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Citation

Visser, L., Velden, N. van der, Smets, E., Lelie, S. van der, Nieuwenbroek, E., Vliet, L. M. van, & Hillen, M. A. (2022). Methodological choices in experimental research on medical communication using vignettes: the impact of gender congruence and vignette modality. *Patient Education And Counseling*, 105(6), 1634-1641. doi:10.1016/j.pec.2021.10.015

Version: Publisher's Version

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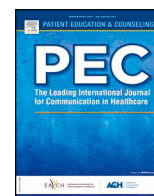
Downloaded from: <https://hdl.handle.net/1887/3620741>

Note: To cite this publication please use the final published version (if applicable).



Contents lists available at ScienceDirect

Patient Education and Counseling

journal homepage: www.elsevier.com/locate/pec

Methodological choices in experimental research on medical communication using vignettes: The impact of gender congruence and vignette modality

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ARTICLE INFO

Article history:

Received 23 July 2021

Received in revised form 15 September 2021

Accepted 4 October 2021

ABSTRACT

Objective: Experimental vignette designs are used to systematically test the effects of medical communication. We tested the impact of two methodological choices –gender congruence and vignette modality– on analogue patient reported outcomes.

Methods: In an online experiment using a vignette portraying an oncological bad news consultation, we manipulated (1) gender congruence between the analogue and the vignette patient, and (2) vignette modality, i.e., text, audio, or video. Cancer-naïve students acting as analogue patients ($N = 209$, 22 ± 3 years old, 75% F) were assigned one randomly-selected vignette variant and completed questionnaires. Using 3×2 (repeated-measures) ANOVAs, we tested main and interaction effects of gender congruence and modality on self-reported engagement, recall, trust, satisfaction and anxiety.

Results: We found no main effects of gender congruence or modality on any of the outcomes, nor any interaction effects between modality and congruence.

Conclusion: Our results indicate that researchers may needlessly create gender-congruent vignettes at considerable cost and effort. Also, the currently assumed superiority of videos over other modalities for experimental vignette-based research may be inaccurate.

Practice implications: Although further testing in an offline format and among different populations is warranted, decisions regarding gender congruence and modality for future vignette-based studies should be based primarily on their specific aims.

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1. Introduction

High-quality communication is essential for healthcare professionals (HCP) when conducting medical consultations. HCP communication affects how patients perceive a consultation as well as their emotional well-being and behavior (e.g., treatment adherence) [1,2]. However, solid evidence on how HCP's communication affects patient outcomes is scarce, because barriers exist to obtain causal

evidence in clinical practice. Practically, testing the impact of isolated elements of HCP's communication is unfeasible, as the effects of other elements cannot be ruled out. Ethically, manipulating communication in clinical practice would involve exposing patients to sub-optimal communication, which could have harmful consequences [3].

Researchers increasingly use experimental vignette designs to overcome these barriers and systematically test the effects of HCP's communication on patient outcomes. A vignette is a 'short, carefully constructed description of a person, object, or situation, representing a systematic combination of characteristics' (p. 128) [4]. A vignette can involve text, audio, or video. When investigating medical communication, multiple vignettes are developed that reflect

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(parts of) medical interactions [5,6]. The key to experimental vignette designs is standardization: communication, medical content, and the environment are kept identical across vignettes, while variation exists only in the communication element of interest (i.e., the manipulation). Effects of the manipulation are tested using so-called ‘analogue patients’ – disease-naïve individuals or (former) patients instructed to imagine themselves being in the shoes of the portrayed patient [7]. Analogue patients may be used when testing the specific effects of communication in clinical practice is not practically feasible or ethically justifiable [8]. The use of analogue patients as proxies for clinical patients appears valid [8,9]. After exposing analogue patients to one or more (randomly assigned) variants of the vignette, researchers can assess various outcomes at different levels: cognitive (e.g., information recall), affective (e.g., emotional response), relational (e.g., trust, satisfaction) or behavioral (e.g., intended treatment decision).

Analogue patients need to engage optimally with the vignettes to ensure ecological validity of this design [10,11]. Engagement is commonly measured to ensure analogue patients are able to identify with the portrayed character, be transported into the narrative, and experience emotions accordingly [12]. Research so far indicates high engagement among analogue patients [13–16]. Still, methodological choices in the development and delivery of vignettes can have far-reaching consequences in terms of (ecological) validity, affecting not only analogue patient engagement, but consequently the outcomes of interest when investigating the effects of HCP’s communication, such as information recall and trust in the physician [6].

Two specific methodological considerations urgently warrant systematic evidence regarding their effect on analogue patients’ engagement and other outcomes. First, it is presently unclear to what degree the analogue patient should resemble the portrayed patient. Analogue patients may engage more with vignette patients who resemble them in age, gender, and/or appearance [17–20]. To enable matching analogue patients’ gender to that of the portrayed patient, many researchers currently create male and female versions of vignettes at considerable costs, although evidence so far about the influence of such gender congruence is inconclusive.

