Providing Health Information about Colorectal Cancer with Patient Narratives: The Effects of Language and Indicated Format on Trust, Identification and Risk Perceptions

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Abstract

Colorectal cancer patients who do not understand medical terminology, frequently have different needs when it comes to receiving health information about treatment options. Prior research has indicated that the use of narratives in decision aids and support tools about (colorectal) cancer treatment options and their possible outcomes have a positive influence on how the information is processed in order to develop a better understanding. There is suggested that automatically generated texts are effective in the field of health communication, enabling a faster and easier way to communicate health information and to filter important insights from available data of other cancer patients. This research aims to investigate general attitudes towards automatically generated texts in order to explore if these can indeed be used as an effective format to present health information. In a 2x2 between subject experimental study, 165 participants were assigned to four different conditions, in order to investigate the effects of indicated formats (automatically generated vs. human written) of, and language (factual vs. emotional) in these narratives on one's identification with the patient, trust in the source of the narrative, and risk perceptions. The results showed significant outcomes that indicate higher identification with the patient when reading a narrative that was indicated to be human written, more trust in the source of an emotional narrative, and higher risk perceptions when reading a factual narrative. However, as the experiment was hypothetical in its context, it is proposed for future research to further investigate the effects of actual automatically generated narratives, and more profound and distinctive language in narratives in order to make more concrete conclusions and suggestions for using (generated) patient narratives in the decision-making process of colorectal cancer patients.

Key words: health information, colorectal cancer, patient narratives, automatically generated texts, emotional language

Introduction

Cancer patients are increasingly encouraged to actively participate in their decision-making process when it comes to treatments (Pieterse et al., 2008). To support colorectal cancer (CRC) patients in this process, a wide range of decision aids (DAs) and support tools (STs) are developed, which explain health information and communicate the risks that these treatments may bring (Hommes et al., 2009; Ubel et al., 2001). However, when it comes to CRC treatments, decision-making is quite complex and emerges from several factors (e.g., considering potential benefits or risks, environmental and social influences) (Zafar et al., 2009). This is strengthened by the fact that CRC patients do not only want to consider information on survival and occurrence of side effects when deciding on possible treatments, since information on how a certain treatment will affect their quality of life (QoL) is also considered important (Zafar et al., 2009; Higginson & Carr, 2001). For example, CRC patients that have the option to consider chemotherapy should be informed about (negative) side effects such as, for example, changes in smell and taste, nausea, pain or fatigue (Vromans et al., 2020).

Prior studies indicated that when using patient narratives, participants felt more related to the patients and identified better with them rather than with a “statistically average person” (Jenni & Loewenstein, 1997), especially when stories included background information (e.g., family, physical activities) of former cancer patients (Bennett et al., 2015). Accurate identification is important for recipients in order to be able to evaluate the relevance of the presented information in their own personal context (Giesing, 2003). For this reason, there are some STs that provide narratives of cancer patients who already have been treated, in which they describe how the concerned health treatment affected their QoL afterwards (Ubel et al., 2001).

Currently a variety of studies have been performed about how (e.g., in which format) to present health information and risk probabilities (in narratives) to the general public (Visschers et al., 2009). According to Gatt et al. (2009), a feasible solution is the automatic generation of textual summaries, which enables a faster and easier way to communicate health information and to filter important insights. These data-to-text generation systems are used in the health domain to an increasing extent (Pauws et al., 2019).

Prior research has indicated that providing health information and risks of treatments through narratives makes the information emotionally interesting (Bennett et al., 2015; De Wit et al., 2008; Ubel et al., 2001), meaning that a narrative can provide a patient with certain information that is often lacking in when providing factual information only (Bennett et al., 2015; Yilmaz et al., 2020). Moreover, it is quite significant to know how the risks that come with these possible treatments are interpreted and thus perceived by cancer patients, to be able to help a patient better in their SDM process (Gigerenzer et al., 2007; Wrench et al., 2007), in which the presentation format of risk information affects this perception (Visschers et al., 2009).

Additionally, it is necessary to know how a certain message is processed in order to be able to predict one’s interpretation and perception (Visschers et al., 2009). And when it comes to delivering health information, the presentation format of that information has the strongest effect when risk information is processed heuristically (Visschers et al., 2009). Using narratives encourages heuristic processing (Winterbottom et al., 2008), and Bennett et al. (2015) argue that it is therefore easier for less-educated people or people with low literacy skills to process information when it is provided in a narrative.

An important factor in how a person processes information is considered to be the trust in the source of that information (Chen et al., 2018). Prior empirical research indicates that people tend to shape their beliefs and attitudes, and thus the influence of both on their decisions, based on health information sources they trust (Cawsey et al., 2000; Chen et al., 2018; Wrench, 2007). Furthermore, a person's identification with a patient may be enhanced by this perceived credibility of the source (McQueen et al., 2011).

When taking all of this in consideration, the following research question is formulated:

RQ: What are the effects of indicated format of and language in narratives about a colorectal cancer patients on: identification, trust in the source, and risk perceptions of the reader?

Theoretical Framework

Effective communication in health care is vital, but has many obstacles. Cancer patients who do not understand medical terminology, frequently have different needs when it comes to receiving health information, and no single report is suitable for every single individual (Cawsey et al., 1997). Every patient may experience the same thing in a different way, thus even though the content of a report contains the same information for all patients, it is described or offered in different ways (Cawsey et al., 1997).

Providing better health information to cancer patients themselves is crucial, and reasons for this can vary from being able to reduce a patient's anxiety to enabling a patient to actively engage in their decision-making and treatment process (Cawsey et al., 1997). However, in decision-making situations information overload is considered to be a serious problem (Gatt et al., 2009). A viable solution to information overload is the use of data-to-text systems which use Natural Language Generation (NLG), as these systems have the ability to make the presentation and content of health information for a patient less complex through highlighting patterns and trends, and by removing unnecessary information and unintended results from available data (Gatt et al., 2009; Van der Meulen et al., 2010). This in turn provides a more concise overview of health information, which is easier to understand and has more personal relevance for a patient (Gatt et al., 2009; Van der Meulen et al., 2010). In short, NLG is the ability to automatically generate textual summaries from accessible (digital) data into comprehensive, human language (Cawsey et al., 1997; Gatt et al., 2009).

Gatt et al (2009) argue that language is the ideal modality to construct clear and appropriate content of health information, because language can adjust the presentation of that information to the needs and requirements of its receiver. To enhance relevance of the presented information and thus meeting the needs and requirements of specific individuals, tailored information can be used. Tailored information in the health context can be explained as adapting the content of health information and the way this is communicated, to reflect certain characteristics (e.g., age, gender, culture) that are in line with the specific individual who is to receive that information (Kreuter and Wray, 2003).

A study by Balloccu et al. (2020) conceptualized a framework about possibilities that can enhance the effectiveness of NLG systems in shared decision-making (SDM), within the dietary domain. SDM can be explained as the process between a patient and a health professional, where information about the different treatment options and possible risks are discussed, and in which the preferences of the (cancer) patient are included (Van Stam et al., 2018). The effectiveness of NLG systems is believed to be enhanced by tailoring its information output, in order to improve SDM about treatment options (Balloccu et al., 2020). Tailoring information in SDM can be explained as providing patients with health information about treatments’ side effects (e.g., possible risks) that is customized and based on their personal and clinical preferences, and their sociodemographic characteristics (e.g., age, gender, physical activities) (Balloccu et al., 2020; Vromans et al., 2020). For example, making possible treatment outcomes more understandable for a new CRC patient by producing a textual summary with tailored information based on relevant implications that are derived from available data of CRC patients with relatable (medical) conditions and the same sociodemographic characteristics as the new CRC patient.

Law et al. (2005) conducted an experiment in the neonatal intensive care unit (NICU) in which they compared trend graphs and textual summaries of patient's health information in order to investigate whether textual summaries are a better way to present patient information to clinicians in the NICU. They concluded that textual summaries have the potential to enhance decision STs, since these led to better performance of health professionals in making appropriate treatment decisions that are in line with the needs of each individual patient (Law et al., 2005).

A qualitative analysis by Reiter et al. (2008) about a system that automatically generates texts for the NICU, suggests that textual summaries are useful when automatically generated. However, their research still encounters several problems in generating appropriate and good texts in a narrative format. Their results indicated that human written texts were better in connecting events from the data in order to produce a coherent story, a quality that automatically generated texts were lacking. They concluded that this quality of "telling" a coherent story is of great significance when it comes to making health information more understandable for patients (Reiter et al., 2008).

This is also confirmed by a study of Hunter et al. (2008) that supports the use textual summaries that are human-written when providing patient data to health professionals in the intensive care. Their research indicated that NLG textual summaries decreased the performance of health professionals in making appropriate treatment decisions. They concluded that the reason for this was because the human-written textual summaries were similar to narratives, whereas the NLG textual summaries were not able to present a consistent narrative to the reader (Hunter et al., 2008). Again, indicating the importance of providing information in a coherent story in order to improve decision-making and the comprehension of health information.

Nevertheless, using textual summaries (either human written or automatically generated) in SDM is still a topic that does not receive a lot of attention in prior literature and studies, especially when it comes to the preferences of (colorectal) cancer patients in receiving these narratives. Moreover, prior studies are mostly based on literature reviews or experiments with patient narratives and their influences on the performance of health professionals, instead of focusing on SDM with the patients themselves. In a paper by Pieterse et al. (2008) there was an important notion about both researchers and health professionals pointing out that the involvement of patients in treatment decision-making is highly needed when it comes to serious illness. Additionally, they argued that for this reason the patient's preferences and values are to be acknowledged by health professionals in making treatment decisions (Pieterse et al., 2008).

According to McKnight et al. (2009), in many Information System-enabled situations (such as the use of NLG textual summaries in health care when presenting health information) trust is a significant factor. Their research offered some developed measure constructs and a theoretical framework in order to evaluate different forms of trust (e.g., trust in technology). In short, trust can be explained as relying on certain characteristics that another person or party possesses, in order to "depend on their capability to fulfill certain needs or to perform a particular action" (McKnight et al., 2009, p. 2). For this reason, it may seem and feel more "natural" to trust an actual person rather than to trust technology, since technology does not hold moral agency (McKnight et al., 2009). Moral agency means that someone is able to make judgments based on what is right and wrong, on which they can be held accountable for (McKnight et al., 2009). For this reason, trust in technology does not necessarily revolve around its "motives" or its will, but rather around a technology's capacity or functionality (McKnight et al., 2009, p. 4). In other words, trust in technology is based on characteristics that the given technology possesses, which are perceived to be positive by the user (McKnight, 2009).

Peters et al. (1997) stated that trust and credibility are dependent on three factors that can be considered as those positive characteristics: (1) perceptions of knowledge and expertise (competence), (2) perceptions of openness and honesty (integrity), and (3) concern and care (benevolence). All three factors can be linked to one's moral agency, which - as mentioned before - is not something that technology holds. For this reason, McKnight et al. (2009) argue that trusting technology is dependent on three different attributes as positive characteristics. As for the competence factor, trust in technology is rather based on its functionality, referring to whether the features of the used technology are actually focused on completing a task (McKnight et al. 2005). Moreover, technology cannot show integrity, yet it can still be considered as being "honest" through showing consistency and reliability by continuously operating in the way it was developed and designed for (McKnight et al., 2009). And finally, technology does not particularly show concern and care in an emotional way, but we do expect it to provide the appropriate help in situations where and when we need it to (see McKnight, 2005). Thus, when using technology in uncertain situations (such as deciding on CRC treatment options that are offered in automatically generated texts within the SDM process), there is a need to trust the "intentions" or purpose of the technology's outcomes in its tasks, as well as trusting our own beliefs in the used technology.

Prior research has indicated that people tend to trust a source that provides health information more when they are acquainted with that source (Chen et al., 2018). Trust in a source is considered to be an important factor when shaping personal interpretations of health information (Chen et al., 2018). This is especially the case for people with limited health literacy skills, since it is harder for them to accurately use and process health information (Chen et al., 2018). In the context of this research, health literacy refers to one's ability to obtain and understand basic health information, and to process this information correctly in order to make health decisions that are appropriate to one’s individual situation (Chen et al., 2018). Moreover, both the credibility of and the trust in a source are mostly driven by a person’s perception of the knowledge and expertise (e.g., professional credentials) of the source of that message (Peters et al., 1997; Winterbottom et al., 2008). Prior research showed that this is especially the case when an individual already has a past experience with or prior knowledge of certain risks and benefits of an illness and its treatment options (Bekker et al., 2013; Chaiken, 1980).

Considering the information from the previous sections, the first hypothesis is formulated as follows:

H1: Thinking a narrative is automatically generated will lead to lower trust in the source of the narrative than thinking a narrative is human written.

People process information either heuristically (system 1), or systematically (system 2). When system 1 is used, information is processed rather quickly and effortlessly and does not demand for elaborate deliberation before making a decision or taking action. The use of system 2 on the other hand requires a more cognitively demanding, active, and effortful way of processing the information, which does demand for a more active way of reasoning before making a decision or taking action (Bekker et al., 2013; Visschers et al., 2009). A systematic review by Winterbottom et al (2008) showed some evidence that the use of patient narratives has the potential to positively influence decision-making, because narratives encourage heuristic processing. Bekker et al. (2013) compared in their systematic review the effect of patient decision aids with and without cancer patient narratives, in which they suggested that the use of personal stories of (former) cancer patients had an effect on both system 1 and system 2, because of individual differences in health literacy and numeracy skills. Numeracy refers to the understanding and applying of mathematical concepts (Lipkus., 2007). In relation to health information and this research, numeracy skills can be explained as the understanding of statistical data of former CRC patients or numerical estimates of risks. However, the results of Bekker et al. (2013) were mixed, and indicated that more research is needed in order to investigate whether the use of personal stories has an effect on decision-making processes.

Personal stories are used to illustrate a more "ordinary" person to the recipient instead of just using a statistical approach, through providing background information about a cancer patient (Bennett et al., 2015). These personal aspects of a patient are less cognitive demanding to process, as it is easier to link them to one's own emotions, and are therefore especially argued to be useful when someone has low (health) literacy and numeracy skills (Bekker et al., 2013). Thus, providing information in a narrative format is favored when it comes to decision-making processes (Winterbottom et al., 2008), since "narratives can induce elements of deliberate reasoning […] by making information more salient and memorable" (Yilmaz et al., 2020, p. 991). Examples of doing this are the use of words (e.g. emotional/value terms), social and personal experiences the narrator uses in a story, or the credibility of the source (e.g., the perceived expertise) of the story (Bekker et al., 2013; Peters et al., 1997).

According to prior research, the combination of personal experiences in and perceived credibility of a narrative may increase identification of a recipient with the character from that narrative (Kreuter et al., 2007; McQueen et al., 2011). Identification with a character of a narrative can be referred to as requiring a recipient to "forget" themselves and feel like they are part of the narrative, or even like they are that character (Cohen, 2001).

