

Linking patient-centered communication with cancer information avoidance: The mediating roles of patient trust and literacy

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ABSTRACT

Objectives: This study, drawing on the pathway mediation model developed by Street and his colleagues (2009) that links communication to health outcomes, explores how patient-centered communication affects cancer information avoidance.

Methods: Data was gathered through online access panel surveys, utilizing stratified sampling across Germany, Switzerland, the Netherlands, and Austria. The final sample included 4910 non-cancer and 414 cancer patients, all receiving healthcare from clinicians within the past year.

Results: The results demonstrated that patient-centered communication is directly associated with reduced cancer information avoidance, especially among cancer patients. Additionally, this association is indirectly mediated through patient trust and healthcare literacy.

Conclusion: The findings provide empirical evidence that reveals the underlying mechanism linking clinician-patient communication to patient health information behavior.

Practice implications: The potential of clinician-patient communication in addressing health information avoidance is highlighted by these findings. Future interventions in healthcare settings should consider adopting patient-centered communication strategies. Additionally, improving patient trust and literacy levels could be effective in reducing cancer information avoidance.

1. Introduction

Information avoidance refers to any behavior intended to prevent or delay the acquisition of available but potentially unwanted information [1]. It involves active measures, such as avoiding information sources or interrupting the information delivery process, to evade accessible information [2]. Cancer, as a type of life-threatening disease that often triggers fear and dread, is a subject where information avoidance is not uncommon [3].

Avoiding cancer information can lead to delayed screenings and diagnoses, undermining the effectiveness of cancer prevention programs [4]. Cancer patients, in particular, need to engage in timely decisions regarding their treatment and healthcare [5]. However, cancer information avoidance (CIA) could impede their participation in decision-making and obstruct efficient information exchange between

them and healthcare providers. Therefore, it is crucial to explore potential strategies to alleviate such avoidance.

A person's decision to avoid information can be driven by multiple factors. Sweeny et al., (2010) distinguish between individual differences and situational factors. Individual differences relate more to personal characteristics such as beliefs and psychological traits. Empirical evidence concerning socio-demographics has demonstrated significant correlations between variables such as age, gender, and education levels with CIA [6]. Individual psychological characteristics [7–9] and cancer beliefs [10] have also been extensively explored. Situational factors indicating the external determinants also impact people's tendency to avoid information [1]. People are more likely to avoid health-related information when they perceive it as difficult to acquire or comprehend, or the information comes from untrustworthy sources [11]. The degree to which individuals believe they can cope with the information

Abbreviations: PCC, Patient-centered communication; CIA, Cancer information avoidance.

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also influences their avoidance behavior [11,12]. The coping resources in health can be derived from various sources, including family, friends, and the healthcare system [13,14].

Overall, providing patients with credible health information, assisting them in understanding information, and supporting them in coping with the emotional challenges of potentially unwanted health information can help reduce their tendency to avoid health information [1]. With this in mind, we turn our attention to clinical communication, where health professionals serve as essential sources of emotional and informational support for patients. Specifically, we focus on patient-centered communication (PCC), an approach characterized by attentiveness to patients' needs, respect for their perspectives, and encouragement of their participation in healthcare decisions [15].

1.1. Pathway linking Patient-centered communication with cancer information avoidance

1.1.1. Conceptual framework

Clinician-patient communication is often linked to numerous health outcomes such as disease management [16], mental wellbeing [17], medical adherence [18], cancer screening behavior [19]. However, the underlying pathways linking health outcomes and clinical communication are often under-explored [20]. Street and his colleagues proposed a pathway mediation model in which they argue that clinician-patient communication affects patient health through both direct and indirect paths [20]. In particular, they proposed two types of mediators that transmit the impacts of communication to health outcomes. The first type of mediator is called "proximal outcomes", representing direct results generated from communication between patients and/or family with clinicians. Proximal outcomes include increased patient satisfaction with care, higher patient trust in clinicians, rapport, and motivation to adhere. These proximal outcomes serve as mediators between communication and ultimate health outcomes. Proximal outcomes can also affect the "intermediate outcomes", and through these intermediate outcomes, the impact of communication is ultimately transmitted to health outcomes. Intermediate outcomes include patients' access to healthcare, better quality of medical decision, patients' adherence, etc. Taking hypertension control as an example, communication can result in better patients' understanding of their treatment plan and increased motivation to adhere to their doctor's advice (proximal outcomes). This enhanced understanding and motivation subsequently lead to higher patient adherence to their medication regimen (intermediate outcomes), ultimately resulting in improved hypertension control (health outcomes) [21].