A second essential methodological consideration is vignette modality, specifically the difference between how analogue patients perceive text, audio, and video vignettes. Of these modalities, video vignettes are presumed to yield the highest engagement, as they include auditory (e.g., tone of voice, background sounds) as well as visual cues (e.g., facial expressions, set dressing) [21,22]. This multi-sensory experience potentially intensifies analogue patients’ emotional experience and enhances their information recall [23,24]. Accordingly, an audio-visual *introduction* to a (video) vignette induced a greater cardio-vascular response among analogue patients –indicating stronger emotional engagement– compared to providing a textual introduction only. However, for the main *content* of the vignette, i.e., the part after the introduction, the presumed superiority of video over text or audio has not yet been established. Moreover, research regarding analogue patients’ engagement in *audio* vignettes is lacking altogether. This is remarkable, as the development of video vignettes is relatively labor intensive and costly, and videos can be less flexibly adjusted (at the last minute) compared to text or audio vignettes.

To test the impact of gender congruence and vignette modality thoroughly, we additionally need to consider two potential moderations. First, gender congruence and vignette modality potentially interact: the relative influence of gender congruence may depend on modality. Specifically, gender congruence might be more important when seeing and/or hearing compared to reading about a patient. Second, the *emotional load* of the vignette content may determine how strongly analogue patients are affected by its modality (i.e., text, audio or video). Effects of vignette modality on analogue patients’ engagement and relevant outcomes may be more diverse for

vignettes that are highly emotionally charged, for example, in which the patient explicitly expresses emotions and/or the clinician responds empathically. Specifically, emotional load is expected to be most influential for engagement when using videos, and least for text vignettes.

Our main aim was to systematically test the impact of two methodological choices in creating vignettes on (a) analogue participants’ engagement with the vignette, and (b) outcomes frequently used to assess the effects of medical communication, i.e., information recall, emotional response, trust, and satisfaction. We therefore tested how analogue patients were affected by (1) gender congruence between the analogue and the vignette patient, and (2) modality of the vignette, i.e., text, audio, or video. Additionally, we tested (3) whether gender congruence affected outcomes stronger for video, audio vs. text vignettes. Finally, we explored (4) whether the emotional load of the vignette moderated the effects of vignette modality.

2. Material and methods

2.1. Design and ethics

We conducted an online, randomized, experimental vignette study. We manipulated vignette modality (three levels: text vs. audio vs. video), gender congruence (two levels: congruent vs. incongruent), and the emotional load of the vignette (two levels: neutral vs. enhanced). Combining these manipulations yielded a total of 12 conditions (see Fig. 1). Study participants acted as analogue patients and were randomly assigned to one of the conditions. The Psychology Ethics Committee provided ethical approval (approval codes: CEP19–0612/341 and 2020–09–04-L.M. van Vliet-V1–2606).

2.2. Sample and procedures

Power calculations indicated that for ANOVA analyses on our primary outcome variable engagement, 158 participants were required to detect a medium effect size (Cohen’s $f^2 = 0.25$) with a power of 0.80 and α of 0.05 [25]. We recruited Dutch-speaking adults, aged 18–30 years, without a history of having received bad news in an oncological setting regarding themselves or a close relative, as this could color their experience of the vignette. We mainly recruited analogue patients via a university system for research participation, and also through advertisements on (digital) information boards and social media. Interested people could contact the researcher who informed them about the study. Upon preliminary consent, analogue patients received a personal link to an online questionnaire. At questionnaire onset, they digitally signed informed consent.

A baseline questionnaire (T0), assessed analogue patients’ background characteristics, health literacy, and current emotional state. Next, they were provided with one randomly selected variant of the vignettes after being instructed to imagine themselves in the situation of the portrayed patient. Immediately after the vignette, they completed a second questionnaire (T1) which measured manipulation success, perceived realism, engagement, and all other outcome measures. Upon completion of the study procedures, analogue patients could choose to receive either 2 study credits or a €7,- gift certificate.

2.3. Vignettes

The vignettes had been created previously in *video* modality, as part of a study testing the impact of oncologists’ emotion-oriented communication on information recall and emotional stress [26]. Vignettes were developed by the researchers, using the professional opinions of medical communication researchers, teachers, physicians and film makers. Further details on initial vignette development are

