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It's not what you say, but how you say it

The effectiveness of message frame-tailoring in online computer-tailored health communication

Altendorf, M.B.

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Smokers who want to quit smoking can increase their success rate of quitting through online smoking cessation interventions (Taylor et al., 2017). When such interventions are also tailored (usually done by computer systems), thus only provide relevant message content to a person, then they are more effective regarding smoking cessation rates than static health interventions (Lustria et al., 2013). However, overall effect of such computer content-tailored interventions on health remain small.

Recently, researchers have pointed towards the potential to not only tailor health interventions in the sense of *what* information is provided (i.e., content-tailoring), but also in terms of *how* this information is communicated, in order to achieve better health outcomes such as increased smoking abstinence rates (Smit et al., 2015). Therefore, with this dissertation, I aimed to systematically develop and explore the potential of the novel approach of *message frame-tailoring*. It was tested whether message frame-tailoring, which refers to adapting the message frame – the *how* of a message – to an individual's communication preference as reflected in their need for autonomy, in isolation and in addition to conventional content-tailoring, resulted in higher message effectiveness. To reach this aim, I firstly aimed to identify the most autonomy-supportive message frame suitable for online computer-tailored health interventions in the context of addictive behaviours (i.e., alcohol reduction and smoking cessation). Secondly, I systematically redesigned an existing online computer content-tailored smoking cessation intervention to include message frame-tailoring and subsequently tested it among experts and potential end-users to reach optimal usability. This intervention was subsequently tested for effectiveness in a randomised controlled trial (RCT).

SUMMARY OF MAIN FINDINGS OF *IT'S NOT WHAT YOU SAY, BUT HOW YOU SAY IT: THE EFFECTIVENESS OF MESSAGE FRAME-TAILORING IN ONLINE COMPUTER-TAILORED HEALTH COMMUNICATION*

**CHAPTER 2 AND 3:
EXPLORING EFFECTS OF AUTONOMY-SUPPORTIVE VERSUS CONTROLLING MESSAGE FRAMES AS INPUT FOR MESSAGE FRAME-TAILORING**

In **Chapter 2 and 3**, the effects of autonomy-supportive versus controlling message frames were explored and tested with regards to participant's perceived autonomy-support, reactance arousal, level of self-determined motivation, socio-cognitive factors related to behaviour change and behaviour(al) intentions to change. Moreover, the need for autonomy was considered as a moderator of message frame effects on perceived autonomy-support. In Chapter 2, this was tested in the context of an online computer-tailored alcohol reduction intervention ($N = 521$), whereas in Chapter 3, the context was an online computer-tailored smoking cessation intervention ($N = 626$). Findings from both studies showed that neither autonomy-supportive nor controlling message frames could produce significant effects on perceived autonomy-support and that there was no moderation effect of participant's need for autonomy. Moreover, in the context of the alcohol reduction intervention no significant effect of message framing on reactance arousal was found. Interestingly, in both studies we found that most study participants evaluated the intervention as positive and reported overall high levels of perceived autonomy-support, regardless of the message frame used. Moreover, in the smoking cessation intervention context, it was found that although message framing had no significant effect on self-determined motivation, a significant effect of self-determined motivation on intention to quit smoking was found, which was mediated by attitude, self-efficacy and social norms about smoking cessation.

CHAPTER 4:

FROM MESSAGE FRAMING TO MESSAGE FRAME-TAILORING

In **Chapter 4**, the process of systematically redesigning an online computer-tailored smoking cessation intervention that only tailored the content of the intervention into an intervention that consisted of both content-tailoring and message frame-tailoring is described. Experts ($N = 10$), communication science students ($n = 19$), and potential end-users (i.e., smokers) ($N = 816$) were engaged in several pilot tests and a usability test of the programme. The pilot tests among experts and smokers aimed to improve the message frames, content and technical functionality of the intervention. It was shown that for instance, the amount of text in the intervention had to be reduced and (introductions to) certain questions had to be clarified. Moreover, pilot test participants wished to receive a summary of all feedback messages at the end of the intervention, which was therefore added. Then, to be able to integrate the novel strategy of message frame-tailoring based on the need for autonomy, a cut-off value for a higher and a lower need for autonomy was determined, based on results of a previous experimental study (described in Chapter 3). Next, message frame-tailoring based on this cut-off point was developed and tested in a usability test. Main findings from the usability testing were that respondents preferred a more modern lay-out of the intervention that also adapts to the device used and that feedback messages' comprehensibility could be improved by having a clear title and showing signal words in bold letters. Last, some minor programming errors were identified and solved, which resulted in a ready-to-use online smoking cessation intervention containing content- and message frame-tailoring.