However, attention paid to the underlying mechanism of communication to patient health has only just begun. In previous studies, the examined health outcomes included mental well-being [22], pain control [23], blood pressure control [24] and colorectal cancer screening [25]. However, attention has not been paid to patients' information behavior. Cancer information avoidance differs from simply not seeking; it is a defensive behavior that patients adopt to avoid confronting cancer-related information [26]. Whether in health promotion or healthcare for cancer patients, or prevention and early diagnoses among individuals without cancer, having them open to receiving cancer information is a prerequisite for healthcare professionals to disseminate health messages and facilitate efficient information exchange. Therefore, the current study applies the pathway mediation model and examines how clinician-patient communication is linked with patients' CIA. In the following sections, we will discuss various pathways between PCC and CIA, drawing on conceptual frameworks and empirical evidence from existing literature.

1.2. Direct path: Patient-centered communication and cancer information avoidance

Epstein and Street (2007) proposed six functions encompassed in

PCC: facilitating information exchange between healthcare providers and patients, fostering healing patient-provider relationships, managing patients' disease-related uncertainties, addressing patients' emotional needs, making shared decisions with patients, and enabling patient self-management.

Patient-centered communication emphasizes delivering information tailored to patients' language preferences [15]. The use of clear, jargon-free language was found to improve patients' engagement and acceptance of information [27]. Difficulty in processing health information is one of the primary reasons why people choose to avoid it [11]. When patients perceive that the information is hard to process, they often adopt a defensive strategy by proactively avoiding it [28]. Therefore, when clinicians convey information in a manner that patients perceive as approachable and easy to understand, the patients would be less likely to avoid the information coming from the clinicians and subsequently leading to a lower level of information avoidance. As a study conducted in the US with general patients, not limited to any specific condition or diagnosis, PCC was negatively linked with patients' avoidance of cancer information [12]. Based on this understanding, we propose the following hypothesis:

H1a. Patient-centered communication has a direct and negative impact on cancer information avoidance.

Given that PCC with cancer patients often involves more in-depth discussion of cancer-related information and complexities, and they receive cancer information from their clinicians more frequently than patients of other conditions, we anticipate that PCC will have a greater direct effect on the CIA among cancer patients compared to non-cancer patients:

H1b. The direct impact of patient-centered communication on cancer information avoidance is moderated by cancer diagnosis, with a greater direct effect observed in cancer patients compared to non-cancer patients.

1.3. Indirect paths: The mediating role of patient trust and healthcare literacy

Promoting patient trust has often been described as one of the goals of clinician-patient communication [29]. In PCC, forming a healing relationship with patients was one of the functions characterized by Street and Epstein (2007). Such a healing relationship can only be formed with patients' trust in their clinicians.

The core values of PCC involve acknowledging and respecting patients' needs and perspectives, and actively involving them in healthcare decision-making [15]. PCC practices, such as encouraging patient participation in healthcare, demonstrating care, and responding to concerns, have been linked to increased patient trust in clinicians [30]. A study from Fiscella et al. (2004) also showed positive relations between patient trust and PCC practices. The other study by Asan et al. (2021) found better patient ratings of patient-centered communication positively associated with patient trust in health information received from the clinicians.

Additionally, the trustworthiness of information sources is a crucial factor when individuals are considering whether to avoid information from those sources, and they are inclined to avoid information that they regard as unreliable [11]. Therefore, it can be anticipated that PCC fosters patient trust, which in turn reduces their avoidance of cancer information from clinicians, thereby decreasing their overall tendency to avoid such information. We anticipate:

H2a. Patient-centered communication has an indirect effect on cancer information avoidance, with this effect mediated by patient trust.

Cancer patients directly receive information from clinicians for their daily cancer care. Thus, for cancer patients, clinicians serve as the primary source of cancer-related information, more so than for individuals

without a cancer diagnosis. [31]. Therefore, it is hypothesized that cancer patients' trust in clinicians will have a greater impact on their CIA:

H2b. The pathway from patient trust to cancer information avoidance is moderated by cancer diagnosis, resulting in greater indirect impacts among cancer patients than non-cancer patients.

People avoid information when they perceive themselves as incapable of dealing with it. They avoid it when it is hard for them to comprehend, assess the credibility of, or see the relevance to their own health [11]. Health literacy is defined by Nutbeam (2008) as individuals' ability to find, understand, and apply information and services for making health decisions that improve or maintain their health. Specifically, individuals with inadequate health literacy are more likely to avoid health information and experience greater difficulties understanding and interpreting health-related information [32].

Sorensen (2012) further elaborates that health literacy should encompass individuals' literacy skills in the three main health domains: healthcare, disease prevention, and health promotion. In the context of healthcare, health literacy refers to a patient's ability to understand and interpret medical information, make informed medical decisions, and adhere to the advice of healthcare professionals [33]. This aspect can be termed as "healthcare literacy"; it specifically reflects a patient's capability to process medical information in their healthcare, effectively adhere to medical advice and make informed-decisions with their clinicians [34].

