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### Tailored health communication in a digital world

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## 9. Tailored Health Communication in a Digital World

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### Abstract

Technology has gained an important role in health communication in recent decades. One example is the use of health technology for tailoring, i.e., using adapted, rather than generic, messages based on the receiver's unique characteristics and preferences. ASCoR researchers have investigated content tailoring, mode tailoring, and message frame tailoring, in the context of multiple topics (e.g., cancer treatment and smoking cessation), applying different methodologies. The results of these studies highlight the potential of tailoring health messages. In particular, tailoring of intervention content and delivery mode seem to be promising approaches to enhance effective health communication. Implications for practice and theory are discussed, as well as future directions, with technological developments high on our health communication research agenda.

**Keywords:** content tailoring, mode tailoring, message frame tailoring, customisation, health communication

### Introduction

In the past decennia, healthcare has changed; from disease-centred to patient-centred, from single-disease-focused to multi-disease-focused, and from not only focused on treatment but also on prevention. These shifts highlight the diverse needs of the general population, patients, and clinicians. However, generic health communication has failed to meet individual needs and to address personal differences determining health (behaviour).

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Although targeting (i.e., customising messages to shared characteristics of population subgroups) is an initial step towards making health communication personally relevant, this strategy is unable to accommodate all these personal differences. Tailoring, in contrast, refers to presenting health content in a manner that suits the preferences and characteristics of an individual person (Kreuter & Skinner, 2000). Tailored messages provide personalised information, stimulate self-referent encoding, are perceived as more personally relevant, are better processed, and are generally more effective than generic messages (Lustria et al., 2016).

Tailoring—further explained in the first part of this chapter—has been an important line of research in health communication at ASCoR. ASCoR researchers have focused on various aspects and types of tailoring, which will be further explained in the second part of this chapter, along with the main results that have been found. In the third part of the chapter, the implications of the work for health communication theory and practice are described. Finally, the chapter includes reflections regarding future directions of research in health communication.

### **Types of tailoring**

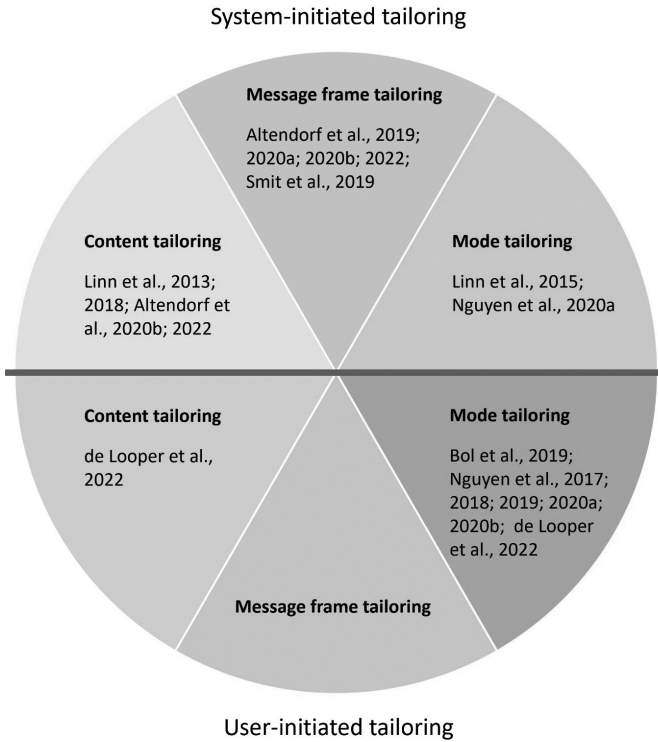
Tailoring can be defined as “system-initiated tailoring” (data-driven personalisation performed by a computer system) or “user-initiated tailoring” (customisation or self-tailoring, through which users themselves can modify the form and/or content of the message) (Sundar & Marathe, 2010). System-initiated tailoring involves a computer system personalising a message based on data about socio-demographic characteristics, needs, and theoretically relevant factors, such as attitudes or self-efficacy (Lustria et al., 2016). Unlike this more traditional way of tailoring, user-initiated tailoring starts with the user and allows the user to customise the information or mode of delivery by selecting personally relevant elements.