McQueen et al. (2011) studied the impact of using cancer patient narratives instead of a more "standard" and informational approach in providing health information about cancer, and showed with their results that narratives have a positive effect on the identification of a recipient with the cancer patient. Igartua (2010) claims that identification with (fictional) characters in narratives explain effects on narrative reception and persuasion. His research consisted of three separate experimental studies in movie narrative contexts, and the results showed that the participants' identification with characters from a narrative had an effect on cognitive elaboration and the affective impact of that narrative (Igartua, 2010). Meaning, the extent of an individual's identification with a character may explain how identification affects an individual's perspective on the received information, together with how that individual will process that information. This is also elaborated on in a research study of Giesing (2005), which states that an accurate identification is important for recipients in order to correctly evaluate the received information in terms of personal relevance. Thus, accurate identification may have a positive influence on SDM processes of individual CRC patients when considering appropriate treatment options.

Considering the information in this section and the previous sections, the following hypotheses are offered.

H2: Thinking a narrative is human written will lead to higher identification with the patient in the narrative than thinking a narrative is automatically generated.

H3: Emotional narratives will lead to higher identification with the patient in the narrative than factual narratives.

According to prior literature, informed consent is perceived to be a highly significant factor in SDM (Lipkus, 2007). In order to achieve informed consent, a patient has to have a comprehensive understanding of optional treatments, the differences between them, and the possible side effects that come with these treatments (Lipkus, 2007; Van Stam et al., 2018; Vromans et al., 2020). Risk communication is used in order to provide patients with this information. A definition that can be used to describe risk communication is "the communication with individuals which address knowledge, perceptions, attitudes and behavior related to risk" (Lipkus, 2007, p. 696), with probability information as a central aspect. Probability information refers to the likelihood of consequences that may occur after making a certain decision (e.g., possible side effects of an optional treatment) (Lipkus, 2007).

Risks are hard to interpret, especially when a cancer patient has low numeracy or health literacy skills (Vromans et al., 2020). Yet, probabilities of risk occurrence are commonly presented to a patient with statistical data and numerical estimates, which are mostly based on the "average cancer patient" (Knapp et al., 2018; Lipkus, 2007; Vromans et al., 2020). A paper by Gigerenzer et al. (2007) recommended a more transparent and understandable communication of risks to patients, as misinterpretation of these numerical formats of risk may counteract informed consent and have a negative influence on SDM.

Prior research indicated that when factual or statistical information about treatment options and their outcomes is provided in a narrative with a personal story, values and opinions within this information can be explained in a more comprehensive way to the reader (Bekker et al., 2013; Bennett et al., 2015; Khangura et al., 2008). In other words, narratives give this factual information a more personal and social context, which makes the steps in decision-making for treatment options easier to understand (Khangura et al., 2008). The purpose of Bennett et al.'s (2015) research was to use CRC patient narratives to engage people more in bowel screening processes and to positively contribute to their decision-making process. The narrative provided to the participants of this study covered the views, thoughts, feelings, and experiences of several individual CRC patients during a bowel screening test. Their research showed that information in a narrative was easier to read for participants than when they were merely presented with factual information about this bowel screening test. Nevertheless, participants considered the factual information within the narratives as being essential when making a final bowel screening decision (Bennett et al., 2015).

In an experiment by Fagerlin et al. (2005) in which the participants were asked to make hypothetical treatment choices for angina, the use of personal stories in patient narratives is somewhat discouraged. Their research argues that treatment decisions are too often influenced by personal stories or experiences only, and indicates that the use of personal stories in the decision-making process may distract patients from factual (and numerical) information that is offered by actual healthcare professionals (Fagerlin et al., 2005). This can be linked to the results of Bekker et al.'s (2015) study, whereby they suggest further research on the influence of personal stories in decision-making processes. Both studies indicated a need to develop a method to make numerical or statistical health information easier to understand in order to improve informed decision-making (Fagerlin et al., 2005; Bekker et al., 2015).

In contrast, Ubel et al. (2001) also conducted two studies in order to test whether personal stories overwhelmed statistical information (about angina) in a decision-making context. The two studies demonstrated that: (1) the use of patient narratives significantly influenced hypothetical treatment choices, and especially when (2) the narrative was presented together with statistical summary data on treatment effectiveness and outcomes (Ubel et al., 2001). These results are in line with prior studies that argue that the integration of factual information in narratives provides a more social and personal context which is mostly lacking in traditional health information resources (Khangura et al., 2008; Bennett et al., 2015).

The results of two experimental studies by Jenni and Loewenstein (1997) also encouraged the use of personal stories when presenting risk probabilities, and indicated that participants felt more related to patients and identified better with them when they were presented with personal stories instead of statistical information about a patient. This, in turn, led to a better understanding of the presented risks (Jenni & Loewenstein, 1997), and again, correctly understanding risks is important within SDM in order to make better informed treatment decisions (Gigerenzer et al., 2007).

A study by Wrench (2007) developed and validated “a simple measure of the degree to which an individual perceives he or she understands the nature of a specific risk” (p. 63). According to his study, risk perceptions and understanding per individual is related to perceived credibility, communication clarity and receiver apprehension, in which the latter is negatively related to risk perceptions (Wrench, 2007). In this research, receiver apprehension makes a reference to one’s fear of being unable to process or understand health information correctly. The results of this study concluded that positive perceptions of the professional credentials of the source, the format, and the way of communication (e.g., language use) in which health information is presented, result in lower risk perceptions (Visschers et al., 2009), whereas receiver apprehension increases risk perceptions (Wrench, 2007; Chesebro, & McCroskey, 2001).

Prior research suggests that tailored risk information about treatments’ side effects may be an efficient and effective strategy to communicate risks to patients, which enables them to make more accurate risk estimates (Lipkus, 2007; Vromans et al., 2020). However, results by Vromans et al. (2020) indicate that communicating tailored risks led to “higher and less accurate risk estimates” (p. 9) of participants when these were verbally communicated, and thus indicating that tailored risk information may lead to less accurate risk perceptions. Additionally, results of an experimental study by De Wit et al. (2008) indicated that when a narrative was written from a patient’s point of view about personal experiences and choices, tailored information led to higher and less accurate risk perceptions.

In the present context, the “accurate perception” or estimate of risks mainly refers to the risk perceptions of a patient that are in line with current scientific insights of that risk (Van Stam et al., 2018). However, Lipkus (2007) importantly noted that a person may be aware of the current scientific insights about probabilities and accurate perceptions, yet still believes that his or her probabilities are different. Nevertheless, an accurate risk perception is quite significant in the health context since it enables cancer patients to better understand or perceive their personal relevance of the presented risk information, which in turn increases the consideration, deliberation and evaluation within their decision-making process (Visschers et al., 2009; Vromans et al., 2020).

In conclusion, within the context of this research, narratives are considered to be a valuable resource to provide health and risk information to CRC patients, as they have the potential to make information "emotionally interesting" (Bennett et al., 2015), which has a positive effect on information retrieval mechanisms (Winterbottom et al., 2009). Meaning, narratives make it easier to retrieve and/or code information in one's memory which in turn increases a person's recall on certain information (Winterbottom et al., 2008; Yilmaz et al., 2020). Recall refers to one's ability to remember, retrieve and reproduce information, which is important when trying to better understand or relate to another person's situation or experience (Bekker et al., 2013; Yilmaz et al., 2020). Moreover, according to a literature review by Visschers et al. (2009) about probability information in risk communication, a person's understanding of risk and health information is influenced by the presentation format of that information (Visschers et al., 2009). Additionally, study by Mottet and Beebe (2006) pointed out that the understanding of information is co-created between the source and the receiver of a message.

By drawing knowledge from these studies, it can be said that who or what is communicating certain information through a narrative possibly influences patients' risk understandings and perceptions.

Given these considerations, the last hypotheses are as follows:

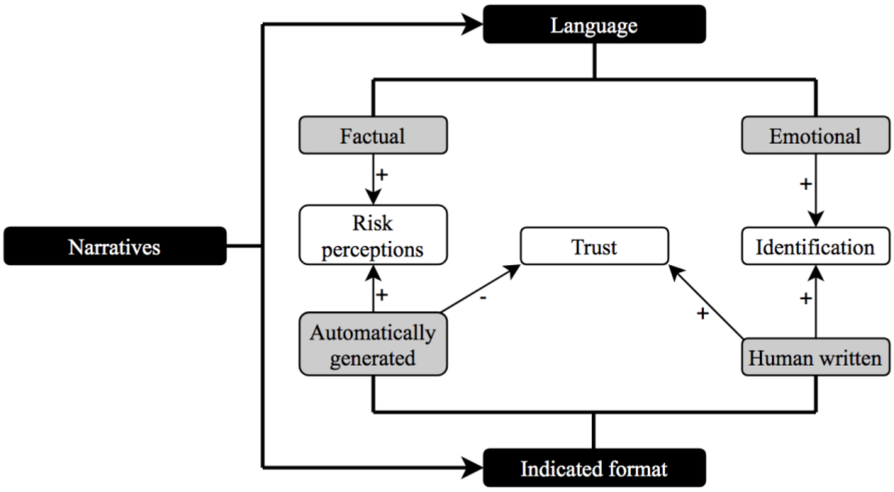
H4: Thinking a narrative is automatically generated will lead to higher risk perceptions in self-perceived probabilities (H4a), perceived likelihood of occurrence (H4b), and less accurate risk estimates (H4c) than thinking a narrative is human written.

H5: Factual narratives will lead to higher risk perceptions in self-perceived probabilities (H5a), higher perceived likelihood of occurrence (H5b), and less accurate risk estimates (H5c) than emotional narratives.

In Figure 1 a conceptual framework is presented based on the independent and dependent variables that can be derived from the aforementioned hypotheses.

Figure 1

Conceptual framework



Note. The (expected) relationships of each variable are indicated with a “-” for a lower outcome and a “+” for a higher outcome.

Method

Experimental design

The objective of this study was to examine the effects of indicated format of and language in narratives, on the concepts of identification, trust in the source, and risk perceptions. The independent variables were indicated format and language. The effects of these independent variables were manipulated in two ways, namely: (1) the information before reading the narrative indicated if that narrative was either automatically generated or human written, and (2) the language in the narrative was either factual or emotional. Thus, both independent variables used in this research had two levels. ‘Indicated format’ had the levels ‘automatically generated’ vs. ‘human written’, and ‘Language’ had the levels ‘factual’ and ‘emotional’. In a 2x2 between-subject design, an experimental study was created with four conditions as presented in Table 1.

Table 1

Four conditions

Independent variables	*Automatically generated*	*Human written*
Factual	Condition 1 Factual and automatically generated indication	Condition 2 Factual and human written indication
Emotional	Condition 3 Emotional and automatically generated indication	Condition 4 Emotional and human written indication

Participants

In order to participate in the study, participants must have met the following criteria: (a) be 18 years or older; (b) be fluent in Dutch. Since the experiment was based on hypothetically being a patient, there was no need for a participant to have prior knowledge or experience on the subject.

To calculate the necessary sample size for this research, G*Power by Faul et al. (2007) was used, which is a stand-alone power analysis program for many statistical tests commonly used in the social, behavioral, and bio-medical sciences (p. 1149). With effect size f = 0.25, power of 80%, a = 0.05, Numerator df = 2, Number of groups = 4, and Number of covariates =3, G*Power indicated a total sample size of 158. Thus, the sample size needed to be of 160 participants.

Operationalization

Trust

In order to measure the participant’s trust in the source of the narrative, a proposed scale developed by Sekhon et al. (2014) was used. The potential item pool of this scale was generated from existing literature, which their research narrowed down to an end result of 29 items. The items from this scale are measured on a 5-point Likert scale where the response options are 1 (= not at all) to 5 (= very much). However, only twelve items from this scale were extracted, since they were most compatible with this research. Namely, the items from the dimensions “Expertise and competence”, “Integrity and consistency”, and “Concern and benevolence”, since these are in line with the three factors as proposed by Peters et al. (1997). The original scale can be found in Appendix A.

The scale was intentionally developed to provide the significance of key antecedents that drive the levels of customer trust. For this reason, the questions were appropriately adjusted, by changing “My___” into “The narrative”. Moreover, the sentences were properly adjusted so that the information was in line with this research. For instance, from the item “Expertise and competence” the question “My … completely handles all my requests.” was changed into “Het verhaal behandelde volledig wat ik zou willen weten als ik kankerpatiënt zou zijn” (“The story fully covered what I would want to know if I were a cancer patient”).

Identification

In order to be able to measure a participant’s identification with the patient in the narrative, a revised scale measurement created by Igartua and P’aez (1998, as cited in Igartua, 2010) was used. This scale measures the levels of identification a participant might feel with characters of a story, and the scale consists of fourteen statements measured on a 5-point Likert scale where the response options are 1 (= not at all) to 5 (= very much). The first seven statements revolve around a participant’s experience of becoming the characters, together with loss of self-awareness, whereas the second seven questions relate to the emotional and empathic reactions of the participant towards the characters of the text. The fourteen items of the original scale can be found in Appendix B.

The scale was adjusted to identification with one character instead of more, since the narrative was about one patient only. Moreover, the scale was appropriately adjusted in order to be in line with this study. For instance, the question “I thought that I would like to be or act like the characters” was changed into “Ik denk dat ik hetzelfde zou hebben gedaan als Kris” (“I think I would have done the same as Kris”).

Risk Perceptions

To measure risk perceptions of participants, questions that were formulated in a research by Vromans et al. (2020) were used in combination with questionnaire-based data that was acquired from the European organization for Research Treatment of Cancer (EORTC) Quality of Life Questionnaire (QLQ) C30, which is used to assess health related quality of life (HRQOL) (Aaronson et al., 1993; Mols et al., 2013). From the EORTC, three symptom scales (fatigue, pain, and nausea and vomiting) were acquired.

Vromans et al. (2020) used three primary outcome measures for measuring risk interpretations, and two secondary outcome measures (see Appendix C for the original scale). In this research, risk perceptions were measured with three different constructs, namely, self-perceived probability, perceived likelihood of occurrence of a risk, and risk accuracy. These measures were used in the questionnaire, in combination with each of the three scales from the EORTC. When using “fatigue” for example, the questions and answers were asked as follows:

For self-perceived probability, the question *“What do you think is the probability you will experience fatigue?”*, the participants were asked to reproduce a number on a scale from 1 to 10.

For perceived likelihood of occurrence of a risk, the question *"How likely is it that you will experience fatigue?"*, the response options were 1 (= not likely at all) to 6 (= very likely).

For risk accuracy, the answer that was given to the question for self-perceived probability (e.g., 6 out of 10), was extracted from the actual risk probability (e.g., 9 out of 10).