Patient literacy is dynamic, as it is influenced by how well the healthcare system delivers information and services that align with patients' abilities, needs, and preferences [35]. This alignment affects patients' capacity to effectively use information for their healthcare [36]. A crucial aspect of PCC involves clinicians assisting patients in understanding their diagnosis and treatment options, and encouraging their participation in decision-making processes [35]. When patients achieve a comprehensive understanding of medical information through effective communication with clinicians, they become more skilled at comprehending and utilizing the information received in their healthcare [37]. Therefore, we anticipate that one pathway from PCC to CIA is mediated by patients healthcare literacy:

H3. Patient-centered communication has an indirect effect on cancer information avoidance, mediated by healthcare literacy.

Furthermore, patient trust in their clinicians can facilitate an environment that is conducive for patients to learn and understand healthcare information and adhering to clinician advice. Trust facilitates an environment where patients feel comfortable to express their concerns and questions [38], and this is essential for them to understand complex

medical information. Patient trust in clinicians is also often associated with greater patient adherence to medical advice and treatment plans [39]. Understanding medical advice and adhering to it are crucial components in healthcare literacy [33]. Therefore, we anticipate patient trust in clinicians will be positively associated with their healthcare literacy. Bringing in PCC and CIA, the indirect path will involve two mediators: patient trust is the proximal outcome of patient-centered communication, while healthcare literacy is the intermediate outcome that is linked with patient trust. This serial mediation path is hypothesized as:

H4. Patient-centered communication has an indirect effect on cancer information avoidance, mediated by both patient trust and healthcare literacy.

We illustrate the hypothesized model, including all proposed paths and associated moderations, in Fig 1.

2. Methods

2.1. Samplings

Data were collected through surveys administered via online access commercial panels in late 2018 and 2019, utilizing stratified sampling in Germany, Switzerland, the Netherlands, and Austria. The analysis of the current study is based on a final sample consisting of 4910 non-cancer patients and 414 cancer patients who all received healthcare within the past year. Ethical review was not required when collecting data through online panels according to local regulations. Compliance with the General Data Protection Regulation was maintained, and the panel provider ensured that all participants gave informed consent. All participant information remained anonymous, and participants had the option to withdraw from the survey or refuse to answer any questions. The detailed sampling technique was published by Link et al. (2021) [40].

2.2. Measures

2.2.1. Patient-centered communication

PCC, the focal independent variable, was measured using a 7-item index ($M=3.70$, $SD=.84$, 95% CI [3.68, 3.72]). These seven items cover the six functions identified in patient-centered communication by Epstein and Street (2007). Participants were asked how often their clinicians: 1) gave them the opportunity to ask all the health-related questions they had, 2) provided the attention they needed for their feelings and emotions, 3) involved them in decisions about their healthcare as much as they desired, 4) ensured they understood the

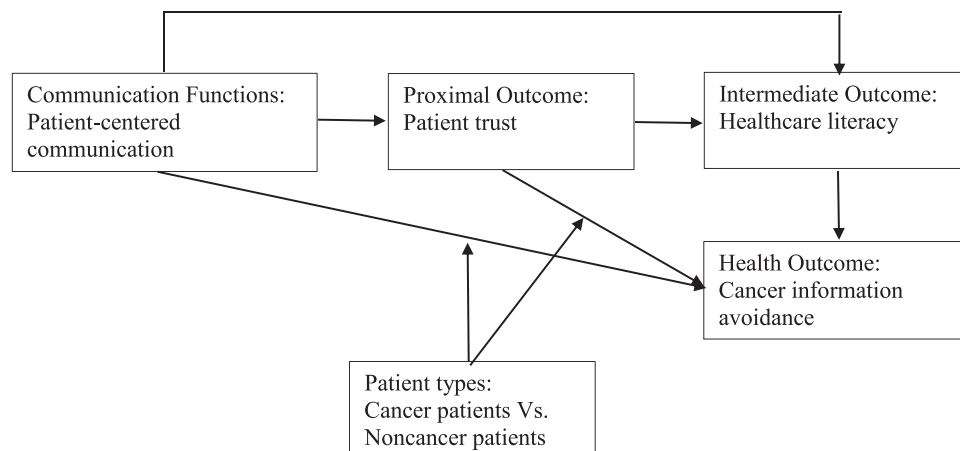


Fig. 1. A hypothesized moderated serial mediation model.

necessary steps to take care of their health, 5) explained things in a way they could understand, 6) spent adequate time with them, and 7) assisted them in dealing with feelings of uncertainty about their health or healthcare. Answers from the 7 items were averaged from 5-point scales, with higher scores indicating better quality of PCC.

Although PCC encompasses multiple communication functions, it is typically treated as one underlying construct in previous studies using this measure, as is the case in the current one. However, a confirmatory factor analysis (CFA) was additionally performed in Mplus to test its unidimensionality. The one-factor model showed a good model fit, indicated by indices including RMSEA ($=.069$), CFI ($=.986$), TLI ($=.980$), and SRMR ($=.016$), suggesting its unidimensional nature (see Table A.1 in Appendix). The reliability was examined through Cronbach's alpha (α) and McDonald's Omega (ω), following the recommendation by Hayes and Coutts (2020) that McDonald's Omega is a more general form of reliability test that is resistant to the influence of the number of items. Both tests demonstrated good reliability of the PCC scale ($\alpha = .930$; $\omega = .930$).

