high self-perceived risk. This means that they did  
363 neither confirm their own risk perception when they saw themselves as being at higher risk, nor  
364 did they deny a risk and therefore confirm the 'no risk' feedback. Together with the significant

365 effects of the risk feedback, this can be interpreted as an indication that in such an essential and  
366 potentially existentially relevant context as the health context, coping with a health threat has a  
367 higher implicit value than the need to confirm one's opinion.

368         This is in line with other findings in the area of coping research, which, in general,  
369 suggest that there is a stronger bias when individuals are in a negative emotional state, which  
370 may be more strongly triggered by an unexpected and immediate risk feedback compared to self-  
371 perceptions that have probably been present for a long time [35]. Moreover, selective exposure  
372 seems to be stronger when the focus lies more on losses instead of gains [36]. In this case, the  
373 threat of physical integrity can be seen as a loss (losing health status), while the defense of the  
374 own opinion is mentally represented rather as a gain (one wants to be proven correct) and thus, is  
375 less susceptible to bias.

376         In this sense, a confirmation bias, meaning a mere confirmation of preconceived opinions  
377 (type 1 defense motive), seems less likely to come into effect in the case of health threats and the  
378 associated autonomous search for information. Rather, it is conceivable that potential risks and  
379 threats are avoided via the self-directed (biased) choice of information channels, a process which  
380 is described in the theory of counter-regulation [37]. According to this theory, negative states, for  
381 example elicited through health threatening information, are understood to be "counteracted" by  
382 actively turning towards positive (e.g., reassuring or unrelated) information. Our explorative  
383 findings also partly support this claim: Participants with a higher ability to regulate their negative  
384 emotions showed a more biased selection towards positive information, which may help to  
385 reassure themselves, and therefore to downregulate their negative feelings. Our results regarding  
386 the moderating effect of HIL further support these assumptions. In fact, higher HIL led to a  
387 stronger selective exposure. This means that with a higher ability, less balanced information is

388 considered, which at first seems to be counter-intuitive. In general, HIL is positively associated  
389 with health outcomes in the literature [38], which initially does not seem to match with an  
390 unbalanced consideration of relevant health information. However, since the performance test we  
391 used primarily measures the abilities to search, acquire and evaluate suitable sources and health  
392 information (according to the definition of HIL), this effect suggests that basic abilities of  
393 information processing may be ‘misused’ in the present case to meet one’s needs and motives. In  
394 this regard, Meppelink, Smit, Fransen and Diviani [27] also showed a biased selection of  
395 messages that were in line with their own beliefs concerning vaccination (regardless of the line  
396 of argumentation, against or in favor) for participants with higher HL. They also showed a higher  
397 prevalence of biased perceptions of message convincingness for people with higher HL.  
398 Accordingly, future research and interventions should consider extending the HIL construct to  
399 include the aspect of a balanced search. Moreover, it should further investigate the relationship  
400 between literacy and selective exposure and its possible implications.

401         Moreover, the rather small effect size of the impact of risk feedback, and the non-  
402 significant results for perceived risk indicate a need for further research. As stated before, the  
403 type 1 defense motive (defending one’s opinion) may not be as important when one’s own health  
404 is threatened. Nevertheless, our experiment shows an overall tendency towards biased  
405 information selection when it comes to health topics, and, furthermore, we concede that our  
406 claims that type 1 would be less important are based on the interpretation of non-significant  
407 results. To disentangle the effects of the two defense motives in future studies, some adjustments  
408 to the paradigm and evaluation task are advisable. In contrast to the currently used cover story, it  
409 could be beneficial to use a more ambivalent and controversial health topic where the own  
410 opinion is held at high stake. At the same time, the cover story should not induce such a large

411 threat in order to prevent triggering *only* the self-defending motive – at least for a portion of the  
412 participants. Such topics could include, for example, efficacy of homeopathic drugs or vaccine  
413 hesitancy [27]. This makes it possible to develop scenarios in which the two motives are  
414 activated both separately and simultaneously (e.g., in different experimental groups). In the case  
415 of homeopathy, for example, risk feedback based on a homeopathic ‘assessment’ may be  
416 perceived as much more threatening to physical well-being by homeopathy supporters. In  
417 contrast, homeopathy sceptics would supposedly rather doubt the content and see their own  
418 convictions threatened.

