How oncologists’ communication impacts patients’ information recall and emotional stress
A video-vignettes approach
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This chapter is partially based on:
This publication is added to this thesis as Appendix A.
The main goal of the research described in this thesis was to investigate the impact of oncologists’ communication during medical consultations on patients’ recall of information provided in those consultations, with a special focus on the possible mediating role of emotional stress in this relation. A better understanding of these relations is meant to enhance insight and inform medical communication skills teaching of medical students and oncologists, and thus contribute to high-quality, evidence based patient care. As explained in Chapter 1, the experimental video-vignettes design using analogue patients is an appropriate methodology to systematically investigate the hypothesized causal relationships. Nevertheless, we first set out to optimize the ecological validity of our video-vignettes studies by investigating the impact of several methodological decisions on analogue patients’ engagement.

This thesis is therefore divided into two parts:

PART I - The video-vignette approach
PART II - How oncologists’ communication impacts patients’ information recall and emotional stress

In this last chapter, our main findings will be summarized for both parts separately, followed by a general discussion of these finding in the context of the existing literature. Moreover, we will discuss potential practical implications of our findings, reflect on the methodology used, and suggest future research directions.

PART I - THE VIDEO-VIGNETTE APPROACH

Summary of findings

Participants in video-vignettes studies investigating the doctor-patient interaction are called analogue patients. As described in Chapter 1, an assumption critical to the ecological validity of video-vignette designs, is that analogue patients engage with the video vignette, meaning that they really immerse in the video vignette’s story, imagine themselves being in the shoes of the video patient, and experience emotions accordingly, while viewing the video with great attention. In Part I of this thesis, we described our research to further optimize analogue patients’ engagement when using this methodology, thereby contributing to the rigor of the video-vignettes studies described in Part II of this thesis. In Chapter 2 to 4, we addressed three issues. First, to enable the multi-dimensional assessment of analogue patients’ engagement while viewing video vignettes, we developed the 15-item Video Engagement Scale (VES), based on an existing set of questions. In two study populations (N = 181 and N = 228) we tested the internal consistency and test-retest reliability of the developed
scale, which proved to be adequate in both samples. Moreover, good content validity was indicated by positive correlations between the VES and perceived realism of the video and video patient, and identification with the video patient. Subsequent confirmatory factor analysis indicated a four-dimensional model fit, largely resembling our hypothesized model. Therefore, we concluded that the VES reliably and validly measures analogue patients’ engagement while watching video vignettes. This work is described in Chapter 2. The resulting scale consists of four dimensions: (1) ‘Emotions and empathy’: emotional reactions evoked by the video and empathy with the video patient; (2) ‘Identity’: adopting the video patient’s identity; (3) ‘Attention’: attentional focus on the video; and (4) ‘Going into a narrative world’, the sensation of being immersed in the story and world shown in the video vignette.

Second, as described in Chapter 3, we compared analogue patients’ engagement in two commonly utilized groups of analogue patients, i.e., (former) cancer patients (N = 22) and disease-naive individuals (N = 24), in a randomized video-vignettes study. Disease-naive means that these individuals had no current medical conditions, and a medical history without cancer. We used the VES to assess self-reported engagement retrospectively, and added psychophysiological measures (electrodermal activity, cardiovascular activity and cortisol levels) to assess the emotional dimension of engagement during watching a video vignette depicting a bad news consultation. We intended to match the groups in age. However, it turned out to be difficult to recruit disease-naive participants, matching the cancer patients in their –older- age. This is important, as the differences we initially found between cancer patients’ and disease-naive individuals’ self-reported engagement and blood pressure response disappeared after adjusting for age. No group differences were found on the other physiological measures of emotional arousal. These results therefore indicated that analogue patients’ video-vignette engagement does not depend on analogue patients’ medical history. Instead, older age turned out to be a more prominent predictor of engagement.

