Cyberchondriasis – The Effect of Searching the Internet on Health Concerns

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Abstract

Studies show a rising trend that individuals who worry about their health regularly search the internet. Recently, potentially negative effects of doing so have been highlighted. Illness anxiety and negative affectivity may influence these effects. We tested if searching the internet about a personal symptom leads to increased health concerns and if these traits have an impact.

Data from 79 students were collected. Participants were asked to name and evaluate a symptom of personal concern and to research that symptom using the internet for five minutes.

Searching the internet resulted in a significant increase in health concerns and this was significantly moderated by negative affectivity but not by illness anxiety. A replication of these findings, possibly with an older sample scoring higher on illness anxiety will help to better understand the relations described above, and to point consumers and health professionals into the right direction regarding media usage.

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Cyberchondriasis – The Effect of Online Research on Health Concerns

Searching the internet for information concerning one's health has become increasingly common (McMullan, Berle, Arnaez, & Starcevic, 2019). For example, a recent study in the German population found that about 46% of Germans use the internet regularly to learn about health issues (Bertelsmann-Stiftung, 2018). In fact, the number of internet users collecting health information is even higher in other countries (72%, Fox & Duggan, 2013). Five percent of all Google searches are health-related (Google, 2015). On the one hand, such online health research can help to gain greater control over health and support better health-care decisions (Tan & Goonawardene, 2017). On the other hand, Brown, Skelly and Chew-Graham (2019) highlight two relevant disadvantages: Firstly, the problematically low quality of online health information was criticized by the majority of evaluation studies (e.g. Zhang, Sun, & Xie, 2015). Secondly, online health information has been identified as a possible source of anxiety for internet users. The term cyberchondria describes pathological anxiety linked to health related internet searches and was first used publicly by a journalist writing for the Wall Street Journal (Carns, 1999). Mechanisms responsible for this link are not yet well known. However, learning about symptoms of grave illnesses may in itself be enough to instill the worry that one might suffer from that very illness. Furthermore, getting information about symptoms of (serious) illnesses may affect the perception and interpretation of these symptoms, as people generally have difficulty accurately perceiving body sensations and thus top-down mechanisms are likely quite relevant for the perception of such symptoms (Petersen, Van Staeyen, Vögele, von Leupoldt, & Van den Bergh, 2015).

Starcevic and Berle (2013, 2015) introduced a hybrid model of reassurance seeking and compulsive health-related Internet use. Specifically, they highlighted that online health research may result in a substantial change in emotional status (i.e., increase in distress / anxiety vs. decrease

in distress / anxiety). This outcome may then either lead to Cyberchondria through repeated excessive distressing Internet searches or by inducing excessive searches in order to achieve reassurance. It remains unclear, however, which of these paths is entered more regularly.

In a number of studies patients were asked whether they were searching the internet for health information and how their experiences with the emotional consequences of these searches were. These studies have shown that online health research may indeed enhance levels of distress and uncertainty about one`s feared condition (Baumgartner & Hartmann, 2011; Doherty-Torstrick, Walton, & Fallon, 2016; Singh, Fox, & Brown, 2016; White & Horvitz, 2009) and potentially result in in greater functional impairment (Doherty-Torstrick et al., 2016). In their review, Brown, Skelly, and Chew-Graham (2019) highlighted that the proportion of individuals self-reporting an increase in anxiety about their health following their online health research is quite variable across studies (72.7%, Berezovska, Buchinger, & Matsyuk (2010); 15%, Andreassen et al. (2007)). Nonetheless, they also reported a significant relation between illness anxiety and increased self-reported anxiety and distress after online health research (Baumgartner & Hartmann, 2011; Doherty-Torstrick et al., 2016; Muse, McManus, Leung, Meghreblian, & Williams, 2012; Singh & Brown, 2014). Arguably, the increased distress after online health research might be due to illness anxious individuals checking the internet more frequently. Brown et al. (2019) see an alternative explanation in the possibility that the online search present information, which might be particularly threatening to people with high illness anxiety.

Recently, McMullan, Berle, Arnaez, & Starcevic (2019) conducted a random effect meta-analysis and also found a positive correlation between health anxiety and online research information seeking [$r = 0.34, p < .0001$] as well as between health anxiety and cyberchondria [$r = 0.62, p < .0001$]. However, because of the lack of longitudinal studies, no detailed theoretical

and empirical analysis of the causal pathway (Brown et al., 2019) and potential moderators and covariates (McMullan et al., 2019) of health anxiety and online health research has yet been established.

