



How Positively Valenced Health Messages can Foster Information Selection: Evidence from Two Experiments

Alexander Ort^{1*}, Perina Siegenthaler² and Andreas Fahr²

¹Department of Health Sciences and Medicine, Universität Luzern, Luzern, Switzerland, ²Department of Communication and Media Research, Université de Fribourg, Fribourg, Switzerland

Objective: Positively valenced appeals have received comparably less attention than negative appeals. However, messages utilizing negative emotions have been repeatedly criticized, and research has demonstrated the beneficial effects of applying positive emotionally-charged messages. Therefore, this study investigates the impact and effectiveness of positive to negative messages.

Design: In two studies ($N_1 = 108$, $N_2 = 355$), participants were exposed to one video about healthy eating and exercising, which was manipulated concerning valence (positive vs. negative).

Main Outcome Measures: We assessed efficacy perceptions and attitudes toward healthy eating and exercising as well as participants' selection of topic-related information on a mock-up website immediately after message exposure.

Results: A positive emotional experience led to stronger efficacy perceptions, which promoted attitudes toward the displayed behavior but not information selection (Study 1). A more diverse sample in a follow-up replication (Study 2) substantiated these findings. Additionally, it demonstrated that being affected by a health issue has a decisive influence on the selection of information. In particular, a higher BMI negatively influenced information selection when efficacy perceptions were high.

Conclusion: The study demonstrates the double-edged nature of strengthening efficacy expectations, as they can promote healthy attitudes and provide affected individuals with a false sense of security.

Keywords: persuasive messages, overweight and obesity, emotional framing, positive emotion, self-efficacy, attitude, information selection

INTRODUCTION

Health campaigns are among the most important means of health promotion and disease prevention (Snyder, 2007). Within this framework, fear appeals are commonly applied in health communication to achieve health-related goals, such as attitude and behavior change (Neurauter, 2005; Carey et al., 2013; Ruiter et al., 2014). Fear appeals are usually conceptualized to contain threatening cues with respect to health-relevant behavior that aim to trigger fear and anxiety. In addition, they include

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*Correspondence:

Alexander Ort
alexander.ort@unilu.ch

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recommendations of how the risk can be avoided or at least reduced (Maddux and Rogers, 1983; Witte, 1992; Dillard, et al., 1996; Carey et al., 2013; Ruiter et al., 2014). There is an ongoing debate in health communication (practice and academic research) about the excessive use and the possible adverse effects of such threatening or aversive appeals in health communication (Atkin, 2002; Kok et al., 2018). For this reason, there is an increased call for the utilization of more “positive” alternatives or complementary rhetorical strategies to fear appeals (Van’t Riet et al., 2009). These alternatives focus on encouraging people to behave healthily by outlining positive lifestyle scenarios instead of utilizing scaring tactics that confront the audience or target group with terrifying messages or information (Pressman and Cohen, 2005; Nabi, 2016).

Besides the doubts about the (sometimes careless) use of fear appeals, there has been criticism as to theoretical models describing or explaining health-relevant behavior rarely include information seeking as a significant and essential outcome of being confronted with (persuasive) health communication. This omission is a limitation because information-seeking represents one first and a substantial step toward health-relevant attitude and behavior reinforcement or change (Goodall and Reed, 2013; So, 2013; So et al., 2016).

Therefore, the goal of this study was to investigate and compare the effects of negative vs. positive health messages on 1) message processing, i.e., central cognitive predecessors of health-related behavior, as well as 2) the actual selection of relevant health information.

Explaining the Effects of Emotionally Charged Persuasive Health Messages

Since the beginning of a systematic investigation of fear appeals over half a century ago, various models have been proposed that aim to explain the formation of health-relevant behaviors as a result of these messages; e.g., Health Belief Model (HBM)—Rosenstock, 1960; Protection Motivation Theory (PMT)—Rogers, 1975; Rogers, 1983; Parallel Response Model (PRM)—Leventhal, 1970; Extended Parallel Process Model (EPPM)—Witte, 1992. One of the most commonly applied models is the Extended Parallel Process Model (EPPM; Witte, 1992), which postulates that cognitive processing of a fear appeal, besides the resulting emotional experience, mainly depends on threat and efficacy cues within the message. The model proposes that confrontation with a fear appeal will result in two appraisal processes. For one, individuals assess their risk (threat appraisal). If they perceive the threat as low, the contents of the message will have no further impact. If threat perceptions are strong enough, this will trigger emotional reactions (i.e., fear or anxiety) and promotes further message processing. Individuals then weigh their perceptions of threat against their efficacy perceptions, i.e., their capability to act and the effectiveness of these actions (coping appraisal). On the one hand, a weak coping appraisal will result in maladaptive responses (fear control), such as reactance, denial, or refusal of change in attitude and behavior. On the other hand, a sufficiently strong coping appraisal will promote adaptive reactions (danger control), such as message

acceptance and change in attitudes (i.e., thoughts and beliefs about the proposed behavior) or message compliant behaviors.