Third, Chapter 4 described our study in which we systematically tested how two variations in video-vignette introduction format and three variations in camera focus influenced analogue patients’ engagement with a video vignette showing a bad news consultation. The effects of two introduction formats (audiovisual versus written) and three variations in camera focus (1: on the physician only, versus; 2: on the physician and the patient at neutral moments alternately, versus; 3: on the physician and the patient at emotional moments alternately) were tested, as well as their interaction. Four main findings indicate that these methodological choices especially influence analogue patients’ (N = 181; cancer-naive students) emotional engagement while viewing the vignette. First, how the video vignette was introduced mattered: analogue patients showed a stronger cardiovascular response in reaction to an audiovisual introduction, as compared to a written introduction. This effect was sustained during the subsequent watching of the videotaped medical consultation. Second, the use of alternating camera shots specifically focused on emotions of the patient in the video caused the strongest emotional engagement in analogue patients, as reflected by their electrodermal response...
to the vignette. Third, an interaction effect of introduction format and camera focus was found on analogue patients’ self-reported emotional engagement, as measured by the VES. Focusing only on the oncologist during the consultation resulted in lower levels of emotional engagement when combined with the audiovisual introduction, as compared to the written introduction. Fourth, the other three dimensions of self-reported engagement were not influenced by introduction format or camera focus. In sum, from Chapter 4 we can conclude that the use of an audiovisual introduction combined with alternating camera shots focused on the video patient’s emotional expressions during the medical consultation maximizes analogue patients’ emotional engagement, and could therefore increase the ecological validity of the video-vignettes design.

Discussion of findings

In this section we will explain how the findings presented in Part I of this thesis add to the existing knowledge. To this end, a brief summary of previous research on the validity of the video-vignettes methodology, using analogue patients as proxies to actual patients, will be provided first. In their systematic review, van Vliet and colleagues [1] identified 38 published articles based on 34 video-vignette studies investigating medical communication. In 31 of these publications, analogue patients assessed physicians’ communication. Van Vliet et al. showed that most of these video-vignette studies tried to ensure internal validity, i.e., the extent to which an experimental video-vignettes study demonstrates a causal relationship between specific elements of physician’s communication and the analogue patient related outcome(s). A prerequisite to this is that the communication elements of interest are manipulated as intended. Otherwise, the observed changes in the outcome variable, e.g., analogue patients’ satisfaction with the physician’s communication, might be explained by other factors. To ensure internal validity, medical communication experts or (analogue) patients can be involved in the development and evaluation of the successfulness of communication manipulations, for example when creating the script or test video recordings [2, 3].

In addition to internal validity, video-vignette studies have to ensure external validity, i.e., whether the results from such a study can be generalized to actual medical practice. This type of validity has been investigated in a study by Blanch-Hartigan et al. [4], in which analogue patients viewed videotaped medical consultations and rated their satisfaction with the physician. Analogue patients’ satisfaction rating were then shown to be significantly correlated to the ratings of the actual patients in those videotaped interactions. Blanch-Hartigan and colleagues therefore concluded that the use of analogue patients in a video-vignettes study is a valid approach to evaluate provider-patient interactions.

However, as with any relatively new methodology, critical remarks can still be made. For one, a correlation does not reflect perfect generalizability to clinical practice. Therefore, in Part I of this thesis, we aimed to find ways to gain more insight into, and optimize, the external validity of the video-vignette approach. One way of improving the external validity of a video-vignettes study is to
increase its ecological validity, i.e., the extent to which the act of watching a video vignette as an analogue patient resembles experiencing an actual medical consultation as a patient. To this end, several video-vignette studies reviewed by van Vliet et al. [1] tried to increase analogue patients’ identification with the video patient, by recruiting individuals waiting for a doctor’s appointment, depicting only the physician in the video-vignette consultation, or introducing the patient in the video via text or video prior to showing the video vignette [1]. However, as stated by Hillen and colleagues in their recommendations on video-vignette development [2], no ‘gold standard’ exists for most of these methodological decisions, as systematic research testing the impact of different choices is lacking. Moreover, to ensure ecological validity solely based on analogue patients’ identification with the patient in the video seems too restricted; other concepts such as transportation (i.e., the extent to which one becomes absorbed into the story and mentally enters the narrative world [5]), and empathy might be relevant as well.

