How oncologists' communication impacts patients' information recall and emotional stress

A video-vignettes approach

Visser, N.C.

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Does silence speak louder than words? The impact of oncologists’ emotion-oriented communication on (analogue) patients’ information recall and emotional stress.

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Visser LNC, Tollenaar MS, van Doornen LJP, de Haes JCJM, Smets EMA. Does silence speak louder than words? The impact of oncologists’ emotion-oriented communication on (analogue) patients’ information recall and emotional stress.
ABSTRACT

Objective
This study aimed to examine the impact of two types of oncologists’ emotion-oriented communication on participants’ recall of medical information, including the potential mediation by emotional stress. Additionally, moderation effects on these relationships by participant characteristics were examined.

Methods
An oncologist’s communication in response to a patient’s emotional expressions was manipulated during a videotaped, scripted bad news consultation. Three conditions were created: 1) standard communication, 2) emotion-oriented silence, and 3) emotion-oriented speech. Analogue patients, i.e., 217 cancer-naive individuals instructed to imagine themselves in the position of the patient while watching the video, were randomly allocated to one condition. Measurements included information recall, emotional stress (self-reported and physiological), and personality characteristics.

Results
Emotion-oriented silence ($p = .002$) and speech ($p = .019$) enhanced information recognition compared to standard communication, but no differences in free recall were found. None of the emotional stress measures mediated these relations. Poorer functional health literacy predicted poorer recognition for individuals in the standard condition, and this negative influence was counteracted by emotion-oriented communication. Emotion-oriented speech evoked more skin conductance responses in analogue patients with higher attachment anxiety levels, compared to silence.

Discussion and conclusions
By acknowledging and exploring emotions and providing empathy and support, and by means of attentive silence, the oncologist’s communication resulted in better information recognition. These findings can inform medical communication skills training and therefore contribute to evidence-based medical care. How oncologists’ communication affects patients’ information recall warrants further investigation, as this relation could not be explained by the tempering of emotional stress.
INTRODUCTION

Cancer patients want and need much information to be able to make informed decisions and cope with their disease [1]. However, several systematic literature reviews indicate that their information needs are not always met and remain during the course of cancer treatment [2, 3]. Oncologists are mentioned as key information sources most often [2] and might therefore be deployed to fulfill those needs. Unfortunately, patients forget approximately 50% of information provided during oncological consultations, especially treatment-related information [4, 5]. Identifying and optimizing strategies for oncologists to improve patients’ information recall, i.e., their ability to remember the provided medical information, is therefore imperative [6]. This study addresses three knowledge gaps regarding to the impact of oncologists’ communication on patients’ information recall.

Reducing cancer patients’ emotional stress during the consultation has been suggested as the mechanism by which communication could improve information recall (e.g. [7, 8]). Here, emotional stress is defined as the increase in physiological arousal and/or self-reported negative feelings evoked by emotional stimuli, such as the provision of bad news during a consultation. Communication behaviors displaying oncologists’ emotional engagement with the patient have been shown to enhance recall, such as conveying compassion [9] or providing reassurance and ongoing support [10]. The current study builds on that research by focusing on emotion-oriented behaviors, i.e., oncologists’ behaviors enacted directly in response to patients’ negative emotional expressions with the intention to alleviate those negative emotions (based on [11]). Literature on patient-centered care and medical communication skills education suggests that oncologists can help patients manage their emotions by verbally exploring and acknowledging the expressed emotions and/or by providing empathic and supportive statements in response to emotions (e.g. [12]). In contrast to this emotion-oriented speech, silence has been suggested as a non-explicit way to provide space in response to patients’ emotions [13]. However, the effects of oncologists’ emotion-oriented silence and emotion-oriented speech on patients’ information recall have never been examined and compared.

Previous studies thus assume that emotional stress mediates the relationship between oncologists’ communication and patients’ information recall. This means that patients’ emotional stress should be associated with both communication and information recall. With regard to communication, oncologists’ attending to patients’ emotions might facilitate patients’ ability to cognitively reappraise the stressful situation and down-regulate their negative emotions [14]. In contrast, being inclined to suppress emotions during the course of the consultation has been proven to lead to increased physiological arousal and impaired information recall [15]. However, inconsistent effects were shown in various experimental studies with regard to the impact of oncologists’ communication on emotional stress (e.g. [8, 9]). Still, if an effect was found, this was most often a tempering effect (e.g. [7]). Regarding the association between emotional stress and information recall, higher levels of
emotional stress have been associated with poorer memory performance in other fields (e.g. [16]). However, results from recent experimental studies investigating patient-provider communication are inconsistent. Sep et al., did find a relationship between physiological arousal levels and information recall [10], while Visser et al., could not provide evidence for such a relationship [17]. Given its’ focus on emotion-oriented behaviors this study is particularly suited to investigate the potential mediation of the relationship between oncologists’ communication and patients’ information recall by emotional stress.