After investigating the effectiveness of fear appeals for over 60 years (for a meta-analytic review, see, e.g., Witte and Allen, 2000; Tannenbaum et al., 2015), researchers have reached a consensus. Usually, studies find a positive relationship between fear appeals and adaptive behavior, which is mediated by cognitive factors, such as individuals’ appraisals of threat and efficacy—whereas efficacy seems to play a more critical role than threat (Witte and Allen, 2000; Peters et al., 2013; Noar et al., 2015; Tannenbaum et al., 2015; Ort and Fahr, 2018; 2020). However, there is still disagreement as these findings might not apply to every topic, channel, or target group (Dillard et al., 2017). In addition to this, messages that induce high levels of fear run the risk of inhibiting further processing and lead to reactance reactions (Dillard and Shen, 2005; Kok et al., 2018) or create boomerang effects (Cho, 2012; Ruiter et al., 2014). Moreover, the universal application of fear appeals in campaigns can result in wear-out-effects, thus negatively affecting the effectiveness of campaigns in general (Atkin, 2002).

To avoid negative effects of aversive appeals and foster adaptive behavior, alternative strategies are increasingly discussed and investigated. A particularly promising alternative is the use of more “positively” emotionalizing content (e.g., within the context of gain-loss-frames; e.g., Rothman and Salovey, 1997; O’Keefe and Jensen, 2007; O’Keefe and Jensen, 2008; Gallagher and Updegraff, 2012) or entertaining features (Moyer-Gusé and Nabi, 2010). Messages applying such characteristics operate differently than conventional fear appeals (Peters et al., 2013; Nabi and Green, 2015). Applying those positive frames does not change the significance of the underlying health-risk but alters the way of addressing it. These approaches have in common that they—in one way or another—potentially elicit a “positive” emotional experience. The assumption is that such experiences mitigate the unfavorable effects of threatening persuasive appeals, thus contribute to fostering health-beneficial outcomes by promoting favorable message processing and efficacy perceptions (Fredrickson, 2001; Fredrickson and Cohn, 2008; Fredrickson, 2013; Quoidbach et al., 2015).

Research in emotional psychology empirically confirms that a positive emotional experience—related to, e.g., prospects of success or luck—can foster attention and benefit information processing, promote efficacy perceptions, and ultimately lead to adaptive behavioral outcomes. Important outcomes include information-seeking or behavior change (Broaden and Build Model of Positive Emotions; Lazarus et al., 1980; Monahan, 1995; Fredrickson, 2001; Lewis et al., 2007; Martin, 2010; Prestin and Nabi, 2012; Fredrickson, 2013; Yang and Lee, 2016). Moreover, positive emotional experiences are well-suited to reduce chances of resistance toward persuasive messages (Atkin, 2002; Van’t Riet et al., 2009; Yang and Lee, 2016).

Irrespective of the favorable impact of promoting positive emotions, their use in health campaigns has been studied far less to date than the effects of fear appeals (e.g., Lewis et al., 2007; Nabi, 2016). Therefore, this study’s first contribution is to explicitly compare the effects of negative vs. positive health

messages on central cognitive predecessors of health-related behavior, i.e., efficacy perceptions about and attitudes toward the targeted health behavior.

Health Information Seeking and Information Selection

Models and theories that try to explain health-related behavior focus either on cognitive indicators for message processing and related constructs (e.g., reactance and attitude) or take an outcome-oriented perspective (e.g., intentions to act or actual behavior). However, while effects on message processing are consistently verified, research often struggles to provide evidence for behavior-related outcomes (Snyder et al., 2004; Snyder, 2007; Kok et al., 2018). That is why selecting health-relevant information can be an additional outcome that can be considered a preliminary step or proxy for adaptive reactions. It is expected that the selection of information related to the presented topic results from favorable processing of the presented information—i.e., persuasive health messages within the extension of the EPPM—and can, therefore, serve as a proxy for information-seeking processes triggered by those messages. (So, 2013). The fact that the search and selection of additional information concerning a health-topic represent an essential step toward achieving behavior-related goals substantiates this assumption and demonstrates its significance within these contexts (Johnson and Case, 2012). For example, information seeking is seen as the first favorable stage toward adaptive behavior (danger control; Goodall and Reed, 2013; So, 2013) and plays an important role in triggering health-related behaviors (Shi et al., 2004; So et al., 2016). Specific actions include web searches, selecting health-related TV-programs, or personal conversations with friends or health-experts (Niederdeppe et al., 2007).

The benefit of considering the search and selection for health information as an important and additional outcome is supported by the fact that, especially in times of digital media, relevant health-related information is easily accessible. Nowadays, more and more people autonomously look for information related to health, wellness, or illness (especially on the Internet) instead of (solely) consulting health-professionals, such as physicians, pharmacists, or dietitians (Xiao et al., 2014). Thus, besides reinforcing or changing attitudes and behaviors, promoting the search and selection of relevant information is becoming more important in health communication.

Information seeking as a self-determined behavior has received much scientific attention. However, searching and selecting information as an immediate response triggered by persuasive health messages has mainly been neglected (except for, e.g., Dillman Carpentier and Parrott, 2016; Phua and Tinkham, 2016, So et al., 2016; Myrick, 2017). In light of its importance and health promotional potential, the second contribution this study wants to make is to shed light on the possibilities of utilizing positively and negatively framed health messages to trigger people to turn toward corresponding additional information.