In addition to possibilities for system-initiated or user-initiated tailoring, new digital technologies also offer new opportunities for what to tailor. The first type of tailoring is “content tailoring.” Here, the content of the information is adapted to people’s personal situation, preferences, and characteristics. This type of tailoring was originally (mostly) system-initiated. Content tailoring has been found to be (cost-)effective in promoting various health-related behaviours, but with small overall effect sizes, indicating room for further improvement (e.g., Krebs et al., 2010; Lustria et al., 2013). In the realm of digital messages, health communication scholars at ASCoR have ventured into mode tailoring and message frame tailoring. “Mode

tailoring” involves adapting the delivery mode of a message or intervention to participants’ learning styles or preferences (Smit, Linn, et al., 2015). The rationale for mode tailoring is based on the premise that individuals vary widely in their modality preferences (e.g., textual vs audiovisual information), processing styles (e.g., verbal vs visual learners), and cognitive motivations (e.g., low vs high need for cognition). For example, older people often must deal with age-related sensory (e.g., impaired vision and/or hearing) and cognitive (e.g., reduced processing speed) declines, which are likely to change their mode preferences for online information. Since message framing refers to the taking of a certain perspective when formulating a message, highlighting some bits of information while omitting others, we defined “message frame tailoring” as adjusting this perspective based on people’s individual needs (Smit, Linn, et al., 2015). Although we theorise that an intervention’s message frame can be tailored to different information-processing styles, such as respondents’ need for cognition, need for affect, and need for autonomy, especially the latter has been the focus of several of our research projects (Altendorf et al., 2019; Altendorf, Hoving, et al., 2020; Altendorf, Smit, et al., 2020; Altendorf et al., 2022; Bol et al., 2019; Smit et al., 2019; van Strien-Knippenberg et al., 2022). Previous studies investigated whether interventions tailored to cognitive and affective needs are more effective than non-tailored interventions in changing health behaviour (intentions) (Williams-Piehota et al., 2003), but tailoring digital health communication to the need for autonomy seemed to have unexplored potential.

## **Empirical findings**

ASCoR researchers have studied the effects of system- and user-initiated tailoring of the content, mode, and/or message frame of online health information in both experimental and real-life settings using technological advances and new tailoring processes. Experimental design is commonly used at ASCoR to evaluate and develop tailored health messages and to draw conclusions about cause-and-effect relationships. Randomised controlled trials (RCTs) are often used to draw conclusions about the effectiveness of tailored messages in a real-world clinical context, often informed by the Medical Research Council’s (MRC) framework for the development and evaluation of complex interventions (Craig et al., 2008). Figure 9.1 gives an overview of the various studies on tailoring conducted at ASCoR. In the next sections, we will discuss our research on system-initiated and user-initiated tailoring of health information.

**Figure 9.1. Overview of Tailoring Studies at ASCoR** 

### Findings on system-initiated tailoring

Below, we will discuss findings from our research on system-initiated tailoring relating to content, mode and/or message frame. We will first elaborate on the results from our experimental research, and then share the results from our research in real-world clinical contexts (via the RCTs).

#### *Experimental research*

The message frame tailoring studies in our line of research were always system-initiated. ASCoR researchers pioneered the use of the need for autonomy as a basis for tailoring and evaluating the message frames of online health behaviour change interventions. The concept of the need for autonomy is derived from self-determination theory (SDT) (Ryan & Deci, 2000), a theory that suggests that every person has a basic need for autonomy. Yet, people differ in the degree to which the need for autonomy is present. In several online message frame tailoring experiments, health messages

worded in an autonomy-supportive style (e.g., using words like “can” or “could” or giving choices, e.g., whether to read additional information) were compared with health messages worded in a more directive communication style (e.g., using words like “should” and “must” and not giving choices). People’s individual need for autonomy was considered as a potential effect moderator in these studies (Altendorf et al., 2019; Altendorf, Smit, et al., 2020; Smit et al., 2019). Contrary to expectations, there was no moderating effect when testing a digital alcohol reduction intervention (Altendorf et al., 2019) and an online smoking cessation intervention (Altendorf, Smit, et al., 2020). However, in a vegetable intake intervention, providing choices—rather than the using of autonomy-supportive language—was found to be an easy-to-implement strategy to increase effectiveness, particularly for people with high autonomy needs (Smit et al., 2019).