The "actual" risk probabilities that were offered in the narrative were *hypothetical* (pain 3 out of 10, fatigue 8 out of 10, and nausea 4 out of 10).

All of the scales for the dependent variables were correctly translated to Dutch, and the measurements per scale (e.g., 5-point Likert scale) were used as they were in the original questions to prevent unreliable outcomes.

Covariates

There was a possibility that a participant's prior experiences, algorithmic trust, or anxiety had an influence on the dependent variables of this research (identification, trust in the source, and risk perceptions). This is based on mentions about health literacy (Bekker et al., 2013; Chaiken et al., 1980; Chen et al., 2018; Vromans et al., 2020), the importance of reducing anxiety when providing better health information to cancer patients (Cawsey et al., 1997), and the fact that it can be harder to trust automatic generated texts than texts written by a human (Hunter et al., 2008; McKnight et al., 2009).

Prior experiences were measured with two items, namely, 'Do you have personal experiences with (colorectal) cancer and/or chemotherapy yourself', and 'Do you know someone in your near environment who has (had) (colorectal) cancer and/or chemotherapy?' in which the answer options were "yes", "no", or not to disclose this information.

For anxiety, the seven anxiety questions from the Hospital Anxiety and Depression Scale (HADS) by Olssøn et al. (2005) were included at the end of the questionnaire to see if anxiety also could have a possible effect on the dependent variables. These original questions can be found in Appendix D. Scores were allocated to the answer options of axniety (never = 0, very often = 3), and the lower the score, the lower a participant's anxiety.

Next to anxiety, three questions about trust in AI systems were implemented in the questionnaire to see if algorithmic trust may have influenced the dependent variables. These three questions were based on a study by Gillespie et al. (2021) and the original questions can be found in Appendix E. In the questions, the term "AI applications" was changed into "automatically generated texts".

Materials

For this study, four different conditions were created. In the first condition, participants were presented with a factual narrative, from which it was mentioned beforehand that it was automatically generated. In the second condition, participants were presented with that same factual narrative, however the information beforehand indicated that this narrative was human written. In the third and fourth conditions the same was done, however the language in the narratives was not factual but emotional. Thus, the narratives in condition 1 and 2 had the exact same content, and the narratives in condition 3 and 4 had the exact same content. This was done in order to retain experimental control and avoid confounding variables. Furthermore, both the factual and emotional narrative contained "factual information" about colorectal cancer stadium II, chemotherapy, and risk probabilities of side effects after chemotherapy, since prior research did show that providing factual information in narratives is considered as being essential in several ways (see Bennett et al., 2015).

Pilot and Changes

In the pilot version of the questionnaire, a unisex name "Marijn" was used. However, some people read this as "Martijn", a male name. For this reason, in the final version of the questionnaire the name was changed into "Kris".

Moreover, the pilot showed that participants misinterpreted the questions of the manipulation check after they were presented with the questions about algorithmic trust. A consequence of this was that more participants thought they were presented with an automatically generated text, even though they were presented with the indication that the narrative was human written. For this reason, half of the participants were presented with these questions before they could read the narrative, and the other half was presented with these questions at the end of the questionnaire, to make sure there was less confusion about the indicated format of the narrative.

Finally, the narrative was divided into smaller parts instead of presenting it as a whole, to make sure the amount of text was not too overwhelming.

Narrative Content

The factual information that was needed for the patient narratives was based on general information derived from kanker.nl.

Both of the narratives presented a story of the same person (Kris) who was just recently diagnosed with early stage colorectal cancer (stadium II). The focus of both stories was the deliberation of possible outcomes if “Kris” would choose continue his/her treatment with chemotherapy. However, the factual narrative used a more factual (and thus formal) tone of voice without personal emotions, whereas the emotional narrative used a more emotional (and thus informal) tone of voice by explaining more of the patient’s feelings when going through this process and their treatment choices by using emotion words (e.g., happy, scared, etc.). Moreover, both narratives included some background information (e.g., work, physical activities, having children), since prior research mentioned that background information in a narrative possibly enhances identification with a (colorectal) cancer patient and more accurate risk perceptions (Bennett et al., 2015; Jenni & Loewenstein, 1997).

Additionally, the participants were presented with a more “tailored” narrative, based on their gender (man or woman) and age (between 18 and 30 years old, or 31+ years old), since tailored information is believed to make the health context of an (automatically generated) narrative more understandable and relatable (Balloccu et al., 2020; Kreuter & Wray, 2003; Lipkus, 2007; Vromans et al., 2020;) (see Appendix F & G).

Finally, the narratives were written from a first-person account of the patient who explained his/her experiences during this process.

Procedure

A Qualtrics questionnaire was distributed by sending out a shared link via social media to the network of the researcher, e.g. WhatsApp groups of master students, family, and Facebook (e.g., Student Survey Exchange page). When clicking on the link, participants were first asked to read and sign the informed consent (see Appendix H). Participants who did not accept the informed concept were redirected to the end of the questionnaire and thanked for their consideration.

When the informed consent was accepted, the participants were first asked to fill in demographic questions about their gender, age, and educational level. Additionally, they were asked if they had any previous experience with (colorectal) cancer and/or chemotherapy themselves or in their environment (see Appendix I). Three questions about algorithmic trust were either asked before reading the narrative, or at the end of the questionnaire when all other questions were answered (see Appendix J, Table J1). Before being presented with the questions about algorithmic trust, participants were provided with a brief explanation about automatically generated texts and its use in STs and DAs of cancer patients (see Appendix J, Table J2).

After answering the first set of questions, participants were randomly assigned to one of the four conditions, using the built-in randomizer function from Qualtrics. The first part of the questionnaire was the narrative of CRC patient “Kris”. Before participants were exposed to the narrative, the questionnaire indicated if the narrative was either automatically generated or human written, depending on the assigned condition of the participant (see Appendix K).

After reading one of the narratives, participants were briefly informed about what was expected of them, and thereafter asked to fill out the questionnaire on the outcome variables (identification, trust in the source, risk perceptions, and the HADS) (see Appendix L - O). Moreover, a manipulation check was done in order to see whether participants knew if their narrative was either emotional or factual, and to see whether they knew if their narrative was indicated to be automatically generated or human written (see Appendix P).

At the end of the survey they were thanked for their participation and were debriefed about the experiment and its purpose (see Appendix Q).

Analyses

Statistical tests (via SPSS) were conducted on all the data to be able to draw conclusions. To do so, first, the data had to be transformed into measurable units. This meant that for both identification and trust the mean of all answers given by the participants was calculated. For risk perceptions, means were calculated for both self-perceived probability and perceived likelihood of occurrence. Moreover, for risk accuracy, the absolute difference between the means of the actual risk for each side effect and the self-perceived probability was calculated, as was done in a research by Knapp et al. (2010) (see Vromans et al., 2020). These were gradual scores, where scores closer to zero were considered as being more accurate.

All scales were checked for homogeneity of variance and normality, and the outliers for each outcome measure. The outcomes of the dependent variables were then compared for each condition by performing five factorial analyses of variance, from which three of the factorial ANOVAs were performed for the risk perception constructs. All invalid answers for risk perception (e.g., not providing a number between 1 and 10 on self-perceived probability) were not included in mean calculations.

Three two-way ANCOVAs were used in order to check whether the covariates (algorithmic trust, anxiety, and prior experiences) had an additional effect on the *significant* ($p < .05$) results from the factorial ANOVAs.

Finally, two one-way ANOVAs were performed to see whether the participants that correctly indicated their condition in the manipulation check scored differently comparing to the whole sample on the outcome measures identification, trust, and risk perceptions.

Internal consistency

Before analyzing the data all the scales were checked for their reliability, measured with Cronbach's alpha. This was not done for risk accuracy, since this was not measured with a scale in the questionnaire, but based on the scores of self-perceived probabilities. The results of the reliability analyses can be found in Table 2.

Table 2

Cronbach's alpha for trust, identification, self-perceived probability, perceived likelihood of occurrence, algorithmic trust, and anxiety.

Scale	*Reliability*	*Cronbach's alpha*
Trust	Excellent	α = .90
Identification	Good	α = .87
Self-perceived probability	Acceptable	α = .72
Perceived likelihood of occurrence	Questionable	α = .64
Algorithmic trust	Acceptable	α = .73
Anxiety	Good	α = .86

As can be seen in Table 2, the reliability of the perceived likelihood of occurrence scale was questionable. However, no items were deleted from the scale since the constructs that measured risk perceptions were based on three symptom scales (pain, fatigue, and nausea), and deleting items would exclude one of these scales.

Results

Descriptive statistics

Out of the 215 people who opened the survey, 56 people (25.80%) did not finish the survey. However, 8 people (3.69%) who did not fill in the survey completely, did fill out all the questions related to the three main dependent variables of this survey (identification, trust, and risk perceptions) and were therefore included in the analyses. Of the 167 participants that were left, two did not continue beyond the informed consent page, leaving the final count of participants that are included in this research on 165 participants.

Out of the 165 participants, 123 participants were between the ages of 18 and 30 (74.5%), ten between the ages of 31 and 45 (6.1%), 25 between the ages of 46 and 60 (15.2%), and seven participants were older than 61 (4.2%). The sample consisted of more female participants (n = 127) than male participants (n = 37), and one participant indicated otherwise (n = 1). From these participants, 10 people had personal experiences with cancer, and 155 did not. Moreover, 117 participants knew someone on their personal environment with experiences with cancer, and 48 did not.

The study was divided into four conditions, in which 46 participants were included in the first condition (27.9%), 41 participants in the second condition (24.8%), 37 in the third condition (22.4%), and 41 in the fourth condition (24.8%).

As for the manipulation check, six participants did not know whether the language in the narrative was either emotional or factual, and 26 participants did not know whether the narrative was indicated to be automatically generated or human written. The results of the manipulation check can be found in Table 3.

Table 3

Actual number of participants vs. answers manipulation check

	Actual number	*Manipulation check*
Factual	87	68
Emotional	78	27
Automatically generated	83	52
Human written	82	43

Note. The actual number refers to the total amount of participants in that particular condition, whereas the manipulation check refers to how many of those participants correctly indicated that condition.

There were no effects of gender and age on identification, trust, and the risk perception constructs. However, there was an effect found for educational level on trust in the source (*p* = .022), which indicated that when participants' education was higher, their trust in the source was lower. These results are highlighted in Table 4, in which the means and standard deviations for all dependent variables per demographic can be found.

Table 4

Mean scores per demographic per dependent variable (identification, trust, self-perceived probability, perceived likelihood of occurrence, and risk accuracy with means and SD's (M (SD)).

		Identification	**Trust**	**SPP**	**PLO**	**Accuracy**
Gender	Men	3.13 (.65)	3.56 (.64)	5.67 (1.39)	3.64 (.70)	1.02 (1.14)
		N = 37	*N* = 37	*N* = 37	*N* = 37	*N* = 37
	Women	3.30 (.65)	3.52 (.67)	5.44 (1.40)	3.51 (.75)	.85 (1.20)
		N = 127	*N* = 127	*N* = 127	*N* = 12hat	*N* = 125
	Sig.	***.933***	***.923***	***.626***	***.740***	***.599***
Age	18 - 30	3.30 (.59)	3.53 (.67)	5.43 (1.45)	3.47 (.75)	.89 (1.22)
		N = 123	*N* = 123	*N* = 122	*N* = 123	*N* = 122
	31 - 45	2.99 (.66)	3.50 (.44)	5.67 (1.41)	3.80 (.83)	1.00 (1.18)
		N = 10	*N* = 10	*N* = 10	*N* = 10	*N* = 10

		Identification	***Trust***	***SPP***	***PLO***	***Accuracy***
Age	46 - 60	3.08 (.90)	3.34 (.82)	5.62 (1.15)	3.77 (.62)	.80 (1.03)
		N = 25	*N* = 25	*N* = 24	*N* = 25	*N* = 24
	61+	3.49 (.46)	3.82 (.44)	6.24 (1.23)	3.67 (.51)	1.24 (1.23)
		N = 7	*N* = 7	*N* = 7	*N* = 7	*N* = 7
	Sig.	***.172***	***.377***	***.461***	***.162***	***.844***
Educational level	High school	3.48 (.96)	**3.98 (.69)**	5.39 (1.36)	3.72 (.85)	.72 (1.18)
		N = 6	*N* = 6	*N* = 6	*N* = 6	*N* = 6
	MBO	3.48 (.58)	**3.64 (.86)**	5.94 (1.00)	3.78 (.75)	.94 (1.00)
		N = 6	*N* = 6	*N* = 6	*N* = 6	*N* = 6
	HBO	3.27 (.57)	**3.55 (.60)**	5.54 (1.35)	3.45 (.66)	.97 (1.08)
		N = 33	*N* = 33	*N* = 33	*N* = 33	*N* = 33
	WO	3.23 (.66)	**3.48 (.69)**	5.42 (1.42)	3.52 (.75)	.84 (1.21)
		N = 116	*N* = 116	*N* = 114	*N* = 116	*N* = 114
	PhD	3.16 (.70)	**3.23 (.76)**	6.33 (1.63)	3.67 (.82)	1.33 (1.63)
		N = 4	*N* = 4	*N* = 4	*N* = 4	*N* = 4
	Sig.	***.239***	***.022***	***.509***	***.653***	***.603***

Note. SPP stands for self-perceived probability, PLO stands for perceived likelihood of occurrence.

Trust in the source

To test hypothesis H1: “Thinking a narrative is automatically generated will lead to lower trust in the source of the narrative than thinking a narrative is human written.”
a factorial ANOVA was performed. Trust was measured with twelve items on a 5-point Likert scale (1 = highly disagree, 5 = highly agree). The means and standard deviations for trust can be found in Table 5.