Singh and Brown (2016) looked at how health anxious individuals behave online. They asked high/low health anxious internet users to search for information about a personal symptom online for about 15 minutes. Participants were then asked to recall and rate their anxiety levels during the search. Both groups reported significant increases in anxiety after visiting so called "escalation type" websites, describing especially serious causes/conditions. In addition, highly anxious individuals were significantly more likely to engage in such escalation queries. Thus, health anxious individuals possibly use maladaptive search strategies that increase the chance of exposure to health threats. Note, that it was relatively uncommon for participants to find escalation-type websites (only in about 13.5% of cases). Participants in this study unfortunately were asked to rate their anxiety in hindsight, not during or directly after reading the page content. Thus, it is unclear if the self-report of increased anxiety after reading escalation type webpages can indeed be attributed to the direct effects of the content of these webpages, or, alternatively, if knowing about the content of these webpages led the participants to believe that their anxiety might have increased. Nonetheless, this study clearly points to the potential of online searches to impact the experience of anxiety when searching the internet for symptoms and their causes.

In summary, most of the cross-sectional studies suggest that researching the internet is influenced by illness anxiety and that internet searches may have a negative impact on an individual's emotions and ability to cope with a symptom. Thus, looking at the effects of searching the internet for explanations for one's personal symptoms of concern is in itself an important focus

of study. Furthermore, as detailed above, illness anxiety may influence the impact of these internet searches.

Another characteristic of the person hat has often been linked to the experience of distressful somatic symptoms is negative affectivity (compare Constantinou, 2018, for an overview). In fact, negative affectivity has been shown to influence symptom perception towards overperception (i.e., towards the more likely formation of medical unexplained symptoms; Constantinou, 2018). In our opinion, this overperception can be linked to two main factors: First, negative affectivity is correlated with lower interoceptive accuracy (e. g. Bogaerts et al., 2006) and increases in perceptual biases (Petersen et al., 2015). This liberally biased perception that is decoupled from sensory input increases perception of symptoms (Van den Bergh, Witthoft, Petersen, & Brown, 2017). Finally, increased symptom perception might trigger worries concerning one's own health status. Secondly, negative affectivity biases cognitions. For example, it has been linked to a more negative interpretation of the causes and consequences of somatic symptoms (e. g. Stegen, Van Diest, Van de Woestijne, & Van den Bergh, 2000). Not surprisingly, negative affectivity on a population level is associated with worse illness information seeking experiences (Beckjord, Rutten, Arora, Moser, & Hesse, 2008).

Consequently, within our study we planned to experimentally test if searching the internet with regard to an unpleasant, user-defined, and personally relevant symptom indeed leads to increased health concerns regarding that symptom. Most importantly, we planned to test the effect of such internet searches for symptoms of personal concern by asking individuals to assess their worry or concern about a specific symptom <u>before and immediately after</u> conducting that search. Moreover, the potential influence of illness anxiety and negative affectivity on this mechanism

was to be explored under the assumption that both these moderators should increase the negative effect of an internet search on personally relevant health concerns.

Method

Materials

The severity of health concerns was assessed with a four-item questionnaire designed by the authors, using a six-point Likert-type scale. Specifically, participants were asked a) how much they were currently occupied with thinking about the symptom, b) how much they were currently worried about the symptom, c) as how threatening they were currently experiencing the symptom, and d) how likely it was at the moment that they would go and see a doctor about the symptom. The internal consistency of this questionnaire was good at both t1 (Cronbach`s α =.83) and t2 (Cronbach's α = .83).

The potential moderator illness anxiety was measured using the German modification of the Whiteley Index (Pilowsky, 1967), which is a reliable (Cronbach's α range between .77 and 0.83) and valid self-report instrument targeting hypochondriacal attitudes and behaviors with 14 dichotomous items (Hinz, Rief, & Brähler, 2003). Negative affectivity was assessed using the Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983). The German version of this scale (Lingen, Buss, & Snaith, 2011) is also a reliable (Cronbach's α = .80) and valid self-report measure assessing the two domains of anxiety and depression in context of physical illness with 14 items on a four-point Likert-type scale. Whereas the HADS is not the most common measure of negative affectivity, a recent study has shown that the total score of this questionnaire reliably reflects variations of psychological distress and is indeed closely related to negative affect (Luciano, Barrada, Aguado, Osma, & Garcia-Campayo, 2014), although it is not clear how much the trait and state component each contribute to our measure of negative affect. One control

variable was additionally collected: participants were asked to report any known diagnoses of chronic diseases concerning either themselves or people important to them personally.

Procedure

After receiving all information relevant for participation and giving informed consent, participants were seated in front of a computer screen. The consent procedure included the information that the experiment aimed to study general characteristics of consumer experience and behavior when checking health concerns online.