In another online experiment, we tested if system-initiated tailoring to mode preference was more effective than non-tailoring in terms of recall and intention to perform breast self-examination. Breast self-examination instructions were either tailored to the participant’s mode preference (text, text with illustrations, or video) or non-tailored by randomly providing one of these modes. The intention to perform breast self-examination was higher if the instruction was tailored to the mode preference. No effects on recall of information were found (Linn et al., 2015).

### *Randomised controlled trials*

In one of our studies using the MRC framework, we systematically developed a tailored multimedia intervention (TMI) to improve medication adherence among chronically ill patients (Linn et al., 2013). The TMI combined content tailored technology with interpersonal communication. Technology was used to collect data on patients’ barriers to adherence, to send tailored text messages for long-term support with minimal effort and to support clinicians in tailoring their communication to patients’ needs during consultations. An RCT was then conducted in six hospitals. Results showed positive changes in the intervention group on important antecedents of medication adherence: patient satisfaction with nurses’ affective communication and self-efficacy at treatment initiation. The effect on self-efficacy was maintained after six months (Linn et al., 2018).

To build on the results from the online experimental studies on message frame tailoring, we also considered the need for autonomy in real-world research. Instead of merely including the need for autonomy as a potential effect moderator, we tested the effectiveness of message frame tailoring based on the need for autonomy, in isolation and in combination with content

tailoring, in an RCT with a 2 (message frame tailoring vs no message frame tailoring) by 2 (content tailoring vs no content tailoring) design among adult smokers intending to quit smoking (Altendorf, Hoving, et al., 2020). Results revealed that message frame tailoring based on the need for autonomy may be an effective addition to conventional content tailoring for people with a high need for autonomy. Yet, for people with a low need for autonomy, message frame tailoring was not effective in its current form. More research is needed to investigate what type of tailoring might benefit this group.

An advantage of conducting experiments in a naturalistic setting is the opportunity to include a trial-based economic evaluation, i.e., an economic evaluation study based on data collected alongside a (randomised controlled) trial, allowing to compare the costs of an intervention to its (health) benefits. Despite the challenges involved (Smit, de Vries, et al., 2015), such evaluations can provide valuable information for policymakers on resource allocation, especially when the results of the evaluation are inconclusive or insignificant in terms of effectiveness alone. To illustrate, while effectiveness results suggested that the combination of message frame tailoring and content tailoring was only beneficial for participants with a high need for autonomy, the combination of these two tailoring strategies was found to have a high potential for cost-effectiveness (increased smoking abstinence) and cost-utility (increased quality of life), for the entire sample studied, thus providing good value for money (Altendorf et al., 2022).

### **Findings on user-initiated tailoring**

In addition to system-initiated tailoring, health information can also be tailored directly by the receivers, which we refer to as user-initiated tailoring. In the sections that follow, we will first discuss findings from our experimental research on user-initiated tailoring relating to content and mode, followed by results from our research in real-world clinical contexts (via the RCTs).

#### *Experimental research*

In an experimental study on the effects of user-initiated content tailoring, customisation of a mobile health app (operationalised as the possibility to add specific features of the app to a personal dashboard) led to higher intentions to engage in physical activity for respondents with a higher need for autonomy, but not for those with a lower need for autonomy (Bol et al., 2019).

As for user-initiated mode tailoring, we experimentally tested the effect of an informative website for patients with cancer that allowed younger

and older adults to self-tailor the mode in which the information was presented. The mode-tailored condition (as compared to non-tailored conditions) improved attention to the website and, consequently, recall in older adults, but not in younger adults (Nguyen et al., 2017). For both younger and older adults, mode tailoring positively influenced satisfaction with the attractiveness and comprehensibility of the website, as compared to non-tailored conditions (Nguyen et al., 2018). Furthermore, a comparison between user-initiated and system-initiated mode tailoring showed that both strategies were more effective than non-tailored information, but depending on the outcome variable (i.e., attention, satisfaction, recall), health literacy level, and age of recipients, one strategy worked better than the other (Nguyen, Bol, & King, 2020). In the research that followed, we examined the underlying mechanisms that explain the effectiveness of mode tailoring (Nguyen, Bol, & Lustria, 2020). User-initiated mode tailoring showed an increase in perceived active control, resulting in higher perceived message relevance and website engagement, and reduced cognitive load. Positive indirect effects of mode tailoring through these mechanisms were found for both website attitude and information recall (Nguyen, Bol, & Lustria, 2020).