Therefore, we have tried to fill some of these knowledge gaps by means of the work described in Chapter 2, 3 and 4. We first developed a valid and reliable questionnaire to assess all relevant dimensions of analogue patients’ engagement while viewing video vignettes. Next, we established that analogue patients’ video-vignette engagement does not depend on analogue patients being a (former) patient or not. Furthermore, we determined that using an audiovisual introduction and alternating camera shots focused on the video patient’s emotional expressions improves analogue patients’ emotional engagement. The findings presented in Part I of this thesis are thus an essential addition to the evidence base for making methodological choices in the development of video vignettes for research purposes. These findings can therefore be used by researchers to improve the rigor of future video-vignette studies investigating the patient-provider interaction.

General reflections on, and suggestions for future research directions regarding, the video-vignette methodology will be discussed after the summary and discussion of the research described in Part II of this thesis. Here, we will discuss the implications of the findings presented in Part I for our own video-vignette studies.

Implications of findings for the video-vignette research described in this thesis

The work presented in Part I of this thesis has informed methodological decisions in our own research in several ways. First, we used the newly developed Video Engagement Scale (VES) to examine the impact of analogue patient disease history and variations in introduction format and camera focus, and to check for unintended, undesirable differences in engagement between video-vignette conditions. Second, when recruiting analogue patients for further video-vignette studies, we could put less emphasis on disease history and considered other arguments. Hence, from an ethical standpoint, we considered it unnecessary to burden (former) cancer patients for our experimental research. Instead, we recruited cancer-naive students as analogue patients, because of two additional reasons. Based on the difficulty we had recruiting disease-naive individuals for the study described in Chapter 3, we considered recruiting large samples of students to be more

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PART II - HOW ONCOLOGISTS’ COMMUNICATION IMPACTS PATIENTS’ INFORMATION RECALL AND EMOTIONSAL STRESS

Summary of findings
The study described in Chapter 5 explored if analogue patients’ psychophysiological arousal and/or self-reported feelings as evoked by an oncological bad news consultation were related to their recall of information provided by the oncologist in the video vignette. Cancer-naive students ($N = 181$) acted as analogue patients in this experimental video-vignettes study. Electrodermal and cardiovascular activity were recorded during a baseline period and during watching the video vignette. Self-reported negative feelings, i.e., anxiety, tenseness, anxiousness, sadness, depression, uncertainty, tiredness, anger and irritation, were assessed before and after watching. Both free recall and recognition of information were assessed after 24 to 28 hours. Results showed that watching the consultation evoked significant psychophysiological and self-reported emotional stress responses. However, testing the associations between our emotional stress measures and free recall and recognition resulted in one significant, small correlation only. Considering multiple testing, this significant result was probably due to chance. Alternative analytical methods yielded identical results. Therefore we concluded in Chapter 5 that, despite significant psychophysiological and self-reported emotional stress responses to the bad news vignette, these responses did not affect the extent to which information was recalled.
In two subsequent video-vignette studies \( (\text{Chapter 6 and 7}) \) we compared affect-oriented communication by the oncologist in the video vignette’s consultation with standard communication. More specifically, we aimed to test the impact of trust-conveying (Chapter 6) and emotion-oriented (Chapter 7) communication on information recall. In addition, we investigated whether such communication could temper analogue patients’ emotional stress and whether the relationship between communication and information recall was mediated by reductions in emotional stress. The reasons for performing a second (and third) study investigating the hypothesized relationship between emotional stress evoked during an oncological consultation and information recall were twofold. First, we wanted to replicate, and thereby lend further support to, the null-findings described in Chapter 4, as considerable evidence from other fields indicate a relationship between emotional stress and memory performance. Second, by changing the design of the study and comparing different communication conditions, we intended to increase variability in outcomes and therefore the chance of demonstrating the hypothesized relationship (if true).