Lastly, previous research has indicated that the relationships between oncologists’ communication and patient outcomes are not consistent across patients [18, 19]. With regard to information recall, poorer health literacy and older age for example have been related to limited recall in patients [4, 17]. Also, patients’ personality characteristics might be linked to how communication is perceived, and therefore influence their emotional stress levels in response to that communication [20]. To illustrate, individuals with high trait-anxiety were found to be more tense after consultations that involved much emotional talk, compared to individuals with low trait-anxiety [19]. Furthermore, individuals who are less able to regulate their own emotions might benefit most from oncologists’ emotion-oriented behaviors, as these facilitate regulation [21]. Moreover, patients’ attachment style might shape their expectations about oncologists’ communication and therefore influence how they respond to emotion-oriented communication [22]. Hence, to avoid a one-size-fits-all approach, moderation effects on the relationships between oncologists’ communication and patients’ information recall and emotional stress by patient characteristics need further investigation.

In this randomized, experimental study we aimed to 1) investigate and compare the effects of emotion-oriented speech and emotion-oriented silence on information recall; 2) test the mediation of the relationship between communication and information recall by emotional stress; 3) explore the moderating effects of 3a. health literacy and age on the relationship between communication and information recall, and 3b. trait anxiety, emotion regulation, and attachment style on the relationship between communication and emotional stress.

**MATERIALS AND METHODS**

**Design and ethics**

A video-vignettes design [23] was used allowing for conclusions about causality. In this experimental design, specific elements of an oncologist’s communication are varied across multiple, otherwise standardized, scripted videotaped consultations. In this study, the oncologist’s behavior in response to a cancer patient’s emotional expressions was manipulated to create three conditions: 1) standard communication; 2) emotion-oriented silence; 3) emotion-oriented speech. The impact of these communication types on information recall and emotional stress was investigated by randomly
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allocating so-called analogue patients to the conditions. Analogue patients are individuals instructed to imagine themselves in the position of the patient in the video while viewing the videotaped consultation. The psychology research ethics committee from Leiden University has approved this study (PREC15-1116/65).

Participants
Cancer-naive individuals (N = 217) were recruited at Leiden University. They were on average 21 years old (range 18-33; SD = 2.7) and mostly female (86%). This sample was selected to minimize the possible confounding influences of education level and previous experience with cancer and cancer treatment on information recall. Inclusion criteria comprised: 1) age 18-35 years; 2) Dutch language proficiency; 3) no use of medication for cardiovascular diseases, 4) never had cancer, and 5) no previous experience with oncological consultations. Participants were compensated either 10 € or three course credits for their participation.

Experimental procedures
After arrival at the laboratory on the first day, written informed consent was obtained. Participants were then randomly assigned to one of the three video-vignette conditions. After completing the first digital questionnaire (T0), all participants were attached to the physiological equipment. They then watched a calm nature documentary for approximately ten minutes: an eight minute acclimatization period and a two minute period to register physiological baseline activity. Next, they watched the video vignette and immediately thereafter completed the second digital questionnaire (T1). On the second day (T2), participants were interviewed by telephone 24-28 hours after the experimental session to assess information recall. To prevent deliberate encoding, participants were kept unaware of the upcoming recall test. At the end of the interview, participants were fully debriefed.

Video-vignette conditions
The development of valid video-vignette conditions followed published recommendations [23]. A detailed description of this development was added as supportive information (Supplement A). The basic script comprised a bad news consultation involving an oncological surgeon, referred to as ‘the oncologist’, and a patient with esophageal cancer. During the consultation, the patient’s diagnosis and prognosis were discussed first, followed by the provision of additional information about treatment, side-effects, and procedures. Four short additional script segments were developed during which the oncologist’s responses to the patient’s emotional expressions were varied to create the three conditions (see Figure 1 for an example). In the standard communication condition, the oncologist provided limited space for further disclosure of emotions. In the emotion-oriented silence condition, the oncologist responded with attentive silence, until the patient resumed the conversation. The oncologist in the emotion-oriented speech condition responded
by acknowledging and/or exploring the patient’s emotional expressions. Moreover, he provided empathic and supportive statements. Next, video recordings were made with professional actors. To stimulate analogue patients’ ability to identify with the video patient, two identical versions were created for each video-vignette condition, one with a male actor and one with a female actor acting as the video patient. The duration of the resulting emotion-oriented video vignettes was 510 seconds. The standard communication video was 72 seconds shorter. Finally, an introduction was added to all video vignettes, in which the patient was introduced and a standardized instruction was given.

<table>
<thead>
<tr>
<th>Start of manipulation</th>
</tr>
</thead>
</table>
| **Oncologist**: (has been explaining why curative surgery is not a preferable option) ... So when the cancer has metastasized, as in your case, we should not perform surgery.  
**Patient** (with watering eyes): Okay.  