At the beginning of the online survey (t1), participants were asked to name and evaluate a bodily symptom of personal concern. Then, illness anxiety and negative affectivity were assessed using the Whiteley Index and the Hospital Anxiety and Depression Scale. Subsequently, participants were asked to perform a five-minute Google-search on the previously mentioned bodily symptom. Specifically, they were instructed to "check this given personal symptom on the internet the same way as they would usually do". Health concerns about the symptom were measured again after the enquiry was finished (t2). The internet searches of 32 people were recorded using QuickTime, however, because two computers were used, this was not possible for the rest of the participants (the old operating system of one of the computers did not allow QuickTime to be run). We compared the group whose internet searches were recorded with the rest. However, no difference with regard to illness anxiety, negative affectivity, intensity of health concerns with regard to the personally relevant symptom or age was found (all p's > 0.1).

Analysis

Measures were compared using repeated-measure analysis of variance (ANOVA). Moderated regression analysis was conducted to determine the effects of the two potential moderators, illness anxiety and negative affectivity (compare Figure 1). All analyses were

performed using SPSS 24.0, the additive and moderated moderation analyses were computed with the help of Hayes` PROCESS macro for SPSS (Hayes, 2017). Significance was determined using 95% bias-corrected confidence intervals. The variables were continuous and centered prior to analysis, the estimated effects reported were unstandardized regression coefficients.

- insert Figure 1 about here -

Results

Participants

Participants were recruited on the campus of the University of Cologne through email and an announcement before a general lecture. The survey was completed by 80 participants, seventy-nine of whom (17 male, 63 female, mean age = 22.7 (SD = 5.8) with a range of 17-53 years) provided sufficient information to be included in the analysis. One participant had to be excluded from the final data set because he had failed to self-report any (bodily) symptom of personal concern.

The self-reported symptoms of personal concern were mostly of orthopedic or gastro-intestinal type, as well as various forms of headache (compare Table 1). A plausible link between the diagnosis of a chronic disease in the personal environment of the respective participants and the mentioned individual symptoms – for example multiple sclerosis and numbness – was observed in eight cases (information available in Table 1). The level of concern about the symptoms of personal relevance at t1 was positively correlated with both the measure for negative affectivity (r = 0.28, p < 0.01) and illness anxiety (r = 0.49, p < 0.001).

The Whiteley Index sum score of the 79 included participants ranged from 0 to 13 points, out of 14 possible points ($M = 4.2$; $SD = 2.7$). Thus, the mean illness anxiety score was below the cut-off of 8 reported for the German version of the Whitley Index (Rief, Hiller, Geissner, & Fichter, 1994). Nine participants (11%) exceeded the cut-off value for likely hypochondria (according to DSM-IV, American Psychiatric Association, 1994). Sum scores of the Hospital Anxiety and Depression Scale ranged from 1 to 27 ($M = 10.9$; $SD = 5.8$). 18 (22.8 %) participants surpassed the cut-off of 15 that is recommended for the general German population to identify severe symptoms of anxiety and depression (Hinz & Brähler, 2011).

Descriptives of the internet searches

In order to get an idea of how the internet searches commonly were conducted, a brief analysis of the 32 recorded search-processes was carried out and unveiled the following characteristics: 50% of the participants simply clicked on the first link of the results returned by the search engines for the respective searches. Most often, this search contained only the symptom as search string. 29% of the participants searched additionally and explicitly for possible causes of their symptoms, the main focus of 17% was on searching for options for self-help, e.g. exercises in the context of back pain. Only four of the 32 participants extended their search to include possible psychosomatic causes of their symptoms.

Regarding the webpages visited, 50% of participants clicked on one of the webpages provided by 'apotheken-umschau.de' (a series of websites provided by a publisher well known for offering a free health related journal through almost all pharmacies in Germany). About 30% initially clicked on a webpage from the publisher Onmeda (another somewhat more international health information related publisher). Professional medical webpages such as the webpage of the 'Deutsches Ärzteblatt' (official journal of the German Medical Association) rarely were selected

after appearing in the search results. Websites that 'escalated' the personal symptom according to the criteria suggested by Singh, were visited by only 2 (5,7%) of the 32 participants; this included, for example, forum entries with catastrophizing discussion threads.

- insert Table 1 about here -

Impact of the internet search on personal health concerns

A repeated-measure analysis of variance (ANOVA) with Greenhouse-Geisser correction determined that mean levels of health concerns with regard to the personally relevant symptoms showed a statistically significant difference between the measurement at t1 ($M = 2.68$, $SD = 1.11$) and t2 ($M = 3.17$, $SD = 1.16$), $F(1,75) = 41.26$, $p < 0.001$, partial $\eta^2 = .35$ (Figure 2). No significant difference between male and female participants was observed, $F(1,78) = .041$, $p = .84$.

- insert Figure 2 about here -

Moderation analysis

In the second step, the potential influence of illness anxiety and negative affectivity was explored.