#### *Randomised controlled trials*

As a follow-up to the experimental mode tailoring studies described above, an RCT was conducted in an academic hospital aimed at newly diagnosed patients with cancer. Results showed the positive effects of exposure to an online educational intervention, which allowed them to self-tailor the intervention delivery mode, on satisfaction with the information and anxiety for younger patients (<65), but not for older ones (Nguyen et al., 2019).

Also, in a pilot RCT in four hospitals we tested the effectiveness of the Patient Navigator, systematically developed, MRC framework-guided website for patients newly diagnosed with cancer to prepare themselves for a consultation with a clinician by self-tailoring the content and the modality of the information. Even though the tailoring function of the tool was not frequently employed, usage of the Patient Navigator resulted in positive evaluations of the information, decreased anxiety after the consultation, and patients using fewer words during consultations, without impairing their satisfaction. These findings provide an opportunity to further personalise communication during consultation and respond to other patients' needs (de Looper et al., 2022).

Appendix 9.1 gives a summary of the characteristics and results of ASCoR studies on tailoring.

## Contributions to theory and practice

Traditional tailoring research primarily focused on the effectiveness of system-initiated content tailoring and exploring its underlying mechanisms. Yet, our work goes beyond content tailoring by investigating the effects of mode and message frame tailoring, and both system-initiated and user-initiated types of tailoring. We confirmed the role of perceived relevance as a mediator but also identified new theoretical mechanisms and boundary conditions related to system-initiated mode and message frame tailoring, as well as user-initiated tailoring, such as perceived active control and cognitive load.

### Theoretical insights

The elaboration likelihood model (ELM) (Petty & Cacioppo, 1986) is core to research on the effectiveness of tailored health communication (Kreuter & Wray, 2003). It suggests that factors such as relevant knowledge, individual differences in need for cognition, and the cognitive resources available to the individual influence the ability to process information. Motivation to engage with information (e.g., attention to a message) also influences information processing: When individuals perceive messages as personally relevant, they are more motivated to process information deeply, leading to stronger attitude changes. The ELM's proposed mechanisms, including perceived relevance and attention, have previously been confirmed as important mediators of the effectiveness of content tailored communication (Lustria et al., 2016). Similarly, ASCoR researchers have confirmed mediators proposed by the ELM (i.e., perceived relevance, engagement), but also identified why and under what circumstances (i.e., moderators) tailoring interventions are most effective, and the theoretical mechanisms (i.e., mediators) that explain the effects of different tailoring strategies (i.e., beyond content tailoring). For example, user-initiated mode tailoring increases the ability and motivation to process information by increasing recipients' sense of active control and reducing cognitive load. Furthermore, message frame tailoring, and content tailoring, as well as their interaction, was found to significantly predict the perceived relevance of smoking cessation messages, which consequently predicted participants' self-determined motivation. In turn, self-determined motivation positively influenced attitudes and self-efficacy to quit smoking, and self-efficacy predicted smoking abstinence (Altendorf, Hoving, et al., 2020).

Relevant to understanding mode tailoring effects, the cognitive theory of multimedia learning (CTML) (Mayer & Moreno, 2003) has often been used

as a framework for designing multi-modal information and understanding its effects on learning (information processing and recall) (Mayer, 2002). In short, CTML suggests that combining multiple modes that complement each other (including verbal and visual representations, such as text with visuals, or visuals with narration) enhances learning (as compared to unimodal information) because information processing is cognitively less demanding, which may lead to deeper information processing. As cognitive resources are distributed across different processing systems, the combination of modes is expected to reduce overall cognitive load and thus facilitate information processing (Mayer, 2002). However, variability in a person's prior knowledge or working memory capacity can influence how information is being processed, and, therefore, the CTML's notion that deeper learning is facilitated by multi-modal information is not always guaranteed (Ayres, 2015). Based on our research at ASCoR, we propose that limitations of CTML can be accounted for by considering variability in individual preferences, needs and/or abilities for the mode of information presentation (i.e., tailoring). Concretely, mode tailoring could be used as a design principle to optimise multimedia information and learning, especially in contexts where audiences are likely to vary in information-processing preferences and abilities.