Table 5

Mean scores per condition (language and indicated format) with means and SDs (M (SD)) for trust

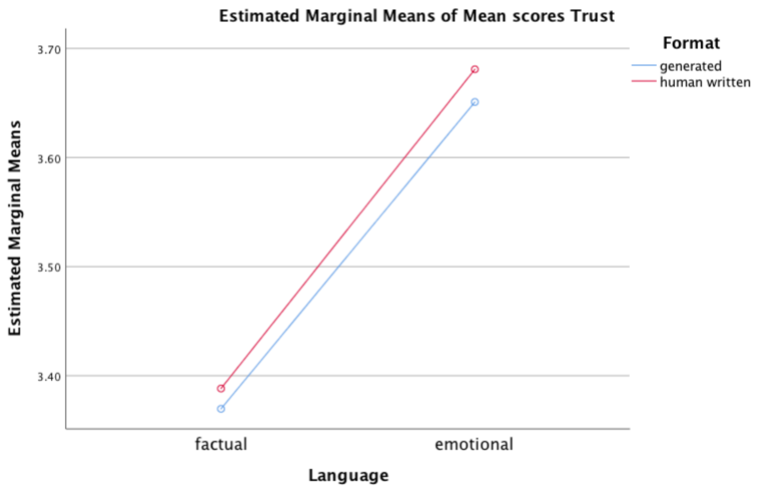
		Language		
		Factual	Emotional	*Mean indicated format*
Indicated format	Automatically generated	3.36 (.59)	3.65 (.67)	3.50 (.64)
		N = 46	*N* = 37	*N* = 83
	Human written	3.39 (.71)	3.68 (.71)	3.53 (.72)
		N = 41	*N* = 41	*N* = 82
	Mean language	3.38 (.65)	3.67 (.69)	3.51 (.68)
		N = 87	*N* = 78	*N* = 165

While there was a difference in the means of trust for participants in the automatically generated (*M* = 3.50, *SD* = .64, n = 38) and human written (*M* = 3.53, *SD* = .72, n = 82) conditions, no significant main effect was found for the indicated format on trust in the source (F(1, 161) = .054, *p* = .816). For this reason, hypothesis H1 was rejected.

However, there was a main effect found for language (F(1, 161) = 7.534, p = .007), $\eta_{partial}^2$ = .05), indicating that participants who read the factual narrative (*M* = 3.38, *SD* = .65, n = 87) trusted the source less than participants who read the emotional narrative (*M* = 3.67, *SD* = .69, n = 78), which was not included in the hypotheses. Figure 2 shows the estimated marginal means for trust in the source.

Figure 2

Estimated marginal mean scores for trust, separated by indicated format



Identification

To test hypotheses H2: “Thinking a narrative is human written will lead to higher identification with the patient in the narrative than thinking a narrative is automatically generated.”, and H3: “Emotional narratives will lead to higher identification with the patient in the narrative than factual narratives.”, a factorial ANOVA was performed. Identification was measured with fourteen items on a 5-point Likert scale (1 = highly disagree, 5 = highly agree). The identification scores were not normally distributed since there was a slight skewness (*z-scoreskewness* = -2.07), 95% CI [-.725, -.032]). Because the confidence interval does not cross zero, it should not bias the results very much. The mean scores and standard deviations for identification can be found in Table 6.

Table 6

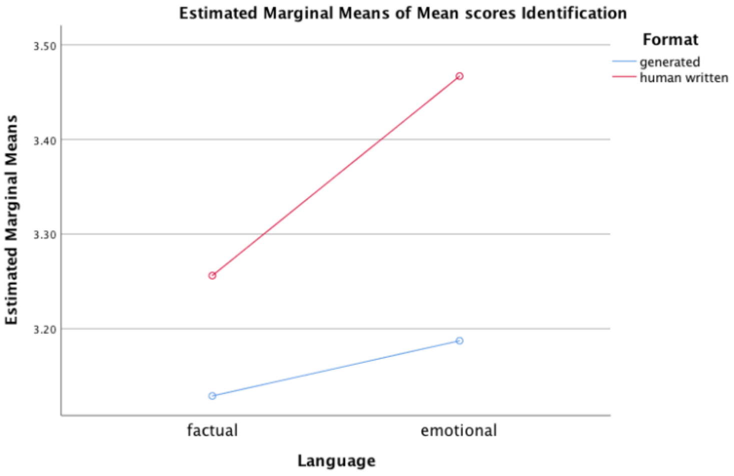
Mean scores per condition (language and indicated format) with means and SDs (M (SD)) for identification

		Language		
		Factual	Emotional	*Mean indicated format*
Indicated format	Automatically generated	3.13 (.65) *N* = 46	3.19 (.77) *N* = 37	3.15 (.71) *N* = 83
	Human written	3.26 (.54) *N* = 41	3.47 (.59) *N* = 41	3.36 (.57) *N* = 82
	Mean language	3.19 (.60) *N* = 87	3.33 (.69) *N* = 78	3.26 (.65) *N* = 165

A small-sized significant main effect was found for indicated format (F(1, 161) = 4.11, *p* = .044, $\eta_{partial}^2$ = .03), indicating that participants had a higher identification with "Kris" when the narrative was indicated to be human written (*M* = 3.36, *SD* = .57, n = 82) than when the narrative was indicated to be automatically generated (*M* = 3.15, *SD* = .71, n = 83). For this reason, hypothesis H2 was supported. Figure 3 shows the estimated marginal means for identification.

Figure 3

Estimated marginal mean scores for identification, separated by indicated format.



While there was a difference in the means of identification for factual (*M* = 3.19, *SD* = .60, n = 87) and emotional narratives (*M* = 3.33, *SD* = .69), n = 78), no significant effect was found for language on identification (F(1, 161) = 1.799, *p* = .812). Concluding, the results reject hypothesis H3.

Risk perceptions

To test hypotheses H4: "Thinking a narrative is automatically generated will lead to higher risk perceptions in self-perceived probabilities (H4a), perceived likelihood of occurrence (H4b), and less accurate risk estimates (H4c) than thinking a narrative is human written.", and H5: "Factual narratives will lead to higher risk perceptions in self-perceived probabilities (H5a), higher perceived likelihood of occurrence (H5b), and less accurate risk estimates (H5c) than emotional narratives.", three factorial ANOVAs were performed.

Self-perceived probability

To test hypotheses H4a and H5a, a factorial ANOVA was performed. Self-perceived probability was measured using 1 to 10 estimates. The scores for self-perceived probability were not normally distributed (*z-scoreskewness* = -3.34, 95% CI [.073, 1.240], *z-scorekurtosis* = 3.88, 95% CI [.293, 2.826]). However, the assumption of homogeneity was met. The mean scores and standard deviations from this analysis can be found in Table 7.

Table 7

Mean scores per condition (language and indicated format) with means and SDs (M (SD)) for self-perceived probability

		Language		
		Factual	Emotional	*Mean indicated format*
Indicated format	Automatically generated	5.79 (1.59) *N* = 45	5.24 (1.08) *N* = 36	5.55 (1.41) *N* = 81
	Human written	5.76 (1.39) *N* = 41	5.17 (1.35) *N* = 41	5.47 (1.39) *N* = 82

	Factual	Emotional	*Mean indicated format*
Mean language	5.78 (1.49)	5.20 (1.22)	5.51 (1.40)
	N = 86	*N* = 77	*N* = 163

A main significant effect was found for language (F(1, 159) = 6.89, *p* = .009, $\eta_{partial}^2$ = .04), indicating that participants that read the factual narrative had higher self-perceived probabilities (*M* = 5.78, *SD* = 1.39, n = 86) than participants who read the emotional narrative (*M* = 5.20, *SD* = 1.22, n = 77), which supports hypothesis H5a.

The ANOVA showed no significant effect for indicated format on participants' self-perceived probability (F(1, 159) = .052, *p* = .820) and therefore the results reject hypothesis H4a.

Perceived likelihood of occurrence

To test hypotheses H4b and H5b, a factorial ANOVA was performed. The mean scores and standard deviations can be found in Table 8.

Table 8

Mean scores per condition (language and indicated format) with means and SDs (M (SD)) for perceived likelihood of occurrence

		Language		
		Factual	Emotional	*Mean indicated format*
Indicated format	Automatically generated	3.61 (.71)	3.41 (.74)	3.52 (.73)
		N = 46	*N* = 37	*N* = 83
	Human written	3.73 (.77)	3.41 (.69)	3.57 (.75)
		N = 41	*N* = 41	*N* = 82
	Mean language	3.67 (.74)	3.41 (.71)	3.54 (.73)
		N = 87	*N* = 78	*N* = 165

A significant main effect was found for language (F(1, 161) = 5.40, *p* = .021, $\eta_{partial}^2$ = .03), indicating that perceived likelihood of occurrence was higher for participants who read the factual narrative (*M* = 3.67, *SD* = .74, n = 87) than for participants who read the emotional narrative (*M* = 3.41, *SD* = .71, n = 78), and hypothesis H5b was supported.

The ANOVA showed no significant effect for indicated format on participants' perceived likelihood of occurrence (F(1,159) = .298, *p* = .586) and therefore rejects hypothesis H4b.

Risk accuracy

For risk accuracy, the scores were not normally distributed ($z\text{-}score_{skewness}$ = 7.03, 95% CI [.966, 1.704], $z\text{-}score_{kurtosis}$ = 2.96, 95% CI [-.232, 2.682]) and Levene's test of equality of variances was significant (F(3, 159 = 3.22, *p* = .024). The ANOVA showed no significant effects for indicated format (F(1, 159) = .50, *p* = .482), and language (F(1, 159) = 3.28, *p* = .072) on risk accuracy.

Overall, the results for risk perceptions reject hypotheses H4c and H5, and support hypotheses H4a and H4b.

Exploratory analyses

Interaction effects

There were no significant interaction effects found for indicated format and language on trust (F(1, 161) = .003, *p* = .957), identification (F =(1, 161) = .577, *p* = .449), self-perceived probability (F(1, 159) = .009, *p* = .924), perceived likelihood of occurrence (F(1, 159) = .287, *p* = .593), and risk accuracy (F(1, 159) = .18, *p* = .669).

Covariates

There were three covariates considered during this research: people's anxiety, their algorithmic trust, or their prior experiences with (colorectal) cancer and chemotherapy. To test whether these covariates had an effect on the significant effects that were found on the outcome measures (identification, trust, self-perceived probability, and perceived likelihood of occurrence), four ANCOVAs were performed.

A participant's anxiety was measured with seven items on a 4-point scale (1 = very often, 4 = never). However, there were no significant effects found for anxiety as a covariate on the outcome measures.

Algorithmic trust was measured with three items on a 5-point scale (1 = highly disagree, 5 = highly agree).

Prior experiences with cancer and chemotherapy were measured with two items (personal experience and knowing someone), from which the answers "yes" or "no" were used.

Trust. There was a significant effect found for algorithmic trust (F(1, 155) = 11.15, $p = .001$, $\eta_{partial}^2 = .07$), indicating that when a participant did have more algorithmic trust, their trust in the source increased after the covariates were controlled for. However, participants who read the factual narrative (*M* = 3.52, *SD* = .12) still trusted the source less than participants who read the emotional narrative (*M* = 3.82, *SD* = .13). The results can be found in Table 9.

Table 9

ANCOVA results trust

	ANOVA		**ANCOVA**		
	F	Sig.	F	Sig.	$\eta_{partial}^2$
Trust	***7.53***	***.007***	***8.02***	***.005***	***.05***
Algorithmic trust	-	-	11.15	.001	.07
Anxiety	-	-	.39	.533	.00
Prior experience					
Personal	-	-	1.38	.241	.01
Knowing someone	-	-	1.68	.197	.01

Note. Results of effect of language on trust in the source

Identification. There was also a significant effect found for algorithmic trust on identification (F(1, 155) = 7.28, p = .008, $\eta_{partial}^2$ = .05), indicating that when the algorithmic trust of participants was higher, identification of participants with “Kris” decreased. The results can be found in Table 10

Table 10

ANCOVA results identification

	ANOVA		**ANCOVA**		
	F	Sig.	F	Sig.	$\eta_{partial}^2$
Identification	***4.11***	***.044***	***3.84***	***.052***	***.02***
Algorithmic trust	-	-	7.28	.008	.05
Anxiety	-	-	.24	.624	.00
Prior experience					
Personal	-	-	.88	.350	.01
Knowing someone	-	-	.02	.877	.00

Note. Results of effect of indicated format on identification

As can be seen in Table 10, the effect of indicated format on identification becomes insignificant (p = .052), indicating that hypothesis H2: “Thinking a narrative is human written will lead to higher identification with the patient in the narrative than thinking a narrative is automatically generated.”, should be rejected. However, it should be noted that this is a small effect size, .02 < η^2 < .05, and therefore this shift in the effect of indicated format on identification can be considered as negligible in this study because of the relatively small sample size.

Risk Perception. No significant effects were found for the covariates on self-perceived probability.

There was a significant effect found for prior experience when having personal experience with cancer (F(1, 155) = 8.03, p = .005, $\eta_{partial}^2$ = .049) on perceived likelihood of occurrence. The results of the ANCOVA can be found in Table 11.

Table 11

ANCOVA results perceived likelihood of occurrence

	ANOVA		**ANCOVA**		
	F	Sig.	F	Sig.	$\eta_{partial}^2$
Likelihood of occurrence	***5.40***	***.021***	***4.934***	***.028***	***.03***
Algorirthmic trust	-	-	.983	.323	.01
Anxiety	-	-	.475	.492	.00
<u>Prior experience</u>					
Personal	-	-	8.03	.005	.05
Knowing someone	-	-	2.04	.155	.01

Note. Results of effect of language on perceived likelihood of occurrence

The results of the ANCOVA indicate that participants who answered “yes” on having personal experience (*M* = 4.48, *SD* = .54, n = 7) do have a higher perceived likelihood of occurrence than participants who answered “no” (*M* = 3.62, *SD* = .69, n = 79), indicating that when a participant did have personal experiences with cancer and chemotherapy, their perceived likelihood of occurrence increased. However, the effect size is considerably small, $.03 < \eta^2 < .05$. Thus, even though the effect was found to be significant, the differences in the results are negligible in this study because of the small sample size. The means for prior experiences with cancer and chemotherapy can be found in Table 12.

Table 12

Mean scores for language and prior experiences with cancer and chemotherapy with means and SDs (M (SD)) for perceived likelihood of occurrence

		Personal experience		
		Yes	No	*Mean language*
	Factual	4.48 (.54)	3.62 (.69)	3.69 (.72)
Language		*N* = 7	*N* = 79	*N* = 86
	Emotional	3.44 (.77)	3.39 (.71)	3.39 (.71)
		N = 3	*N* = 74	*N* = 77
	Mean experience	4.17 (.76)	3.51 (.71)	3.55 (.73)
		N = 10	*N* = 153	*N* = 163

Manipulation check

Two one-way ANOVAs were conducted to test whether participants who correctly answered the manipulation check scored differently on the outcome variables (identification, trust, and risk perceptions).

Language. There was a significant effect found for participants who correctly experienced their language condition on identification (F(1, 93) = 5.40, *p* = .022, $\eta_{partial}^2$= .05), indicating that participants who read the emotional narrative (*M* = 3.45, *SD* = .62, n = 27) had a higher identification with "Kris" than participants who read the factual narrative (*M* = 3.13, *SD* = .61, n = 68). Meaning, hypothesis H3: "Emotional narratives will lead to higher identification with the patient in the narrative than factual narratives." is supported by the results from participants who experienced their language condition correctly.