Research Interest

The previous theoretical implications and empirical evidence provide the framework for the studies in this article. Consequently, they will focus on two aspects: First, there is still a lack of research to explain the effect of invoking positive emotions while processing health-related messages, especially when compared to negative emotional experiences. Second, there is a lack of knowledge on health-relevant (topic-related) information seeking as an outcome of message processing (unlike, e.g., Hastall and Knobloch-Westerwick, 2013; So et al., 2016). Taking a closer look at this behavior-related dependent variable (in addition to cognitive indicators such as efficacy perceptions and attitudes) might offer valuable insights into underlying processes and effects.

The model under investigation proposes that exposure to a positive emotionally-charged message leads to a more positive emotional experience (*H1*). Subsequently, and based on findings in persuasive health communication and emotional psychology outlined above (e.g., Fredrickson, 2001; Fredrickson, 2013; Tannenbaum et al., 2015), a positive emotional experience will indirectly and positively impact the selection of health-relevant information through its positive impact on efficacy perceptions (*H2a* and *H2b*). Furthermore, being in a positive emotional state will indirectly and positively impact the selection through a beneficial effect on attitudes (*H3a* and *H3b*). Finally, following the propositions of the EPPM (Witte, 1992), it is expected that efficacy perceptions promote attitudes toward healthy eating and exercising (*H4*). For an overview of the proposed serial mediation model, see **Figure 1**.

STUDY 1

Materials and Methods

Design

To assess the relationships between positive emotional experience, perceived efficacy, attitude, and information-seeking, a one factorial online-experiment was conducted. Participants saw a health-related video about overweight and obesity consequences for individual health (promoting fitness and a healthy diet). Fighting overweight and obesity are significant challenges facing society related to health, especially in industrialized countries (World Health Organization, 2020). The prevalence of both overweight and obesity has increased over the past decades. According to the World Health Organization (2020), overweight¹ and obesity² has nearly tripled between 1975 and 2020. A lifestyle lacking exercise and physical activity, unhealthy diets (mainly consisting of high-energy food), and overeating are major causes for this development. The topic is discussed concerning aesthetics and even more important concerning its significant influence on the perceived quality of life and related secondary diseases (Osei-Assibey et al., 2016). Beyond the severe individual consequences, the prevalence of overweight and obesity in the general population can also affect a country's economic performance and

¹BMI \geq 25.

²BMI \geq 30.

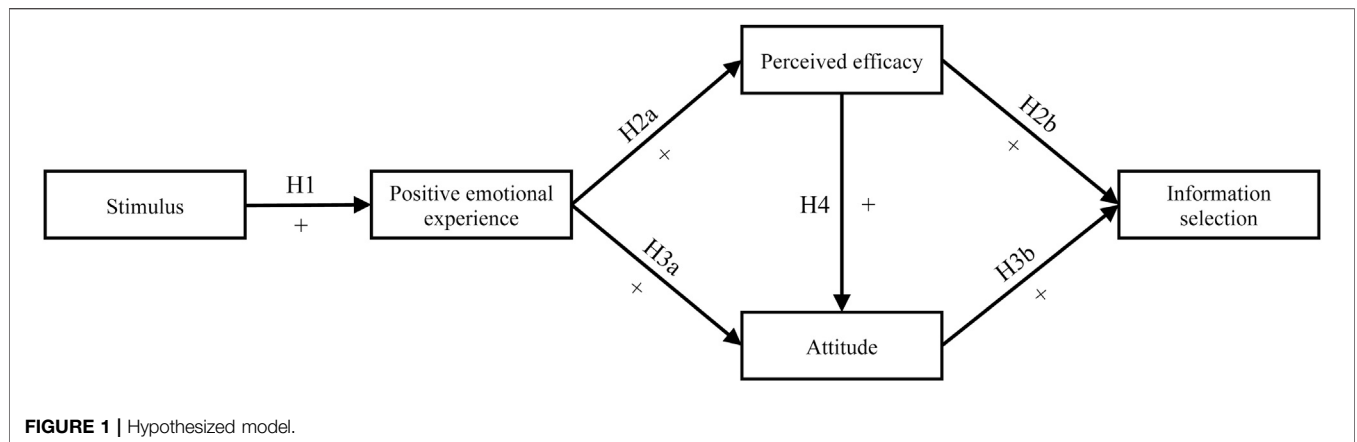


FIGURE 1 | Hypothesized model.

substantially increase social costs (Lehnert et al., 2013; Dobbs et al., 2014).

The video’s manipulation through emotional framing aims to create different valence experiences, either positive or negative (independent variable). A modified extract from the documentary “Fat, sick, and nearly dead” (parts one and two; Cross and Engfehr, 2011; Engfehr, 2014) served as a basis to create the stimulus material. In these documentaries, Joe Cross, an Australian traveling the United States, only drank fruit and vegetable juice for over six months to lose weight. On his journey, he meets Phil, an American truck driver. When they meet, Phil is heavily overweight and, as a result, suffers from severe health issues. Motivated by Joes’ achievements, Phil also starts to drink juice and successfully reduces weight (ending of the stimulus with the positive and encouraging ending; 3:43 min). However, in the second part of the documentary, it is shown that this success did not last for long, and Phil eventually even gains more weight (ending of the stimulus with the negative ending; 4:47 min). Both versions impact the emotional experience (mediator 1) of the participants. By also considering Affective Disposition Theory (Zillmann, 1996), the positive emotional experience will result from shared joy with the successful protagonist. This, in turn, should lead to higher efficacy beliefs (mediator 2).