419         Another possible explanation that only one of our hypotheses was confirmed could be  
420 ascribed to the nature of the selection task. With eight to-be-selected snippets out of a total of 16  
421 snippets, the resulting cognitive load when performing the task might be excessive, which could  
422 also lead to a rather balanced selection almost automatically. A significant reduction of the  
423 number of snippets should force a selection according to the currently active motive(s).  
424 However, a disadvantage of this procedure would be that the lower number of selected snippets  
425 leads to a lower variance in the dependent variable, because possible resulting values are  
426 restricted. Our initial idea was that the relatively high number of eight selected snippets would  
427 result in more detailed differences in the extent of selective exposure, depending on the  
428 independent variables and moderators. Another solution to this problem was recently  
429 implemented by Kerwer, Rosman, Wedderhoff and Chasiotis (in-principle accepted). In their  
430 study, only four snippets were presented at a time, from which one had to be selected for further  
431 reading. This was done four times, so that a total number of 16 snippets were presented while  
432 simultaneously reducing cognitive load.

**433 Implications**

434           The findings from the present study have some rather ambivalent implications. In line  
435 with Sassenberg and Greving [11], our results suggest that an autonomous selection of  
436 information may help patients to react to a health threat via consulting reassuring information  
437 about their health. One could argue that this is a positive implication in the sense that it may help  
438 them to develop a more positive view of their own health and make them feel better. However,  
439 the findings also implicate that a suggested health threat leads to a bias in information selection.  
440 This might be because, as we have discussed, a suggested risk increases negative affective states  
441 like anxiety, which trigger defense motives to feel better and/or reassured. This is also in line  
442 with previous research, which states that the likelihood of a unilateral selection of positive  
443 information is higher when a negative affective state is present, which is also referred to as  
444 “counter-regulation” [36,39,40]. Research on health message perception and on the effects of  
445 fear appeals in health promoting information also supports our findings and points to further  
446 implications [16,41]. In fact, health information which emphasizes individual risk factors does  
447 not automatically cause the recipient to implement appropriate behavior to reduce the risk (i.e.,  
448 giving up smoking). On the contrary, such information often evokes defensive cognitive and  
449 behavioral reactions, such as ignoring, denying or downplaying it [16]. In contrast, messages  
450 which, besides pointing to a significant health threat, suggest ways to diminish the threat and  
451 enhance the recipients’ self-efficacy, seem to be more effective with regard to changes in health  
452 behavior [41,42]. Positive affect and a substantial amount of confidence to be able to deal with  
453 the threat thus seem to be essential in order to avoid a bias towards positive information and to  
454 select information in a less biased manner [28,41]. It is therefore conceivable that, as a  
455 consequence, individuals who are in a negative affective state because they have been threatened

456 by risk suggesting information, have a biased (positive) picture of their own health, resulting  
457 from biased information retrieval in the past. This poses the danger that they underestimate  
458 potential health risks and do not consider necessary interventions. The first few weeks of the  
459 corona pandemic clearly shows which unfavorable courses and consequences it can have to  
460 trivialize a threat to oneself (and others) through preferring false (reassuring) information that  
461 calls into question the desired behavior of social distancing. Emphasizing information about the  
462 (relatively) low mortality rate, indicators to not falling in the risk group and labeling the disease  
463 as "just another kind of flu" led to downplaying the individual and societal risk all over the world  
464 and played a significant role in its further proliferation. In this respect, Sassenberg and Greving  
465 [11] also refer to the risk of a potential negative impact on the doctor-patient relationship, as  
466 patients could be too confident about their health status and be inaccessible to reasonable  
467 arguments that point in another direction.

### 468 **Conclusions**

469 Our study provides evidence for selective exposure and bias in health information  
470 seeking. In the presence of an externally suggested threat to their health, individuals tend to  
471 reassure themselves, and therefore show a selective exposure to positive information. This may  
472 also override a potential motivation to defend one's own opinion (often referred to as  
473 confirmation bias) when it is in conflict with the reassuring information. However, further  
474 research and adjustments to the information selection task are required to investigate these rather  
475 tentative conclusions.