In the video-vignettes study described in \( \text{Chapter 6} \), the oncologist adopted either standard or trust-conveying communication behavior, characterized by verbally conveying his competence, honesty and caring [6]. Such communication might reduce patients’ fear and worry and thereby improve information recall. The two video vignettes we used were previously developed and validated by Hillen et al. [6]. Cancer-naive students (N = 97) were randomly assigned to view one of the two video-vignettes. Electrodermal and cardiovascular activity were recorded during a baseline period and during watching the video vignette. Free recall and recognition of information were assessed 24 to 28 hours after viewing. Results showed that percentages accurate free recall were higher in the trust-conveying condition than in the standard communication condition (65.3% versus 59.5%), but information recognition did not differ. Moreover, the increase in heart rate from baseline to watching the vignette was smaller for analogue patients in the trust-conveying condition than shown by analogue patients in the standard condition. No effects of communication on two measures of electrodermal activity were found. Furthermore, a mediation effect could not be confirmed, as analogue patients’ heart rate response was not associated with free recall of information. However, the results from the mediation analysis showed that after controlling for heart rate, the direct effect of communication on free recall was no longer significant, suggesting that heart rate might partially mediate the relationship between communication and information recall. Therefore, the tempering of emotional stress as a potential mechanism through which oncologists’ communication might influence patients’ recall of information was still considered an avenue for further investigation, leading to the work described in Chapter 7. To conclude, \( \text{Chapter 6} \) indicated that oncologists’ use of a trust-conveying communication style, characterized by the verbalization of competence, honesty and caring, increases analogue patients free recall of medical information.

For the video-vignettes study described in \( \text{Chapter 7} \), we first focused on maximizing the validity of our design. To this end, we ensured the internal validity by developing and extensively testing the communication manipulations, based on the existing literature and expert knowledge on medical
communication skills. We developed a standard communication condition and two conditions in which the oncologist’s communication was manipulated during four script segments by adding emotion-oriented behaviors, i.e., behaviors enacted in response to the patient’s negative emotional expressions with the intention to alleviate those emotions. The resulting emotion-oriented communication conditions comprised of either attentive silence, labeled as emotion-oriented silence, or acknowledging, explorative, empathic and supportive statements, labeled as emotion-oriented speech. Moreover, we optimized the ecological validity of this video-vignette study, based on the findings presented in Part I of this thesis. We hereby focused on optimizing analogue patients’ emotional engagement, as analogue patients’ emotional stress was an important outcome. In fact, our aims were three-fold. First, we aimed to investigate and compare the effects of emotion-oriented silence and emotion-oriented speech on recall of information provided in an oncological bad news consultation. Second, we wanted to test the mediation of the relationship between communication and information recall by emotional stress. Third, we aimed to explore whether the relationships between communication and patient outcomes are consistent across patients, i.e., to explore the moderating effects of: 1) health literacy and age on the relationship between communication and information recall, and 2) trait anxiety, emotion regulation, and attachment style on the relationship between communication and emotional stress.

Cancer-naive students (N = 217) acted as analogue patients and were randomly assigned to one of the three video-vignette conditions. We used similar measures as in Chapter 6, with the exception of analogue patients completing an additional questionnaire on personal characteristics. First, our findings showed that emotion-oriented silence and speech both resulted in analogue patients correctly recognizing more information as compared to standard communication (respectively 80.0% vs 78.0% vs 71.4%). Free recall scores did not differ between conditions. Second, we found no mediation effects by emotional stress. Remarkably, no communication effects were shown on analogue patients’ psychophysiological arousal or self-reported negative feelings evoked by the bad news consultation. Third, we found that emotion-oriented communication counteracted the negative influence of functional health literacy on information recognition, in particular when the oncologist responded with emotion-oriented speech. In addition, some indications were found that emotion-oriented speech can amplify the emotional arousal response of individuals who are more prone to experience anxiety in close relationships, respond with anxiety to situations, and struggle to regulate their emotions. In sum, the research described in Chapter 7 indicated that, by providing space for emotions by means of attentive silence or by acknowledging and exploring patients’ emotions and providing empathic and supportive statements, oncologists’ communication could result in better recognition of information. This is important as cancer patients’ memory is often prompted, for example when talking with medical professionals or relatives or reading on the internet. They then have to be able to identify what information is relevant to their situation. Moreover, low health literate cancer patients may especially benefit from oncologists’ use of emotion-oriented communication.
In the qualitative study presented in Chapter 8, we introduced actual patients and oncologists to the emotion-oriented communication video vignettes from Chapter 7, to examine their perceptions and preferences. Moreover, we aimed to investigate their opinions on the impact of such emotion-oriented communication, and barriers for oncologists to act in such a manner. Additionally, we aimed to explore oncologists’ evaluations of their own communication performance and their perspectives on potentially ways to improve current practice. We therefore conducted semi-structured in-depth interviews with a heterogeneous sample of (former) cancer patients (N = 16) and medical oncologists, radiotherapists and oncological surgeons (N = 13). We found that most, but not all, cancer patients and oncologists preferred emotion-oriented speech, in which the oncologist acknowledges and explores patients’ emotions and provides statements displaying empathy and support, when compared to an oncologist minimally responding, or responding with attentive silence, to patients’ emotions. In addition, emotion-oriented speech was assumed to positively influence a broad variety of outcomes, related to the six functions of medical communication, including ‘responding to emotions’, ‘providing information’, ‘fostering the relationship’, ‘decision making’, ‘gathering information’, and ‘enabling disease and treatment related behavior’ [7]. In general, patients and oncologists had many similar views, also with regard to factors hindering oncologists’ to respond (adequately) to patients’ emotions. Such barriers were assumed to be related to the oncologist, the patient, or the context, and were thus more comprehensive than oncologists’ communication skills with regard to addressing emotions. Oncologists suggested the regular videotaping of consultations as a promising methods to reflect on their communication in response to emotions, and thereby to improve such communication. In sum, Chapter 8 confirmed emotion-oriented speech as the preferred response to cancer patients’ emotional expressions.