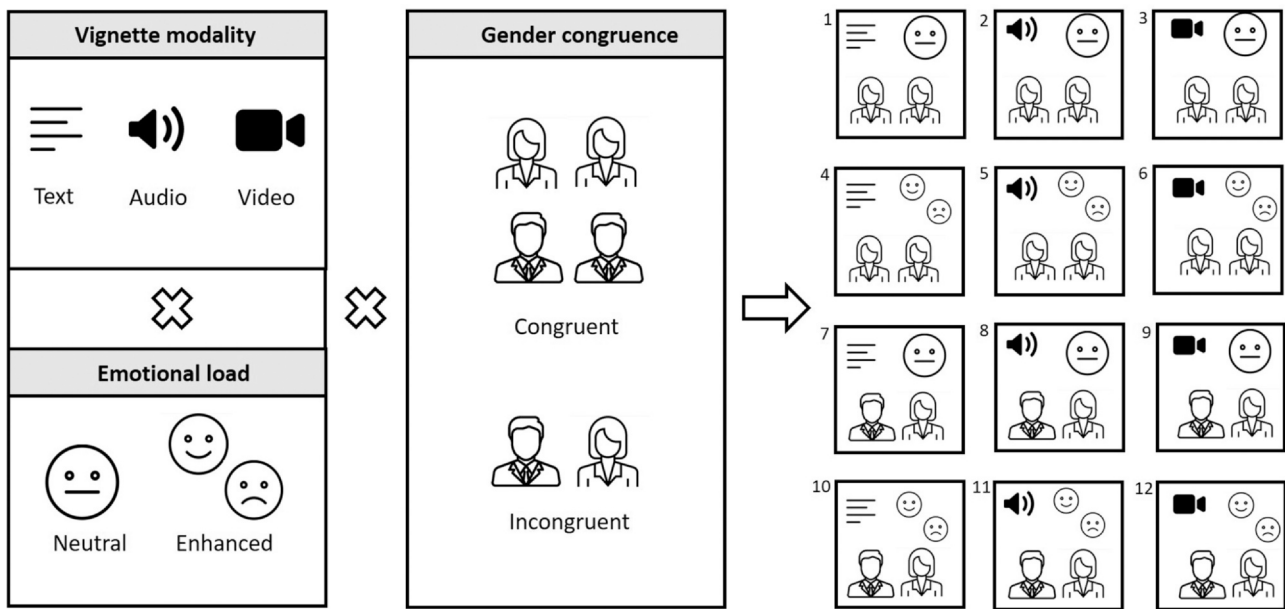


Fig. 1. Overview of all 12 vignette conditions.

reported elsewhere [26]. All vignettes contained the same content: a bad news consultation involving a patient of approximately 35 years old and a (male) oncological surgeon discussing the severity of the patient's cancer diagnosis, prognosis, treatment options and potential associated side effects. The surgeon informs the patient that the cancer is incurable and median life expectancy is six months. After the patient responds emotionally to this bad news, the surgeon discusses the proposed course of the treatment, as well as the patient's questions and concerns.

In the videos, professional actors played the roles of patient and surgeon. Video duration was approximately 10 minutes, including an introduction with background information and viewing instruction. To manipulate *gender congruence*, we had previously created two identical video variants: with a male vs. a female patient, to enable (mis)matching with analogue patients' gender [26]. Additionally, we had developed two versions of both videos to manipulate *emotional load* of the communication. In the neutral variant, the surgeon pays relatively little time and attention to the patient's emotions. In the emotionally enhanced variant, the surgeon is more perceptive to emotions (e.g., asking 'what is it you are worried about?'), which generated increased emotional expressions in the portrayed patient (see Appendix 1 and [27] for a full description). Based on all four variants of the video vignettes, we created the *modality manipulations* (i.e., text and audio), while keeping all other content identical. The audio vignettes consisted of the sound recording of the video vignettes. The text vignettes included verbatim transcriptions of all utterances in the video, supplemented with descriptions of any non-verbal behaviors and emotional expressions that were visible or audible in the videos (see Appendix 1 for a segment from the text vignette). The text vignettes required approximately 7 minutes reading time.

2.4. Measures

2.4.1. Background characteristics

At T0, we assessed analogue patients' age, gender, and health literacy using three subscales (i.e., functional, communicative, and critical) of a validated Dutch self-report measure [28] with good internal consistency (Cronbach's alpha's > .81).

2.4.2. Perceived realism and manipulation success

We measured perceived realism of the vignettes (i.e., credibility, realism, likely to happen in real life) at T1 using three previously developed items (1–7-point Likert scale, 'not at all' to 'very much so') [29,30]. Internal consistency in the current sample was good (Cronbach's alpha = .86). To check manipulation success of the neutral vs. enhanced emotional load of the vignettes, five items assessed analogue patients' perception of the surgeon's attention to the emotions of the portrayed patient (e.g., 'The surgeon acknowledged the patient's emotions'; 1–7 point Likert scale, 'completely disagree' to 'completely agree'; Cronbach's alpha = .94 (excellent)).