2.2.2. Patient trust

Trust was assessed using a single item ($M=4.18$, $SD=.84$, 95% CI [4.15, 4.20]) that inquired about the extent to which participants trust the health information provided by doctors. A five-point scale was employed, where lower values indicate a lower level of trust.

2.2.3. Healthcare literacy

Healthcare literacy was assessed using a six-item index ($M=3.89$, $SD=0.76$, 95% CI [3.87, 3.91]) derived from the European Health Literacy Questionnaire (HLS-EU-Q16). Originally, the HLS-EU-16 was designed to measure health literacy across three main domains: healthcare, disease prevention, and health promotion. For this study, we selected items specifically related to healthcare. Participants were asked to rate how easy it is for them to 1) understand what their doctor tells them, 2) understand the need for health screenings, 3) grasp instructions from doctors or pharmacists on medication use, 4) be aware of health warnings about behaviors like smoking, low physical activity, and excessive alcohol intake, 5) use information from doctors to make decisions about their illness, and 6) follow instructions from doctors or pharmacists. Average scores from a 5-point scale were used, with higher scores indicating better literacy.

Although the original HLS-EU-Q16 health literacy scale is multidimensional, the current study focuses solely on individuals' literacy levels in clinical settings, which can be treated as a single construct [41]. A CFA was conducted to ensure unidimensionality, and the model indices indicated that the one-factor model has a good fit (RMSEA $= .066$, CFI $= .981$, TLI $= .968$, and SRMR $= .021$) (Table A.1 in Appendix). The scale also showed good reliability: $\alpha = .841$; $\omega = .842$.

2.2.4. Cancer information avoidance

Cancer Information Avoidance (CIA) was assessed using a 6-item index (Mean $= 2.82$, $SD = 0.89$, 95% CI [2.80, 2.85]; $\alpha = .818$, $\omega = .803$). This scale was originally developed and validated for measuring information avoidance in health by Howell & Shepperd (2016) and has been used to assess information avoidance in areas such as COVID-19, diabetes, and colon cancer [42,43]. For this study, a slightly modified version was used, adding cancer as a topic of information. Participants were asked to indicate their level of agreement with six statements: 1) I would avoid learning about cancer; 2) Even if it upsets me, I want to know things about cancer; 3) I want to know things about cancer; 4) When it comes to cancer, ignorance is bliss; 5) I can think of situations in which I would rather not know things about cancer; 6) It is important to know things about cancer. Scores were calculated using a 5-point scale, with items 2, 3, and 6 reverse-coded so that higher scores indicate greater avoidance of cancer information.

2.2.5. Control variables

Demographic variables including age, gender, education and country were included as control variables. Age was measured in years; education was measured as the highest grade completed (primary education and below $= 1$, tertiary education $= 3$); gender was represented by dummy variables, with females coded as 0. The countries included were Germany, Switzerland, the Netherlands, and Austria, with Germany being treated as the reference group.

Individual characteristics including cancer fatalism beliefs, cancer fear, which are associated with CIA in previous studies, were included as covariates to minimize potential bias [10,44,45]. Cancer fatalism was represented through three variables, highlighting fatalism related to cancer cause, chance, and death. However, death-related fatalism were not answered by the majority of cancer patients, therefore we dropped it from our analysis. These were all measured on 5-point scales, with higher values denoting greater fatalism. An 8-item index ($\alpha = .943$; $\omega = .945$) on a 5-point scale was used to gauge cancer fear; average scores were calculated, with higher scores signifying greater fear. Survey questions are detailed in Table A.2 in the Appendix.

Furthermore, situational factors that are correlated with cancer information avoidance including social support to cope with health issues were incorporated as a covariate [26,46]. Social support was gauged using a 3-item index on a 5-point scale, with higher scores denoting more support from family, friends, or colleagues ($\alpha = .814$, $\omega = .821$) (see Table A.2 in Appendix).

2.3. Statistical analysis

A descriptive analysis was conducted to summarize the characteristics of the sample. We explored the pathway linking patient-centered communication, trust, healthcare literacy, and cancer information avoidance, as well as the moderating role of cancer diagnosis (cancer patients vs. non-cancer patients) using the PROCESS macro by Hayes (2022) in SPSS Version 28. The PROCESS' model system does not provide a model that would reflect our hypothesized pathways, thus we had to construct a customized model. This was achieved using the bmatrix statement to specify paths linking independent, dependent, and mediating variables, and the wmatrix statement to define the position of the moderator (see Fig. A.1 in Appendix). A 95% confidence level (two-tailed) was set for all analyses.

3. Results

Table 1 provides descriptive statistics for non-cancer and cancer patients. Non-cancer patients have a mean age of 43.76 years ($SD=14.47$), evenly split by gender, and education levels vary: 23.1% junior high or below, 46.0% upper secondary, 30.9% bachelor's or higher. Cancer patients average 53.68 years ($SD=12.01$), with more females (56.3%), and their education levels are 33.1% junior high or less, 44.7% upper secondary, 22.2% bachelor's or higher.