Discussion of findings

The main objective of this thesis was to investigate the impact of oncologists’ affect-oriented communication on patients’ recall of information provided during medical consultations, with a special focus on the possible mediating role of emotional stress in that relation. The proposed relations were summarized in a model as presented in Figure 1. Part II of this thesis presented three experimental video-vignette studies that tested this hypothesized model. In addition, Part II included one qualitative interview study that provided more insights into the views of both cancer patients and oncologists regarding oncologists’ communication in response to cancer patients’ emotional expressions.

The research in Part II of this thesis provided evidence for the causal and positive influence of two specific forms of affect-oriented communication, i.e., trust-conveying and emotion-oriented communication, on patients’ recall of medical information. Combined with the four publications that were discussed in Chapter 1 of this thesis [9-12], these results firmly underscore that oncologists’ affect-oriented communication can impact patients’ information recall. With the exception of
the research by Fogarty et al. [13], who found a small negative effect of enhanced compassion on information recall, affect-oriented communication impacted information recall in a positive way. Furthermore, our research suggested emotion-oriented speech as the best way to respond to patients’ emotions, when compared to emotion-oriented silence. Still, the findings presented in this thesis also indicated that it is important for oncologists to attune their communication to each individual patient, as differences in preferences and impact exist.

Two issues warrant further discussion regarding the relationship between oncologists’ communication and information recall. First, inconsistencies were shown between free recall and recognition findings. In Chapter 6 we found an effect of trust-conveying communication on free recall, and in Chapter 7 an effect of emotion-oriented silence and speech on recognition of information. Previous experimental research investigating the effects of communication on information recall has also shown inconsistencies between free recall and recognition findings (see for example [12]). These inconsistencies are difficult to explain. The first, and most straight-forward, explanation

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**Figure 1. A model of hypothesized relationships**

*Notes.* Without accounting for emotional stress, affect-oriented communication was expected to positively impact information recall, which is called the total effect. When accounting for emotional stress as a potential mediator of this relation, the total effect can be broken down into two effects. First, the indirect effect, or in other words the mediation effect, whereby communication exerts its influence through (analogue) patients’ emotional stress. Specifically, affect-oriented communication was assumed to reduce emotional stress (path a), and these lower levels of emotional stress were assumed to result in higher levels of information recall (path b). Second, the direct effect, which can be calculated by predicting information recall based on communication while controlling for emotional stress, thus taking into account a possible mediation effect.

Since emotional stress was expected to be a (partial) mediator of the impact of affect-oriented communication on information recall, we hypothesized that an indirect effect could be demonstrated, and-as a consequence- the direct effect was expected to be smaller than the total effect [8].
might be that the manipulated elements of communication, i.e., the phrases conveying trust and the emotion-oriented statements and silence, somehow elicited differential effects regarding free recall and recognition. Small differences in physicians’ communication can matter with regard to information recall, as shown recently by Bientzle et al. [14] in a randomized video-vignettes study testing the differential impact of doctor-centered communication, patient-centered communication and patient-centered communication with need-orientation (PCC-N). They found that the analogue patients in the PCC-N condition correctly recognized less information, as compared to the other two conditions, indicating that small variations in communication such as the additional addressing of a patient’s needs can elicit differential effects. A second explanation could be that oncologists’ communication might differentially affect free recall and recognition based on the medical context. The influence of trust-conveying communication on analogue patients’ free recall of information was shown in the context of an oncological treatment-related consultation, while emotion-oriented communication improved recognition of information in the context of an oncological bad news consultation. These hypotheses warrant further investigation.