<table>
<thead>
<tr>
<th>Standard</th>
<th>Emotion-oriented silence</th>
<th>Emotion-oriented speech</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short silence</td>
<td>Short silence</td>
<td><strong>Oncologist</strong>: You expected otherwise, right? (short silence) I can see this is a huge setback for you.</td>
</tr>
</tbody>
</table>
| **Patient** (overwhelmed): That is disappointing. | **Patient** (overwhelmed): That is disappointing. | **Patient** (nods): Yes, this is disappointing.  
**Short silence** But are we not going to do anything?  
**Oncologist**: Shall I tell you a bit more about that now, about what we can do?  
**Patient**: Yes. |
| Short silence | Silence | **Oncologist** (nods): Yes.  
**Silence. The patient is visibly trying to process this news. Rubbing the eye/face, sighing, taking deep breaths. The oncologist waits quietly while looking at the patient, he lets the patient settle down at his/her own pace.**  
**Patient**: But are we not going to do anything? |
| **Oncologist** (nods): Yes. | **Oncologist** (nods): Yes. | **End of manipulation**  
**Oncologist**: The only thing we can do is ... *(providing information about optional palliative treatment).* |

**Figure 1.** Script segment displaying the communication manipulations across the three communication conditions on one of four occasions.
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Measures

Sample characteristics (assessed at T0)
Participants reported their age, gender, height and weight (to calculate their body mass index (BMI), which has been found to correlate with physiological arousal [17]). Health literacy was assessed using two scales of a validated Dutch self-report measure [24]. Both scales contained five items informing how often participants have had trouble with: 1. functional health literacy, i.e., reading and understanding basic health information; 2. communicative health literacy, i.e., gathering, processing and communicating about health information. Items were answered on a 4-point Likert scale ranging from 1 = ‘never’ to 4 = ‘often’. Higher mean scores indicate poorer health literacy. Trait-anxiety was assessed by using the 20-item trait-anxiety scale of Spielberger’s state-trait anxiety inventory (STAI-T) [25]. Items were answered on a 4-point Likert scale ranging from 1 = ‘almost never’ to 4 = ‘almost always’. Higher mean scores indicate a stronger tendency to respond to situations with anxiety. Emotion regulation was measured using an adapted version of the Emotional control scale of the behavior rating inventory of executive function (BRIEF) [26]. Ten items (e.g., ‘I get upset easily over little things’) were answered on a 3-point scale ranging from 1 = ‘never’ to 3 = ‘often’. Higher mean scores indicate a lower ability to regulate one’s own emotional responses. Attachment style was assessed using a Dutch translation [22] of the Experiences in close relationships short form (ECR-sf) [27]. The ECR-sf measures attachment anxiety and attachment avoidance on separate scales with six items each, answered on a 7-point Likert scale ranging from 1 = ‘completely disagree’ to 7 = ‘completely agree’. Higher mean scores on the attachment anxiety scale indicate a stronger fear of interpersonal abandonment, need for approval from others, and distress when others are unavailable. Higher mean scores on the attachment avoidance scale indicate a stronger fear of interpersonal intimacy, need for self-reliance, and reluctance to self-disclose.

Video-vignette evaluation (assessed at T1)
To assess self-reported engagement with the video vignette the 15-item Video Engagement Scale (VES) was used [28]. Moreover, perceived realism of the video vignette (3 items) and the oncologist (2 items) were assessed. Items were answered on a 7-point Likert scale ranging from 1 = ‘completely disagree’ to 7 = ‘completely agree’. Mean scores indicate higher levels of engagement and perceived realism. Differences between conditions are not desirable.

To test the communication manipulations, analogue patients’ perception of the oncologist’s communication was assessed using five items; ‘The oncologist 1) provided space in response to patient’s emotions; 2) responded empathically; 3) acknowledged patient’s emotions; 4) provided support to the patient; 5) explored patient’s emotions’. All items were measured on a 7-point Likert scale ranging from 1 = ‘totally disagree’, 7 = ‘totally agree’.
Recall of information (assessed at T2)

The development of the information recall questionnaire and codebook is described in a previous publication by our group [17]. The questionnaire comprised of 16 items, covering information provided by the oncologist about the disease, treatment, side-effects, and procedures. Eight items were open ended, assessing free recall. The item scores ranged from 0 (not recalled), to 1 (recalled partially), to 2 (recalled completely). Recognition was assessed using the same eight questions with three multiple-choice answers. Answers were scored as either 0 (incorrect answer) or 1 (correct answer). All answers were scored by two coders. If coders disagreed, they discussed until consensus was reached. Percentages accurate free recall and recognition were calculated.

Emotional stress

Self-reported emotional stress

Anxiety levels were assessed at T0 and T1 using a Dutch 6-item version of the state version of the State-trait anxiety inventory (S-STAI-S) [29], with items answered on a 4-point Likert scale ranging from 1 = ‘not at all’ to 4 = ‘very much so’. In addition, self-reported emotional stress levels at T0 and T1 were assessed using seven visual analogue scales ranging from 0 to 100 asking participants how: 1) depressed; 2) angry; 3) sad; 4) uncertain; 5) irritated; 6) tense, and; 7) anxious they felt at that moment.