CHAPTER 5:

EFFECTIVENESS OF MESSAGE FRAME-TAILORING

In the RCT described in **Chapter 5**, the objective was to test the effectiveness of message frame-tailoring based on the need for autonomy, in isolation and in combination with content-tailoring within the context of the redesigned online computer-tailored smoking cessation intervention (described in Chapter 4). Findings of this RCT ($N = 273$) confirmed the positive effect of content-tailoring on seven-day point prevalence abstinence from smoking at one-month

follow-up, as found in previous research. However, message frame-tailoring did not significantly increase smoking abstinence rates, neither alone nor in combination with content-tailoring. When investigating underlying mechanisms of message frame-tailoring and content-tailoring effects, it appeared that message frame-tailoring, content-tailoring and their combination significantly predicted perceived relevance of the smoking cessation message, which in turn predicted self-determined motivation to quit smoking. Self-determined motivation, positively affected attitudes towards smoking cessation and self-efficacy beliefs, but only self-efficacy positively predicted smoking abstinence. Notably, smokers with a higher need for autonomy had higher abstinence rates than those with a low need for autonomy, regardless of the message frame used. Moreover, smokers with a higher need for autonomy in all conditions perceived the messages in general as significantly more relevant and had higher levels of self-determined motivation, more positive attitudes towards smoking cessation and higher self-efficacy perceptions than their low need for autonomy counterparts.

DISCUSSION OF MAIN FINDINGS

About message framing and a ceiling effect of perceived autonomy-support. Overall, the results from Chapters 2 and 3 indicated that our autonomy-supportive message frames did not significantly increase participants' perceived level of autonomy-support compared to controlling or neutrally formulated message frames. However, participants in general perceived overall rather high levels of autonomy-support. This was also the case for participants who scored below the need for autonomy threshold and therefore did not receive autonomy-supportive message frames, but controlling or neutral message frames. This finding points towards the question of whether a ceiling effect of perceived autonomy-support was present, which can be defined as a situation in which most people achieve the highest or nearly highest possible score (Ho & Yu, 2015; Salkind, 2010). However, in the alcohol study, about 30% of all participants and in the smoking cessation study about 20% of all participants scored in the upper 75 percentile of the scale, which does not match with the definition of a ceiling effect. Below, I discuss potential reasons that might have caused these generally high levels of perceived autonomy-support and in turn

might have led to not finding message frame effects.

Internet environment and perceived autonomy-support. Regardless of the type of message frame received in our interventions, the internet environment could have led to a feeling of freedom, because it provided participants in both studies with the freedom to participate at any location and time. This freedom of participation “whenever and from wherever it is convenient” could have enhanced the overall perception of autonomy-support when using the intervention. This idea is supported by our finding that, in Chapter 2, the controllingly framed messages did not lead to the expected reactance arousal (i.e., negative emotions such as anger and counter arguing towards the message). More specifically, only approximately three percent of our participants provided with controlling message frames articulated negative thoughts towards these messages, that were in fact mainly related to the content of the message and not to the message frame that was used. Additionally, a possible explanation (also described in Chapter 2) for not identifying negative message evaluations comes from Politeness theory (Brown & Lewinson, 1978), which emphasises that controlling language use might not lead to negative message evaluations and reactance arousal when the message offers positive feedback and uses polite language, which has been the case in our interventions.

Behavioural context and framing effects. Another possible explanation for not finding any effects on perceived autonomy-support can be derived from the addictive nature of the behaviours under study. That is, a recent and similar study that aimed to increase vegetable consumption suggests that the provision of choice – a feature also used in our autonomy-supportive message frames – may induce higher levels of perceived autonomy-support (compared to controlling message frames) (Smit et al., 2019). Moreover, a study in the context of mobile physical activity applications showed that for participants with a higher need for autonomy, the option to customise the health app (which can be considered an operationalisation of choice and, thus, autonomy-support) led to a higher intention to engage in physical activity than no such customisation feature (Bol, Høie, Nguyen, & Smit, 2019). As the