- insert Figure 3 about here -

An additive moderation analysis was conducted to test whether the relation between health concerns regarding personal bodily symptoms before (t1) and after (t2) the online internet search was moderated by illness anxiety (as measured by the Whiteley Index) or negative affectivity (as measured by the HADS). Health concerns about the symptom at t2 constituted the dependent variable; health concerns about the symptom at t1, illness anxiety, negative affectivity, and the interactions between health concerns about symptom at t1 and illness anxiety or negative affectivity, respectively, were predictors. The results are displayed in Figure 3. Altogether the additive moderation model accounted for a significant amount of variance of the concerns about

health at t2 (F (7, 71) = 31.02, $p < .001$, $R^2 = .75$). The additive moderation analysis revealed no significant moderation effect of illness anxiety, $b = .02$, $t(73) = .59$, $p = .56$ and also no main effect of illness anxiety, $b = .03$, $t(73)=.79$, $p=.43$, but a significant moderation effect of negative affectivity, $b = -.03$, $t(73) = -2.27$, $p = .03$ and a significant main effect of negative affectivity, $b = .04$, $t(73) = 3.0$, p = 0.004. The moderation of the effect of concerns about symptom at t1 by negative affectivity uniquely accounts for 1,75% of the variance, $F(1,73) = 5.15$, $p = .026$.

The moderation effect of negative affectivity is illustrated in Figure 4.

- insert Figure 4 about here -

Finally, in an exploratory analysis, we additionally tested whether the interaction found between concerns about symptom at t1 and negative affectivity was moderated by illness anxiety (i.e., a moderated moderation analysis was performed). The interaction between concerns about symptom at t1, negative affectivity and illness anxiety was not statistically significant, $b = -.004$, $t(71) = -.73$, $p = .466$. Thus, no support was found for a moderated moderation.

Discussion

Our results clearly demonstrate a relatively large negative effect of searching the internet on health concerns with regard to a personally relevant symptom: the participants were significantly more concerned about their symptom after searching the internet for only 5 minutes. Thus, we were able to experimentally demonstrate direct detrimental effects of looking up information on one's personal symptom on the internet. These findings clearly confirm the effect that has previously been illustrated using self-reports of previous user experiences (e. g. White & Horvitz, 2009). Interestingly, our results are unlikely to be caused by the effects of internet web pages that contain especially frightening or catastrophising information (i. e., escalation type webpage as defined by Singh and Brown (2016)), given that our participants mainly read through

rather innocuous web pages presenting regular information commonly presented in news outlets or consumer webpages. Furthermore, the participants in this study exhibited a normal mental health status given that only a small portion of them (11%) exceeded the cut-off of our illness anxiety measure, and approximately 23% reported levels of negative affectivity usually considered to be indicative of mental disturbance (Hinz & Brähler, 2011).

Illness anxiety did not impact the effects of an internet search on the concerns about a personal symptom in the present sample. This is somewhat surprising, given that illness anxiety is at least partially defined by regularly experiencing symptoms and worrying about them. Interestingly, whereas we found an actual increase in personal concern or anxiety about a personal symptom, participants in the study by Doherty-Torstrick and colleagues (2016) actually reported no change in anxiety (individuals with high illness anxiety) or a decrease in anxiety (individuals with low illness anxiety). Perhaps, worrying about a possible illness if a symptom is experienced is a normal reaction (as is the case in the present study, given that we asked participants to report an actual symptom they recently experienced). Hence, it would be possible that illness anxiety may not have a direct impact on increased worry during internet research, but rather on follow-up behavior such as repeated internet queries and consultation of medical doctors. This was not evaluated in this study but would be interesting for future work. As described above, individuals with illness anxiety appear to generally consult the internet more often (Muse et al., 2012) or are more likely to consult a health care provider if they worry (Eastin & Guinsler, 2006). Alternatively, our sample may be different in that we sampled mainly young and healthy individuals with relatively low illness anxiety. Possibly, our results could have been different had we included individuals with clinical levels of health anxiety.

In contrast, negative affectivity indeed did impact the effects of searching the internet about a symptom of personal concern. The more negative affectivity was reported at baseline, the stronger the increase in health concerns in reaction to the internet search was experienced. This was to be expected given that in symptom provocation studies negative affectivity influences symptom reporting and catastrophizing about that symptom (e. g. Aronson, Barrett, & Quigley, 2006; Stegen et al., 2000).

Moreover, this effect was moderated in that negative affectivity had a stronger impact if, originally, the participants had reported relatively lower levels of health concerns than if they had reported relatively higher levels of health concerns (compare figure 4). We can only speculate why negative affectivity had a stronger impact if health concerns at t1 were relatively lower. Possibly, individuals that reported relatively lower health concerns a t1 may have also been less likely to have focused on these health concerns right before participating in the experiment. Thus, the relatively novel focus on the personal symptom induced by the experiment and the worrying associated with negative affectivity may together have resulted in the additional increase in health concerns. In contrast, if negative affectivity was at least partially related to the experience of the personal symptom and health concerns about that symptom, the internet search may not have changed the focus on the personal symptom and thus may have had a relatively smaller impact on the health concerns. Finally, this effect might be due to a ceiling effect, since participants with high health concerns already started in the upper third of the rating scale.