476 What is certain, however, is that an independent search for health information is  
477 increasingly deemed necessary and seems to be implicated by modern health care systems in  
478 terms of the promotion of patient empowerment and informed decision making. Nevertheless,

479 the wide availability of health-related information to the general population (via internet), also  
480 creates new risks for imbalanced information acquisition and use. Selective exposure might help  
481 patients to reassure themselves and cope with their emotional states, but it may also lead to an  
482 incorrect assessment of their individual health (risk) status.

### 483 **Acknowledgements**

484 The researchers would like to thank Martin Kerwer for his constructive feedback during  
485 the whole process and the anonymous reviewers for their insightful suggestions and careful  
486 reading of the manuscript.

487 **References**

- 488 1. Fox S, Duggan M. Health Online 2013. Pew Research Center. Washington, D.C.; 2013.
- 489 2. Kunda Z. The case for motivated reasoning. *Psychological Bulletin*. 1990;108(3):480–98.  
490 doi: 10.1037/0033-2909.108.3.480. PubMed PMID: 2270237.
- 491 3. Sherman DK, Cohen GL. Accepting Threatening Information: Self–Affirmation and the  
492 Reduction of Defensive Biases. *Curr Dir Psychol Sci*. 2016;11(4):119–23.  
493 doi: 10.1111/1467-8721.00182.
- 494 4. Olson JM, Stone J. The Influence of Behavior on Attitudes. In: Albarracín D, Johnson BT,  
495 Zanna MP, editors. *The handbook of attitudes*. Mahwah, NJ: Lawrence Erlbaum Associates;  
496 2005. p. 223–71.
- 497 5. Edwards K, Smith EE. A Disconfirmation Bias in the Evaluation of Arguments. *Journal of*  
498 *Personality and Social Psychology*. 1996;71(1):5–24.
- 499 6. Ditto PH, Lopez DF. Motivated skepticism: Use of differential decision criteria for preferred  
500 and nonpreferred conclusions. *Journal of Personality and Social Psychology*.  
501 1992;63(4):568–84. doi: 10.1037/0022-3514.63.4.568.
- 502 7. Hart W, Albarracín D, Eagly AH, Brechan I, Lindberg MJ, Merrill L. Feeling validated  
503 versus being correct: A meta-analysis of selective exposure to information. *Psychological*  
504 *Bulletin*. 2009;135(4):555–88. doi: 10.1037/a0015701. PubMed PMID: 19586162.
- 505 8. Albarracín D, Johnson BT, Zanna MP, editors. *The handbook of attitudes*. Mahwah, NJ:  
506 Lawrence Erlbaum Associates; 2005. p. 826.
- 507 9. Schweiger S, Oeberst A, Cress U. Confirmation bias in web-based search: A randomized  
508 online study on the effects of expert information and social tags on information search and



- 509 evaluation. *J Med Internet Res.* 2014;16(3):e94. doi: 10.2196/jmir.3044. PubMed  
510 PMID: 24670677.
- 511 10. Greving H, Sassenberg K. Counter-regulation online: Threat biases retrieval of information  
512 during Internet search. *Computers in Human Behavior.* 2015;50:291–8.  
513 doi: 10.1016/j.chb.2015.03.077.
- 514 11. Sassenberg K, Greving H. Internet Searching About Disease Elicits a Positive Perception of  
515 Own Health When Severity of Illness Is High: A Longitudinal Questionnaire Study. *J Med*  
516 *Internet Res.* 2016;18(3):e56. doi: 10.2196/jmir.5140. PubMed PMID: 26944335.
- 517 12. Wason PC. Reasoning about a rule. *Q J Exp Psychol.* 1968;20(3):273–81.  
518 doi: 10.1080/14640746808400161. PubMed PMID: 5683766.
- 519 13. Frey D. Recent Research on Selective Exposure to Information. In: *Advances in*  
520 *Experimental Social Psychology*: Elsevier; 1986. p. 41–80.
- 521 14. Knobloch-Westerwick S, Johnson BK, Westerwick A. To Your Health: Self-Regulation of  
522 Health Behavior Through Selective Exposure to Online Health Messages. *J Commun.*  
523 2013;84(2):n/a-n/a. doi: 10.1111/jcom.12055.
- 524 15. Munro GD, Stansbury JA. The dark side of self-affirmation: Confirmation bias and illusory  
525 correlation in response to threatening information. *Pers Soc Psychol Bull.* 2009;35(9):1143–  
526 53. doi: 10.1177/0146167209337163. PubMed PMID: 19491331.
- 527 16. van ‘t Riet J, Ruiters RAC. Defensive reactions to health-promoting information: An  
528 overview and implications for future research. *Health Psychology Review.* 2013;7 Suppl  
529 1:S104-136. doi: 10.1080/17437199.2011.606782.
- 530 17. Wedderhoff O, Chasiotis A, Rosman T. Don't Tell Me What to Think: How Perceived and  
531 Suggested Risk Affect Selective Exposure to Health Information; 2019.