Participants were recruited at University of Fribourg (Switzerland), a mid-sized European university. Data collection took place between the 19th and April 29, 2016. After data cleansing, i.e., removing outliers due to too short or too long response time, the sample consisted of 108 cases (68% female) with an average age of 29 years ($M = 28.73$; $SD = 10.81$). Participants randomly saw one version of the stimulus—each version was viewed by 54 individuals. After seeing the video, participants completed a questionnaire that assessed the central variables of the EPPM, two dependent variables (attitude toward healthy eating and exercising and actual information selection), and demographic information.

Outcome Measures

Emotional Experience

A modified and translated version of Izard (1977) Differential Affect Scale (DAS; Renaud and Unz, 2006) was used to assess the emotional

experience related to the documentary. Single-items measured distinct emotional states about the video, i.e., joy, happiness, or fear, on a 5-point Likert-type scale (1 = ‘not at all,’ 5 = ‘very strong’). For the research interest, only the positive emotional experience of participants was of further relevance. Therefore, an index for positive emotional experience was build (joy, happiness, interest, affection, content, and trust; $M = 2.37$, $SD = 0.82$, $\alpha = 0.80$; see Table 1).

Efficacy Perceptions

Perceived efficacy was measured based on Witte (1996) Risk Behavior Diagnostic Scale (RBS). Items indicated participants’ perceptions of self-efficacy and response efficacy with respect to the addressed issue (e.g., ‘If I eat healthily, I am less likely to become overweight.’) on a 5-point Likert-type scale (1 = ‘strongly disagree,’ 5 = ‘strongly agree’). Respective items were combined to form an index of perceived efficacy ($M = 4.35$, $SD = 0.84$, $\alpha = 0.89$).

Attitude

The attitude toward healthy eating and exercising was measured in accordance to the Theory of Planned Behavior (Ajzen, 1991) asking participants to give their opinion on healthy nutrition and exercising behavior, each on a five-item, 5-point, semantic differential scale

TABLE 1 | Study 1: means, standard deviations, Pearson zero-order correlations, and internal consistencies/correlations.

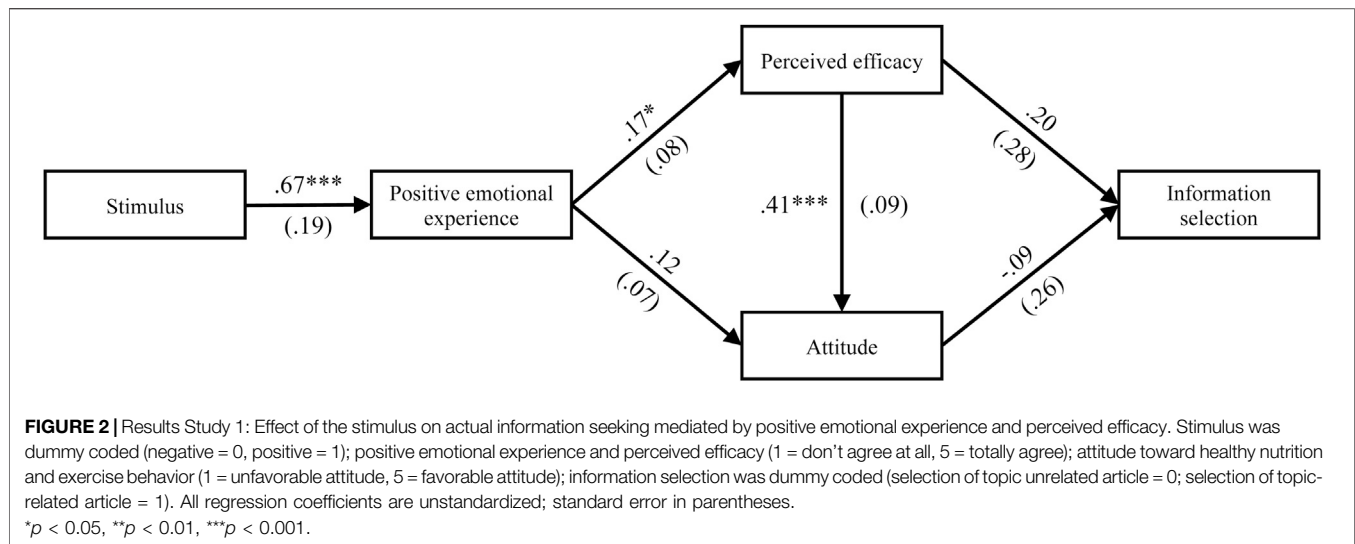
Variable	M	SD	1	2	3	4
1 Stimulus ^a	—	—	—			
2 Positive emotional experience	2.37	0.82	0.23*	(0.80)		
3 Perceived efficacy	4.35	0.84	0.03	0.23*	(0.89)	
4 Attitude	4.36	0.62	0.08	0.22*	0.43***	(0.87)
5 Information seeking (behavior) ^b	0.35	0.48	-0.07	-0.05	0.05	-0.03

Note. $N = 108$; matrix diagonal (in parentheses): Cronbach’s alpha; $M =$ mean; $SD =$ standard deviation.