One exploratory finding should also be highlighted. Our preliminary analysis of the webpages visited by a subsample of our participants revealed that most webpages simply conveyed regular health information about symptoms and illnesses and did not appear to sensationalized symptoms and possible horrific causes of these symptoms. Nonetheless, reading this information

impacted our participants negatively and quite substantially given the medium effect size we found. Clearly, the idea that health concerns are mainly the result of webpages grossly misleading naïve consumers cannot explain the negative impact we documented in this study. Future studies should therefore not only focus on webpages of the "escalation type" as defined by Singh and Brown (2016), but rather also look at mechanisms affecting consumers negatively while they educate themselves about their health using regular webpages with adequate content on health and illnesses.

Limitations

A number of limitations have to be considered when interpreting this data set. First, our participants mainly were comprised of students and thus mostly can be described as young and generally healthy. The results of this study therefore should not be generalized towards older, less healthy populations. Also, given the relative low number of likely illness anxious individuals in our sample, we cannot exclude that searching the internet for a symptom of personal concern may have an even stronger impact in a person suffering from illness anxiety or somatic symptom disorder. Also, due to technical problems we were only able to collect information about the actual web searches conducted in a subsample of our participants. Whereas we believe that to be unlikely, we cannot exclude that in the rest of the sample, relative more or even all participants had visited escalation types of webpages. However - at least concerning illness anxiety, negative affectivity, intensity of health concerns with regard to the personally relevant symptom or age - participants with and without documented web searches were undistinguishable. Our participants searched the internet for only five minutes. This is a relatively short period of time. Most importantly, previous studies asking illness anxious individuals about their internet habits showed that these individuals may sometimes search the internet for hours with regard to their symptomatology (Singh & Brown,

2014). Thus, our results must be limited to the effects of short searches on the internet. Arguably, for example, we cannot exclude that individuals may habituate to researching symptoms if doing so for longer time periods. Indeed, treating individuals suffering from illness anxiety often includes exposure treatment and may even entail asking an individual to search the internet in order to confront him or her to health-related stimuli for an extended time (Weck, Neng, Richtberg, Jakob, & Stangier, 2015). Similarly, it may also be the case that with longer search times, illness anxiety may have an impact on health concerns that we did not find in our current study. Also, given our use of the HADS as a measure of negative affectivity, it is not clear how much the trait and state component each contributed to this measure. Finally, we restricted possible moderators to negative affectivity and illness anxiety. However, other traits may also impact cyberchondria, such as, for example, intolerance of uncertainty or anxiety sensitivity (compare Fergus, 2015; Norr, Albanese, Oglesby, Allan, & Schmidt, 2015).

In summary, in this study, we demonstrated experimentally, that searching the internet can result in a significant increase in health concerns and this effect was moderated by negative affectivity but not by illness anxiety. A replication of this findings, possibly with an older sample scoring higher on illness anxiety or even in a group of individuals diagnosed with illness anxiety or somatic symptom disorder is clearly warranted. In this context it would be interesting to use multiple measures for negative affectivity, such as the trait version of the State Trait Anxiety Inventory or the negative affect scale of the Positive and Negative Affect Scale in order to increase replicability. These would entail the additional benefit of potentially pinpointing if the findings of negative affectivity are more likely related to state or trait aspects. Such studies should also systematically look at the effects of search duration and webpage contents and consider subsequent health-related behavior. Whereas it is clearly desirable that all humans have access to all relevant

information including health related information, our study points to the perils that may come with such access. We hope that our study will help to better understand the relations described above, and to point consumers and health professionals into the right direction regarding optimal media usage and ways to improve it.

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Table Caption

Table 1: *Self-reported Personally Relevant Symptoms*

Types of personally relevant somatic symptoms	experienced within the last month?	ever experienced?
orthopaedic pain	19 (1 rheumatism)	3 (1 craniomandibular dysfunction)
gastrointestinal symptoms	18 (1 morbus crohn)	6
headache	8 (1 hashimoto)	9
acute cold symptoms	5	
complications in relation to surgery	2 (1 vascular disease)	
tachycardia / sweating / shortness of breath / hypertension	2 (1 hashimoto)	5
weakness / faintness / tremor		2
Tinnitus	1	1
hearing loss		1
lower abdominal pain / menstrual pain	1 (endometriosis)	2
visual impairment / vision loss		1 (multiple sclerosis / neuritis nervi optici)
numbness / tingling		3 (1 multiple sclerosis)
allergy / allergic shock		2
insomnia		
hypothermia	1	
hardening in cheek area	1	
appendicitis	1	
immunodeficiency		1
grief		1

Note: Numbers represent how many subjects self-reported any symptoms; numbers in brackets represent possible self-reported chronic diseases, which might be the cause of such symptoms.