H1a proposed that patient-centered communication would directly affect cancer information avoidance. As indicated in Table 3, patient-centered communication negatively predicted cancer information avoidance in both cancer patients ($\beta = -.176$, $p < .001$, 95% CI $[-.275, -.076]$) and non-cancer patients ($\beta = -.060$, $p < .001$, 95% CI $[-.093, -.027]$), thus supporting Hypothesis 1a.

H1b predicted that the relationship between patient-centered communication and cancer information avoidance would be moderated by a cancer diagnosis (cancer vs. non-cancer patients), with a greater association among cancer patients. The moderation effect was significant and negative, as shown by the coefficient of interaction ($\beta = -.115$, $p < .05$, 95% CI $[-.219, -.012]$), confirming Hypothesis 1b (Table 2).

H2a hypothesized that patient trust mediated the effects of PCC on CIA. As shown in Table 2, Patient-centered communication was positively related to patient trust ($\beta = .300$, $p < .001$, 95% CI $[.273, .328]$).

Table 1
Descriptive statistics.

Variables	Non-cancer patients n = 4910	Cancer patients n = 414	Total study population n = 5324
Age (M/SD)	43.76/14.47	53.68/12.01	44.53/14.54
Gender (n/%)			
Female	2485/50.6	233/56.3	2718/51.1
Male	2425/49.4	181/43.7	2606/48.9
Education (n/%)			
Junior high school and below	1133/23.1	137/33.1	1270/23.9
Upper secondary education	2259/46.0	185/44.7	2444/45.9
Bachelors and above	1518/30.9	92/22.2	1610/30.2
Country (n/%)			
Germany	2469/50.3	234/56.5	2703/50.8
Switzerland	769/15.7	49/11.8	818/15.4
Netherlands	815/16.6	72/17.4	887/16.7
Austria	857/17.5	59/14.3	916/17.2
Cancer fatalism (M/SD)			
Cancer cause	2.95/1.18	3.03/1.20	2.96/1.18
Cancer chance	2.73/1.04	2.88/1.13	2.74/1.05
Cancer fear (M/SD)	2.86/1.09	2.95/1.13	2.86/1.09
Social support (M/SD)	3.82/.97	3.86/1.10	3.83/.98
Patient trust (M/SD)	4.17/.84	4.20/.82	4.18/.84
Healthcare literacy (M/SD)	3.88/.76	4.02/.75	3.89/.76
Patient-centered communication (M/SD)	3.69/.83	3.77/.89	3.70/.84
Cancer information avoidance (M/SD)	2.86/.88	2.39/.98	2.82/.89

However, trust did not significantly predict cancer information avoidance among all participants (non-cancer patients: $\beta = .014$, $p = .16$, 95% CI [.045, -.017]; cancer patients ($\beta = -.150$, $P < .01$, 95% CI [-.188, -.117]). As indicated in Table 3, this indirect path was significant only among cancer patients ($\beta = -.045$, 95% CI [-.080, -.009]), but it remained insignificant among non-cancer patients ($\beta = -.004$,

Table 2
Regression results of the endogenous variables.

a Variables	Trust			Healthcare literacy			b,c Cancer information avoidance		
	Estimate	SE	95% CI	Estimate	SE	95% CI	Estimate	SE	95% CI
Age	.003 **	.001	[.001, .004]	.005 ***	.001	[.004, .006]	-.001	.001	[-.002, .001]
Gender	.085 ***	.022	[.043, .127]	-.116 ***	.018	[-.151, -.081]	.056 *	.024	[.010, .103]
Education	.012	.015	[-.018, .041]	.050 ***	.012	[.026, .074]	-.044 **	.016	[-.077, -.012]
Country	reference								
Germany									
Switzerland	-.024	.031	[-.085, .037]	-.070 **	.026	[-.120, -.019]	.018	.034	[-.048, .085]
Netherland	.099 *	.030	[.040, .159]	.066 **	.025	[.017, .115]	.184 ***	.033	[.119, .249]
Austria	.158 **	.030	[.100, .216]	.058 *	.025	[.010, .106]	-.155 ***	.032	[-.219, -.092]
Cancer fatalism – cancer cause	-.016	.010	[-.035, .003]	-.019 *	.008	[-.035, -.004]	.067 ***	.011	[.046, .087]
Cancer fatalism – cancer chance	.008	.011	[-.013, .029]	-.047 ***	.009	[-.064, -.029]	.087 ***	.012	[.064, .110]
Cancer fear	.047 ***	.010	[.027, .067]	-.044 ***	.009	[-.060, -.027]	.034 **	.011	[.012, .057]
Social support	.132 ***	.012	[.109, .155]	.136 ***	.010	[.116, .155]	-.057 ***	.013	[-.083, -.032]
Patient-centered communication (PCC)	.300 ***	.014	[.273, .328]	.232 ***	.012	[.208, .255]	-.060 ***	.017	[-.093, -.027]
Patient trust	NA			.215 ***	.011	[.192, .237]	-.014	.016	[.045, -.017]
Healthcare literacy	NA			NA			-.152 ***	.018	[-.188, -.117]
b Cancer diagnosis	NA			NA			.534 *	.249	[.047, 1.022]
Interaction 1 (PCC × Cancer diagnosis)	NA			NA			-.115 *	.053	[-.219, -.012]
Interaction 2 (Trust × Cancer diagnosis)	NA			NA			-.136 *	.057	[-.247, -.024]
R ²	.160			.303			.122		