There was also a significant effect found for participants who correctly experienced their language condition on perceived likelihood of occurrence of risk (F(1, 93) = 6.71, *p* = .011, $\eta_{partial}^2$ = .07), again indicating that participants who read the factual narrative (*M* = 3.70, *SD* = .72, n = 68) had a higher perceived likelihood of occurrence than participants who read the emotional narrative (*M* = 3.26, *SD* = .80, n = 27). Participants who experienced the factual condition correctly had a higher perceived likelihood of occurrence when comparing it to perceived likelihood of occurrence of the whole factual condition (*M* = 3.67, *SD* = .74, n = 87), whereas participants who experienced the emotional condition correctly had a lower perceived likelihood of occurrence when comparing it to perceived likelihood of occurrence of the whole emotional condition (*M* = 3.41, *SD* = .71, n = 78).

Indicated format. There was a significant effect found for participants who correctly experienced their indicated format condition on trust in the source (F(1, 92) = 7.13, *p* = .009, $\eta_{partial}^2$ = .07), indicating that participants who read the narrative that was indicated to be human written (*M* = 3.72, *SD* = .68, n = 43) had more trust in the source than participants who read the narrative that was indicated to be generated (*M* = 3.35, *SD* = .64, n = 51). Meaning, hypothesis H1: "Thinking a narrative is automatically generated will lead to lower trust in the source of the narrative than thinking a narrative is human written.", is supported by the results from the participants who experienced their indicated format condition correctly.

There was also a significant effect found for participants who correctly experienced their indicated format condition on identification (F(1, 92) = 10.56, *p* = .002, $\eta_{partial}^2$= .10), again indicating that participants who read the narrative that was indicated to be human written (*M* = 3.46, *SD* = .56, n = 43) had a higher identification with "Kris" than participants who read the narrative that was indicated to be automatically generated (*M* = 3.03, *SD* = .71, n = 51). Moreover, participants who experienced the human written condition correctly had a higher identification with "Kris" when comparing it to identification of the whole human written condition (*M* = 3.36, *SD* = .57, n = 82), whereas participants who experienced the generated condition correctly had a lower identification with "Kris" when comparing it to identification of the whole generated condition (*M* = 3.15, *SD* = .71, n = 83).

Conclusion

This research aimed to answer the research question whether the indicated format of and language in narratives have an effect on identification with a colorectal cancer patient, trust in the source, and individual risk perceptions of the reader of that narrative. The results of the analyses support hypotheses H2: “Thinking a narrative is human written will lead to higher identification with the patient in the narrative than thinking a narrative is automatically generated.”, H5a: “Factual narratives will lead to higher risk perceptions in self-perceived probabilities than emotional narratives”, and H5b: “Factual narratives lead to higher risk perceptions in perceived likelihood of occurrence than emotional narratives.”

Thus, it can be concluded from this study that when a narrative is indicated to be human written, the reader’s identification with the patient in the narrative increases. As for language, factual narratives do lead to higher self-perceived probability and perceived likelihood of occurrence. Additionally, an unexpected finding of this study indicated that emotional narratives lead to more trust in the source.

Discussion and Limitations

Risk perceptions

Firstly, only part of the effect of language in narratives on risk perceptions can be explained by the results of this study. Participants who read the factual narrative did have a higher self-perceived probability and perceived likelihood of occurrence than participants who read the emotional narrative. Therefore, these results are partly in line with the study of Wrench (2007) in which the results indicated that the way of communication (such as the used language) influences risk perceptions. However, results are still insufficient in order to provide a clear explanation on how it influences risk accuracy and to what extent participants actually understood the risks. Moreover, the context of this study only considered prior experiences with (colorectal) cancer as health literacy. Future researchers can implement a more extensive measurement for health literacy, from which the outcomes can be considered as an independent variable for measuring the effect on, for example, risk perceptions and the understanding of these risks.

Secondly, the indicated format of a narrative did not have an effect on individual risk perceptions. Insufficient results may be explained by the fact that prior literature on risk communication referred to formats as numerical or statistical formats (De Wit et al., 2008; Fagerlin et al., 2005; Lipkus et al., 2007; Ubel et al., 2001; Visschers et al., 2009; Vromans et al., 2020), and these formats were not included in this study. For future research it is proposed to further investigate the influence of these formats of and language in patient narratives on people’s understanding and estimating risks.

Finally, the perceived likelihood of occurrence was higher of participants who had personal experiences with (colorectal) cancer and chemotherapy themselves than participants who did not, an interesting finding which is not elaborated on in, to our knowledge, prior literature. On the one hand, these results somewhat conflict with prior studies that argue that understanding the personal relevance of risks leads to better risk estimates (Lipkus, 2007; Jenni & Loewenstein, 1997). On the other hand, these results may give more insights to the important notion of Lipkus (2007) about patients being aware of risk insights and probabilities, yet still believe their probabilities are different.

Trust

An unanticipated finding of this study is that the results show that emotional narratives lead to more trust in the source than factual narratives. Furthermore, the analyses showed that when a person had more algorithmic trust (and thus more trust in automatically generated texts), their trust in the narratives as a reliable source increased. These findings are in line with Chen et al. (2018) who argued that when participants perceive a source that provides health information as something they are familiar with, they tend to trust that source more.

Moreover, it partly supports the suggestions of Peters et al. (1997) and Winterbottom et al. (2008) about the fact that trust in a source is mostly driven by the perceptions of someone on the (professional) credentials of that source, since the questions about algorithmic trust included a question about the “expertise” of automatically generated texts (“I believe that texts that are written by a machine are very accurate”).

This study did not find a significant effect of indicated format on trust in the source However, as the manipulation check showed, not all participants were aware whether the narrative was either indicated to be generated or human written. When only considering participants who actually were aware of the indicated format of the narrative they had read, participants trusted the source more when they thought the narrative was human written than participants who thought the narrative was automatically generated. These findings are in line with McKnight et al.’s (2009) research, indicating that it is indeed easier to trust a human rather than something that is automatic.

Nevertheless, this study was still focused on only an *indication* whether the narrative was human written or automatically generated, and the narratives used in this study were all human written. Moreover, the results that did indicate an effect of the “format” on trust in the source were based on a relatively small group of participants. Since prior literature suggest that the *actual* use of NLG textual summaries or narratives can enhance the effectiveness of communicating health information (Balloccu et al., 2020; Gatt et al., 2009; Reiter et al., 2008), it may be interesting for future researchers to explore whether these unexpected findings for trust are still supported when using actual automatically generated texts.

Identification

The results of this study showed that there was a higher identification with the patient in the narrative (Kris) when participants thought the narrative human written than when they thought the narrative was automatically generated. From these findings, it can be said that the credibility of the narrative and thus the credentials of that narrative (who or what wrote the narrative) influences a reader’s identification, which is in line with prior findings of Kreuter et al. (2007) and McQueen et al. (2011). This conclusion also partly supports the findings of Hunter et al. (2008) and Reiter et al. (2008), which both indicated that human written texts were better in “telling” a coherent story of personal experiences of a patient, which also is indicated to positively influence identification with a patient in a narrative (Kreuter et al., 2007; McQueen et al., 2011).

Another interesting finding of this study was the fact that when participants had more algorithmic trust, their identification with “Kris” decreased and the effect of the indicated format on identification was shown to be insignificant. Since this effect and the sample size of this study were considerably small, it is interesting to further investigate if the effect of algorithmic trust on identification also occurs when using an actual automatically generated format of a narrative within a larger sample.

The fact that language did not have an effect on identification of participants with “Kris” can be explained by the fact that (1) there were less participants in the conditions that included emotional language, (2) not all participants were aware if the narrative was either emotionally or factually written, and (3) prior research and the measurement of identification used in this study were based on identification with (a) character(s) in visual narratives (McQueen et al., 2011; Igartua, 2010), instead of identification with a character in a textual narrative. Nevertheless, the results of this study are in line with prior literature that showed evidence that the use of personal (and thus more emotional) stories in patient narratives are not necessarily considered to be helpful in the decision-making process and the understanding of health information (Bekker et al., 2013; Fagerlin et al., 2005).

On the other hand, participants who were aware of the used language in the narrative did identify more with the patient in the emotional narrative than participants who read the factual narrative. Still, it should be noted that only 27 participants correctly experienced the emotional narrative whereas 68 participants correctly experienced the factual narrative. For this reason, the difference is considered as being too wide between both groups in such a small sample in order to make appropriate conclusions about these findings within this study. Additionally, more of the participants still experienced the emotional narrative as being factual in both emotional conditions. Therefore, for future research it is proposed to use more profound information and distinctive language within patient narratives, in order to investigate the effects of language in narratives more thoroughly.

In conclusion, the results of this study did provide new objectives and insights for positive effects of personal stories within patient narratives and on attitudes towards these patient narratives, which can potentially improve shared-decision making in colorectal cancer treatments.

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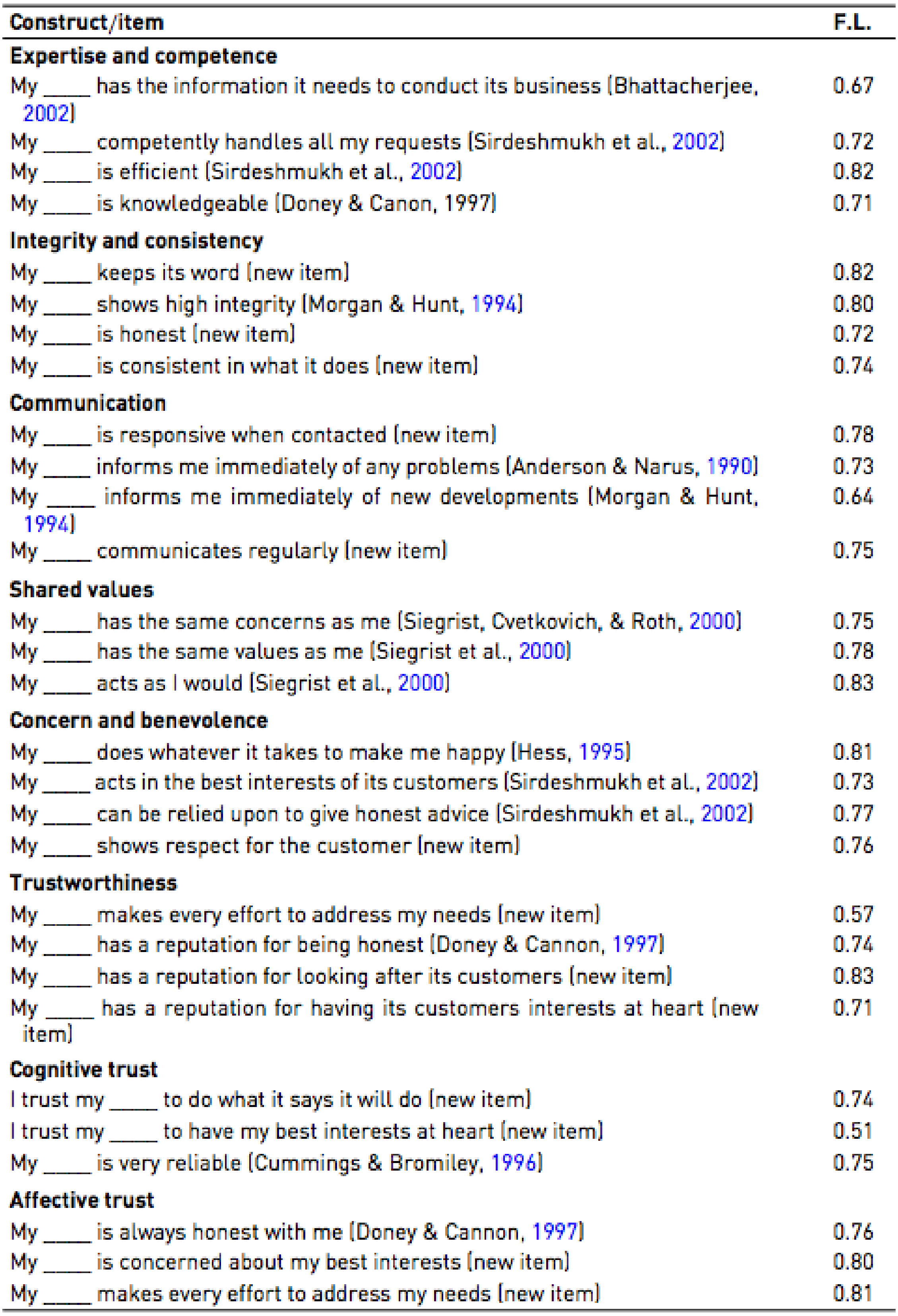
Appendices

Appendix A - Proposed trust scale by Sekhon et al. (2014)



Construct/item	F.L.
Expertise and competence	
My _____ has the information it needs to conduct its business (Bhattacherjee, 2002)	0.67
My _____ competently handles all my requests (Sirdeshmukh et al., 2002)	0.72
My _____ is efficient (Sirdeshmukh et al., 2002)	0.82
My _____ is knowledgeable (Doney & Canon, 1997)	0.71
Integrity and consistency	
My _____ keeps its word (new item)	0.82
My _____ shows high integrity (Morgan & Hunt, 1994)	0.80
My _____ is honest (new item)	0.72
My _____ is consistent in what it does (new item)	0.74
Communication	
My _____ is responsive when contacted (new item)	0.78
My _____ informs me immediately of any problems (Anderson & Narus, 1990)	0.73
My _____ informs me immediately of new developments (Morgan & Hunt, 1994)	0.64
My _____ communicates regularly (new item)	0.75
Shared values	
My _____ has the same concerns as me (Siegrist, Cvetkovich, & Roth, 2000)	0.75
My _____ has the same values as me (Siegrist et al., 2000)	0.78
My _____ acts as I would (Siegrist et al., 2000)	0.83
Concern and benevolence	
My _____ does whatever it takes to make me happy (Hess, 1995)	0.81
My _____ acts in the best interests of its customers (Sirdeshmukh et al., 2002)	0.73
My _____ can be relied upon to give honest advice (Sirdeshmukh et al., 2002)	0.77
My _____ shows respect for the customer (new item)	0.76
Trustworthiness	
My _____ makes every effort to address my needs (new item)	0.57
My _____ has a reputation for being honest (Doney & Cannon, 1997)	0.74
My _____ has a reputation for looking after its customers (new item)	0.83
My _____ has a reputation for having its customers interests at heart (new item)	0.71
Cognitive trust	
I trust my _____ to do what it says it will do (new item)	0.74
I trust my _____ to have my best interests at heart (new item)	0.51
My _____ is very reliable (Cummings & Bromiley, 1996)	0.75
Affective trust	
My _____ is always honest with me (Doney & Cannon, 1997)	0.76
My _____ is concerned about my best interests (new item)	0.80
My _____ makes every effort to address my needs (new item)	0.81

Appendix B - Revised identification scale by Igartua (2010)

1. I thought I was like the characters or very similar to them
2. I thought that I would like to be like or act like the characters
3. I identified with the characters
4. I felt “as if I were one of the characters”
5. I had the impression that I was really experiencing the story of the characters
6. I felt as if I “formed part of ” the story
7. I myself have experienced the emotional reactions of the characters
8. I understood the characters’ way of acting, thinking or feeling
9. I tried to see things from the point of view of the characters
10. I tried to imagine the characters’ feelings, thoughts and reactions
11. I understood the characters’ feelings or emotions
12. I was worried about what was going to happen to the characters
13. I felt emotionally involved with the characters’ feelings
14. I imagined how I would act if I found myself in the place of the protagonists

Appendix C - Outcome measures risk interpretations by Vromans et al. (2020)

Primary outcome measures

1. What do you think is the probability you will experience this side effect?
2. The absolute difference between the actual risk of each side effect occurring and each participant's estimated risk.
3. How likely is it that you will experience this side effect?