Second, when comparing recall percentages between communication conditions, the recall improvement caused by either trust-conveying or emotion-oriented communication might seem limited. We tried to put these results in perspective, taking into account the number of recall items assessed, by stating for example in Chapter 7: “on an eight item scale these results indicate that emotion-oriented communication enabled one out of every two participants to correctly recognize an additional piece of medical information”. However, it is also important to consider that we used the video-vignettes design to provide empirical evidence on the causal relationships between specific elements of communication and outcomes variables, i.e., information recall and emotional stress. As mentioned by Hillen in her dissertation [15], video-vignette studies do not provide evidence on the absolute value of the outcomes. This means that in this thesis we can draw conclusions about the statistical significance and the direction of effects, but not about the size of the effects presented.

In addition, the findings presented in Part II of this thesis question the assumption that reducing emotional stress is the underlying mechanism through which affect-oriented communication influences information recall. This is an important finding, as in medical communication research and medical (communication) education these relationships are often assumed to exist [10, 11, 16, 17]. Other mechanisms might be at play. As emotion-oriented silence was demonstrated to impact information recognition as well and to a similar extent as emotion-oriented speech, an alternative explanation could be that both approaches provide patients with extra time to adequately process and store the provided medical information into their memory. In video-vignette research the ‘enhanced’ communication condition, e.g., the affect-oriented communication condition, is usually longer in duration than the standard communication condition, unless this difference is compensated by means of a so-called filler [2]. Therefore this alternative hypothesis also applies
to the research of Fogarty et al. [13], Hillen et al. [12], Sep et al. [10], and van Osch et al.[11]. This hypothesis warrants further examination.

Alternative explanations for not finding evidence of mediation by emotional stress on the relationship between communication and information recall can also be formulated. First, the relationship between emotional stress and information recall might be more complex than accounted for in our studies. Research has shown that stress can either impair, enhance, or have no effect on memory, for example depending on the emotional valence of the to-be-remembered information or the timing of the stressor [18]. Second, the relationship between communication and emotional stress might be more complex than accounted for in our study. We for example found some evidence suggesting that oncologists’ communication does affect emotional stress levels in some individuals but not in others. Third, analogue patients’ emotional stress levels evoked in video-vignette research were likely not as high as patients’ emotional stress levels in actual oncological consultations. This might have decreased our chance to detect relations. Thus, we cannot conclusively say that the reduction of emotional stress is not a mechanism through which oncologists’ affect-oriented communication impacts patients’ information recall. Still, the research described in Part II of this thesis suggests that other mechanisms play a role.

OVERALL METHODOLOGICAL REFLECTIONS

First, we reflect on the video-vignettes methodology. Previous research indicates that analogue patients in a video-vignettes design can be validly used as a proxy to actual patients to evaluate physician’s communication behavior [1, 4]. We found our video vignettes to evoke statistically significant emotional stress responses in analogue patients. Nevertheless, the validity of using the video-vignettes approach to investigate emotional stress as an underlying mechanism through which oncologists’ communication influences information recall can be called into question. As stated before, we expect the emotional stress of actual patients in medical practice to be higher than the responses of our analogue patients, especially regarding psychophysiological arousal. To our knowledge, no studies have addressed patients’ emotional stress levels during actual consultations. Therefore, we cannot compare the emotional stress levels we found in our video-vignette studies, to the levels obtained during actual consultations, and generalizability of the results to actual patient samples is limited. Replication of our findings in more clinically relevant, heterogeneous samples is warranted. Still, as the results repeatedly show an impact of affect-oriented communication on analogue patients’ information recall, either free recall and/or recognition, these effects are considered to be robust.