operationalisation of autonomy-supportive and controlling message frames in our studies was similar to operationalisation used in the vegetable promotion study, I assume that the autonomy-supportiveness of the internet environment may not have been the sole the cause for not identifying significantly different message frame effects on perceived autonomy-support but that an (additional) explanation should be sought in the different behavioural context. That is, it could be that autonomy-supportive message frame features could be more effective when used in the context of stimulating healthy behaviours, as opposed to the reduction of unhealthy and / or addictive behaviours, such as alcohol consumption or smoking. In this vein, earlier research on gain- and loss framing found that different message frames are more effective in certain behavioural contexts than others (Rothman, Martino, Bedell, Detweiler, & Salovey, 1999; Van't Riet, Ruiters, Werrij, & De Vries, 2010). That is, a gain frame seems to be more effective when the behaviour is considered as less severe. For instance, the outcome of not engaging in physical activity or healthy eating might be considered less "severe" than the outcome of continuing to smoke. Thus, it could be possible that just as with gain frames, also autonomy-supportive message frames might have been more effective when less severe behaviour change was considered, such as increasing healthy nutrition instead of combating smoking addiction. Future studies might want to investigate whether a moderating effect of the sort of behaviour change / study context (e.g., addictive behaviours, as opposed to for instance, healthy eating) indeed exists.

Online reading behaviour. Another possible explanation for not finding message framing effects in the studies described in Chapter 2 and 3 could be that participants simply did not sufficiently notice the variations in message framing. When participants were asked about their thoughts towards the messages, most comments were related to the content of the messages, not to the message frames. Related, scholars previously provided evidence that reading behaviour in digital environments differs from reading in print environments (Liu, 2005). Because people spend much time on electronic screens and on the internet, which is replete with information and text, people seem to read less deeply and attentively as in the print environment, but

rather skim and scan through a text to efficiently spot the information that is considered necessary (Duggan & Payne, 2011; Liu, 2005). This finding could be applied to our studies, as (as also described in Chapter 4) participants mentioned that, overall, the intervention consisted of a lot of text and that they recommended reductions of the amount of text. Some participants requested shorter feedback messages with more bullet-points, more illustrations, structured with sub-headings and including hyperlinks to additional readings, that could also be skipped if a participant was not interested to read more. Our findings might be interpreted as supporting evidence for the proposed common pattern of online reading behaviour of skimming and scanning bits of the text only. It is possible that participants did not notice our message frames, but most likely just searched for the – in their opinion – necessary content. Indeed, results from the manipulation check in Chapter 3 showed that although overall the frame manipulations succeeded, an inconsistent pattern was found across individual items, possibly indicating an erratic reading pattern. For future research, investigations with for instance eye-tracking methods could assess whether patterns of online / screen-based reading behaviour, such as keyword spotting, might lead to subtle changes in message framing being missed and may result in comprehensive health messages having no or even detrimental effects. In case participants indeed seem to miss the differences in the message frames used, it could be an objective for future research to explore the optimal length and formulation of health messages provided in the online context in order to be most effective in changing health behaviour.

Effects of message frame-tailoring based on the need for autonomy. The final study of this dissertation concerned the potential of message frame-tailoring as a novel tailoring strategy to increase the effects of online computer-tailored smoking cessation interventions on smoking cessation behaviour. We were able to confirm the previously found positive effect of the content-tailored program on smoking abstinence (Smit, De Vries, & Hoving, 2012). Yet, we could not observe an effect of message frame-tailoring based on smokers' need for autonomy on smoking abstinence for all smokers. However, a trend was observed for those with a higher need for autonomy who had higher smoking abstinence rates one-month post intervention than their lower need

for autonomy peers.

Moreover, it is worth mentioning here that two findings that related to message relevance were striking. First, message frame-tailoring showed to have a negative effect on perceived message relevance, which was an unexpected finding. Second, no tailoring at all (i.e., generic smoking cessation messages), as provided in the control condition, led to the highest perceived message relevance. To better understand these unexpected findings and to further comprehend how message frame-tailoring influenced perceived relevance, we inspected these effects in more detail by looking at smokers with a higher and with a lower need for autonomy separately. These analyses indicated that smokers with a higher need for autonomy perceived the messages that were autonomy-supportively framed (i.e., were frame-tailored to their need for autonomy) and content-tailored as more relevant than their lower need for autonomy counterparts who received controllingly framed and content-tailored messages. Based on this finding, it could be assumed that message frame-tailoring positively affected smokers with a higher need for autonomy, but not their lower need for autonomy peers. As we found that smokers with a lower need for autonomy who received message frame-tailoring (either with or without content-tailoring) scored relatively low on all measured outcomes (i.e., relevance, self-determined motivation to quit, socio-cognitive measures, smoking abstinence). Following, a central question for discussion is: **What kind of message frame would be best suitable for smokers with a lower need for autonomy?** It could be that those with a lower need for autonomy might need different message frames than the controlling message frames used in this study. It does, however, remain unclear what kind of message frame would be more suitable for smokers with a lower need for autonomy than the messages we used. Below, I discuss possible alternative message frames for smokers with a lower need for autonomy.