Secondary outcome measures

4. a. The risk information about the side effect was made personally for me
   b. The way how the risk information was being presented was relevant for me

1. How uncertain do you think the likelihood of experiencing this side effect after chemotherapy is?

Appendix D - HADS by Olssøn et al. (2005)

1. *I feel tense or 'wound up'*
    3. Most of the time
    2. A lot of the time
    1. From time to time, occasionally
    0. Not at all
2. *I get a sort of frightened feeling as if something awful is about to happen*
    3. Very definitely and quite badly
    2. Yes, but not too badly
    1. A little, but it doesn't worry me
    0. Not at all
3. *Worrying thoughts go through my mind*
    3. A great deal of the time
    2. A lot of the time
    1. From time to time, but not too often
    0. Only occasionally
4. *I can sit at ease and feel relaxed*
    0. Definitely
    1. Usually
    2. Not often
    3. Not at all
5. *I get a sort of frightened feeling like 'butterflies' in the stomach*
    0. Not at all
    1. Occasionally
    2. Quite often
    3. Very often
6. *I feel restless as if I have to be on the move*
    3. Very much indeed
    2. Quite a lot
    1. Not very much
    0. Not at all
7. *I get sudden feelings of panic*
    3. Very often indeed

2. Quite often
1. Not very often
0. Not at all

Appendix E - Trust in Artificial Intelligence by Gillespie et al. (2021)

(All items are measured on a 7-point Likert scale)

1. How willing are you to rely on information provided by an AI system?
2. I believe that [AI application] produce output that is accurate
3. I believe that [AI application] are developed based on sound ethical principles (e.g. fairness)

Appendix F

F1. Introduction emotional narrative

When a participant was 31+ years:

Man

Mijn naam is Kris. Ik ben 43 jaar, ik heb een vrouw en twee kinderen en ik heb een leuke baan in Consultancy. Naast dat ik vaak met de kinderen buiten ben, tennis ik ook twee keer in de week. Niet zo lang geleden ben ik gediagnosticeerd met darmkanker stadium II.

Woman

Mijn naam is Kris. Ik ben 43 jaar, ik heb een man en twee kinderen en ik heb een leuke baan in Consultancy waar ik het erg druk mee heb. Naast dat ik vaak met de kinderen buiten ben, tennis ik ook twee keer in de week. Niet zo lang geleden ben ik gediagnosticeerd met darmkanker stadium II.

When a participant was between 18-30 years:

Mijn naam is Kris. Ik ben 28 jaar en ik heb een leuke baan in Consultancy, waar ik het erg druk mee heb. Daarnaast ben ik erg sportief en tennis ik twee keer in de week. Niet zo lang geleden ben ik gediagnosticeerd met darmkanker stadium II.

F2. Introduction factual narrative

When a participant was 31+ years:

Man

Mijn naam is Kris. Ik ben 43 jaar, ik heb een vrouw en twee kinderen en ik heb een baan in Consultancy waar ik het erg druk mee heb. Naast dat ik vaak met de kinderen buiten ben, tennis ik ook twee keer in de week. Ik ben recent gediagnosticeerd met darmkanker stadium II.

Woman

Mijn naam is Kris. Ik ben 43 jaar, ik heb een man en twee kinderen en ik heb een baan in Consultancy waar ik het erg druk mee heb. Naast dat ik vaak met de kinderen buiten ben, tennis ik ook twee keer in de week. Ik ben recent gediagnosticeerd met darmkanker stadium II.

When a participant was between 18-30 years:

Mijn naam is Kris. Ik ben 28 jaar en ik heb een baan in Consultancy waar ik het erg druk mee heb. Daarnaast ben ik erg sportief en tennis ik twee keer in de week. Ik ben recent gediagnosticeerd met darmkanker stadium II.

Appendix G

Table G1

Narratives when 31+ years old

Emotional	Factual
Op een ochtend tijdens werk merkte ik dat ik opeens heel erg moe was. Geen gewone vermoeidheid, er klopte gewoon iets niet. Dit was vreemd voor mij omdat ik normaal nooit ziek ben. Nu had ik al een tijdje buikkrampen, wat me vooral erg opviel tijdens mijn laatste tenniswedstrijd, maar dit was niet iets waar ik me heel erg druk om maakte. Uiteindelijk heb ik toch maar bij de huisarts aan de bel getrokken. Na het bespreken van mijn klachten, werd ik snel doorgestuurd om een colonoscopie (een endoscopisch onderzoek van de dikke darm) te laten maken door een internist in het ziekenhuis.	Ik was aan het werk toen ik me heel erg moe voelde. Ik ben normaal nooit ziek maar ik had ook buikkrampen tijdens tennis, dus ik ben naar de huisarts gegaan. Die heeft me meteen doorverwezen om een colonoscopie te laten maken, dit is een endoscopisch onderzoek van de dikke darm.
Met sneldiagnostiek hoorde ik al gauw dat het niet goed zat: ik had darmkanker, stadium II. Stadium II wil zeggen dat de tumor in mijn dikke darm al door de spierlaag van de darmwand heen is gegroeid. Ik schrok hier natuurlijk wel van, ik heb nog zoveel dingen die ik met de kinderen zou willen doen! Voor mensen met stadium II geldt eigenlijk voor iedereen dat er wordt aangeraden om een operatie te ondergaan. Dit advies heb ik dan ook meteen aangenomen en de operatie heb ik net achter de rug.	Dankzij sneldiagnostiek kwam de kanker snel aan het licht en ik zat zelf in stadium II. Dit wil zeggen dat de tumor in je dikke darm al door de spierlaag van de darmwand heen is gegroeid. Ik heb natuurlijk een gezin, dus dit was vervelend nieuws en dit had ik niet verwacht. In stadium II wordt ook altijd aangeraden om een operatie te krijgen. Deze operatie heb ik dan ook net gehad.
Nu ik de operatie heb gehad, sta ik voor de volgende keuze: chemotherapie. De dokter geeft wel aan dat hij niet zeker weet of de chemotherapie aan zal slaan. Daarnaast is chemotherapie natuurlijk ook een flinke aanslag op je lichaam, omdat het niet alleen de kankercellen, maar ook de gezonde cellen doodt. Dit vind ik een lastige overweging omdat die operatie ook al een aardig effect heeft gehad op mijn leven en lichaam, al helemaal wat de kinderen en mijn sportieve hobby's betreft. Wat ik wel een heel erg fijn idee vind aan chemotherapie, is dat het natuurlijk wel de kans kan verkleinen dat de kanker terugkeert. Aan de andere kant kan het natuurlijk ook nóg meer vermoeidheid, pijn en misselijkheid met zich meebrengen.	Nu ik de operatie heb ondergaan, is er aan mij voorgelegd of ik chemotherapie wil. Het verschilt per persoon of dit aanslaat of niet en omdat het niet alleen de kankercellen maar ook de gezonde cellen doodt, heeft dit een flinke aanslag op je lichaam. Dit is wel vervelend met sporten en de kinderen. Aan de andere kant kan het wel de kans verkleinen dat de kanker terugkeert. Er is aan mij verteld dat met chemotherapie ook andere bijwerkingen gepaard gaan; namelijk bijwerkingen als pijn, vermoeidheid en misselijkheid.
Omdat chemotherapie ook effect heeft op je spiercellen, is mij verteld dat ongeveer 8 op de 10 mensen dan ook erge vermoeidheid ervaren en dat ik moet proberen te blijven bewegen om dit niet te verergeren. Dit was voor mij een kleine opluchting, want dit is voor mij gelukkig geen probleem. Ik kan waarschijnlijk alleen niet meer sporten in de mate die ik gewend ben.	Chemotherapie heeft ook effect op je spiercellen en er is aan me verteld dat mensen in dezelfde situatie als ik ongeveer 8 op de 10 keer erge vermoeidheid ervaren. Om dit tegen te gaan, is me aangeraden om zo veel mogelijk te blijven bewegen. Dit is wel vervelend in het dagelijks leven, maar ik beweeg wel al met tennis en buiten met de kinderen in het weekend. Ik weet niet in hoeverre dit tijdens chemotherapie ook kan.
Pijn verschilt ook per patiënt. De dokter schat in dat op mijn leeftijd ongeveer 3 op de 10 mensen dit ervaren, wat me ergens wel meevalt, maar wat me wel heel erg vervelend lijkt voor mijn gezin.	Het verschilt per persoon of je pijn krijgt tijdens je chemotherapie, en de dokter heeft gezegd dat op mijn leeftijd vaak 3 op de 10 mensen pijn ervaren. Dit is wel iets wat vervelend kan zijn voor mijn gezin, als ze aan me kunnen zien dat ik pijn heb.
De bijwerking die ik zelf het meest associeer met chemotherapie en die me ook erg vervelend lijkt voor mijn gezin, is misselijkheid. Dit ook omdat ik vaak heb gehoord dat mensen die chemotherapie hebben gehad hier last van hadden. De arts heeft me hierin gerustgesteld en heeft me verteld dat dit eigenlijk wel meevalt. In mijn situatie heeft ongeveer 4 op de 10 mensen hier echt last van. Daarnaast zijn er gelukkig genoeg medicijnen die hiertegen helpen.	Daarnaast komt misselijkheid ongeveer 4 op de 10 keer voor in mijn situatie. Voor misselijkheid is er ook nog een optie om medicijnen te slikken die dit verhelpen.
De chemotherapie zal tussen de 3 en 6 maanden duren, waarvan ik elke twee weken een behandeling zal ondergaan. Ik vind dit met die bijwerkingen wel een lastige keuze en weet nog steeds echt niet wat ik moet doen, ook omdat ik er nog zo veel mogelijk wil zijn voor mijn gezin. Zij kunnen niet zonder mij en ik niet zonder hen.	De chemotherapie zal ongeveer tussen de 3 en de 6 maanden duren, waarvan ik welke twee weken een behandeling zal ondergaan. Ik weet nog steeds niet met de bijwerkingen of ik dit wel wil, want ik wil er kunnen zijn voor mijn gezin.

Table G2

Narratives when 18-30 years old

Emotional	Factual
Op een ochtend tijdens werk merkte ik dat ik opeens heel erg moe was. Geen gewone vermoeidheid, er klopte gewoon iets niet. Dit was vreemd voor mij omdat ik normaal nooit ziek ben. Nu had ik al een tijdje buikkrampen, wat me vooral erg opviel tijdens mijn laatste tenniswedstrijd, maar dit was niet iets waar ik me heel erg druk om maakte. Uiteindelijk heb ik toch maar bij de huisarts aan de bel getrokken. Na het bespreken van mijn klachten, werd ik snel doorgestuurd om een colonoscopie (een endoscopisch onderzoek van de dikke darm) te laten maken door een internist in het ziekenhuis.	Ik was aan het werk toen ik me heel erg moe voelde. Ik ben normaal nooit ziek maar ik had ook buikkrampen tijdens tennis, dus ik ben naar de huisarts gegaan. Die heeft me meteen doorverwezen om een colonoscopie te laten maken, dit is een endoscopisch onderzoek van de dikke darm
Met sneldiagnostiek hoorde ik al snel dat het niet goed zat: ik had darmkanker, stadium II. Stadium II wil zeggen dat de tumor in mijn dikke darm al door de spierlaag van de darmwand heen is gegroeid. Ik schrok hier natuurlijk wel van. Ik ben nog jong en er zijn nog zoveel dingen die ik wil doen! Voor mensen met stadium II geldt eigenlijk voor iedereen dat er wordt aangeraden om een operatie te ondergaan. Dit advies had ik dan ook meteen aangenomen.	Dankzij sneldiagnostiek kwam de kanker snel aan het licht en ik zat zelf in stadium II. Dit wil zeggen dat de tumor in je dikke darm al door de spierlaag van de darmwand heen is gegroeid. Ik ben nog jong dus dit was niet iets wat ik had verwacht. In stadium II wordt ook altijd aangeraden om een operatie te krijgen. Deze operatie heb ik dan ook net gehad.
Nu ik de operatie heb gehad, sta ik voor de volgende keuze: chemotherapie. De dokter geeft wel aan dat hij niet zeker weet of de chemotherapie aan zal slaan. Daarnaast is chemotherapie natuurlijk ook een flinke aanslag op je lichaam, omdat het niet alleen de kankercellen, maar ook de gezonde cellen doodt. Dit vind ik een lastige overweging omdat die operatie ook al een aardig effect heeft gehad op mijn leven en lichaam, al helemaal wat mijn sportieve hobby's en uitgaansleven betreft. Wat ik wel een heel erg fijn idee vind aan chemotherapie, is dat het natuurlijk wel de kans kan verkleinen dat de kanker terugkeert. Aan de andere kant kan het natuurlijk ook nóg meer vermoeidheid, pijn en misselijkheid met zich meebrengen.	Nu ik de operatie heb ondergaan, is er aan mij voorgelegd of ik chemotherapie wil. Het verschilt per persoon of dit aanslaat of niet en omdat het niet alleen de kankercellen maar ook de gezonde cellen doodt, heeft dit een flinke aanslag op je lichaam. Dit is wel vervelend met sporten en uitgaan. Aan de andere kant kan het wel de kans verkleinen van het terugkeren van de kanker. Er is aan mij verteld dat met chemotherapie ook andere bijwerkingen gepaard gaan; namelijk bijwerkingen als pijn, vermoeidheid en misselijkheid.
Omdat chemotherapie ook effect heeft op je spiercellen, is mij verteld dat ongeveer 8 op de 10 mensen dan ook erge vermoeidheid ervaren en dat ik moet proberen te blijven bewegen om dit niet te verergeren. Dit was voor mij een kleine opluchting, want dit is voor mij gelukkig geen probleem. Ik kan waarschijnlijk alleen niet meer sporten in de mate die ik gewend ben.	Chemotherapie heeft ook effect op je spiercellen en er is aan me verteld dat mensen in dezelfde situatie als ik ongeveer 8 op de 10 keer erge vermoeidheid ervaren. Om dit tegen te gaan, is me aangeraden om zo veel mogelijk te blijven bewegen. Dit is wel vervelend in het dagelijks leven, maar ik beweeg wel al veel met tennis. Ik weet niet of dit tijdens chemotherapie ook kan.
Pijn verschilt ook per patiënt. De dokter schat in dat op mijn leeftijd ongeveer 3 op de 10 mensen dit ervaren, wat me ergens wel meevalt, maar wat me toch wel erg vervelend lijkt in mijn (sociale) dagelijks leven.	Het verschilt per persoon of je pijn krijgt tijdens je chemotherapie, en de dokter heeft gezegd dat op mijn leeftijd vaak 3 op de 10 mensen pijn ervaren. Dit is wel iets wat vervelend kan zijn tijdens het uitgaan.
De bijwerking die ik het meest associeer met chemotherapie en die me ook erg vervelend lijkt in het dagelijks leven en mijn werk, is misselijkheid. Dit ook omdat ik vaak heb gehoord dat mensen die chemotherapie hebben gehad hier last van hadden. De arts heeft me hierin gerustgesteld en heeft me verteld dat dit eigenlijk wel meevalt. In mijn situatie heeft ongeveer 4 op de 10 mensen hier echt last van. Daarnaast zijn er gelukkig genoeg medicijnen die hiertegen helpen.	Daarnaast komt misselijkheid ongeveer 4 op de 10 keer voor in mijn situatie. Voor misselijkheid is er ook nog een optie om medicijnen te slikken die dit verhelpen.
De chemotherapie zal tussen de 3 en 6 maanden duren, waarvan ik elke twee weken een behandeling zal ondergaan. Ik vind dit met die bijwerkingen wel een lastige keuze en weet nog steeds echt niet wat ik moet doen.	De chemotherapie zal ongeveer tussen de 3 en de 6 maanden duren, waarvan ik welke twee weken een behandeling zal ondergaan. Ik weet nog steeds niet met de bijwerkingen of ik dit wel wil.