Physiological arousal

Electrodermal and cardiovascular measures were used to index both sympathetic and parasympathetic nervous system activity, and reflect analogue patients’ emotional arousal [30]. The physiological arousal data were measured continuously throughout the experiment. Averages of each measurement were calculated over the baseline period and the vignette. Electrodermal activity (EDA) was recorded at a sampling rate of 1000 Hz with the wireless BioNomadix EDA module (Biopac systems, Goleta, CA), using two disposable electrodes attached to the index and middle finger of the non-dominant hand. An electrocardiogram (ECG) was recorded with the wireless BioNomadix ECG module (Biopac systems, Goleta, CA) at a sampling rate of 1000 Hz, using three disposable electrodes placed on the chest. All data waveforms were visually processed offline to exclude artifacts. Data extraction was performed using a tailor made toolbox in MATLAB (The MathWorks Inc., Natick, MA). The tonic level of EDA in micro Siemens (μS), referred to as skin conductance level, was calculated. Skin conductance responses, i.e., peaks in EDA, were identified using a threshold of 0.05 μS. The number of skin conductance responses per minute was calculated [31]. Heart rate (in beats per minute) and root mean squared successive differences (in milliseconds) were derived from the ECG signal. The latter as a measure of heart rate variability, i.e., beat-to-beat fluctuations in heart rate [32].
Data analysis

Sample size calculation
G*Power 3.1.9.2 software was used to compute the required sample size; a sample of 159 analogue patients was required based on an analysis of variance (ANOVA) with three conditions, an alpha of 0.05, power of 0.80 and a medium effect size. Because of an estimated 25% of missing or unreliable data, we aimed to recruit at least 212 analogue patients (formula: \( \frac{159}{75} \times 100 \)).

Data preparation
Recall data from 13 (6%) and self-reported data from two (1%) analogue patients were missing or excluded from analyses, e.g., because data were not collected within the timeframe or because of problems with video presentation during the experiment. Physiological data from six (3%) analogue patients were not recorded due to technical difficulties. In addition, electrodermal activity data from 44 (20%) and electrocardiogram data from 20 (9%) analogue patients were excluded from analyses based on observed severe signal disruptions or repeated movement during recording. Observed differences scores \[33\] were calculated for all self-reported emotional stress measures (formula: \( T_1 - T_0 \)) and physiological arousal measures (formula: vignette – baseline). Data were conservatively judged to be outliers, and removed, if standardized scores were above 4 or below -4.

Statistical analysis
SPSS statistics software (version 23) was used for analyses except for structural equation modeling (SEM), for which Mplus 7 software was used [34]. P-values reported are two-tailed. The .05 probability level was used as a criterion of statistical significance. Partial eta-squared (\( \eta^2 \)) is reported as a measure of effect size when relevant, with suggested norms: .01 = small effect, .06 = medium effect, .14 = large effect [35]. The successfulness of randomization and manipulation of communication was checked by using the chi-square statistic and (M)ANOVA’s. To achieve the first aim, the effects of communication on free recall and recognition were tested using two ANOVA’s. Significant effects were further analyzed using post-hoc tests where appropriate. To test the hypothesized mediation by emotional stress, two steps were taken. First, the number of emotional stress measures that needed testing as a potential mediator was reduced by using SEM to detect a latent emotional stress dimension in the self-reported data. This dimension -from now on referred to as ‘self-reported emotional stress’- had a good fit to all the self-reported data, when excluding the visual analogue scales anger and irritation, and was used in all further analyses. No latent dimensional structure was detected with regard to the physiological arousal data. A detailed description of these analyses is added as supportive information (Supplement B). Second, SEM was used to perform five mediation analyses: one for self-reported emotional stress and for each of the four physiological arousal measures. SEM provided standardized regression coefficients and statistical significance of: 1) the total effect of communication on information recall, without accounting for emotional
stress, 2) the direct effect of communication on information recall, accounting for emotional stress, and 3) the indirect effect, the effect of communication on information recall via emotional stress. To achieve the third aim, moderation effects were tested by means of linear regression analyses predicting free recall and recognition scores based on communication conditions and their interactions with health literacy and age. Furthermore, moderation effects on the relationships between communication and self-reported stress and physiological arousal were tested using SEM and linear regression analyses respectively. The standard communication condition was used as the reference condition in all regression analyses mentioned above (unless otherwise specified).

RESULTS

Randomization check

No differences between conditions were found in analogue patients’ gender ratio, age, BMI, health literacy, or personality characteristics (p-values ≥ .11). Across conditions, analogue patients’ scored their engagement with the video and their perceived realism of the oncologist and the video-vignette a 5.0 or higher on a scale from 1 to 7. No differences were found between conditions (p-values ≥ .23). Based on these findings, randomization was judged to be successful and no covariates were included in further analysis.

Analogue patients’ perception of the manipulated communication

As intended, large differences between conditions were shown in analogue patients’ perception of the physician’s communication behavior in response to patient’s emotions (see Table 1; p-value < .001, \( \eta^2_{\text{partial}} = .18 \)). analogue patients’ in the emotion-oriented speech condition perceived

<table>
<thead>
<tr>
<th>Table 1. Analogue patients’ perception of the manipulated communication: means and standard deviations stratified by condition, including the significance of differences between conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
</tr>
<tr>
<td>M (SD)</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Perceived response to emotions¹</td>
</tr>
<tr>
<td>Providing space</td>
</tr>
<tr>
<td>Empathic</td>
</tr>
<tr>
<td>Acknowledging</td>
</tr>
<tr>
<td>Supportive</td>
</tr>
<tr>
<td>Explorative</td>
</tr>
</tbody>
</table>

Notes ¹Possible range: 1-7; Higher values indicate that this behavior was perceived more. Bonferroni adjusted post-hoc comparisons between conditions.
the communication to be more acknowledging, supportive and explorative than analogue patients' in both other conditions (see ‘contrasts’ in Table 1). Moreover, emotion-oriented speech communication was perceived as more space providing than standard communication, and as more empathic than emotion-oriented silence. No differences were found between analogue patients’ perceptions of emotion-oriented silence and standard communication.