NA: Not applicable.

a: Except for age, gender, education, country and cancer diagnosis, all variables used 5-point scales. The unstandardized coefficients are reported.

b: Cancer diagnosis was coded as “0” for non-cancer patients and “1” for cancer patients. The table presents results for Patient trust and PCC for non-cancer patients.

c: When coding cancer diagnosis as “1” for cancer patients and “0” for non-cancer patients, the results for cancer patients are as follows:

The coefficient for Patient trust is $-.150$ ($P < .01$, 95% CI [-.188, -.117]).

The coefficient for Patient-centered communication is $-.176$ ($P < 0.001$, 95% CI [-.275, -.076]).

* $P < .05$;

** $P < .01$;

*** $P < .001$.

95% CI [-.014, .005]). Therefore, H2a is supported only among cancer patients.

H2b posited that the relationship between patient trust and CIA would be moderated by a cancer diagnosis, with a stronger correlation among cancer patients than non-cancer patients. As mentioned earlier, patient trust was a significant predictor of cancer information avoidance only among cancer patients and remained insignificant among non-cancer patients. The greater association among cancer patients was further confirmed by the coefficient of interaction 2 ($\beta = -.136$, $p < .05$, 95% CI [-.247, -.024]) thus supporting H2b.

H3 proposed a pathway from PCC directly to healthcare literacy, bypassing patient trust, and then leading to CIA. Patient-centered

Table 3
The bootstrap results of the moderated multiple serial mediation model^a.

Path	Estimates	SE	t	P	Bootstrapped 95% CI	
					Lower	Upper
Direct effect						
Non cancer patients	-.060 *	.017	-3.575	< .001	-.093	-.027
Cancer patients	-.176 *	.051	-3.448	< .001	-.275	-.076
Indirect effect (X → Trust → Y)						
Non Cancer patients	-.004	.005	-	-	-.014	.005
Cancer patients	-.045 *	.018	-	-	-.080	-.009
Indirect effect (X → Literacy → Y)	-.035 *	.005	-	-	-.046	-.026
Indirect effect (X → Trust → Literacy → Y)	-.010 *	.002	-	-	-.013	-.007

a Bootstrapping with 5000 resamples was applied.

b X: Patient-centered communication;

c Y: Cancer information avoidance;

* Significant at the 0.05 level or better (two tailed).

communication was positively associated with healthcare literacy ($\beta = .232$, $p < .001$, 95% CI [.208, .255]). The significance of this indirect path is evident from a coefficient of $\beta = -.035$ and a bootstrapped 95% CI [-.046, -.026], as shown in Table 3, thereby supporting H3.

H4 posits a pathway from PCC to patient trust, to healthcare literacy, and ultimately leading to CIA. As shown in Table 2, the association between patient trust and healthcare literacy was positive and significant ($\beta = .215$, $p < .001$, 95% CI [.192, .237]). Furthermore, healthcare literacy was found to negatively predict CIA ($\beta = -.152$, $p < .001$, 95% CI [-.188, -.117]). The effect of this indirect path is significant with a coefficient of $\beta = -.010$ and a bootstrapped 95% CI [-.013, -.007] (Table 3). Therefore, H4 is supported.

Fig. 2 displays a diagram illustrating the results within the hypothesized model. It includes estimates and significance levels, delineated for cancer patients (in brackets) and non-cancer patients.

4. Discussion

Our study applied the pathway mediation model [20] linking patient-centered communication to cancer information avoidance through patients' trust in clinicians and healthcare literacy. The pathway mediation model has been previously tested with health outcomes including cancer screening [25], patient pain control [23] and emotional well-being [22]. This study appeared as the first study that looked at patient health information behavior. Proactively avoiding cancer-related information can potentially harm not only the cancer patients but also patients of other conditions. For cancer patients, being receptive to information enables participation in their healthcare and informed decision-making with clinicians. Similarly, non-cancer patients' openness is crucial for cancer screening and prevention programs [4]. Therefore, this study based on the pathway mediation model allows us to examine the role of clinician-patient communication in affecting patient CIA.