Appendix H – Consent

Beste participant,

Bedankt voor uw deelname aan dit onderzoek. Mijn naam is Fleurisanne Botman en ik ben een masterstudent Communicatie- en Informatiewetenschappen aan Tilburg University. Dit onderzoek wordt gedaan voor mijn masterscriptie.
Voordat u besluit deel te nemen aan dit experiment, vraag ik uw aandacht voor de volgende informatie:

Dit onderzoek gaat over mogelijke support tools voor mensen met (in het geval van dit onderzoek) darmkanker en hun kwaliteit van leven na het ondergaan van chemotherapie. Het invullen van deze enquête zal ongeveer 5-10 minuten duren. Eerst wordt er aan u gevraagd een aantal persoonlijke vragen te beantwoorden en vervolgens krijgt u een kort persoonlijk verhaal te lezen van een patiënt met darmkanker, Kris. Na het lezen van dit verhaal zullen er wat vragen over de inhoud worden gesteld.

Het is belangrijk dat alle vragen zo eerlijk mogelijk worden beantwoord. Uw antwoorden zullen volledig vertrouwelijk en anoniem behandeld worden.

Als u akkoord gaat met deelname aan dit onderzoek, geeft u aan dat:

- Uw deelname aan dit onderzoek geheel vrijwillig is
- U 18 jaar of ouder bent
- U zich ervan bewust bent dat u op elk moment zou mogen en kunnen stoppen met dit onderzoek
- U ermee instemt dat de gegevens gebruikt kunnen worden voor verder wetenschappelijk onderzoek of wetenschappelijke publicaties
- U ermee instemt dat anonieme gegevens gedeeld kunnen worden met andere onderzoekers

Mochten er onduidelijkheden zijn of heeft u vragen over dit onderzoek, kunt u altijd contact met mij opnemen via f.r.m.c.botman@tilburguniversity.edu.

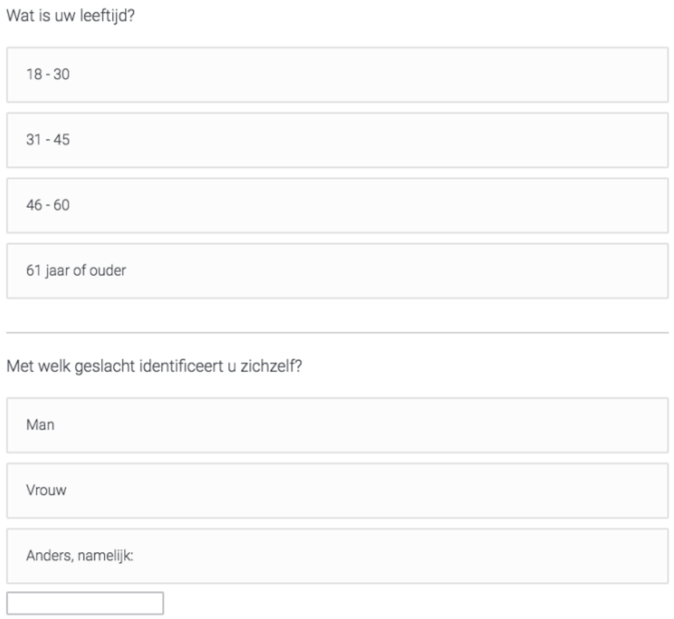
Gaat u akkoord met de voorwaarden zoals hierboven vermeld?

Ik heb bovenstaande informatie gelezen en ga hiermee akkoord

Ik heb bovenstaande informatie gelezen en wil niet mee doen met het onderzoek

Appendix I

Demographic questions



Wat is uw leeftijd?

18 - 30

31 - 45

46 - 60

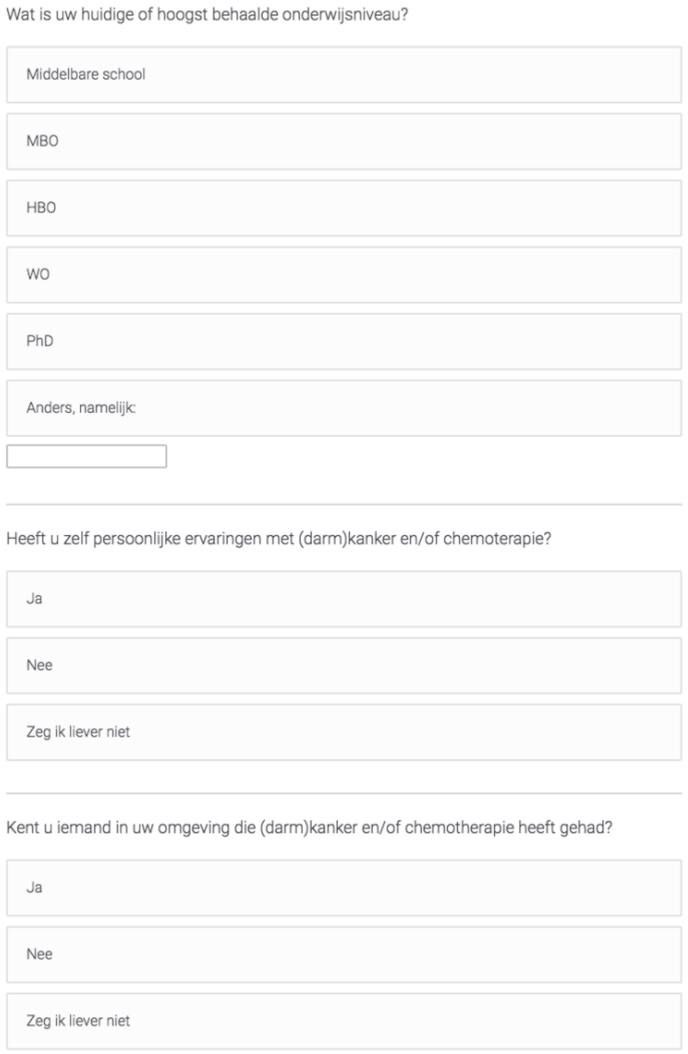
61 jaar of ouder

Met welk geslacht identificeert u zichzelf?

Man

Vrouw

Anders, namelijk:



Wat is uw huidige of hoogst behaalde onderwijsniveau?

Middelbare school

MBO

HBO

WO

PhD

Anders, namelijk:

Heeft u zelf persoonlijke ervaringen met (darm)kanker en/of chemoterapie?

Ja

Nee

Zeg ik liever niet

Kent u iemand in uw omgeving die (darm)kanker en/of chemotherapie heeft gehad?

Ja

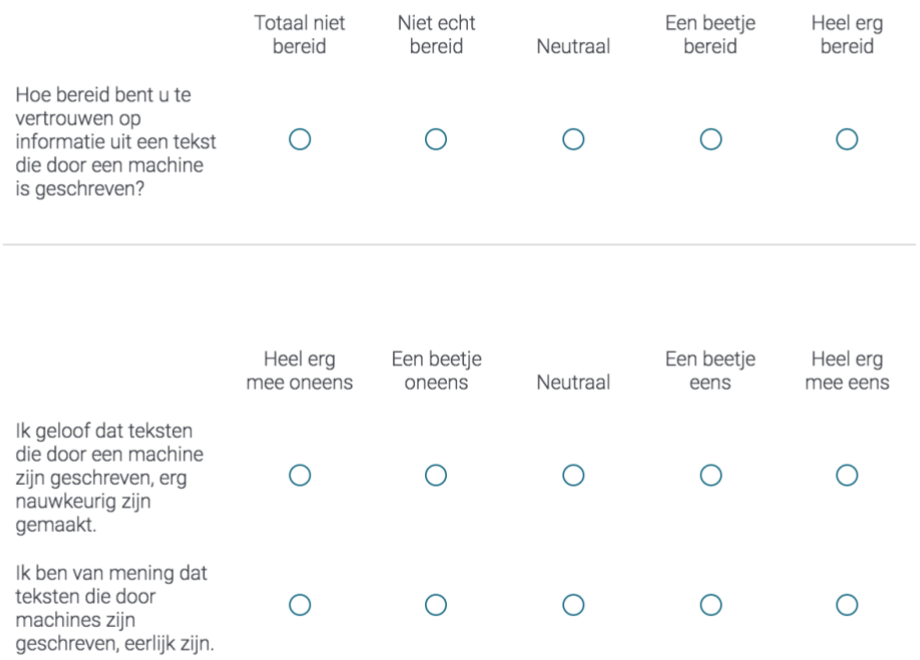
Nee

Zeg ik liever niet

Appendix J1

Figure J1

Questions general trust in automatic generated texts



	Totaal niet bereid	Niet echt bereid	Neutraal	Een beetje bereid	Heel erg bereid
Hoe bereid bent u te vertrouwen op informatie uit een tekst die door een machine is geschreven?	○	○	○	○	○

	Heel erg mee oneens	Een beetje oneens	Neutraal	Een beetje eens	Heel erg mee eens
Ik geloof dat teksten die door een machine zijn geschreven, erg nauwkeurig zijn gemaakt.	○	○	○	○	○
Ik ben van mening dat teksten die door machines zijn geschreven, eerlijk zijn.	○	○	○	○	○

Figure J2

Information DAs and NLG

TILBURG UNIVERSITY

Als mensen worden gediagnosticeerd met kanker en de optie krijgen voor chemotherapie, kan er gebruik worden gemaakt van keuzehulpen of support tools om de uiteindelijke keuze van de patiënt te ondersteunen of te optimaliseren. Deze tools worden tegenwoordig steeds vaker gepresenteerd met persoonlijke verhalen van (voormalige) kankerpatiënten, die zelf zijn geschreven of automatisch worden gegenereerd. Het automatisch genereren van een tekst betekent in het kort dat een tekst niet is geschreven door een persoon, maar automatisch is geschreven door een machine door middel van het combineren van bestaande informatie over (voormalige) patiënten.

Geef op basis van deze informatie nu zo een eerlijk mogelijk antwoord op de volgende drie vragen.

Appendix K

Information about the narrative

Figure K1

Man, automatically generated

Het verhaal dat u nu te lezen krijgt, is een kort verhaal van Kris over zijn ervaring met de diagnose en behandeling van darmkanker. **Het verhaal is AUTOMATISCH GEGENEREERD**.

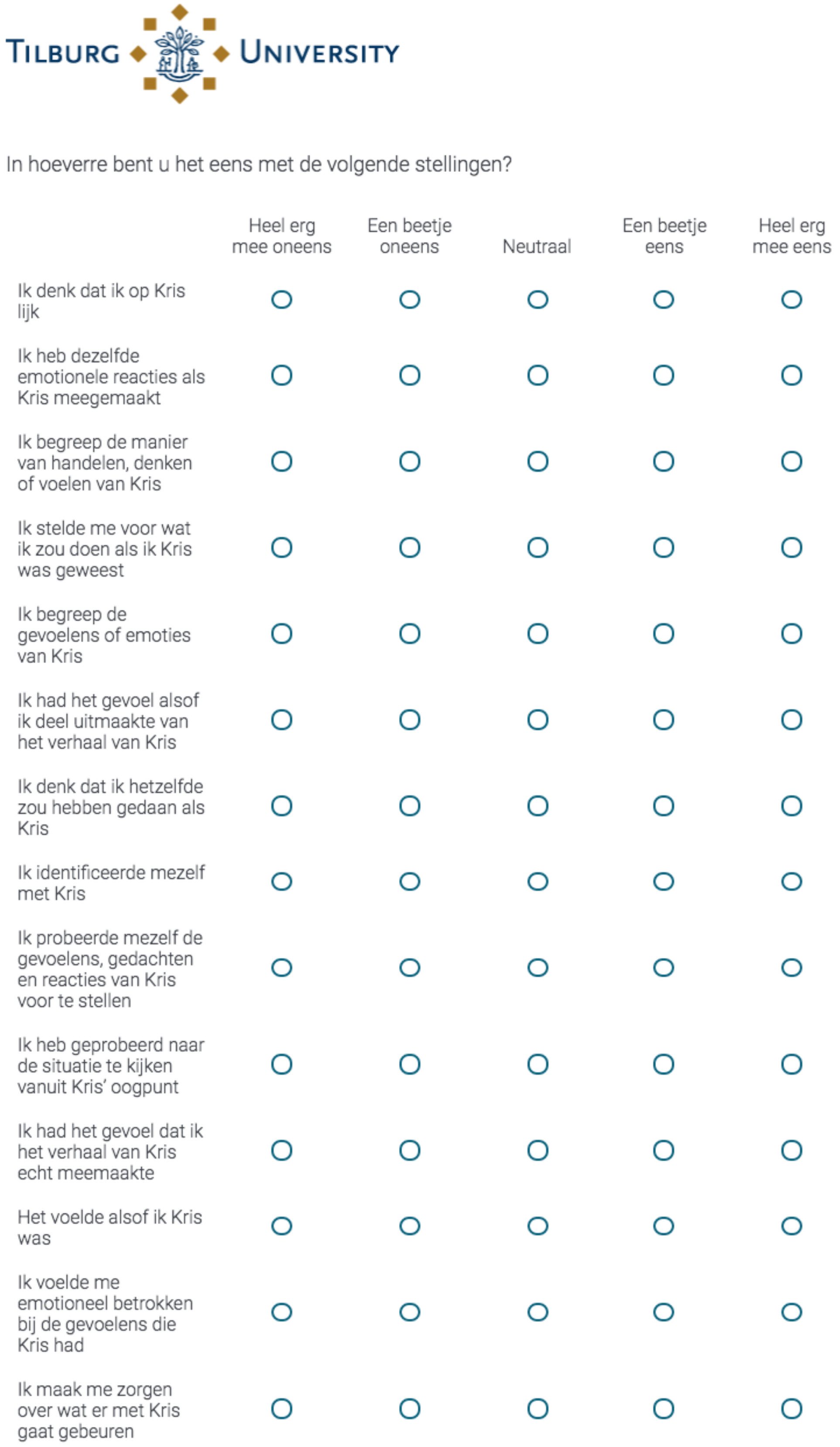
Figure K2

Woman, human written

Het verhaal dat u zo te lezen krijgt, is een kort verhaal van Kris over haar ervaring met de diagnose en behandeling van darmkanker. **Het verhaal is geschreven *door Kris ZELF*.**