^aDummy-coded (0 = negative, 1 = positive)

^bDummy-coded (0 = no relevant selection, 1 = health-relevant selection).

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



(e.g., 'bad-good,' or 'advantageous-disadvantageous'). Both were averaged to form a reliable index ($M = 4.36$, $SD = 0.62$, $\alpha = 0.87$).

Selection of Topic-Related Information

To observe the actual selection of topic-related information as a proxy for adaptive outcomes triggered by the presented information, participants subsequently saw a mock-up website that contained four articles. One of the articles contained health-relevant information about nutrition and exercising behavior. The other three topics addressed non-health-relevant issues (see **Appendix**). Participants were instructed to select and read one out of these four articles—their selection was logged (Leiner et al., 2016) and dichotomized (0 = non-health-relevant articles; 1 = health-relevant article; 35% of participants chose the topic-related article).

Control Variables (Parasocial Processing, Health Condition, Body Mass Index)

Since exposure to narrative media formats provides the opportunity for parasocial processing (Bilandzic and Busselle, 2013), measurement of this construct included items like 'I was intensively thinking about Phil's behavior' or 'I would like to get to know Phil in person' (Schramm and Hartmann, 2008) on a 5-point Likert-type scale ranging from 1 'strongly disagree' to 5 'strongly agree' ($M = 2.47$, $SD = 0.73$, $\alpha = 0.70$). In addition, participants' subjective health status was measured using a single item ranging from 1 = 'excellent', 5 = 'bad'; $M = 2.33$, $SD = 0.88$) as well as their individual BMI ($M = 22.86$, $SD = 3.27$).

Results

Preceding correlation analyses substantiate initial assumptions about dependencies between variables of interest (see **Table 1**). Data were analyzed using Hayes's PROCESS macro extension for SPSS by specifying a customized serial mediation analysis with two levels (Hayes, 2018; V 3.5; 10,000 bootstrapping samples, 95% confidence intervals [CI]). The stimulus was entered as the independent variable (dummy coded; negative = 0, positive = 1), and the index of experienced positive emotions was entered as a first-level mediator.

Subsequently, perceived efficacy and attitude were entered as second-level mediators, while the selection of information was entered as the dependent variable (see **Figure 1**). As PROCESS follows an OLS regression/General Linear Modeling approach, the analysis not only accounts for the hypothesized effects, but also includes all other direct and indirect effects. For reasons of clarity, these non-hypothesized effects will only be reported in case they reach significance.

First of all, the model reflects the successful manipulation of positive emotional experiences by both versions of the stimuli. The positive version led to higher levels of positive emotional experience than the negative version ($b = 0.67$, $SE = 0.19$, $p < 0.001$, 95% CI [0.28, 1.04]; $H1$ confirmed; all regression coefficients [b] are unstandardized).

Results (see **Figure 2**) furthermore attest a beneficial relationship between positive emotional experience and perceived efficacy ($b = 0.17$, $SE = 0.08$, $p = 0.017$; $H2a$ confirmed), while experiencing positive emotions was not found to be related to attitudes ($b = 0.12$, $SE = 0.07$, $p = 0.113$; $H3a$ not confirmed). However, positive framing indirectly impacts attitude through its positive influence on efficacy perceptions ($b = 0.41$, $SE = 0.09$, $p < 0.001$; $H4$ confirmed). While attitudes as an indicator of adaptive reactions toward the message were positively influenced by the positive stimulus, no significant relationships emerged for the selection of information. Neither efficacy perceptions ($b = 0.20$, $SE = 0.29$, $p = 0.476$) nor attitudes ($b = -0.09$, $SE = 0.26$, $p = 0.735$) could be related to this immediate measure for behavior. Therefore, $H2b$ and $H3b$ had to be dismissed.

Discussion Study 1

Individuals with a higher level of positive emotional experience show a more pronounced efficacy-perception. In turn, this positive appraisal leads to a more favorable attitude toward the proposed health behavior, i.e., healthy nutrition and exercise. However, there was no effect on the actual selection of information. One explanation might be that the message did neither explicitly encourage participants to search for further information, nor were they instructed to do so immediately after seeing the stimulus. The fact that the investigated sample mainly consisted of young people with normal body weight

TABLE 2 | Study 2: means, standard deviations, Pearson zero-order correlations, and internal consistencies/correlations.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4
1 Stimulus ^a	—	—	—			
2 Positive emotional experience	2.83	1.21	0.26**	(0.88)		
3 Perceived efficacy	4.19	0.69	-0.02	0.11*	(0.82)	
4 Attitude	4.45	0.52	-0.03	0.18**	0.50***	(0.73)
5 Information seeking (behavior) ^b	0.55	0.50	0.07	0.05	0.01	-0.01

Note. *N* = 355; matrix diagonal (in parentheses): Cronbach's alpha; *M* = mean; *SD* = standard deviation.

^aDummy-coded (0 = negative, 1 = positive);

^bDummy-coded (0 = no relevant selection, 1 = health-relevant selection).

p* < 0.05, *p* < 0.01, ****p* < 0.001.