Viewed through the lens of the path mediation model, we discovered that patient trust, as the proximal outcome, and healthcare literacy, as the intermediate outcome, collectively mediate the relationship between patient-centered communication and cancer information avoidance. The paths predicted by the theoretical model, including links from PCC to CIA, from PCC to patient trust and then to CIA, as well as from PCC to patient trust, subsequently to healthcare literacy, and finally to

CIA, were all confirmed. This affirms the pathway mediation model's applicability in studying the connection between communication and patients' information behavior.

We also identified an indirect pathway, wherein patient-centered communication influences healthcare literacy (the intermediate outcome) and subsequently affects cancer information avoidance, bypassing patient trust (the proximal outcome). This pathway was not initially anticipated by the pathway mediation model, where intermediate outcomes are typically conceptualized as deriving from proximal outcomes. However, this finding echoes results from other studies, indicating the complexity in defining constructs as either proximal or intermediate outcomes.

For example, Jiang (2017) treated patient satisfaction with healthcare as a proximal outcome, finding it to significantly mediate the effect of PCC on patients' mental well-being [22]. Meanwhile, another study used the same measure for patient satisfaction but categorized it as an intermediate outcome, with patient trust as the proximal outcome [29]. Both studies, employing the pathway mediation model, yielded significant results. Patient satisfaction was perceived as a proximal outcome directly resulting from communication, and as an intermediate outcome that emerges from increased trust due to communication. Similarly, in our study, healthcare literacy functions both as a proximal outcome resulting from PCC and as an intermediate outcome following patient trust. Future research utilizing the pathway mediation model should consider the possibility that a construct may serve as both a proximal and an intermediate outcome. Both paths should be included and tested to capture the full complexity of these relationships.

We also discovered that a cancer diagnosis acts as a moderator, influencing both the direct path from PCC to CIA and the indirect path mediated by patient trust. Epstein and Street (2007) identified several potential moderators affecting clinician-patient communication and health outcomes, including the type of disease, which aligns with our observations in this study. This finding underscores that clinician-patient communication is context-specific, and its impact on patient health must be evaluated with the context in mind. It highlights the necessity for clinician-patient communication to be attuned to the unique challenges and needs presented by different health conditions, particularly in emotionally demanding conditions such as cancer.

Studies that focused on CIA have paid substantial attention to individual differences [12]. In the literature, evidence primarily highlights

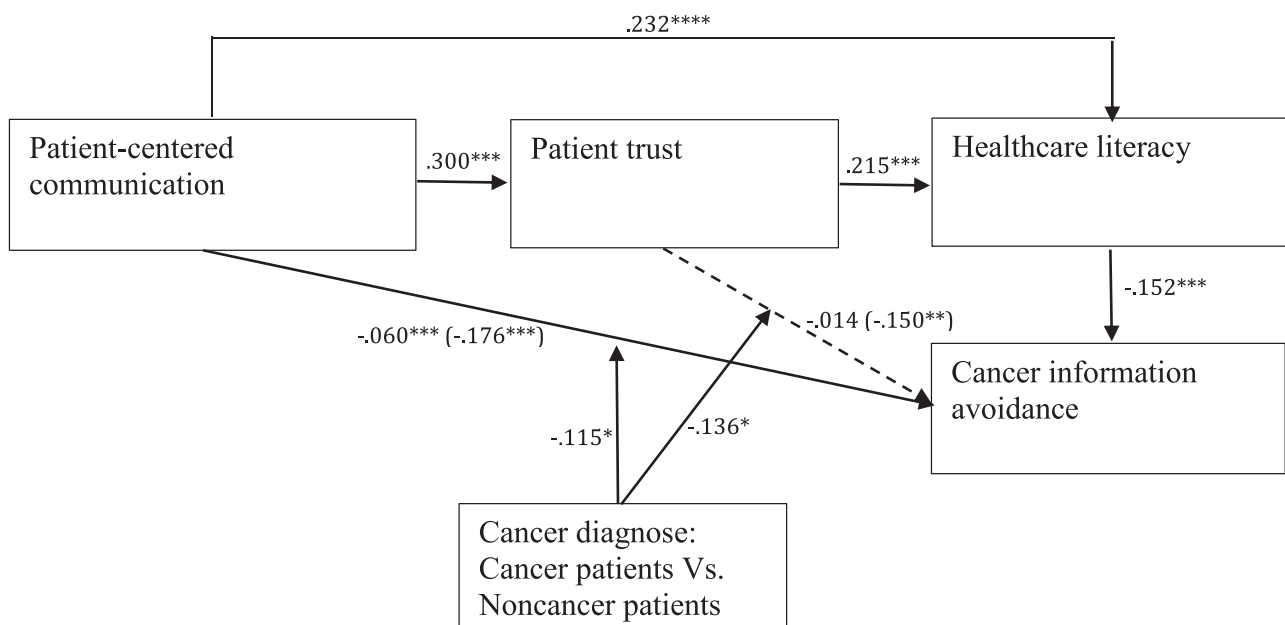


Fig. 2. Results of the hypothesized moderated serial mediation model.

personal cancer-related beliefs, psychological factors, and personality traits [47,48]. In a patient's healthcare journey, their interaction with clinicians plays a crucial role in shaping their understanding of their disease and their health management behavior [49]. Our study broadens the scope of the information avoidance literature to encompass communication factors, demonstrating that a patient-centered communication approach is linked to patients' reduced avoidance of cancer-related information. This finding is consistent with numerous studies showing that PCC encourages patients to take proactive measures in managing their health, such as improved medication adherence and adopting healthier lifestyle behaviors [50,51]. PCC can be perceived as an effective strategy to empower patients to take a more proactive stance in their healthcare management [12,52], hereby taking less defensive action in acquiring health information.