ASCoR researchers have used the self-determination theory (SDT) (Ryan & Deci, 2000) to explain the effects of message frame tailoring. SDT suggests that autonomous motivation, driven by meeting psychological needs, like the need for autonomy, plays an important role in the initiation and maintenance of health-related behaviour (change) and subsequent positive health outcomes (Ng et al., 2012). However, while all individuals have a basic need for autonomy, differences exist in how this need manifests (Smit & Bol, 2020). Some people prefer to choose their own path towards change, whereas others prefer to be guided by expert advice (Resnicow et al., 2008; Resnicow et al., 2014). *Message frame tailoring* seemed especially helpful for people reporting a high need for autonomy (Altendorf, Hoving, et al., 2020)—suggesting that tailoring health communication may be key. This recognition could extend SDT's theoretical assumptions.

### **Practical insights**

ASCoR researchers have explicitly focused on the development and evaluation of tailored health communication interventions among populations that are often underserved, e.g., older people. Older adults might benefit from mode tailoring, since it may increase their attention and recall (Nguyen et

al., 2017), as well as their satisfaction with the attractiveness and comprehensibility of a website (Nguyen et al., 2018). Yet, the ability to self-tailor the modality through which older adults receive information did not always have such positive effects (de Looper et al., 2022; Nguyen et al., 2019). This highlights that findings from general adult populations cannot directly be generalised to patients, and age is not the only factor that may make people vulnerable—factors like socio-economic status and health literacy should also be considered.

Relatively recent research on the “digital health divide,” i.e., the tendency for digital health interventions to benefit disadvantaged populations less (Cornejo Müller et al., 2020), further illustrates this. Western et al. (2021), for example, concluded that digital interventions aimed at the promotion of physical activity are effective for adults of high, but not of low, socio-economic status. Moreover, Szinay et al. (2023) found that older people, those in lower-skilled jobs, and those living in rural areas might benefit less from mobile interventions than others. Also, vulnerable populations have been found to be less likely to start using digital health interventions (Chesser et al., 2016) and to engage with them (Szinay et al., 2023). As uptake and engagement with intervention content are important determinants of intervention effectiveness, it is important to investigate the reasons for the digital divide and to actively involve people from vulnerable target groups in intervention design, e.g., through co-creation, before assuming that findings from previous work in this area are applicable to them.

In line with findings from other scholars, (e.g., Smit et al., 2013; Stanczyk et al., 2014), the economic evaluation research conducted at ASCoR showed that the combination of message frame tailoring and content tailoring has potential for cost-effectiveness and cost-utility (Altendorf et al., 2022). This is an important finding, since—especially in healthcare—limited budgets are usually available to implement effective lifestyle interventions on a large scale, and (healthcare) policymakers need to make decisions on resource allocation, while aiming to produce most value for money. ASCoR researchers have suggested practical strategies to overcome the challenges that come with the economic evaluation of digital lifestyle interventions (Smit, de Vries, et al., 2015).

Our research shows that integrating technology with interpersonal communication can improve the delivery of tailored healthcare. First, offering online health information as a preparation tool before consultations enhances information processing. However, it should be recognised that not all patients, especially older people, prefer computer-based information sources. Second, incorporating mode tailoring into online health information

can benefit patients by improving website evaluations, increasing information recall, and reducing anxiety. While it may be tempting to include all information modes on a website without tailoring, this approach is thus not recommended. Third, to integrate tailoring effectively, it is important to consider differences in information-processing styles, preferences, needs, and abilities of different patient groups. For now, providing textual information as the fixed, primary mode of intervention delivery is recommended, as text remains the preferred choice for many patients.

## **Next steps**

Despite the various tailored health communication interventions that have been designed and tested, there is a constant need to improve and redefine these interventions in line with technological developments.

## **Artificial intelligence to inform tailoring message content**

ASCoR researchers have begun to explore the convergence of technology and interpersonal communication in the healthcare setting to optimise tailoring (Sanders et al., 2020). AI methods such as machine learning (ML), and natural language processing (NLP) can be used to improve tailored information provision. As part of several interdisciplinary teams, ASCoR researchers are involved in tailoring research starting with (1) the development of rule-based expert systems that integrate screening tools and treatment guidelines, (2) the analysis of routinely collected “messy” data in general practitioners’ electronic health records, and (3) the analysis of harmonised datasets from different patient cohorts to develop prediction models that allow the calculation of individual health risks. The information obtained from these methods will be integrated into a clinical decision support system (CDSS). A CDSS can link individual patient characteristics in the electronic health record to a computerised clinical knowledge base to generate patient-specific treatment recommendations to the healthcare provider. This information can then be used to improve patient–provider communication and shared decision-making during consultations (de Wildt et al., 2023; Westerbeek et al., 2023).