2.4.3. Engagement with the vignette

At T1, we measured self-reported engagement with the vignette using the validated brief 9-item Video Engagement Scale (VES-sf) [7] [Lehmann et al., submitted]. The VES-sf consists of two 4-item subscales, i.e., Immersion (e.g., 'When I had been viewing for a while, it seemed as if I had become the patient in my thoughts') and Emotional impact (e.g., 'I empathized with the patient'). An additional item ('I was fully concentrated on the video while watching') is used as a screener; participants scoring ≤ 2 are excluded from analyses. We adapted item phrasing to apply to other vignette modalities (e.g., 'listening' or 'reading' instead of 'viewing'). Items had a 1–7 point Likert response scale ('completely disagree' to 'completely agree'). Internal consistency was excellent overall, and good for the subscales Immersion and Emotional impact (Cronbach's alpha = .92; .86; and .89, respectively).

2.4.4. Emotional state

The State-subscale of the 6-item Dutch State-Trait Anxiety Inventory short version (STAI-S) [29,30] assessed emotional state just prior to (T0) and immediately after (T1) exposure to the vignette. All items used 1–4 point Likert response scale ('not at all' to 'very much so'). Internal consistency was good (Cronbach's alpha T0 = .82; T1 = .80).

2.4.5. Information recall

We assessed information recall at T1, using a 20-item questionnaire used in our previous work [31]. The questionnaire measures free recall (10 open-ended items) and recognition (the same 10

Table 1
Descriptive characteristics (means and standard deviations) of all outcome measures, stratified by gender congruence and modality.

Modality	Gender congruence	N	Engagement: Immersion (VES-sf) ^a		Engagement: Emotional impact (VES-sf) ^b		Anxiety (STAI-S) ^b T0 - T1		Trust (TiOS-sf) ^c		Satisfaction (PSQ) ^d		Free recall (% accurate) ^e		Recognition (% accurate) ^e	
			M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)		
Text	Congruent	35	4.32 (1.29)	5.27 (1.39)	1.77 (0.48)	2.15 (0.68)	3.53 (0.90)	47.46 (22.16)	66.14 (19.42)	83.43 (16.26)						
	Incongruent	38	4.52 (1.22)	5.38 (1.21)	1.87 (0.55)	2.20 (0.64)	3.61 (1.05)	48.03 (22.05)	69.61 (13.70)	86.32 (13.03)						
	Total	73	4.43 (1.25)	5.33 (1.29)	1.82 (0.51)	2.18 (0.66)	3.57 (0.97)	47.76 (21.95)	67.95 (16.66)	84.93 (14.64)						
Audio	Congruent	34	4.30 (1.30)	5.55 (1.01)	1.80 (0.65)	2.18 (0.71)	3.57 (0.88)	41.96 (20.77)	68.09 (12.67)	85.29 (11.87)						
	Incongruent	35	4.61 (1.56)	5.66 (1.33)	1.73 (0.36)	2.16 (0.62)	3.51 (0.88)	40.72 (19.47)	63.07 (15.41)	82.00 (15.87)						
	Total	69	4.46 (1.44)	5.61 (1.18)	1.76 (0.52)	2.17 (0.66)	3.54 (0.87)	41.33 (19.98)	65.54 (14.25)	83.62 (14.03)						
Video	Congruent	34	4.75 (1.43)	5.81 (1.00)	1.78 (0.40)	2.28 (0.63)	3.22 (1.11)	36.08 (23.30)	67.94 (14.05)	83.82 (12.31)						
	Incongruent	33	4.56 (1.34)	5.55 (1.24)	1.97 (0.46)	2.48 (0.58)	3.75 (0.90)	45.77 (21.84)	70.76 (18.73)	87.58 (12.26)						
	Total	67	4.66 (1.38)	5.68 (1.12)	1.87 (0.44)	2.38 (0.61)	3.48 (1.04)	40.85 (22.95)	69.33 (16.46)	85.67 (12.34)						
Total	Congruent	103	4.46 (1.34)	5.54 (1.16)	1.78 (0.51)	2.20 (0.67)	3.44 (0.97)	41.89 (22.38)	67.38 (15.57)	84.18 (13.54)						
	Incongruent	106	4.56 (1.37)	5.53 (1.26)	1.85 (0.47)	2.27 (0.62)	3.62 (0.94)	44.91 (21.19)	67.81 (16.17)	85.28 (13.88)						
	Total	209	4.51 (1.35)	5.53 (1.21)	1.82 (0.49)	2.24 (0.65)	3.53 (0.96)	43.42 (21.79)	67.60 (15.84)	84.74 (13.69)						

Notes:
^a VES-sf = Video Engagement Scale short form (potential score range 1–7).
^b STAI-S = State-Trait Anxiety Inventory short version (potential score range 1–4).
^c TiOS-sf = Trust in Oncologist Scale short form (potential score range 1–5).
^d PSQ = Patient Satisfaction Questionnaire (potential score range 0–100).
^e Potential score range 0–100.

items in an A-C multiple-choice format) of the information provided by the surgeon. For free recall, participants could gain 0, 1 or 2 points ('no recall' to 'full recall'). For recognition, answers were scored as either 0 (incorrect) or 1 (correct). We calculated total scores and percentages of the accurate free recall and recognition.