### The impact of communication on information recall

Percentages correct free recall and recognition, including the standard errors, are displayed in Figure 2. No differences in free recall were found between conditions ($F(2, 201) = 0.64, p = .529, \eta^2_{\text{partial}} = .01$). A medium-sized effect of communication was shown on recognition ($F(2, 201) = 5.27, p = .006, \eta^2_{\text{partial}} = .05$). Post-hoc comparisons showed that emotion-oriented communication, both silence ($p = .002$) and speech ($p = .019$), resulted in better recognition than standard communication. No difference in recognition was found between emotion-oriented conditions ($p = .480$).

![Figure 2](image.png)

**Figure 2.** Mean correct free recall and recognition of information in percentages, stratified by condition

**Notes.** 1 = standard communication; 2 = emotion-oriented silence; 3 = emotion-oriented speech. Differences were found in recognition scores between emotion-oriented silence and standard communication, and between emotion-oriented speech and standard communication, as indicated by the asterisk ($p < .05$). Standard errors are represented in the figure by the error bars attached to each column.
Emotional stress as a potential mediator

Standardized estimates (betas) and p-values for the direct- and indirect-effect models are displayed in the lower part of Table 2, for the self-reported emotional stress dimension and each of the four physiological arousal measures separately. None of the emotional stress measures mediated between communication and free recall or recognition as the indirect-effect model estimates were (close to) zero and non-significant. Moreover, the direct effect standardized estimates were comparable to those of the total-effect models (displayed in the upper part of Table 2).

### Table 2. Predicting free recall and recognition of information: regression coefficients and p-values for the total-effect models, direct-effect models and indirect-effect models

<table>
<thead>
<tr>
<th>Total effects</th>
<th>FREE RECALL</th>
<th>RECOGNITION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>SE b</td>
</tr>
<tr>
<td>Constant</td>
<td>51.90</td>
<td>1.97</td>
</tr>
<tr>
<td>Emotion-oriented silence</td>
<td>2.83</td>
<td>2.79</td>
</tr>
<tr>
<td>Emotion-oriented speech</td>
<td>2.36</td>
<td>2.81</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Direct and indirect effects, testing the mediation of</th>
<th>FREE RECALL</th>
<th>RECOGNITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-reported emotional stress</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotion-oriented silence</td>
<td>0.09</td>
<td>.302</td>
</tr>
<tr>
<td>Emotion-oriented speech</td>
<td>0.07</td>
<td>.367</td>
</tr>
</tbody>
</table>

| Heart rate                                             |             |             |
| Emotion-oriented silence                              | 0.09        | .274        | 0.00     | .973  | 0.25 | .001 | 0.00 | .978  |
| Emotion-oriented speech                               | 0.08        | .335        | 0.00     | .966  | 0.20 | .012 | 0.00 | .814  |

| Heart rate variability                                 |             |             |
| Emotion-oriented silence                              | 0.09        | .277        | -0.02   | .987  | 0.24 | .002 | 0.00 | .691  |
| Emotion-oriented speech                               | 0.08        | .337        | 0.00     | .987  | 0.19 | .014 | 0.00 | .702  |

| Skin conductance level                                 |             |             |
| Emotion-oriented silence                              | 0.09        | .263        | 0.00     | .725  | 0.25 | .002 | 0.00 | .728  |
| Emotion-oriented speech                               | 0.08        | .320        | 0.00     | .670  | 0.20 | .009 | 0.00 | .604  |

| Skin conductance responses                             |             |             |
| Emotion-oriented silence                              | 0.09        | .290        | 0.44     | .663  | 0.24 | .003 | 0.00 | .807  |
| Emotion-oriented speech                               | 0.08        | .326        | 0.00     | .760  | 0.20 | .012 | 0.00 | .855  |

**Notes.** The standard communication condition was used as the reference condition. The b-coefficient of the constant in the total-effect model predicting free recall shows that participants in the standard condition correctly answered 51.90% of the free recall items. The b-coefficient of the constant in the total-effect model predicting recognition shows that participants in the standard condition correctly answered 71.38% of the recognition items. The b-coefficients of emotion-oriented silence and emotion-oriented speech show the absolute increase in the percentages correct free recall and recognition, when compared to standard communication.
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Personal characteristics as potential moderators

Moderation of communication effects on recall by health literacy and age

As shown by the significant interaction effect coefficients in Table 3, the impact of communication on information recall was moderated by functional health literacy scores. The regression model predicting recognition explained 7.3% of the variance in recognition scores ($p = .010$, $R^2 = .073$). The standardized estimates show that poorer functional health literacy (corresponding with higher scores on the scale) predicted poorer recognition for individuals in the standard communication condition. In the emotion-oriented communication conditions the negative influence of functional health literacy was counteracted, in particular when the oncologist responded with emotion-oriented speech. Such interaction between communication and functional health literacy was also