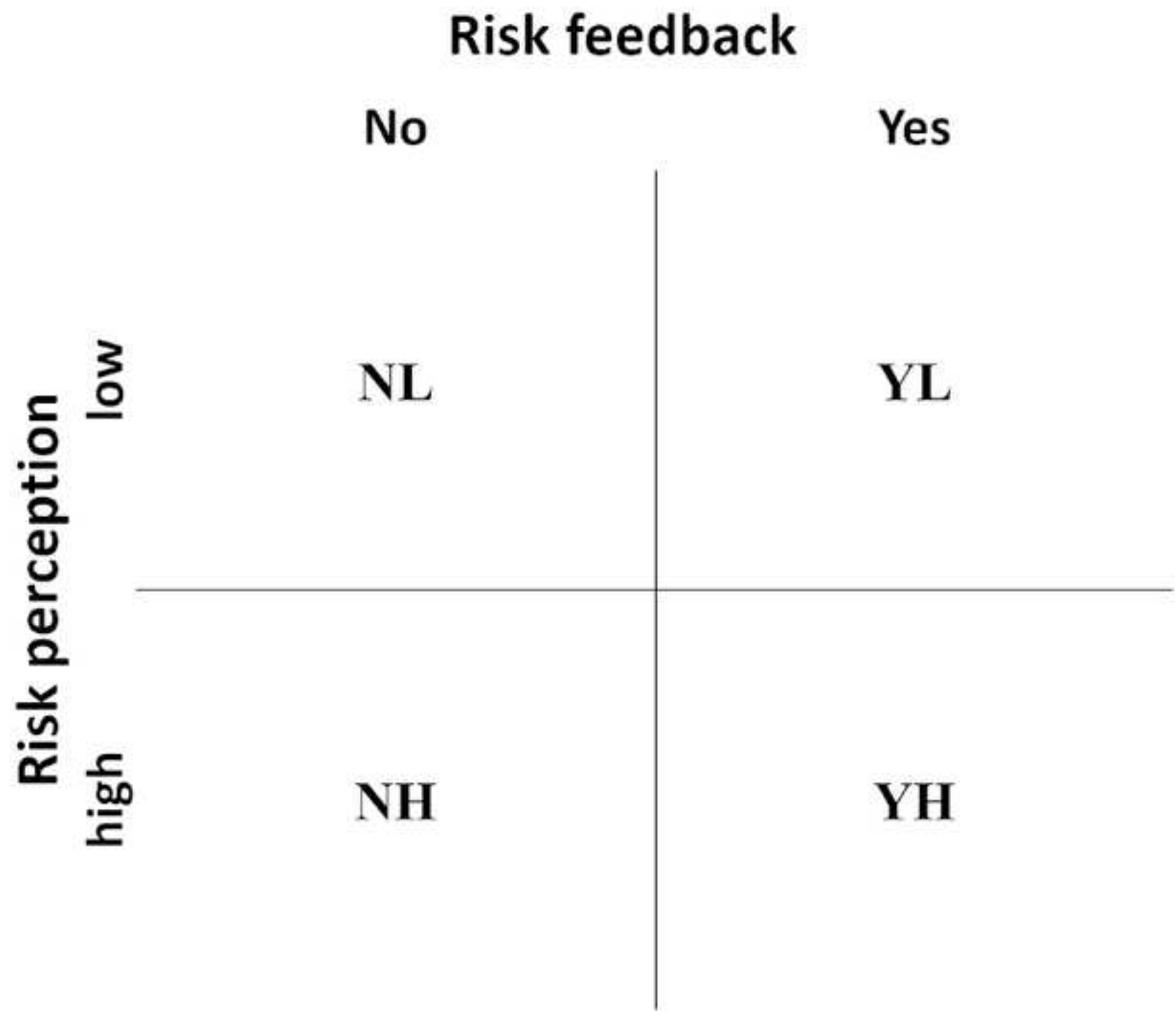
- 532 18. Faul F, Erdfelder E, Buchner A, Lang A-G. Statistical power analyses using G\*Power 3.1:  
533 Tests for correlation and regression analyses. *Behav Res Methods*. 2009;41(4):1149–60.  
534 doi: 10.3758/BRM.41.4.1149. PubMed PMID: 19897823.
- 535 19. Mayer A-K, Holzhäuser J, Chasiotis A, Wedderhoff O. Assessing health literacy by  
536 performance tests: The Health Information Literacy Knowledge Test (HILK). In: Mayer A-  
537 K, editor. *Health literacy across the life span*. Lengerich: Pabst Science Publishers; 2018. p.  
538 127–45.
- 539 20. Behm T. SWE-IV-16 - Skala zur Erfassung der Informationsverhaltensbezogenen  
540 Selbstwirksamkeitserwartung (SWS-IV-16); 2018. mul.
- 541 21. Carver CS, White TL. Behavioral inhibition, behavioral activation, and affective responses  
542 to impending reward and punishment: The BIS/BAS Scales. *Journal of Personality and*  
543 *Social Psychology*. 1994;67(2):319–33. doi: 10.1037/0022-3514.67.2.319.
- 544 22. Hartig J, Moosbrugger H. Die “ARES-Skalen” zur Erfassung der individuellen BIS- und  
545 BAS-Sensitivität. *Zeitschrift für Differentielle und Diagnostische Psychologie*.  
546 2003;24(4):293–310. doi: 10.1024/0170-1789.24.4.293.
- 547 23. Ebert DD, Christ O, Berking M. SEK-ES - Fragebogen zur emotionsspezifischen  
548 Selbsteinschätzung emotionaler Kompetenzen; 2014. ger.
- 549 24. Breyer B, Bluemke M. Deutsche Version der Positive and Negative Affect Schedule  
550 PANAS (GESIS Panel); 2016. deu.
- 551 25. Hossiep R, Krüger C. Bochumer Inventar zur berufsbezogenen  
552 Persönlichkeitsbeschreibung—6 Faktoren (BIP-6F). Göttingen, Germany: Hogrefe; 2012.