2.4.6. Trust in the surgeon

At T1, the 5-item validated Trust in Oncologist Scale short form (TiOS-sf) assessed trust in the portrayed surgeon [32,33]. Statements are answered on a 1–5 point Likert scale ('completely disagree' to 'completely agree'). Item phrasing was adapted to refer to the portrayed surgeon. Internal consistency was good (Cronbach's alpha = .88).

2.4.7. Satisfaction with the consultation

At T1, the 5-item Patient Satisfaction Questionnaire (PSQ) assessed satisfaction with the consultation, answered on 0–100 Visual Analogue Scales ('not at all satisfied' to 'completely satisfied') [34]. Internal consistency was excellent (Cronbach's alpha = .90).

2.5. Analyses

We performed all analyses using SPSS Statistics 27 [35]. We used the Chi-square test statistic and (M)ANOVAs to test for differences across conditions in gender, age, and the three health literacy scales (entered at once in one MANOVA), perceived realism and perceived emotional load. Using six 3 × 2 ANOVAs, we tested main and interaction effects of gender congruence and modality on self-reported engagement (on the dimensions Immersion and Emotional impact separately), free recall and recognition of information, trust in the surgeon, and satisfaction with the consultation. Furthermore, using repeated measures ANOVA we tested the influence of gender congruence and modality on change in self-reported anxiety from T0 to T1. Using (repeated measures) ANOVA, we explored the potential interaction between modality and emotional load on outcomes. We used the 0.05 probability level as a criterion of statistical significance, and (partial) eta-squared as a measure of effect size. Suggested norms for partial eta-squared are: small = 0.01; medium = 0.06; large = 0.14 [36,37].

3. Results

3.1. Sample

In total 225 analogue patients participated, of whom 13 did not complete the study. Another 2 reported their gender as 'other', disabling categorization as gender (in)congruent. Finally, 1 person scored below the cut-off value of 3 on the screener item of the VES-sf [Lehmann et al., submitted] and was excluded as per protocol. In total, we included 209 analogue patients in the analyses.

3.2. Analogue patients' characteristics

Analogue patients were on average 22 years old (SD = 3) and 157/209 (75%) were female. We found no differences between conditions regarding analogue patients' gender (p-values > .660), age (p-values > .318), and health literacy (p-values > .655). Across conditions, analogue patients rated perceived realism of the vignette as 5.75 on average (SD= 1.06; scale 1–7) and we found no differences between conditions (p-values ≥ .059). Based on these findings, we considered randomization successful, and did not include any covariates in further analyses. As intended, differences between conditions were reflected in analogue patients' perception of emotional load (p < .001, η² = 0.10). Analogue patients in the enhanced emotional load conditions perceived the surgeon as paying more attention to

the vignette patient's expressed emotions ($M = 4.49$, $SD = 1.48$) than in the neutral conditions ($M = 3.45$, $SD = 1.68$).

3.3. The influence of gender congruence and modality on self-reported engagement

Table 1 shows descriptive statistics for self-reported engagement (Immersion and Emotional impact), stratified by gender congruence and modality. We found no main effects of gender congruence ($F(1209) = 0.309$, $p = .579$, $\eta_p^2 = 0.002$) or modality ($F(2209) = 0.609$, $p = .545$, $\eta_p^2 = 0.006$) on the subscale Immersion. No interaction effect between congruence and modality on Immersion was present either ($F(2209) = 0.656$, $p = .520$, $\eta_p^2 = 0.006$). We found no main effects of gender congruence ($F(1209) = 0.006$, $p = .938$, $\eta_p^2 < 0.001$) or modality ($F(2209) = 1.732$, $p = .180$, $\eta_p^2 = 0.017$) on the subscale Emotional impact. No interaction effect between congruence and modality on Emotional impact was visible ($F(2209) = 0.516$, $p = .598$, $\eta_p^2 = 0.005$).

3.4. The influence of gender congruence and modality on anxiety

Table 1 shows descriptive statistics for analogue patients' anxiety levels at T0 and T1, stratified by gender congruence and modality. Overall, analogue patients' anxiety levels increased after exposure to the vignette ($\Lambda = 0.621$, $F(1, 203) = 123.637$, $p < .001$, $\eta_p^2 = 0.379$). The increase in analogue patients' anxiety from T0 to T1 did not depend on gender congruence ($\Lambda = 1.000$, $F(1203) = 0.000$, $p = .985$, $\eta_p^2 < 0.001$), modality ($\Lambda = 0.987$, $F(2203) = 1.345$, $p = .263$, $\eta_p^2 = 0.013$), or their interaction ($\Lambda = 0.998$, $F(2, 203) = 0.187$, $p = .830$, $\eta_p^2 = 0.002$).