Categorisation into low and high need for autonomy. It could be that lower-autonomy smokers might wish for less controlling language use in messages (e.g., not using controlling terms as “must”) thus the use of a more moderate or neutral language style. To inform message frame-tailoring, respondents were dichotomised according to a cut-off value into higher and lower need

for autonomy groups. This cut-off value was based on the results described in Chapter 3 and SDT literature (Deci & Ryan, 1985b; Smit & Bol, 2019). In our studies, the construct of need for autonomy showed a (slightly skewed) normal distribution curve, meaning that most people reported scores for this construct in between the extremes. In other words, rather many respondents fell into a “moderate” need for autonomy category instead of into a clearly high or low need for autonomy group. The RCT data showed that, overall, smokers had a rather higher need for autonomy ($Mean = 3.36$, $SD = .61$; five-point Likert scale where higher values indicated a higher need for autonomy). The cut-off value was 3.8, which was rather on the higher end of the scale. As a consequence, about 52% ($n = 141$) of smokers were categorised as having a high need for autonomy. At the same time, while categorised as having a low need for autonomy because showing lower than 3.8 on the HCOS, 45% of all participants in fact reported an HCOS score between the cut-off value of 3.8 and the mid-point (i.e., 2.5) of the scale. This raised the question whether these people should instead have been categorised as having a “moderate” need for autonomy. Although categorised as having a low need for autonomy, only three% ($n = 9$) of all participants truly reported a value below the mid of the scale (i.e., 2.5 or lower) for the need for autonomy, i.e., a “true” low HCOS score. Thus, instead of categorising smokers with a score lower than 3.8 as having a lower need for autonomy a big share of participants may have needed to be categorised as having a moderate need for autonomy. Following, it could be possible that the control condition messages might have been a good match for the smokers with a moderate need for autonomy and that the lower-autonomy group messages (i.e., controllingly framed messages) were insufficiently tailored to the smoker’s communication preferences. The results from Chapter 5 showed that the control condition, which was a neutrally framed, generic smoking cessation message, was significantly perceived as more relevant by smokers with a lower need for autonomy as opposed the message frame-tailoring conditions. Moreover, the content-tailoring only condition had a similar neutral message frame and was perceived as equally relevant as the control condition messages by all groups of smokers (i.e., smokers with a higher and lower need for autonomy). This suggests that dichotomising smokers into having either a higher or a lower need for autonomy might be

oversimplifying need for autonomy subgroups. Future research could consider three instead of two tailoring-groups – thus, a group with lower, moderate and higher need for autonomy – in order to explore the effect of message frame-tailoring based on the need for autonomy.

Moreover, as smokers with a lower need for autonomy seemed to benefit less from our message frame-tailored intervention, it could be possible that this group of participants would have fared better with the offer or more support in smoking cessation, such as in combination with face-to-face interventions guided by a professional, or with different kinds of online smoking cessation interventions that are more interactive or make use of (audio-)visual information. In a recent study, Smit and Bol (2019) identified subgroups of mobile health app users based on the need for autonomy and showed that lower need for autonomy participants had limited e-health literacy – that is the skill to read, understand and act upon provided health information. Moreover, Meppelink and Bol (2015) found that adults with a limited health literacy had greater attention to and could recall online health information better when textual information was combined with related illustrations. Possible ways to investigate lower need for autonomy smokers' preferences in smoking cessation interventions would be to conduct qualitative research (e.g., focus group discussions or semi-structured interviews). By means of such research, lower-autonomy smokers could help to co-create effective health messages for their specific group of smokers.