Appendix L

Identification questions

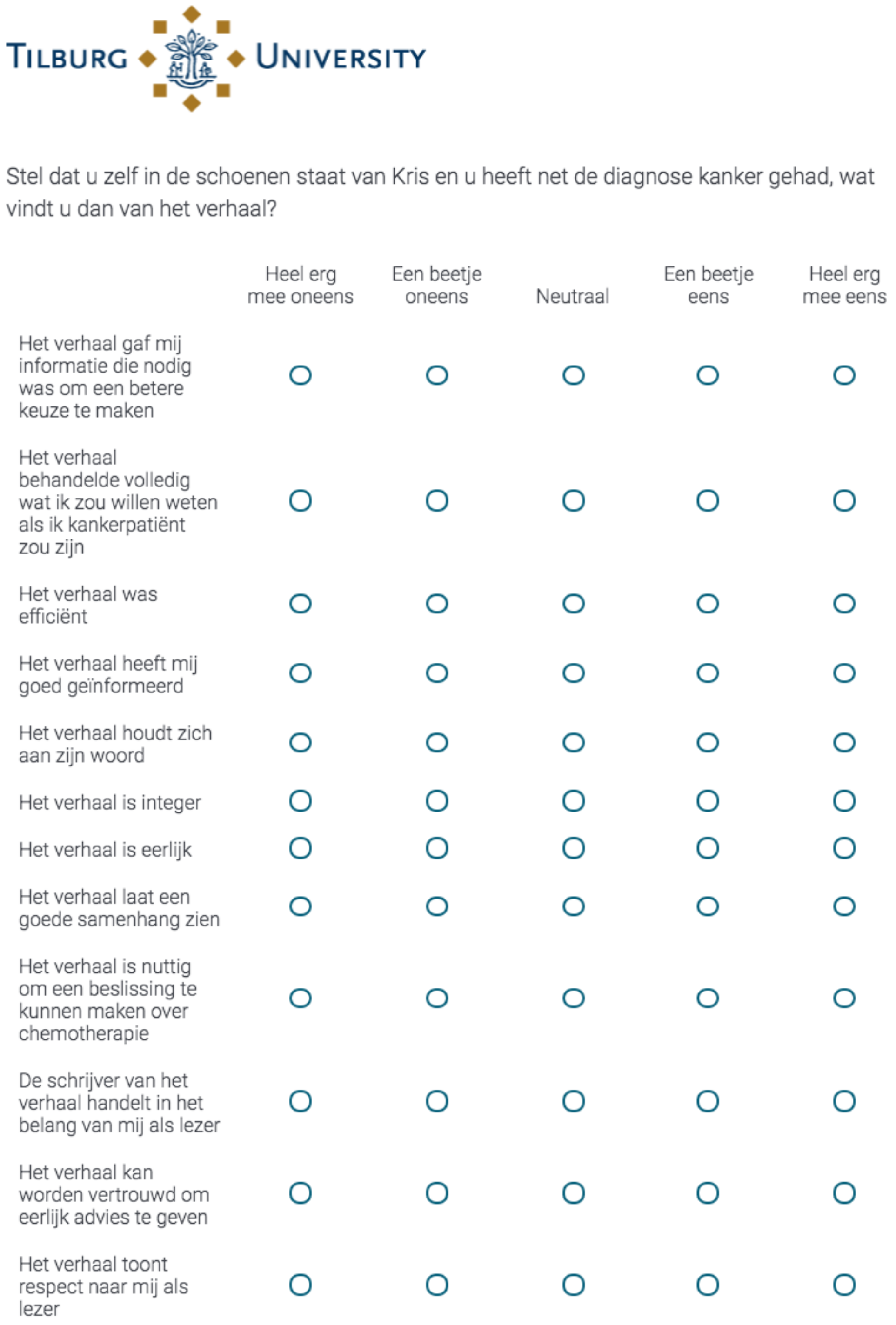


In hoeverre bent u het eens met de volgende stellingen?

	Heel erg mee oneens	Een beetje oneens	Neutraal	Een beetje eens	Heel erg mee eens
Ik denk dat ik op Kris lijk	○	○	○	○	○
Ik heb dezelfde emotionele reacties als Kris meegemaakt	○	○	○	○	○
Ik begreep de manier van handelen, denken of voelen van Kris	○	○	○	○	○
Ik stelde me voor wat ik zou doen als ik Kris was geweest	○	○	○	○	○
Ik begreep de gevoelens of emoties van Kris	○	○	○	○	○
Ik had het gevoel alsof ik deel uitmaakte van het verhaal van Kris	○	○	○	○	○
Ik denk dat ik hetzelfde zou hebben gedaan als Kris	○	○	○	○	○
Ik identificeerde mezelf met Kris	○	○	○	○	○
Ik probeerde mezelf de gevoelens, gedachten en reacties van Kris voor te stellen	○	○	○	○	○
Ik heb geprobeerd naar de situatie te kijken vanuit Kris' oogpunt	○	○	○	○	○
Ik had het gevoel dat ik het verhaal van Kris echt meemaakte	○	○	○	○	○
Het voelde alsof ik Kris was	○	○	○	○	○
Ik voelde me emotioneel betrokken bij de gevoelens die Kris had	○	○	○	○	○
Ik maak me zorgen over wat er met Kris gaat gebeuren	○	○	○	○	○

Appendix M

Trust questions



Stel dat u zelf in de schoenen staat van Kris en u heeft net de diagnose kanker gehad, wat vindt u dan van het verhaal?

	Heel erg mee oneens	Een beetje oneens	Neutraal	Een beetje eens	Heel erg mee eens
Het verhaal gaf mij informatie die nodig was om een betere keuze te maken	○	○	○	○	○
Het verhaal behandelde volledig wat ik zou willen weten als ik kankerpatiënt zou zijn	○	○	○	○	○
Het verhaal was efficiënt	○	○	○	○	○
Het verhaal heeft mij goed geïnformeerd	○	○	○	○	○
Het verhaal houdt zich aan zijn woord	○	○	○	○	○
Het verhaal is integer	○	○	○	○	○
Het verhaal is eerlijk	○	○	○	○	○
Het verhaal laat een goede samenhang zien	○	○	○	○	○
Het verhaal is nuttig om een beslissing te kunnen maken over chemotherapie	○	○	○	○	○
De schrijver van het verhaal handelt in het belang van mij als lezer	○	○	○	○	○
Het verhaal kan worden vertrouwd om eerlijk advies te geven	○	○	○	○	○
Het verhaal toont respect naar mij als lezer	○	○	○	○	○

Appendix N

Risk perception questions

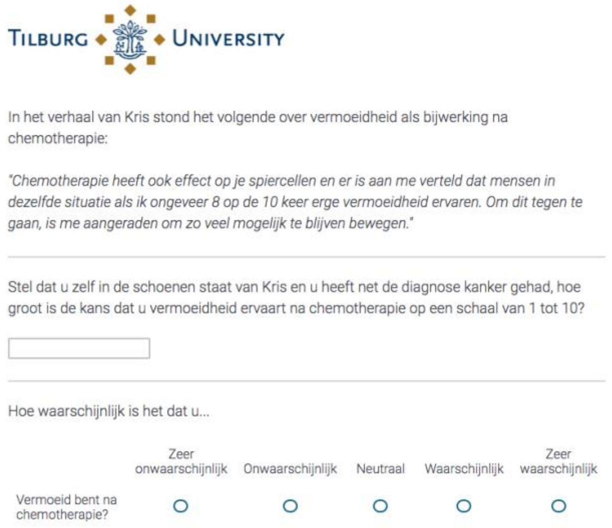
In het verhaal van Kris stond het volgende over pijn als bijwerking na chemotherapie:

"Het verschilt per persoon of je pijn krijgt tijdens je chemotherapie, en de dokter heeft gezegd dat op mijn leeftijd vaak 3 op de 10 mensen pijn ervaren."

Stel dat u zelf in de schoenen staat van Kris en u heeft net de diagnose kanker gehad, hoe groot is de kans dat u pijn heeft na chemotherapie op een schaal van 1 tot 10?

Hoe waarschijnlijk is het dat u...

	Zeer onwaarschijnlijk	Onwaarschijnlijk	Neutraal	Waarschijnlijk	Zeer waarschijnlijk
Pijn heeft na chemotherapie?	○	○	○	○	○



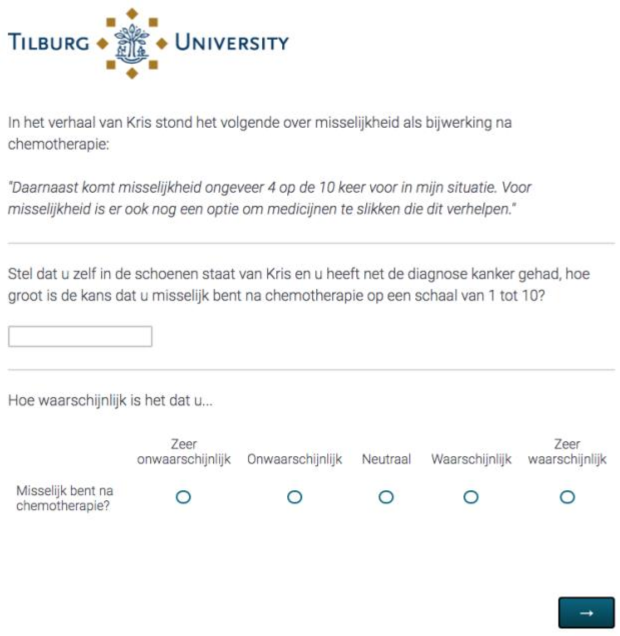
In het verhaal van Kris stond het volgende over vermoeidheid als bijwerking na chemotherapie:

"Chemotherapie heeft ook effect op je spiercellen en er is aan me verteld dat mensen in dezelfde situatie als ik ongeveer 8 op de 10 keer erge vermoeidheid ervaren. Om dit tegen te gaan, is me aangeraden om zo veel mogelijk te blijven bewegen."

Stel dat u zelf in de schoenen staat van Kris en u heeft net de diagnose kanker gehad, hoe groot is de kans dat u vermoeidheid ervaart na chemotherapie op een schaal van 1 tot 10?

Hoe waarschijnlijk is het dat u...

	Zeer onwaarschijnlijk	Onwaarschijnlijk	Neutraal	Waarschijnlijk	Zeer waarschijnlijk
Vermoeid bent na chemotherapie?	○	○	○	○	○



In het verhaal van Kris stond het volgende over misselijkheid als bijwerking na chemotherapie:

"Daarnaast komt misselijkheid ongeveer 4 op de 10 keer voor in mijn situatie. Voor misselijkheid is er ook nog een optie om medicijnen te slikken die dit verhelpen."

Stel dat u zelf in de schoenen staat van Kris en u heeft net de diagnose kanker gehad, hoe groot is de kans dat u misselijk bent na chemotherapie op een schaal van 1 tot 10?

Hoe waarschijnlijk is het dat u...

	Zeer onwaarschijnlijk	Onwaarschijnlijk	Neutraal	Waarschijnlijk	Zeer waarschijnlijk
Misselijk bent na chemotherapie?	○	○	○	○	○

Appendix O

HADS

Probeer nu de antwoorden in te vullen die het beste weergeven hoe u zich **gedurende de afgelopen week gevoeld heeft.**

	Heel erg vaak	Vaak	Af en toe	Nooit
Ik voel me gespannen	○	○	○	○
Ik krijg een soort angstgevoel alsof er elk moment iets vreselijks zal gebeuren	○	○	○	○
Ik maak me erg vaak ongerust	○	○	○	○
Ik kan rustig zitten en me ontspannen	○	○	○	○
Ik krijg een soort benauwd, gespannen gevoel in mijn maag	○	○	○	○
Ik voel me rusteloos en voel dat ik iets te doen moet hebben	○	○	○	○
Ik krijg plotseling gevoelens van panische angst	○	○	○	○

Appendix P

Manipulation check

Het taalgebruik in het verhaal van Kris dat u heeft gelezen:

Was emotioneel

Was vooral feitelijk

Geen idee

Het verhaal van Kris dat u gelezen heeft:

Was door een persoon geschreven

Was door een machine geschreven

Geen idee

Appendix Q

Debriefing

Dit is het einde van het onderzoek. Nogmaals heel erg bedankt voor het deelnemen! **Vergeet niet uw antwoorden te verzenden door onderaan de pagina op de pijl te klikken.**

U heeft net een **fictief** verhaal gelezen over Kris, dat is gebaseerd op algemene informatie over darmkanker en chemotherapie. Ook was er van tevoren aangegeven of dit verhaal door Kris *zelf* geschreven was, óf dat het automatisch was gegenereerd.

Dit onderzoek gaat erover hoe patiëntverhalen keuzes en ondersteuning in het behandelingsproces van kanker kunnen vergemakkelijken. Patiëntverhalen worden tegenwoordig vaak gebruikt in de medische wereld. Deze verhalen kunnen zelf geschreven zijn, of automatisch gegenereerd. Met dit onderzoek werd onderzocht welke versie van een verhaal het meeste effect heeft op iemands identificatie en risico inschatting, en in hoeverre iemand de bron van de geproduceerde tekst vertrouwd. Ook is er gekeken of het taalgebruik (feitelijk of emotioneel) hier een effect op kan hebben.

Mocht u nog verdere vragen of opmerkingen hebben, kunt u contact opnemen met Fleurisanne Botman (f.r.m.c.botman@tilburguniversity.edu).