- 553 26. Adams JM, Hart W, Richardson K, Tortoriello GK, Rentschler A. Monkey see, monkey do:  
554 The effect of social influence on selective-exposure bias. *Eur. J. Soc. Psychol.*  
555 2018;48(6):850–65. doi: 10.1002/ejsp.2375.
- 556 27. Meppelink CS, Smit EG, Fransen ML, Diviani N. "I was Right about Vaccination":  
557 Confirmation Bias and Health Literacy in Online Health Information Seeking. *J Health*  
558 *Commun.* 2019;24(2):129–40. doi: 10.1080/10810730.2019.1583701. PubMed  
559 PMID: 30895889.
- 560 28. Das E. Rethinking the role of affect in health communication. *The European Health*  
561 *Psychologist.* 2012;14(2):27–31.
- 562 29. Hayes AF. Introduction to mediation, moderation, and conditional process analysis: A  
563 regression-based approach. *Methodology in the social sciences.* New York, NY: Guilford  
564 Press; 2013. p. 507.
- 565 30. Shipman JP, Kurtz-Rossi S, Funk CJ. The health information literacy research project. *J*  
566 *Med Libr Assoc.* 2009;97(4):293–301. doi: 10.3163/1536-5050.97.4.014. PubMed  
567 PMID: 19851494.
- 568 31. Baumann N, Kuhl J. Intuition, affect, and personality: Unconscious coherence judgments  
569 and self-regulation of negative affect. *Journal of Personality and Social Psychology.*  
570 2002;83(5):1213–23. doi: 10.1037//0022-3514.83.5.1213.
- 571 32. Koole SL. The psychology of emotion regulation: An integrative review. *Cognition &*  
572 *Emotion.* 2009;23(1):4–41. doi: 10.1080/02699930802619031.
- 573 33. Hastall MR, Wagner AJM. Enhancing Selective Exposure to Health Messages and Health  
574 Intentions. *Journal of Media Psychology.* 2018;30(4):217–31. doi: 10.1027/1864-  
575 1105/a000197.