Table 3. Predicting free recall and recognition of information based on communication, analogue patients’ health literacy or age, and their interaction: regression-model coefficients and $p$-values

<table>
<thead>
<tr>
<th></th>
<th>FREE RECALL</th>
<th></th>
<th>RECOGNITION</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>SE b</td>
<td>Beta</td>
<td>$p$</td>
</tr>
<tr>
<td><strong>FHL model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>50.73</td>
<td>2.00</td>
<td>.136</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Silence</td>
<td>3.93</td>
<td>2.82</td>
<td>0.11</td>
<td>.165</td>
</tr>
<tr>
<td>Speech</td>
<td>3.49</td>
<td>2.82</td>
<td>0.10</td>
<td>.217</td>
</tr>
<tr>
<td>FHL</td>
<td>-5.66</td>
<td>2.13</td>
<td>-0.34</td>
<td>.009</td>
</tr>
<tr>
<td>Silence x FHL</td>
<td>6.09</td>
<td>2.87</td>
<td>0.22</td>
<td>.035</td>
</tr>
<tr>
<td>Speech x FHL</td>
<td>6.64</td>
<td>3.04</td>
<td>0.21</td>
<td>.030</td>
</tr>
<tr>
<td><strong>CHL model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>51.84</td>
<td>1.96</td>
<td>.418</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Silence</td>
<td>2.83</td>
<td>2.80</td>
<td>0.08</td>
<td>.313</td>
</tr>
<tr>
<td>Speech</td>
<td>2.67</td>
<td>2.80</td>
<td>0.08</td>
<td>.341</td>
</tr>
<tr>
<td>CHL</td>
<td>-3.65</td>
<td>1.92</td>
<td>-0.22</td>
<td>.059</td>
</tr>
<tr>
<td>Silence x CHL</td>
<td>4.24</td>
<td>2.73</td>
<td>0.15</td>
<td>.122</td>
</tr>
<tr>
<td>Speech x CHL</td>
<td>3.35</td>
<td>2.83</td>
<td>0.11</td>
<td>.237</td>
</tr>
<tr>
<td><strong>AGE model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>52.22</td>
<td>1.94</td>
<td>.076</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Silence</td>
<td>2.57</td>
<td>2.76</td>
<td>0.07</td>
<td>.352</td>
</tr>
<tr>
<td>Speech</td>
<td>2.28</td>
<td>2.77</td>
<td>0.07</td>
<td>.410</td>
</tr>
<tr>
<td>Age</td>
<td>-5.73</td>
<td>2.03</td>
<td>-0.36</td>
<td>.005</td>
</tr>
<tr>
<td>Silence x Age</td>
<td>4.02</td>
<td>2.74</td>
<td>0.15</td>
<td>.144</td>
</tr>
<tr>
<td>Speech x Age</td>
<td>5.46</td>
<td>2.82</td>
<td>0.19</td>
<td>.054</td>
</tr>
</tbody>
</table>

Notes FHL= functional health literacy; CHL= communicative health literacy
* The $p$-values in these rows reflect the statistical significance of the regression model fit.
shown by the coefficients in the model predicting free recall (Table 3). However, this regression model did not reach statistical significance (\( p = .136, R^2 = .041 \)), and therefore these results should be interpreted with caution.

Communicative health literacy scores did not moderate the effects of communication on free recall nor recognition (see Table 3). Also shown in Table 3, older age predicted poorer recognition, without interacting with communication (model: \( p < .01, R^2 = .079 \)). The model predicting free recall did not reach significance (\( p = .076, R^2 = .029 \)), but a trend was shown in which emotion-oriented speech counteracted the negative impact of older age on free recall of information.

**Moderation of communication effects on emotional stress by personality characteristics**

As a first step, emotion-oriented speech and silence were entered into five separate models to predict self-reported and physiological emotional stress as evoked by watching the vignette. None of these models had a close fit to the data when predicting analogue patients’ self-reported emotional stress (chi-square test of exact model fit = .012, \( R^2 = .004 \)), heart rate (\( p = .830, R^2 = .002 \)), heart rate variability (\( p = .346, R^2 = .011 \)), skin conductance level (\( p = .937, R^2 = .001 \)) and skin conductance responses (\( p = .436, R^2 = .010 \)). Moreover, none of the coefficients for emotion-oriented silence or speech was statistically significant (\( p\)-values > .149). Analogue patients’ trait anxiety, emotion regulation, attachment anxiety and attachment avoidance scores were then entered into separate models, including their interaction with communication conditions. Only one of the resulting twenty models showed statistically significant fit to the data (\( p = .035, R^2 = .071 \)); emotion-oriented speech evoked more skin conductance responses in analogue patients who had reported higher levels of attachment anxiety, when compared to emotion-oriented silence (\( p = .004 \)). In addition, interaction coefficients in two of the models predicting skin conductance level were statistically significant, although the overall models were not. First, emotion-oriented speech caused a stronger skin conductance level response in analogue patients’ with higher levels of trait anxiety (\( p = .003 \)) in the trait anxiety model (\( p = .072, R^2 = .060 \)). Second, analogue patients’ emotion regulation ability interacted with communication (\( p = .172, R^2 = .047 \)); in both emotion-oriented communication conditions a weaker ability to regulate emotions predicted a stronger skin conductance level response (silence: \( p = .043 \), speech: \( p = .009 \)), while this association was reversed in the standard communication condition (\( p = .037 \)).