Furthermore, there has been a recent shift towards using conversational agents for health communication in domains such as mental health, physical activity, and sexual health. Conversational agents are systems that can simulate conversations with users through natural language such as written text

or voice, permitting automated two-way communication between user and system (Balaji et al., 2022). ChatGPT is a recent example of a conversational agent, using AI and NLP to engage in human-like conversations with users. In our future research, we will identify barriers, facilitators, underlying factors, affordances, and regulatory and ethical implications that determine people's (e.g., general public, patients, clinicians) motivation to use AI-based health technologies such as conversational agents. Current projects focus already on encouraging engaging, long-term personalised interactions with conversational agents for health promotion (Balaji et al., 2022).

### **Delivering just-in-time tailored interventions**

New technologies allow us to advance tailoring in other ways as well, not only by providing the right information, but also by providing this information at the right time. Just-in-time adaptive interventions (JITAI) (Nahum-Shani et al., 2018) are specifically designed to account for daily variations in health-related cognitions and behaviours. The main advantages of JITAI have been described as the potential to (1) tailor interventions to the needs of individual users in real time to deliver support at the most promising moment, (2) adapt to input data, (3) be system-triggered, (4) deliver goal-oriented interventions, and (5) allow for customisation according to user preferences (Villinger et al., 2022). Because of these characteristics, JITAI may increase engagement with and effectiveness of health behaviour interventions as compared to more traditional tailored interventions. Within ASCoR, initial attempts have been made to investigate the effectiveness of a JITAI for physical activity (Vos et al., 2023), but as the evaluation of JITAI comes with both theoretical and methodological challenges, more work is needed in this area.

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## Appendix 9.1. Summary of tailoring studies at ASCoR

Authors	Type of tailoring	Study design	Target group	Main results
<b>Altendorf et al. (2019)</b>	System-initiated message frame tailoring	A 2 (autonomy-supportive language vs controlling language) x 2 (choice vs no choice) between-subjects experiment was conducted using an online computer-tailored alcohol reduction intervention.	Adult smokers	Neither autonomy-supportive nor controlling message frames had significant effects on perceived autonomy support or reactance, and there was no moderation from the need for autonomy.
<b>Altendorf et al. (2020a)</b>	System-initiated message frame tailoring	An online 2 (autonomy-supportive; controlling language) x 2 (choice; no choice) between-subjects design with the control condition (generic advice) with adult smokers intending to quit.	Adult smokers	Results revealed no significant effect of autonomy-supportive message frames on perceived autonomy-support or self-determined motivation, nor did the need for autonomy moderate these effects.
<b>Smit et al. (2019)</b>	System-initiated message frame tailoring	A web-based 2 (autonomy-supportive vs controlling language) x 2 (choice vs no choice) experiment was conducted.	Adults	Choice had a significant positive effect on the overall evaluation of the intervention, whereas for participants with a high need for autonomy, there was a significant positive effect on perceived relevance.
<b>Linn et al. (2013; 2018)</b>	System-initiated content tailoring	A cluster randomised controlled trial was conducted in six hospitals, eight nurses, and 160 chronic patients. Hospitals were randomised to either the experimental group (TMI intervention) or the control group (usual care)	Patients with inflammatory bowel disease	By combining tailored counselling with technology, this intervention resulted in positive changes in important prerequisites (i.e., satisfaction and self-efficacy) of medication adherence.
<b>Linn et al. (2015)</b>	System-initiated mode tailoring	An online experiment examining breast self-examination instructions that were either tailored to the participant's mode preference (text, text with illustrations, or video) or non-tailored by randomly providing one of these modes.	Adult women	The intention to perform breast self-examination was higher if the instruction was tailored to the mode preference. There were no effects of mode tailoring on the recall of information.