3.5. The influence of gender congruence and modality on free recall and recognition of information

Table 1 shows mean scores and standard deviations of analogue patients' information recall scores, i.e., percentage correct free recall and percentage correct recognition, stratified by gender congruence and modality. We found no main effects of gender congruence ($F(1209) = 0.037$, $p = .848$, $\eta_p^2 < 0.001$) or modality ($F(2209) = 0.981$, $p = .377$, $\eta_p^2 = 0.010$) on free recall of information. No interaction effect between congruence and modality on free recall was found ($F(2209) = 1.545$, $p = .216$, $\eta_p^2 = 0.015$). Likewise, we found no main effects of gender congruence ($F(1209) = 0.344$, $p = .558$, $\eta_p^2 = 0.002$) or modality ($F(2209) = 0.385$, $p = .681$, $\eta_p^2 = 0.004$) on information recognition. No interaction effect between congruence and modality on information recognition was visible either ($F(2209) = 1.349$, $p = .262$, $\eta_p^2 = 0.013$).

3.6. The influence of modality and gender congruence on trust and satisfaction

Table 1 shows mean scores and standard deviations of self-reported trust in the surgeon and satisfaction with the consultation, stratified by gender congruence and modality. We observed no main effects of gender congruence ($F(1, 209) = 1.839$, $p = .177$, $\eta_p^2 = 0.009$) or modality ($F(2209) = 0.129$, $p = .879$, $\eta_p^2 = 0.001$) on trust. No interaction effect between gender and modality on trust was found ($F(2209) = 1.718$, $p = .182$, $\eta_p^2 = 0.017$). Likewise, we found no main effects of gender congruence ($F(1209) = 1.007$, $p = .317$, $\eta_p^2 = 0.005$) or modality ($F(2209) = 2.222$, $p = .111$, $\eta_p^2 = 0.021$) on satisfaction, nor an interaction effect of gender congruence and modality ($F(2209) = 1.246$, $p = .290$, $\eta_p^2 = 0.012$).

3.7. Exploration of interaction effects of modality and emotional load on outcomes

Testing of the potential interaction between modality and emotional load on all outcomes revealed no moderating effects on engagement dimensions Immersion ($p = .239$) and Emotional impact ($p = .110$), the increase in anxiety caused by the vignette ($p = .765$), free recall of information ($p = .588$), or on information recognition ($p = .385$).

Emotional load also did not moderate the effect of modality on trust in the surgeon ($p = .946$), or satisfaction with the consultation ($p = .286$). Of note, two similar trends were visible, whereby the vignettes with enhanced emotional load resulted in higher levels of trust ($F(1209) = 3.386$, $p = .057$, $\eta_p^2 = 0.018$), and satisfaction ($F(1209) = 3.485$, $p = .063$, $\eta_p^2 = 0.017$), when compared to the neutral conditions (irrespective of modality).

4. Discussion and conclusion

4.1. Discussion

Methodological choices may have implications for the outcomes of research in which vignettes are used to systematically test the effects of medical communication. We investigated the effects of two methodological choices, i.e., gender congruence between the analogue and the portrayed patient, and modality of the vignette (text, audio or video). Contrary to previous assumptions, analogue patients were not differentially affected by the (in)congruence in gender between themselves and the patient portrayed in the vignette. Similarly, vignette modality did not affect analogue patients' engagement with the vignette, increase in anxiety, trust, satisfaction nor their information recall. This lack of association was consistent, irrespective of the emotional load of the vignettes. Thus, researchers may needlessly create gender-congruent vignettes and inaccurately assume superiority of videos over other modalities for experimental vignette-based research.

Our finding regarding gender congruence is in line with a previous study, reporting no effects of gender or age similarity on people's identification with a portrayed character [38]. The authors of that study suggested that similarity in 'superficial' characteristics such as gender might affect a person's engagement less than more profound characteristics such as attitudes or personality traits [38,39]. However, other studies did report higher levels of identification when participants' gender matched the gender of the protagonist [40,41] or argued that gender congruence may be influential only within specific subgroups such as students [42]. Given these inconclusive results, our findings should be substantiated in different samples, for example in a sample with more variation in age, or with a disease history similar to the portrayed patient. Nevertheless, our results warrant the preliminary conclusion that creating gender-congruent vignettes may not always be necessary.

Considering that text, audio and video vignettes appear to affect analogue patients similarly, the optimal choice of modality may vary between studies. Video vignettes provide additional non-verbal and contextual information compared to text or audio, which is difficult to convey realistically using text or audio and may be crucial for some study purposes. On the contrary, analogue patients viewing video vignettes may become distracted by (irrelevant) visual information, such as characteristics of the context. When reading text vignettes, analogue patients lack sound or image. Therefore, they need to imagine non-verbal interaction and emotion, which may on the one hand enhance their involvement. Yet, on the other hand, this could yield variable interpretations and experiences of the vignette [18]. Moreover, analogue patients reading text vignettes can control the pace in which the information unfolds, but for audio or video vignettes they lack such control [43]. Enhanced control may promote

comprehensibility, but differs from real consultations in which HCP usually determine the pace. Researchers may weigh these considerations to eventually choose the modality that optimally fits their study purposes. In Section 4.2 we provide practical recommendations for this choice.