- 576 34. Jonas E, Graupmann V, Frey D. The Influence of Mood on the Search for Supporting  
577 Versus Conflicting Information: Dissonance Reduction as a Means of Mood Regulation?  
578 Pers Soc Psychol Bull. 2016;32(1):3–15. doi: 10.1177/0146167205276118.
- 579 35. Johnson JD, Case DO. Health information seeking. Health communication, Vol 4. New  
580 York, NY: Lang; 2012. p. 274.
- 581 36. Rothermund K, Voss A, Wentura D. Counter-regulation in affective attentional biases: A  
582 basic mechanism that warrants flexibility in emotion and motivation. Emotion.  
583 2008;8(1):34–46. doi: 10.1037/1528-3542.8.1.34. PubMed PMID: 18266514.
- 584 37. Rothermund K. Counter-Regulation and Control-Dependency. Social Psychology.  
585 2011;42(1):56–66. doi: 10.1027/1864-9335/a000043.
- 586 38. Berkman ND, Sheridan SL, Donahue KE, Halpern DJ, Crotty K. Low health literacy and  
587 health outcomes: An updated systematic review. Ann Intern Med. 2011;155(2):97–107.  
588 doi: 10.7326/0003-4819-155-2-201107190-00005. PubMed PMID: 21768583.
- 589 39. Schwager S, Rothermund K. Counter-regulation triggered by emotions: Positive/negative  
590 affective states elicit opposite valence biases in affective processing. Cognition & Emotion.  
591 2013;27(5):839–55. doi: 10.1080/02699931.2012.750599. PubMed PMID: 23237331.
- 592 40. Schwager S, Rothermund K. On the dynamics of implicit emotion regulation: Counter-  
593 regulation after remembering events of high but not of low emotional intensity. Cognition &  
594 Emotion. 2014;28(6):971–92. doi: 10.1080/02699931.2013.866074. PubMed  
595 PMID: 24344748.
- 596 41. Ruiter RAC, Kessels LTE, Peters G–JY, Kok G. Sixty years of fear appeal research: Current  
597 state of the evidence. International journal of psychology. 2014;49(2):63–70.

- 598 42. Schwarzer R. Modeling Health Behavior Change: How to Predict and Modify the Adoption  
599 and Maintenance of Health Behaviors. *Applied Psychology*. 2008;57(1):1–29.  
600 doi: 10.1111/j.1464-0597.2007.00325.x.

Fig1.tif



# 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 Oliver Wedderhoff, unterstützt durch Feedback von Dr. Anita Chasiotis und Dr. Anne-Kathrin Mayer.

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

Die Idee und Konzeptualisierung des ersten Artikels stammt von Dr. Anita Chasiotis. Oliver Wedderhoff und Anita Chasiotis haben die Daten gemeinsam ausgewertet und den Artikel geschrieben. Dr. Anita Chasiotis 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. Vor der ersten Einreichung gab zusätzlich Prof. Dr. Nicola Baumann Rückmeldung.

Die Idee und Konzeptualisierung des zweiten und dritten Artikels stammen von Oliver Wedderhoff. Die Daten werteten Oliver Wedderhoff und Dr. Anita Chasiotis gemeinsam aus. Die Artikel wurden federführend von Oliver Wedderhoff geschrieben. Dr. Anita Chasiotis trug erheblich zu den ersten Versionen der Artikel bei. Vor der ersten Einreichung des zweiten Artikels gaben Dr. Anne-Kathrin Mayer und Dr. Tom Rosman, beim dritten Artikel Dr. Tom Rosman Feedback zu den Inhalten. 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.

## Eidesstattliche Erklärung

Ich versichere, dass ich meine Dissertation ohne Hilfe Dritter und ohne Benutzung anderer als der angegebenen Quellen und Hilfsmittel angefertigt und die benutzten Quellen wörtliche oder inhaltlich entnommenen Stellen als solche kenntlich gemacht habe. Diese Arbeit hat in gleicher oder ähnlicher Form noch keiner Prüfungsbehörde vorgelegen.

Trier, den 27.03.21

Nachname: Wedderhoff

Vorname: Oliver

Unterschrift: \_\_\_\_\_