(BMI: *M* = 22.86, *SD* = 3.27) who perceived their subjective health status as good (*M* = 2.33, *SD* = 0.88; 1 = “excellent,” 5 = “bad”) might have contributed to this result. These factors may have also contributed to low threat perceptions (susceptibility: *M* = 2.16, *SD* = 1.13; 1 = “do not agree at all,” 5 = “totally agree”; Witte, 1996) which might have inhibited the selection of relevant information after confrontation with the message.

Additionally, participants indicated low levels of relating to the displayed character (PSI: *M* = 2.47, *SD* = 0.73). This lack of perceived similarity of the rather normal-weight sample with the obese protagonist might promote pity or compassion rather than sympathy and suppress information selection. Some participants might even have felt an urge to distance themselves from the character. This contrast-effect—as opposed to the so-called assimilation-effect, which results in individuals to orient themselves toward a media character (Mussweiler, 2003)—might have even amplified this effect.

Concluding, it seems that encouraging emotional framing of health information has beneficial effects on key determinants for health-behavior, i.e., efficacy perceptions and attitudes toward healthy nutrition and exercising. However, a lack of relevance of the topic might have suppressed the hypothesized effect on information selection. To address these issues and further shed light on the underlying processes, the study was replicated.

STUDY 2

Materials and Methods

Research design, procedure, measures³ (see Table 2), and stimulus material remained mainly unchanged for the second study. One exception was the information selection website. As the first study focused on a German-speaking sample, the site was slightly modified and translated to English (see Appendix).

³Positive emotional experience: *M* = 2.83, *SD* = 1.21, α = 0.88; perceived efficacy: *M* = 4.19, *SD* = 0.69, α = 0.82; attitude: *M* = 4.45, *SD* = 0.52, α = 0.73; information seeking (dummy-coded; 0 = non-health-relevant articles; 1 = health-relevant article): *M* = 0.55, *SD* = 0.50.

A sample of United States participants was recruited via Amazon Mechanical Turk. Participants were required to be at least 18 years old and must not have seen the documentary yet. After completing the survey, they received a compensation of 1 US\$, which corresponds to the regularly offered compensation on the platform for this kind of HIT (Human Intelligence Task). Data collection took place between 16th and 28th of February 2018. After removing outliers due to too short or too long response time, the final sample consisted of 355 mid-aged participants (*M*_{age} = 38.73; *SD*_{age} = 10.81; 65% female) and an average BMI of 27.0 (*SD* = 7.31). In comparison, the average BMI in Study 1 was 22.9 (*SD* = 3.27).