The current results warrant careful interpretation, due to limitations both inherent in our design choices, as well as more circumstantial constraints, which altogether limit generalizability. First, we included disease-naïve, young, highly educated and predominantly female people as analogue patients. Most participants were students who received study credits for their participation, rather than voluntary participants. These characteristics of the sample may have impacted the results, even though participants were randomly divided over experimental conditions – thus ensuring that the proportion of male vs. female analogue patients was similar across vignette conditions. Second, the study was conducted online rather than in-person. As a result, we were unable to check whether participants fully focused on imagining themselves in the situation of the portrayed patient. Previous studies using similar online designs did establish solid effects of vignettes on various samples of analogue patients [44,45]. Yet, both characteristics of the study population and the (online vs. offline) setting may have influenced participants' motivation, and indirectly attention and engagement. Therefore, our findings need replication in other samples and contexts. Such subsequent research should particularly ensure that analogue patients are maximally engaged in the portrayed situation. They might do so by further increasing analogue patients' resemblance to the portrayed patient, for example by including people with a cancer history. In the current study, we sought to enhance analogue patients' ability to imagine themselves in the shoes of the depicted patient by using an actor whose age resembled our participants. Encouragingly, engagement scores within this sample were relatively high and comparable to previous studies. Moreover, the vignette's emotional load *did* affect analogue patients as expected: physicians' attention to the portrayed patient's emotions enhanced trust and satisfaction among analogue patients (although these effects did not reach statistical significance). Also, the vignettes in general caused a significant increase in self-reported anxiety, as expected. This indicates our study design caused effects on our outcome measures, which supports the preliminary conclusion that vignette modality and gender congruence have no effects. To further substantiate this finding, future research might adopt a qualitative approach for a more in-depth exploration of analogue patients' engagement and experiences during the vignette. A strength of our study includes the experimental design, ensuring that any (lack of) effect could only have been caused by our specific manipulations. Moreover, due to our ample sample size, we should have been able to detect any substantial effects that were present.

4.2. Conclusion

We systematically tested the impact of gender-congruence between participants and the portrayed patient, and of vignette modality, i.e., text, audio or video. Neither modality nor gender congruence affected analogue patients' engagement with the vignette, anxiety, trust, satisfaction, or recall of the provided information. Our results indicate that researchers conducting experimental vignette-based research may needlessly create gender-congruent vignettes and choose video over other vignette modalities, at considerable cost and effort. Although further testing in an offline format and among different populations is warranted, these findings suggest that researchers may base methodological decisions with regard to gender congruence and modality primarily on their specific study aims.

4.3. Practice implications

Our findings imply that researchers conducting vignette-based research may not necessarily need to create gender-congruent conditions to ensure the validity of their study design. Researchers may moreover feel confident to use text or audio vignettes if their resources are limited. All of this could save them crucial investments, both financially and in time. Furthermore, using text or audio instead of video vignettes could be useful when conducting pilot work, which may involve making a first selection out of multiple experimental conditions. Text vignettes could additionally assist researchers in pilot-testing specific segments from a script prior to video development, as the specificity and extent of manipulations in communication behavior are difficult to operationalize [6]. This enables choosing the most influential manipulations, and strengthening manipulation validity and success. Similarly, audio-vignettes enable pre-testing intonation or speed of talk.

Overall, the optimal vignette modality depends on researchers' specific aims. If they need the participant to see and hear the precise behaviors and context they have in mind, videos are preferable. Yet, text may be the favored modality if study purposes require analogue patients to use their own imagination and personal experiences in order to fully envision the displayed situation. The advantages of audio over text vignettes appear relatively limited, as they only add vocal non-verbal information. Yet, if such vocal elements are relevant for a specific study, audio vignettes may be a relevant option.

Funding

LNCV and EMAS are recipients of ABOARD, which is a public-private partnership receiving funding from ZonMW (#73305095007) and Health-Holland, Topsector Life Sciences and Health (PPP-allowance; #LSHM20106). LNCV is supported by a fellowship grant received from Alzheimer Nederland (WE.15-2019-05). MAH is supported by a VENI grant from the Dutch Research Council (NWO) (Grant Number 016. Veni.198.017).

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Leonie N.C. Visser: Conceptualization, Methodology, Software, Validation, Formal analysis, Data curation, Writing – original draft, Writing – review & editing, Supervision, Project administration. **Naomi C.A. van der Velden:** Validation, Writing – original draft, Writing – review & editing, Visualization. **Ellen M.A. Smets:** Conceptualization, Writing – review & editing. **Samantha van der Lelie:** Investigation, Software, Data curation, Writing – review & editing. **Eva Nieuwenbroek:** Investigation, Software, Data curation, Writing – review & editing. **Liesbeth M. van Vliet:** Conceptualization, Resources, Writing – review & editing, Project administration. **Marij A. Hillen:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Supervision, Project administration.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

We thank Nora Looze for her invaluable assistance in creating Fig. 1.