Message frames and personality traits. The results presented in Chapter 5 suggest that smokers with a high need for autonomy as opposed to those with a low need for autonomy benefitted more from the smoking cessation intervention in terms of smoking abstinence, perceived message relevance, self-determined motivation to quit smoking, and socio-cognitive outcomes. However, it remains unclear whether it was the smoker's personality trait or the autonomy-supportive message frame that led to more beneficial outcomes for those with a higher need for autonomy. From SDT-research (Ryan & Deci, 2000), we recognise that those who are autonomously orientated, thus have a higher need for autonomy, also seem to be more deeply engaged in their actions, while those who are more control oriented – i.e., have a lower need

for autonomy – rather tend to regulate their behaviour through outside forces, such as punishments or reward-systems (Ryan & Deci, 2006). Potentially, as someone's need for autonomy might determine one's level of engagement in actions, it might also predict their engagement in an online smoking cessation intervention. In other words, smokers with a higher need for autonomy might have engaged more deeply in our smoking cessation intervention compared to their lower-autonomy counterparts – regardless of the message frame that they were presented with. As a consequence, smokers with a lower need for autonomy might generally benefit less from self-help online computer-tailored smoking cessation interventions as they may process the information provided less deeply than smokers with a higher need for autonomy. Therefore, a question in need of further investigation is whether self-help online smoking cessation interventions are suitable at all for smokers with a lower need for autonomy.

STRENGTHS AND LIMITATIONS OF THIS DISSERTATION

The findings presented in this dissertation should be considered in the light of some strengths and limitations.

A major strength of this dissertation is that I was able to test and provide the first empirical evidence for the integration of three theories into health promotion intervention designs. Namely, Self-Determination Theory (SDT; Ryan & Deci, 2000), the I-Change Model (De Vries, Mudde, Leijs, et al., 2003), which is grounded in the Theory of Planned Behaviour (TPB; Ajzen, 1991), and the Elaboration Likelihood Model (Petty & Cacioppo, 1986). Adding perceived message relevance as a theoretical concept from the Elaboration Likelihood Model as a possible predictor of self-determined motivation into the model of behaviour change built upon the other two theories, is an extension of the findings presented in the meta-analysis by Hagger and Chatzisarantis (2009). It was found that perceived message relevance predicted self-determined motivation, which in turn led to effects on behaviour(al) intention via socio-cognitive factors. Thus, in this dissertation, I showed that an additional (proximal) factor – perceived message relevance – seemed to influence the motivational sequence of smoking cessation.

Although we ensured the highest data quality possible by using self-

report scales that were all shown to be reliable based on sufficient (i.e., above .7) Cronbach's alpha values, the use of self-report measures to assess psychological, socio-cognitive, and behavioural measures represents a limitation of this dissertation. Relying on self-report measures, i.e., on participants reporting their own health status, beliefs, and behaviours, might introduce a social-desirability bias. That is, participants could consciously or unconsciously report about a health status, beliefs or behaviours in a way that they assume to be socially desirable which might not display the truth (Grimm, 2010). Nevertheless, self-report measures have the advantage of being easily administered. Future research might want to use a more integral approach to measuring psychological and socio-cognitive constructs, such as motivation. For instance, combining the use of self-report measures with neurophysiological measures (e.g., assessment of sweat) or participants' behavioural observations (e.g., facial expressions) could enhance measurement precision (Fulmer & Frijtes, 2009).

In addition, we only considered the autonomous orientation subscale of the Health Causality Orientations Scale (HCOS) to determine participant's need for autonomy, whereas the full HCOS consists of two more subscales: a control orientation and an impersonal orientation or amotivation subscale. Considering only the autonomous orientation subscale could have potentially led to an incomplete picture of health-related causality orientations. For instance, recent research by Smit and Bol (2019) demonstrated that a person can have coexisting needs for autonomy and external control. In their study, the authors identified four different groups of people based on their need for autonomy and need for external control, namely: self-reliers (i.e., those who had a higher need for autonomy, but a rather lower need for control), confirmation-seekers (i.e., high scores for need for autonomy, as well as for need for control), expert-dependents (i.e., lower need for autonomy and higher need for control), and indifferents (i.e., lower in both need for autonomy and need for control). This confirms my idea that people could be categorised according to their need for autonomy, yet this also suggests that a dichotomisation into two distinct categories based on the need for autonomy alone might not be optimal. Therefore, we recommend future research to also consider the need for external control, and perhaps even the impersonal orientation subscale,

when assessing people's need for autonomy, in order to ascertain a better and more complete picture of people's health-related causality orientations.