Authors	Type of tailoring	Study design	Target group	Main results
<b>Nguyen et al. (2017)</b>	User-initiated mode tailoring	Online experiment, with a 5 (condition: tailored vs text, text with illustrations, audiovisual, combination) × 2 (age: younger [25–45] vs older [≥ 65] adults) between-subjects design.	Adults	The mode-tailored condition (relative to non-tailored conditions) improved attention to the website and, consequently, recall in older adults, but not in younger adults. Younger adults recalled more from non-tailored information such as text only or text with illustrations, relative to tailored information.
<b>Nguyen et al. (2018)</b>	User-initiated mode tailoring	A 5 (condition: tailored vs text, text with visuals, text with audiovisual, combination) × 2 (age: younger [25–45] vs older [≥ 65] adults) online experimental study.	Adults	Mode tailoring positively influenced satisfaction with the attractiveness and comprehensibility of the website, as compared to non-tailored conditions. These effects on website satisfaction were not different for younger and older adults.
<b>Nguyen et al. (2019)</b>	User-initiated mode tailoring	A randomised controlled trial tested the effects of a web-based tailored educational intervention. The intervention group viewed a mode-tailored website (i.e., enabling patients to tailor information using textual, visual, and audiovisual modes) while the 3 control groups viewed a non-tailored website (i.e., text only, text with images, and text with videos).	Newly diagnosed younger (<65 years) and older (≥65 years) patients with cancer.	Younger patients viewing the mode-tailored website were more satisfied before consultation and reported lower anxiety after consultation. Mode tailoring yielded no other significant differences in patient outcomes.
<b>Nguyen et al. (2020b)</b>	User-initiated mode tailoring	Using a web-based experiment (tailoring vs no tailoring), this study investigated the underlying mechanisms that might explain the effects of <i>mode tailoring</i> (via textual, visual, and audiovisual information) on website attitudes and recall of online health information.	A representative sample of internet users (25–86 years)	Mode tailoring, enabling users to self-customise a health website's presentation mode increased users' perceived active control, which in turn contributed to higher perceived relevance and website engagement and reduced cognitive load. Positive indirect effects of mode tailoring through these mechanisms were found for both website attitude and information recall.

Authors	Type of tailoring	Study design	Target group	Main results
<b>Bolet et al. (2019)</b>	User-initiated mode tailoring	A between-subjects (condition: mode-tailored vs standardised website) online experiment whereby study participants were exposed to a health-related app.	Adults	Results showed that customisation in mobile health apps does not increase perceived active control, autonomous motivation, or the intention to engage in physical activity. However, an interaction effect between customisation and the need for autonomy showed that customisation in mobile health apps leads to higher intentions to engage in physical activity for those with a greater need for autonomy, but not for those with a lesser need for autonomy.
<b>de Looper et al. (2022)</b>	User-initiated mode tailoring and content tailoring	A pilot randomised controlled study was conducted in the four participating hospitals.	Cancer patients	Only one-quarter of the patients visited the self-tailoring page and only three patients self-tailored the content or information presentation mode. Patients who received the Patient Navigator contributed less during the consultation by using fewer words than patients in the control condition and experienced less anxiety two days after the consultation than patients in the control condition.
<b>Altendorf et al. (2020b)</b>	System-initiated content and message-frame tailoring	A randomised controlled trial with a 2 (message frame-tailoring vs no message frame-tailoring) x 2 (content-tailoring vs no content-tailoring) design	Adult smokers intending to quit	Message frame tailoring based on the need for autonomy is an effective addition to conventional content-tailoring techniques in online smoking cessation interventions for people with a high need for autonomy; however, this is not effective in its current form for people with a low need for autonomy.

Authors	Type of tailoring	Study design	Target group	Main results
<b>Altendorf et al. (2022)</b>	System-initiated message frame tailoring and content tailoring	A randomised controlled trial using a 2 (message frame-tailoring, i.e., how messages are presented: autonomy-supportive vs controlling) $\times$ 2 (content-tailoring, i.e., what content is presented: tailored vs generic) design.	Adult smokers	The combination of message frame tailoring and content tailoring in online smoking cessation programmes seemed to have a high potential for cost-effectiveness (smoking abstinence) and cost utility (quality of life), thus providing good value for money.
<b>Nguyen et al. (2020a)</b>	System-initiated and user-initiated mode tailoring	In an online experiment participants viewed either a customised, personalised, or non-tailored (mismatched) website based on individual preferences for presentation mode. We analysed a 3 (condition) $\times$ 2 (health literacy level) $\times$ 2 (age group) between-subjects design, examining effects on: time spent online, attention, perceived relevance, website involvement, website satisfaction, and information recall.	Adults	Mode tailoring, by both customisation and personalisation, is more effective than no tailoring. However, contingent on the outcome variable (i.e., attention, website satisfaction, information recall), or health literacy level, and age group, different tailoring strategies show different effects.