4.1. Limitations

In interpreting our study results, certain limitations warrant consideration. First, the use of cross-sectional data constrains our ability to establish the directionality of relationships in our path analysis. To gain more definitive insights into the causal relationships, future research could adopt longitudinal designs. Additionally, experimental designs that test specific communication interventions could be instrumental in establishing cause-and-effect relationships. Second, our study was conducted using a secondary dataset where trust in clinicians was measured by a single item asking participants about their trust in health information from doctors. This measure does not fully capture the multifaceted nature of trust, which includes dimensions like emotional trust and competence trust. It also overlooks other clinicians involved in patient care. Future research should employ multiple items to comprehensively assess patients' trust in all types of clinicians involved in their healthcare.

5. Conclusion

The present study explored the pathways linking patient-centered

communication and cancer information avoidance. The findings imply that PCC is directly associated with reduced information avoidance, particularly among cancer patients, and indirectly associated through patient trust and healthcare literacy. These findings offer valuable insights into mitigating information avoidance in life-threatening diseases. The inherent communicative nature of PCC highlights the positive role healthcare professionals can play in addressing patients' tendencies to avoid cancer information.

Practice implications

Future interventions should consider adopting patient-centered communication and improving patients' trust and health literacy levels as effective strategies to reduce information avoidance.

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CRediT authorship contribution statement

Qianfeng Lu: Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Eva Baumann:** Writing – review & editing, Data curation. **Elena Link:** Writing – review & editing, Data curation. **Peter J Schulz:** Writing – review & editing, Conceptualization.

Declaration of Competing Interest

None declared.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Appendix. Supporting information

Table A1
Goodness-of-fit indices for CFA and Reliability of used scales for PCC and Healthcare literacy.

Variables	χ^2 (df)	RMSEA (90% CL)	CFI	TLI	SRMR	McDonald's Omega	Cronbach's alpha
Patient-centered communication	370.736 *	.069 (.063, .075)	.986	.980	.016	.930	.930
Healthcare literacy	217.530 *	.066 (.059, .074)	.981	.968	.021	.842	.841

* Significant at the 0.05 level (two tailed).

Table A2
Survey wording of covariates.

Variable	Questionnaire	Scaling details
Social support	Relatives are often also of great importance for one's own health. Please think of people from your personal environment, e.g. your family, your partner, friends, acquaintances, relatives or colleagues. How much do you agree with the following statements? 1. I can count on someone to provide me with emotional support when I need it - such as talking over problems or helping me to make difficult decisions. 2. I have friends and family members that I can talk to about my health. 3. I have a close friend or relative I can turn to if I receive bad news about my health.	5-point scales from totally disagree = 1 to fully agree = 5.
Cancer fear	When you think of cancer, what feelings does it trigger? To what extent do you agree with the following statements? 1. The thought of cancer scares me. 2. When I think about cancer, I feel nervous. 3. When I think about cancer, I get upset. 4. When I think about cancer, I get depressed. 5. When I think about cancer 6. When I think about cancer, my heart beats faster. 7. When I think about cancer, I feel uneasy. 8. When I think about cancer, I feel uncertain.	Same as above

(continued on next page)

Table A2 (continued)

Variable	Questionnaire	Scaling details
Cancer fatalism – cancer cause	In addition, you will find a few general statements about cancer and the associated risk factors. To what extent do you agree with them? It seems like everything causes cancer.	Same as above
Cancer fatalism – cancer chance	There is no much you can do to lower your chances of getting cancer.	Same as above
Cancer diagnosis	Have you ever been diagnosed as having cancer?	Yes = 1, No = 0.

bmatrix=1,1,1,1,1,1

	^a X	M ₁	M ₂
^b M ₁	1	■	■
^c M ₂	1	1	■
Y	1	1	1

^a X: Patient-centered communication;^b M₁: Trust in clinicians;^c M₂: Healthcare literacy;^e Y: Cancer information avoidance.

wmatrix=0,0,0,1,1,0

	^a X	M ₁	M ₂
^b M ₁	0	■	■
^c M ₂	0	0	■
Y	1	1	0

^a X: Patient-centered communication;^b M₁: Trust in clinicians;^c M₂: Healthcare literacy;^e Y: Cancer information avoidance.

Fig. A.1. A conditional process model and its representation as two matrices.

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