Second, some remarks can be made regarding the assessment of emotional stress. Combining self-reported with several psychophysiological indicators of emotional stress is a strength of our
investigations. It allowed us to assess emotional stress over the progression, and during specific parts, of a consultation. Self-report and psychophysiological recordings showed some, yet limited, overlap in our research. Therefore combining them provided added value, and increased our sensitivity to detect effects. However, in our investigations, the relation between communication and information recall was not mediated by either self-reported emotional stress or psychophysiological arousal; nor was an association found between emotional stress and information recall. Therefore, we could not establish their unique value.

Although time consuming to collect and analyze, our studies showed it is feasible to gather psychophysiological arousal data in (large) samples of analogue patients. It is however relatively complex to interpret the psychophysiological arousal results, when compared to self-report. The autonomic nervous system plays a major part in the body’s response to emotional stimuli. In particular, the relative increase in sympathetic activity is assumed to elicit peripheral arousal responses, such as changes in electrodermal activity, heart rate, or blood pressure [19]. Until recently, activation of the sympathetic nervous system was considered an all-or-nothing process; when activated by an emotional stimulus, an undifferentiated arousal response would follow without a distinction between peripheral organs or organ systems [20]. However, based on more recent findings analyzed in a review by Kreibig, it is argued that the emotional arousal response is more differentiated, with specific patterns of peripheral physiological activation in response to (certain) different emotions [21]. In the research described in this thesis we could not identify a common underlying factor in analogue patients’ electrodermal and cardiovascular response to the video vignette (Chapter 7), suggesting a differential impact on each of these psychophysiological measures. This differential effect could thus be caused by the variation in analogue patients’ emotions. Alternatively, other factors might have influenced analogue patients’ peripheral physiological arousal levels differentially, such as hormones or parasympathetic nervous system activity.

**FUTURE RESEARCH DIRECTIONS**

As suggested above, research investigating the association between oncologists’ communication, patients’ emotional stress and patients’ recall of medical information in actual clinical consultations is warranted. Such research can validate the use of the video-vignettes design for investigating outcomes for which analogue patients’ emotional engagement is particularly relevant. Furthermore, with regard to the video-vignettes design, promising new technologies such as virtual reality should be explored, as those might improve the authenticity of analogue patients’ experience, and thereby the ecological validity, while preserving the advantages of an experimental design. Moreover, future research should focus on alternative mechanisms that can explain the impact of physicians’ affect-oriented communication on patients’ information recall. For example, we suggested the provision of additional time during the consultation to process and store information as an essential contribution.
to patients’ information recall. Additionally, research should be directed at the translation of positive research findings into clinical practice.

**PRACTICE IMPLICATIONS**

In oncology, emotions are part of most consultations [22-24]. Adequately responding to patients’ emotions is therefore essential to high-quality care [7, 25]. This research presented in this thesis showed the positive impact of oncologists’ affect-oriented behavior on (analogue) patients’ information recall, and suggests that emotion-oriented speech could influence a broad variety of other outcomes. The finding that oncologists miss approximately two out of three opportunities to attend to and help manage patients’ emotions in current oncological practice [22, 26] is therefore an important issue to address. Our research showed that most oncologists would like to attend to patients’ emotions. Showing evidence that affect-oriented communication strategies can improve not only patients’ emotional wellbeing, but also patients’ ability to recall highly relevant information may encourage oncologists, and physicians in general, to adopt such strategies. Moreover, based on the work described in this thesis we can provide some practical recommendations. First, trust-conveying communication could benefit cancer patients. Oncologists can try to enhance patients’ recall of information by verbalizing their competence, honesty and caring for patients during their conversations on the treatment of cancer. Second, in response to patients’ expression of emotions, oncologists can react best by acknowledging and exploring patients’ emotions and providing empathic and supportive statements, possibly combined with moments of attentive silence.

Additionally, providing educators with the obtained insights will help them to demonstrate trainees the skills to deal with patients’ emotions and to scientifically validate the importance of these skills for patients’ information recall. Advancing communication skills with evidence-based training will be helpful to enhance the professionalism that is the hallmark of good quality of care.

**FINAL CONCLUSION**

In conclusion, the research presented in this thesis provided evidence for the causal and positive influence of oncologists’ trust-conveying and emotion-oriented communication on patients’ free recall and recognition of medical information. Furthermore, the results indicate that the reduction of emotional stress might not be the underlying mechanism through which physicians’ communication influences patients’ information recall.
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