**DISCUSSION AND CONCLUSION**

**Discussion**

This experimental video-vignettes study aimed to test and compare the impact of emotion-oriented variations in oncologist communication in response to a patient’s emotional expressions on analogue patients’ information recall. Both emotion-oriented silence and emotion-oriented speech
resulted in better information recognition when compared to standard communication. Recognition improved from 71% to respectively 80% and 78%. 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. 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.

In contrast to information recognition, no impact was found on analogue patients’ free recall of information. Previous experimental research investigating the effects of communication on information recall has also shown inconsistencies between free recall and recognition findings (e.g. [36]). The type of information that has to be recalled might explain these findings. For example, van Osch et al. found that providing reassurance and ongoing support resulted in higher recognition of contextual-detail information (in line with our findings) and higher free recall of prognostic information [7]. Furthermore, the type of consultation might provide an explanation, as oncologists’ communication might have differential effects on free recall and recognition based on the medical context. For example, in a recent study investigating the impact of trust-conveying communication on information recall provided in the context of a treatment-related consultation, a positive influence was shown on free recall, but not recognition, of information [8]. These hypotheses warrant further investigation.

Secondly, we examined whether oncologists’ emotion-oriented communication might improve information recall by tempering patients’ emotional stress during the consultation. No evidence was found for such a mediation, neither by self-reported negative feelings, nor by physiological arousal. Several explanations for this finding will be discussed as each of these may have implications for further research. First, the relationship between emotional stress and information recall might be more complex than tested in this study. Research has shown that stress can either enhance, impair or have no effect on memory, for example depending of the timing of the stressor or the emotional valence of the to-be-remembered information [37]. Researchers in the fields of stress and memory have tried to disentangle conditions and mechanisms underlying the impact of stress on memory processes [38], but many questions still remain. For example, as raised by Schwabe et al., why does stress affect memory processes in some individuals but not (or to a lesser extent) in others [38]? Second, the intensity of emotional stress as evoked in our sample of analogue patients was likely not as high as cancer patients’ emotional stress levels in actual consultations. Although standardization is a large advantage of this study’s video-vignette design when trying to find proof of principles, ecological validity of such an experimental design is limited. This may have decreased the chance to detect relationships. Therefore, we cannot conclude that the tempering of emotional stress is definitely not a mechanism through which oncologists’ communication impacts patients’ information recall. Nevertheless, our findings suggest that other mechanisms can play a role. As emotion-oriented silence affected information recognition to a similar extent as emotion-oriented
speech, the effective component could be time; both approaches provided participants with extra
time to adequately process and store the provided medical information into their memory. This
interesting hypothesis should be investigated.

Thirdly, individual differences were shown in the impact of the oncologist’s communication on
information recall and emotional stress. With regard to information recall, results indicate that
patients with limited functional health literacy may particularly benefit from oncologists’ emotion-
oriented communication in response to their emotional expressions. This finding is highly relevant
as approximately half of the cancer patients have limited health literacy [39]. With regard to
emotional stress, results suggest that emotion-oriented communication, especially speech, might
amplify the emotional stress response of individuals who are more prone to experience anxiety
in close relationships, respond with anxiety to situations, and have problems in regulating their
own emotions. Whether this amplified emotional stress response may be harmful or adaptive with
regard to other outcomes than information recall is however difficult to conclude [40].

Fourth, an additional remarkable finding is related to the emotion-oriented silence condition.
Although extensively validated by experts during the development of video-vignette conditions, no
differences were shown in how analogue patients’ perceived the oncologist’s response to emotions
between the emotion-oriented silence and standard communication condition. This is an important
finding, as patient perceptions of their physician, such as perceived empathy can be related to other
relevant patient outcomes, such as satisfaction with the physician, compliance and trust [41].

**Strengths and limitations**

Some strengths and limitations of this study are worth mentioning. The first strength is the randomized,
experimental design. This allowed us to assess information recall by using one objectively-scored
questionnaire for all analogue patients. In medical practice, many -potentially confounding- factors
can influence the presentation and the content of the provided medical information. Moreover,
the video-vignette design provided us with an ethical alternative to manipulating oncologists’
communication in actual practice, before effectiveness of such communication behavior is known.
A second strength of this study is that emotional stress was operationalized by using multiple
measures, including self-reported and physiological measures. This increased sensitivity to detect
effects and provided us with the opportunity to examine consistency across measures. The
ecological validity of this video-vignette study was already mentioned as a limitation of this study.
A related limitation regards the use of students as our sample of analogue patients. Although the
use of students enabled the recruitment of a large number of analogue patients and restricted the
potential confounding influence of variables such as prior oncological knowledge, this also limited
the variation in age and health literacy. Therefore, the generalizability of our results is limited and
replication in a more natural, heterogeneous sample is warranted.
Conclusion and implications
To conclude, results from the current experimental study suggest that oncologists’ can improve patients’ recall of medical information provided during the consultation. By acknowledging and exploring patients’ emotions and providing empathic and supportive statements, or by providing space for emotions by means of attentive silence, oncologists’ communication could result in better recognition of information. Low health literate cancer patients may especially benefit from oncologists’ use of emotion-oriented communication. These findings might motivate oncologists to use these communication strategies, can inform medical communication skills training, and therefore contribute to evidence-based medical care. How oncologists’ communication impacts patients’ information recall still needs further investigation, as this relation could not be explained by a tempering effect on (analogue) patients’ emotional stress.