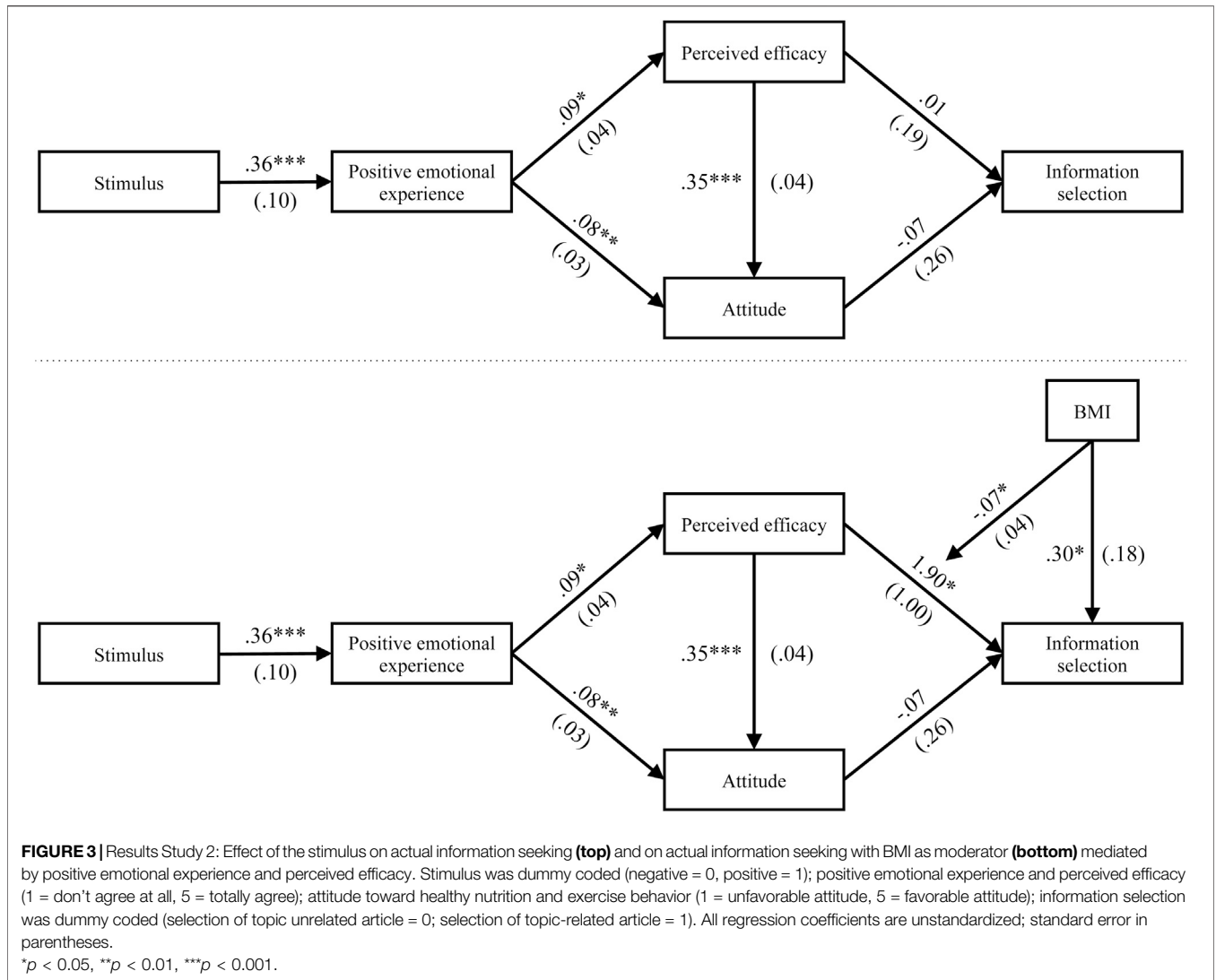
Results

The initial correlation analysis results are displayed in Table 2 and provide first evidence for the relationships between the analyzed factors. As in Study 1, the analysis demonstrates the successful manipulation of participants' emotional experiences. Participants in the positive stimulus group reported stronger positive emotional experiences than participants in the negative condition (*b* = 0.36, *SE* = 0.10, *p* < 0.001).

Results (see top of Figure 3) reconfirm findings of Study 1. First, they substantiate the beneficial relationship between positive emotional experience and perceived efficacy (*b* = 0.09, *SE* = 0.04, *p* = 0.024; *H2a* confirmed). In turn, attitudes toward healthy nutrition and exercising are positively impacted by efficacy perceptions (*b* = 0.35, *SE* = 0.04, *p* < 0.001; *H4* confirmed). In contrast to the first study, a significant relationship between positive emotional experience and attitudes was found (*b* = 0.08, *SE* = 0.03, *p* = 0.003; *H3a* confirmed). In sum this means that the effect of positive emotional experience on attitudes is not only mediated through efficacy perceptions but can also be promoted by positive emotional experiences alone. The results for information selection as dependent variable also replicate the pattern found in Study 1. Accordingly, neither perceived efficacy (*b* = 0.01, *SE* = 0.19, *p* = 0.493) nor attitude (*b* = -0.07, *SE* = 0.26, *p* = 0.396) were significantly related to information selection (*H2b* and *H3b* rejected).

Additional Analysis: The Moderating Effect of Body Mass Index

One explanation for the absence of a significant relationship between the second-level mediators and the dependent variable might, just like in Study 1, be a lack of immediate relevance for participants with normal body weight (BMI). In an additional analysis, participants' BMI was included as a proxy for relevance and modeled to moderate the relationship between perceived efficacy and attitudes on information selection. Indeed, the extended model provides evidence for a direct (*b* = 0.30, *SE* = 0.18, *p* = 0.043) as well as moderating effect (*b* = -0.07, *SE* = 0.04, *p* = 0.036) of BMI on the now significant relationship between perceived efficacy and the selection of information (*b* = 1.90, *SE* = 1.00, *p* = 0.024; see bottom of Figure 3). Thus, participants with a higher BMI were more likely to select the information related to nutrition and exercising behavior, irrespective of their efficacy perceptions.



However, if efficacy perceptions were high, participants with a higher BMI are less likely to seek further health risk information.

GENERAL DISCUSSION

The first goal of this research was to bridge gaps regarding the beneficial effects of emotionally positive (compared to negative) framed health information on message processing. To get a more comprehensive understanding of the underlying mechanisms (Noar et al., 2015), both studies not only accounted for the actual emotional experiences as a first-level affective mediator but also for participants' perceptions of efficacy as well as their attitudes as central second-level cognitive mediators. Thereby, this study follows the theoretical assumptions laid out by the Extended Parallel Process Model (Witte, 1992). Results confirm a beneficial relationship between positive emotional experience and efficacy perceptions. Moreover, they were also positively related to more favorable attitudes toward healthy nutrition and exercise.

Moreover, Study 2 also demonstrated that positive emotions, in addition to their indirect relationship through efficacy perceptions, can also directly promote favorable attitudes.

Another goal was to examine whether the emotional framing would impact immediate behavior-related outcomes (i.e., information-selection as part of information-seeking behavior, which can be seen as a predecessor for actual behavior change; Freimuth et al., 1989; Johnson and Case, 2012; Goodall and Reed, 2013; So, 2013). Contrary to the assumptions, no effect on the selection of information emerged. Findings indicate that solely charging messages with positive emotional cues—although improving efficacy perceptions and attitudes—might not suffice to persuade people to take action, i.e., reflected by a selection of topic-related information.

Contrary to the assumptions, participants did not further engage with the issue—at least immediately after exposure. One explanation that comes to mind is that people are used to persuasive health messages threatening their positive mood as they include information about a potential loss of a current state

of health and urge people to change their insufficiently healthy behavior (Dillard and Shen, 2005; Basil and Witte, 2011; Cho, 2012). Therefore, looking for further information immediately after being confronted with messages whose content has a positive valence might be seen as an additional threat for this (maybe unexpected) pleasant state. As individuals aim to sustain positive emotional states (Zillmann, 1988), people might prioritize unrelated topics.