Figure Caption

Figure 1: Model tested with two independent moderators.

```
┌─────────────────┐   ┌─────────────────┐
│  Moderator 1:   │   │  Moderator 2:   │
│    illness      │   │    negative     │
│    anxiety      │   │   affectivity   │
└─────────────────┘   └─────────────────┘
          \                    \
           \                    \
┌─────────────────────┐   ┌─────────────────────┐
│ UV: health concerns │   │ AV: health concerns │
│ about symptom (t1)  │──▶│ about symptom (t2)  │
└─────────────────────┘   └─────────────────────┘
```
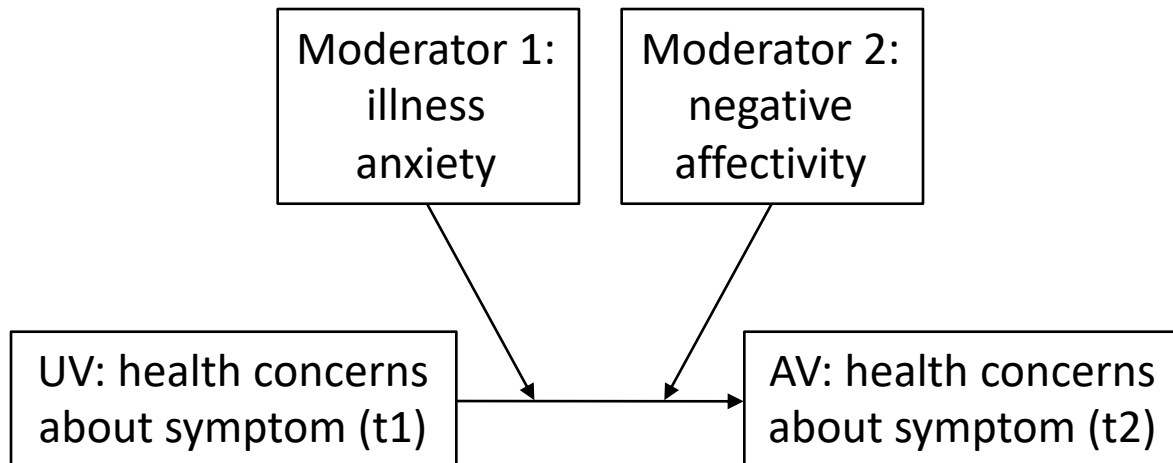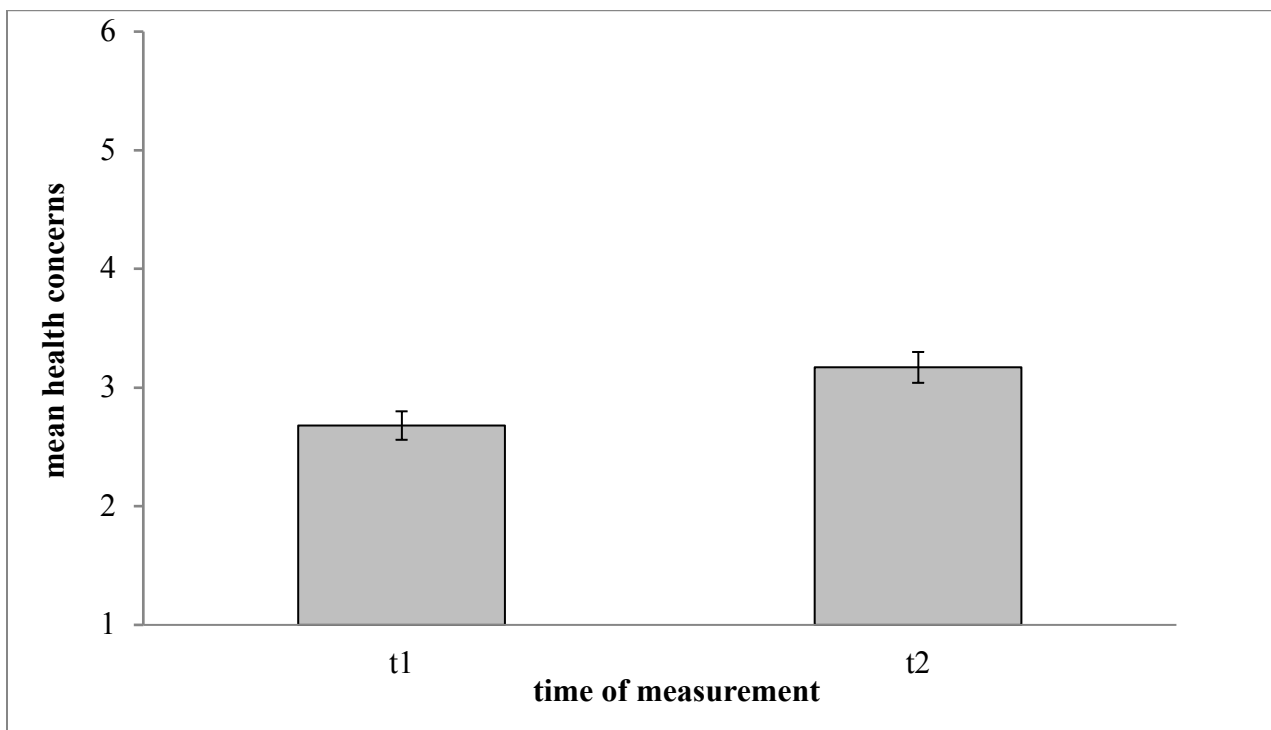
Figure 2. Extent of health concerns before (t1) and after (t2) internet search.