Next, the real life setting and the longitudinal study design of the effect evaluation of message frame-tailoring, which also contained a control condition, were major strengths of the research presented in this dissertation. We tested the potential effect of message frame-tailoring in a real-life setting, as we recruited smokers from the Dutch population who were motivated to quit smoking and most often found our study when searching for smoking (cessation) related information on the internet. This has led to a high external validity of study findings, as opposed to experimental study designs. Moreover, smokers in the RCT were followed-up for one month, which made it possible to investigate behaviour change (i.e., smoking abstinence) over time and also changes in motivation and socio-cognitive outcomes (Caruana, Roman, Hernández-Sánchez, & Solli, 2015). Nevertheless, a potential disadvantage of our longitudinal study design was the relatively high attrition rate. Approximately 50 percent of the participants were lost to follow-up already one-month post-intervention. While high study drop-out is common in longitudinal research studies (Caruana et al., 2015), especially in online intervention research (Eysenbach, 2005; Smit et al., 2012), high rates of attrition might bias study outcomes (De Leeuw & Lugtig, 2015; Eysenbach, 2005; Gustavson, Von Soest, Karevold, & Roysamb, 2012). Moreover, attrition unfortunately limits the statistical power to conduct certain types of analysis, such as structural equation modelling (SEM) with latent variables. We, however, accounted for high attrition rates in the a-priori power analysis by recruiting a higher number of smokers than ultimately needed for our statistical analyses. This resulted in our sample size still being sufficient for the planned SEM analysis, especially as we conducted SEM with manifest instead of latent variables.

IMPLICATIONS FOR PRACTICE

The findings of this dissertation have some practical implications for developers of online health interventions. Results presented with regards to message framing effects, intervention redesign, and message frame-tailoring triggered the question of how to best design persuasive health messages that are likely being read, perceived as relevant, and will lead to the desired

effect of changing behaviour. Based on findings from this dissertation, the beneficial effect of content-tailored messages on smoking abstinence could be confirmed, therefore I recommend continuing using content-tailored messages (Hawkins, Kreuter, Resnicow, Fishbein, & Dijkstra, 2008; Smit et al., 2012). Moreover, I found that autonomy-supportive message frames seemed to be similarly beneficial as the control messages. In general, these message frames were appreciated by all participants throughout all studies, regardless of their individual need for autonomy. In the RCT, it was shown that especially for high-autonomy smokers autonomy-supportive message frames enhanced their message processing, psychological and behavioural outcomes. Therefore, I can cautiously recommend to generally use autonomy-supportive message frames, which offer choice and use suggestive rather than controlling language – for smokers with a high need for autonomy.

With regards to recruitment and the acquisition of larger numbers of online participants in a real-life setting, I recommend to use rather novel sampling strategies. That is, recruitment through social media and Google advertisements, as compared to recruitment through (print) newspapers, and radio stations. The former recruitment methods showed to be effective in recruiting a large number of smokers within a short period of time against low costs, something which was also shown in another recent study in a different context (Bennetts et al., 2019). To illustrate, for the RCT presented in Chapter 5, the majority of participants (approximately 42%) was recruited via paid social media (i.e., Facebook) and Google advertisements. In addition, (online local) newspapers were contacted, who promoted the smoking cessation intervention for free - this resulted in about 18% of participants. In total, 528 participants could be enrolled at a price of about 6100 euro, within two months.

Also, as discussed above, the attrition rate in the RCT was rather high at the first one-month follow-up (47.8% dropout). However, at the second and last follow-up (i.e., after six months, of which the analysis is not reported in this dissertation) more participants filled out the questionnaires (i.e., dropout after six months: 34.3%). It can be assumed that the reward voucher, which was promised to be sent after completion of the second and last follow-up, might have functioned as an incentive for participation in this final follow-up (Görizt, 2006). Because the reward with the voucher was in the nearer future

when participating were invited to the last wave of data collection, attrition rates might have been lower when compared to the first follow-up. Therefore, in order to prevent high attrition rates, I recommend splitting the amount of the voucher over the follow-up period of data collection. In this way, respondents might be more motivated to participate in every wave of data collection.

FINAL CONCLUSION

With this dissertation, I aimed to investigate the effect of message frame-tailoring based on the need for autonomy in an online computer-tailored smoking cessation intervention. Based on the findings described in this dissertation, I cannot conclude that message frame-tailoring based on the need for autonomy is an effective addition to conventional content-tailoring techniques in online health interventions in increasing smoking cessation rates overall. However, smokers with a higher need for autonomy seemed to benefit from frame-tailored messages, compared to their peers with a lower need for autonomy. To enhance the effectiveness of online smoking cessation interventions, future research efforts should therefore be directed towards investigating whether the dichotomisation of smokers into two categories – a lower need for autonomy and a higher need for autonomy - proves to be valid, or whether a third moderate need for autonomy-group might exist.