The fact that the hypothesized effect on information selection only occurred when including participants BMI as a moderator⁴ in Study 2 underlines the importance of topic relevance for health message effectiveness (So et al., 2017). This factor's importance emphasizes the need for practitioners to gather a sufficient amount of information about the relevance of the information to be communicated for a targeted audience before designing or launching a campaign. It also underlines the importance of considering this factor in research on health messages—especially when investigating actual behavioral outcomes. One way of doing this might be to deliberately aim at creating variance concerning participants being affected by the topic under study. Interestingly, BMI negatively interacted with efficacy perceptions. Individuals with a higher bodyweight that hold higher perceptions of efficacy to tackle weight-related issues were less likely to select health-related information. One explanation is that these participants did not see an urgent need to look for further information, as they might have believed to be on top of these issues. This demonstrates the potential drawbacks of strengthening efficacy expectations, as they can provide people with a false sense of security.

Overall, this study's results encourage the use of positive strategies in persuasive health communication as they can promote efficacy perceptions and attitudes toward health-promotional behavior (Monahan, 1995; Van't Riet et al., 2009). Promoting their use is even of greater importance as negative messages (especially the use of fear appeals) increases the risk of undesirable side-effects (e.g., reactance; Van't Riet et al., 2009; Yang and Lee, 2016; boomerang effect; Atkin, 2002). However, promoting efficacy perceptions cannot be seen as general means to improve health-behaviors. But particular caution is required for affected audience groups. Although participants with higher BMI in this study were generally more likely to select topic-related information, high efficacy perceptions negatively affected this selection. Such a lack of triggering the selection of topic-related information can be interpreted as a false sense of security, inhibiting further behavioral actions.

LIMITATIONS AND FUTURE RESEARCH

On a methodological note, the choice to increase external validity using an existing documentary resulted in different lengths of both stimulus versions (positive ending: 3:42 min; negative ending: 4:47 min). Such a difference might have contributed to a different perception of the documentary, e.g., narrative engagement or identification with the character. However,

indicators such as PSI with the character, message judgment, and source credibility did not reveal any peculiarities. Even though this difference in duration did not substantially impact the findings of this study, future studies should seek to apply more balanced stimuli. In addition to this, it seems essential to include a measurement that allows capturing post-exposure information seeking. This would allow for analysis of behavioral actions that materialize not immediately after message exposure but at a later stage.

Methodologically, this study uses an immediate selection of information as a proxy for information seeking processes triggered by the stimulus call for discussion. Forcibly exposing participants to a website with articles out of which they had to select and read one limits the results' generalizability. Confronting people with a persuasive message that challenges their current behavior or communicates new information certainly might be able to trigger information seeking, e.g., as a result of uncertainty or curiosity. However, information seeking can also be conceptualized as a self-initiated action, resulting from involvement with a topic or interest in a specific issue. Future research might apply more elaborate methods of user tracking to account for this aspect and assess less artificial patterns of information seeking behavior.

Another factor that calls for further attention is individuals' coping styles (Miller, 1995). As So (2013) already mentioned in her work about the Extended Parallel Process Model's extension, peoples' way of dealing with uncertain (threatening) situations is an essential factor that can help explain why people engage or abstain from further information seeking. While people with a "monitoring" coping style are likely to look for more information in such situations, people with a rather "blunting" style are more likely to avoid further information. Future research should control for this individual characteristic when investigating information seeking as an outcome of health-relevant information.

Finally, it is necessary to reflect on the investigated samples critically. As data analyses demonstrated, the addressed topic's relevance most likely was low for most/all participants of the first study. The lack of participants with higher BMI ruled out the possibility to account for this factor in further analysis. On a related note, another potential constraint relates to the cultural difference between samples in the two studies. As the documentary takes part in the United States, participants in Study 1 might have had more significant problems relating to the content and protagonist than participants in Study 2 (MTurk sample of US-Citizens). Nevertheless, as both samples displayed similar effect patterns, we can be confident that our analyses revealed stable and culturally independent effects.

CONCLUSION

In sum, this research finds support for the assumption that positively valenced messages can support efficacy perceptions and health promotional attitudes. Regarding information-seeking, the results underline the importance of accounting for people's involvement, especially when they already hold high efficacy perceptions. Particularly in light of the risk that negative emotional frames can lead to unintended effects, the results

⁴BMI directly and positively influenced the selection of information.

encourage using positive persuasive health communication strategies. Such strategies can promote favorable attitudes toward healthy behavior in general. Therefore, they are also suitable to raise awareness or influence perceptions of a specific topic. Nevertheless, this strategy can provide people with a false sense of security and foster false beliefs in their ability to overcome the health risk. To overcome this potential postponement of behavioral actions, campaigners should specifically address relevance and call for immediate action.

DATA AVAILABILITY STATEMENT

The datasets generated for this study are available on request to the corresponding author.

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ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

Conceptualization (main idea, theory): AO, AF; Methodology (design, operationalization): AO, AF; Data Collection: AO (AF); Data Analysis: AO, PS (AF); Writing (original draft preparation): AO, PS; Writing (review and editing): AO, PS (AF); Visualizations: AO, PS.

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

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APPENDIX



FIGURE A1 | Mock-up websites used for information selection in study 1 (top) and study 2 (bottom).