Note: Error bars represent standard errors of the mean values of health concerns about the

symptom at t1 or t2.

Figure 3. Additive moderation analysis results with unstandardized regression coefficients

Health concerns about symptom (t1) x illness anxiety

b=.02, SE=.03, *p* = .557

Moderator 1: illness anxiety

b=.03, SE=.04, *p* = .431

UV: health concerns about symptom (t1)

b=.71, SE=.08, *p* < .001

Moderator 2: negative affectivity

b=.04, SE=.01, *p* = .004

Health concerns about symptom (t1) x negative affectivity

b=-.03, SE=.01, *p* = .026
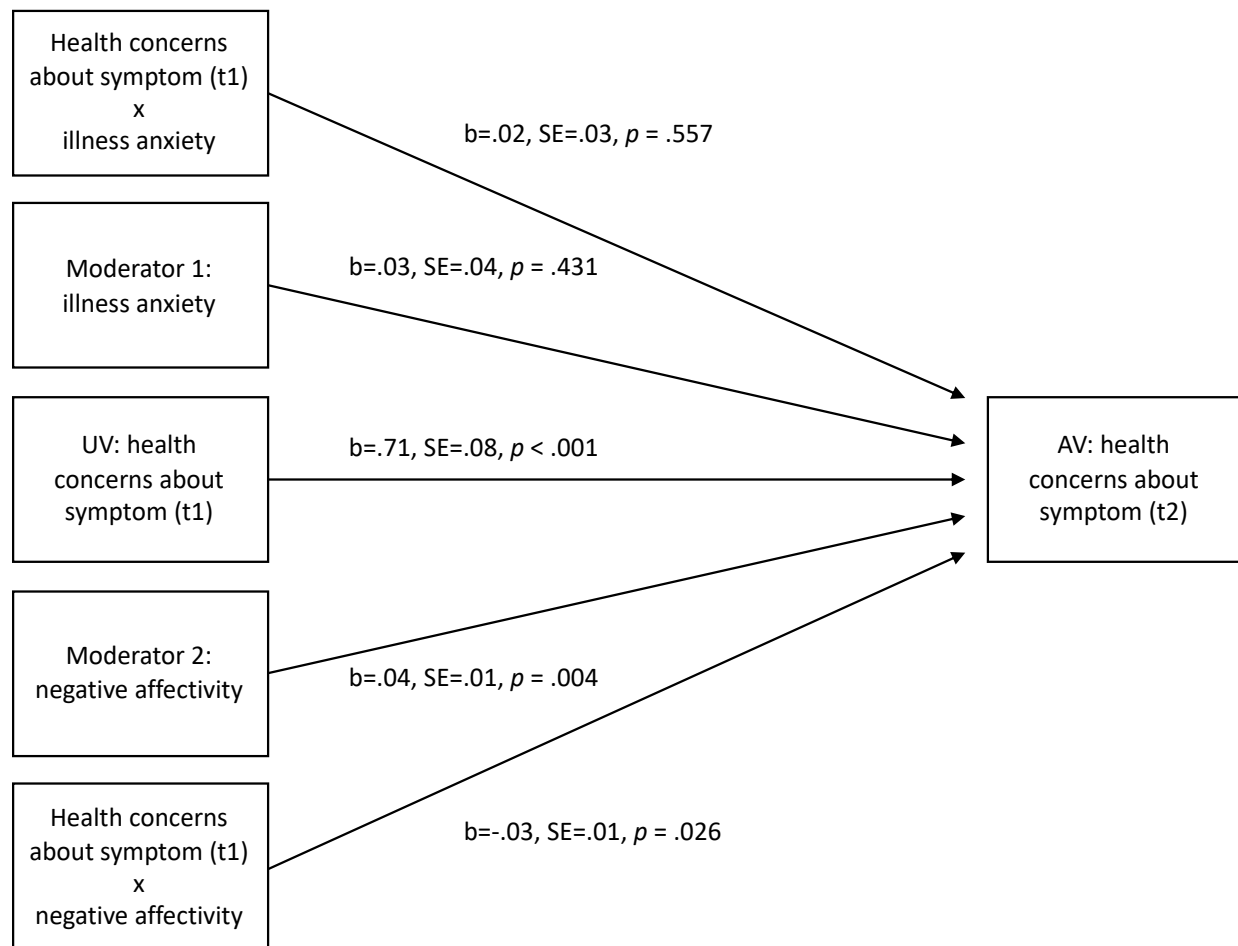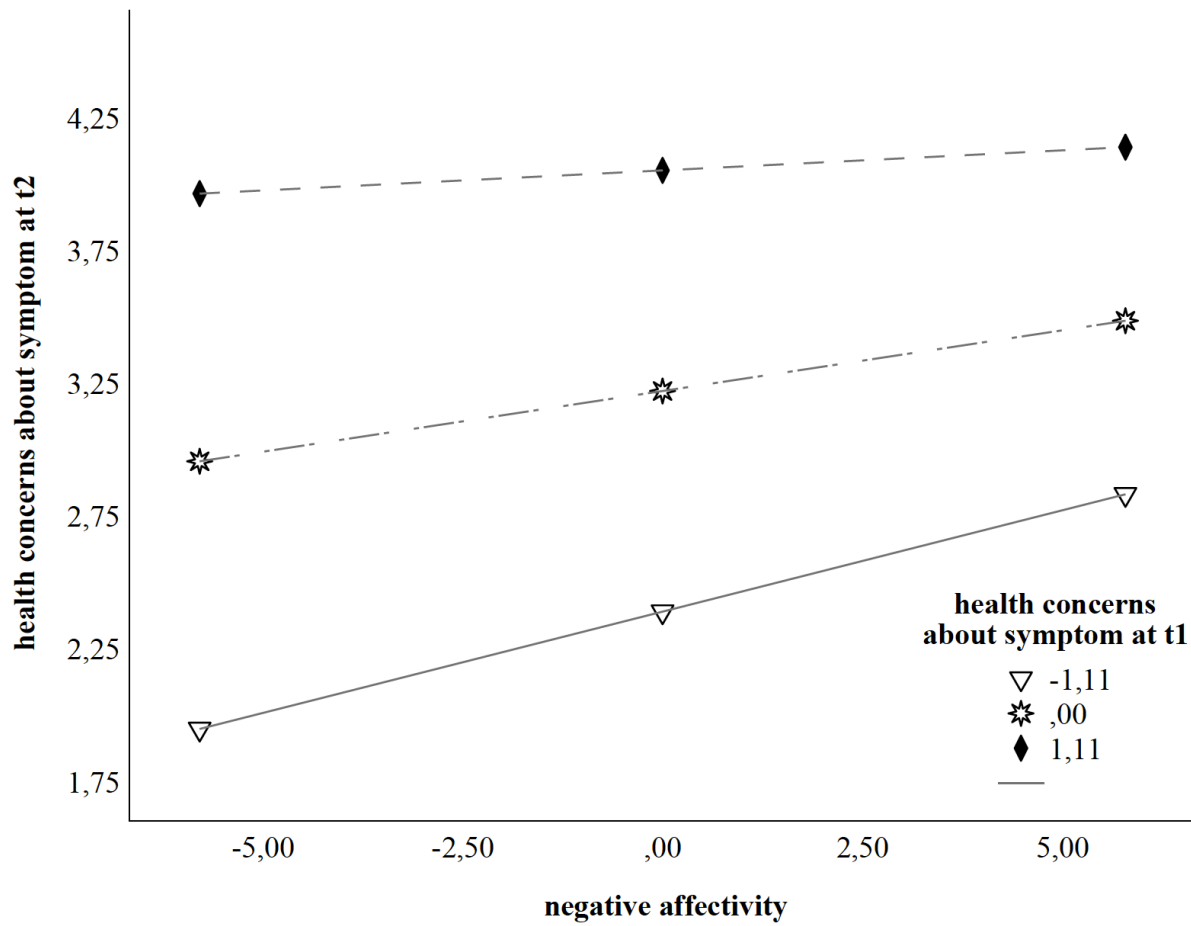
AV: health concerns about symptom (t2)

Figure 4: Influence of negative affectivity on health concerns and of the interaction between negative affectivity and the level of health concerns about the personal symptom at t1.

Note: Moderation effect of negative affectivity (b=.04, SE=0.01, p=0.004), and the interaction effect of health concerns about symptom at t1 × negative affectivity (b= -.03, SE=.01, p = .026).