Appendix 1. A segment from the neutral and enhanced variants of the text vignette, male variant

Neutral variant	Enhanced variant
<p><i>The surgeon continues his story:</i> ‘Radiating the tumor to make it smaller, to ensure you have less trouble eating, is the only thing I can do. This would mean you will first get a CT scan to determine the area that will be radiated, and then you will come to the hospital a number of times for the radiation. Five times at minimum. And possibly followed by chemotherapy. The radiation therapist will discuss this further with you. Mind that this is a palliative treatment, focused at extending life, not cure.’</p> <p>‘Extend it for how long?’ asks mister Bakker quickly, while looking at the physician expectantly. ‘That is difficult to estimate, but we are talking about months of extension’, the surgeon answers. ‘If the chemotherapy works, it will be a few more months.’ ‘Okay, that is not so good’, says mister Bakker distraught. ‘No’, the surgeon responds.</p> <p>While mister Bakker is visibly trying to process all the information, he suddenly wonders: ‘And chemo ... how bad are the side effects?’ ‘Well, yeah,’ the surgeon answers, ‘Nausea, fatigue, increased risk of infections ...’ Next, he explains more about the treatment: ‘The chemotherapy is usually a combination of an IV and tablets. It’s administered in blocks of three weeks, in which you first get the IV, followed by two weeks of tablets, and one week rest. But the medical oncologist and radiation therapist will discuss all of that with you.’ ‘Yeah’, mister Bakker responds softly. <i>The surgeon continues:</i> ‘So now we will start the trajectory. I think that with radiotherapy, if you could eat more easily again, and your complaints are partly gone, that would make a huge ... Yeah, for that time frame that would make a huge difference. Mister Bakker emotionally remarks, mostly to himself: ‘Yeah ... so I will have to say goodbye soon ...’ ‘Yes ... this is heavy news isn’t it?’ the surgeon responds in a warm tone of voice.</p>	<p><i>The surgeon continues his story:</i> ‘Radiating the tumor to make it smaller, to make sure you have less trouble eating, is the only thing I can do. This would mean you will first get a CT scan to determine the area that will be radiated, and then you will come to the hospital a number of times for the radiation. Five times at minimum. And possibly followed by chemotherapy. The radiation therapist will discuss this further with you. Mind that this is a palliative treatment, focused at extending life, not cure.’</p> <p>‘Extend it for how long?’ asks mister Bakker quickly, while looking at the surgeon expectantly. ‘That is difficult to estimate, but we are talking about months of extension’, the surgeon answers. ‘If the chemotherapy works, it will be a few more months.’</p> <p>‘Okay, that is not so good’, says mister Bakker distraught. ‘No’, the surgeon responds. There is a silence, in which mister Bakker is visibly trying to process the information. He sighs deeply and stares ahead. The surgeon asks: ‘What are you thinking about right now?’ After a brief silence, mister Bakker says: ‘The chemo worries me ...’</p> <p>He gazes at the surgeon. ‘Yeah?’ responds the surgeon, ‘And what is it specifically that worries you?’ Mister Bakker explains: ‘I am mainly wondering ... how bad are the side effects?’ ‘Well, yeah,’ the surgeon answers, ‘Nausea, fatigue, increased risk of infections ...’ Next, he explains more about the treatment: ‘The chemotherapy is usually a combination of an IV and tablets. It’s administered in blocks of three weeks, in which you first get the IV, followed by two weeks of tablets, and one week rest. But the medical oncologist and radiation therapist will discuss all of that with you.’</p> <p>‘Yeah’, mister Bakker responds softly. <i>The surgeon continues:</i> ‘So now we will start the trajectory. I think that with radiotherapy, if you could eat more easily again, and your complaints are partly gone, that would make a huge ... Yeah, for that time frame that would make a huge difference. Mister Bakker emotionally remarks, mostly to himself: ‘Yeah ... so I will have to say goodbye soon ...’ He gazes ahead, defeated. The surgeon looks at him empathically: ‘There is a lot confronting you all at once ...’ After a brief silence he continues: ‘I can only imagine that you are very upset by that.’ Mister Bakker nods lightly and sighs.</p> <p>‘Is there anyone who can come and pick you up later, or who you could call?’ asks the surgeon understandingly. ‘Yes, that will be fine,’ answers mister Bakker. ‘Good’, the surgeon responds.</p>

Note: fragments in italic were added after literally transcribing all verbal expressions in the video (and audio) vignettes into text. Fragments in bold reflect instances in which emotional load was varied between the two vignette variants.

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