AUTHOR DISCLOSURES

Conflict of Interest
None.

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Chapter 7 | The impact of emotion-oriented communication on information recall & emotional stress


SUPPLEMENT A

Video-vignette development

A detailed description of the development of the basic script of the videotaped oncological consultation was published previously [42]. For the current study, three valid video-vignette conditions were developed based on expert knowledge, i.e., the professional opinions of medical communication researchers, teachers, physicians and film makers. Eight medical communication researchers and/or teachers identified moments in the basic script in which a response from the oncologist to the patient’s expression of emotions was considered appropriate, and suggested emotion-oriented responses. Next, the first author developed four short additional segments during which the oncologist’s responses were varied to create the three conditions. In the standard condition, the oncologist provided limited space for further disclosure of emotions, by quickly providing more information after a short moment of silence and/or a short verbal response (e.g., ‘yes’). In the emotion-oriented silence condition, the oncologist non-explicitly provided space for emotions by responding with silence, attentively maintaining eye-contact and leaning forward, until the patient resumed the conversation. The oncologist in the emotion-oriented speech condition responded explicitly by acknowledging and/or exploring the patient’s feelings and/or what the patient said. Moreover, he provided empathic and supportive statements. The resulting script with manipulations was read by six experts with various backgrounds and adjusted based on their comments. Next, test video recordings of the script were made and a heterogeneous group of seventeen experts was asked to comment on the realism of the setting, characters and content, and the credibility and validity of the communication manipulations, which led to some changes. Next, final video recordings were made.
Latent emotional stress dimensions

Structural equation modeling (SEM) was used to investigate the underlying dimensional structure of the self-reported emotional stress measures and the physiological arousal measures, in order to reduce the number of emotional stress measures if possible (using and Mplus 7 software [34]). Goodness-of-fit was evaluated with the $\chi^2$ test of exact fit (CHISQ; significant $\chi^2$ indicates a significant difference between data and model). Root mean square error of approximation (RMSEA) [43, 44] was used as an approximate fit index (values > 0.10 indicate poor fit, < 0.08 ‘reasonable’ fit and < 0.05 ‘close’ fit) [45] as well as the comparative fit index (CFI; a value > 0.95 indicates good fit) [46].

Self-reported emotional stress

The model with the strongest fit identified one latent self-reported emotional stress dimension. Six of the eight self-reported emotional stress measures loaded on this dimension. Only the visual analogue scales (VAS) measuring anger and irritation did not load well on this dimension, and were therefore excluded in this model. All fit-indices indicated a good fit for this one-dimensional model and values are shown in Table B1. In comparison, the alternative two-dimensional model, which included the anger and irritation data loading on a second dimension, had a poor fit to the self-reported data, as shown in Table B1. The self-reported emotional stress dimension identified in the one-dimensional model was therefore used in all further analyses.

Physiological arousal

With regard to the four physiological arousal measures, no underlying dimensional structure was identified. The fit indices for an one-dimensional model, including all physiological arousal measures, are shown in Table B1, and indicate poor fit to the data. Modifications (excluding one or two measures) did not improve model fit. The mediation and moderation analyses in this study were therefore repeated for each of the four physiological arousal measures.
Supplemental Table B1. Goodness of model fit of the structural equation models investigating the latent dimensional structure of emotional stress measures

<table>
<thead>
<tr>
<th>Model</th>
<th>CHISQ (p-value)</th>
<th>df</th>
<th>RMSEA [90% CI]</th>
<th>CFI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-reported emotional stress</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-dimensional:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excluding anger and irritation</td>
<td>10.27 (p = .25)</td>
<td>8</td>
<td>0.053 [0.000 ; 0.135]</td>
<td>0.992</td>
</tr>
<tr>
<td>Two-dimensional:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) anxiety, anxiousness, tenseness, sadness and depression</td>
<td>31.94 (p = .02)</td>
<td>18</td>
<td>0.088 [0.033 ; 0.136]</td>
<td>0.965</td>
</tr>
<tr>
<td>2) anger and irritation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Physiological arousal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-dimensional:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All physiological measures</td>
<td>75.96 (p &lt; .01)</td>
<td>2</td>
<td>0.507 [0.413 ; 0.607]</td>
<td>0.466</td>
</tr>
</tbody>
</table>

Notes. CHISQ = Chi-square test of exact fit; RMSEA = Root mean square error of approximation; CFI = Comparative fit index.