

# Patient and physician reports of the information provided about illness and treatment: what matters for patients' adaptation to cancer during treatment?

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## Abstract

**Objective:** The aim of this study was to examine (a) whether illness representations mediate the relation of the amount of information provided by physicians to patients' adaptation to illness; (b) whether patient–physician agreement on the information provided impacts the aforementioned relationship. The study focused on information that, according to the Common Sense Self-Regulation Model, is essential for adaptation to illness.

**Methods:** The sample consisted of 93 patients undergoing chemotherapy and their physicians. Indirect (mediation) effects and conditional (moderated) indirect effects were examined using bootstrapping.

**Results:** The more illness and treatment-related information was provided by physicians, the more positive illness representations (specifically, illness consequences, emotional representations, and personal control) were reported by patients. In turn, these illness representations were related to better physical functioning and better adjustment to cancer. The degree of the patient–physician agreement on the information provided did not affect this relationship.

**Conclusions:** What seems to be more crucial for patients' adaptation to cancer during treatment is the amount of information provided by physicians rather than their agreement with patients on the information provided. Also, there is a need to thoroughly examine the pathways through which information provision impacts adaptation to illness.

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## Background

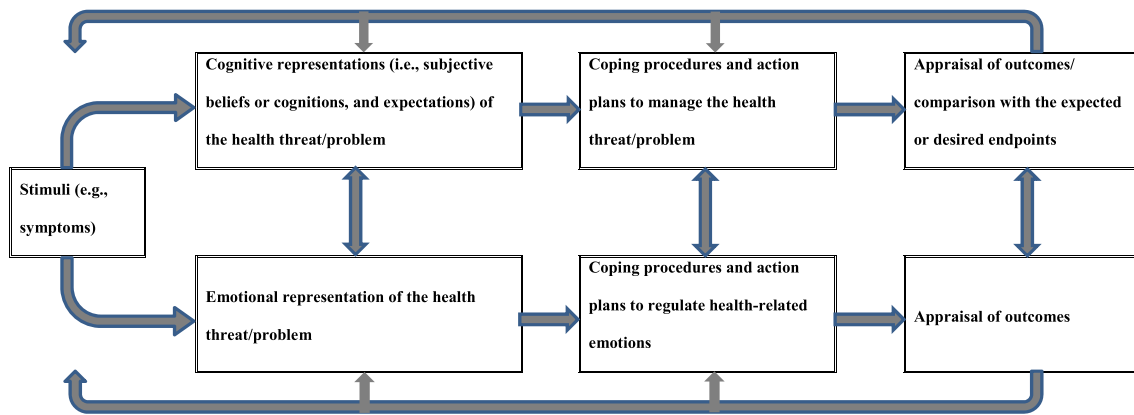
The information exchanged between patients and health professionals is a critical determinant of their relationship and also of patients' well-being [1–4]. For example, although health professionals do not frequently raise issues regarding patients' representations about illness or treatment (e.g., [2,5]), there is evidence that when they engage in such an activity, patients can develop a more accurate and adaptive understanding of their illness, they adhere more to medical advice, and their health condition is better [6,7].

So far, research has not really examined the ways that information provision may impact patients' adaptation to illness [8,9]. However, the Common Sense Self-Regulation Model (CS-SRM; [4,10]) seems to provide an appropriate theoretical background for understanding some of the ways that information provision may affect patients' adaptation to illness.

The CS-SRM suggests that patients develop dynamic cognitive and emotional representations (i.e., subjective beliefs or cognitions) about their condition in order to make sense of and manage the disease [4]. Cognitive illness representations refer to illness identity (symptoms and label/diagnosis), causes (causal attributions of the disease), consequences (the disease impact), timeline (illness course and trajectory) and cure/control

(controllability of symptoms). Patients develop similar representations about their treatment. The CS-SRM also emphasizes emotional reactions to illness, including fear, depression and anger [4,10]. According to the model, there is a causal association between illness representations and health outcomes through illness-related behaviors ([4,11]; see also Figure 1). In this regard, research has shown that a representation of illness as a more controllable, less burdensome condition is related to better adaptation, whereas a perception of illness as a severe, uncontrollable or unpredictable condition is related to worse adaptation and well-being [12].

The CS-SRM posits that the information provided by health professionals is crucial in order for the patients to develop adaptive illness representations and behavior (e.g., [11,12]). Indeed, there is evidence that when physicians are trained to discuss issues related to illness representations or corresponding action plans, patients respond in an adaptive way (e.g., report less worry and try to manage their condition [13,14]). Thus, a possible pathway through which information provision is related to patients' adaptation to illness may be through their illness representations. It is possible that, when physicians provide more information about illness, patients develop a more adaptive representation of illness, which, in turn, is related to better adaptation.



**Figure 1.** The basic illness-related self-regulation process as described by the Common Sense Self-regulation Model [4,11]

### Patient–physician agreement on illness-related and communication-related issues

Patients and physicians differ in the ways they understand illness and treatment [5,15–20]. They also differ in the ways they recall information exchanged during their interactions. Specifically, studies have shown that, although agreement between cancer patients and physicians regarding diagnosis is high, it is much lower on topics such as treatment goals or side effects [21,22]. Furthermore, there is some evidence that the amount of information actually provided by physicians is unrelated to the evaluations of the medical care receivers about their physicians' informativeness [23].

These differences may impact the overall patient–physician communication as well as patients' adaptation to illness. Kleinman [3] suggested that different patient/physician ways of perceiving illness are associated with lower levels of patient satisfaction, worse treatment response and worse health outcomes. There is also evidence that patient–physician disagreement on illness representations is associated with poorer physical and psychological health (e.g., [17,20]). However, as far as the patient–physician agreement on the information provided by physicians is concerned, no study to our knowledge has examined its role in the processes that are related to the patient–physician communication or patients' adaptation to illness. Yet, the examination of this issue is important, as it may have significant implications for the training of health professionals.

### The present study

In this study, we focused on information that, according to the CS-SRM, may help patients develop a more accurate/adaptive understanding of their condition, that is, information about illness (e.g., timeline) and treatment (e.g., treatment expectations). Our first aim was to examine whether this type of information as provided (and reported) by physicians is related to the adaptation to cancer of patients undergoing chemotherapy, through their illness representations. Our hypothesis was that more information provided by physicians

(the independent variable) is related to a more adaptive representation of illness (mediator), which, in turn, is related to better physical functioning and better adjustment to cancer (the dependent variables). Three illness representations are likely more important in this relationship: illness control, illness consequences and emotional representations, the two latter referring to the impact of illness. These two aspects of the illness experience (i.e., illness impact and control) practically reflect patients' main concern during treatment, namely, disease prognosis [24]. Thus, information provided by physicians may be related to a representation of illness as more controllable and less burdensome (i.e., with fewer consequences and less intense emotional representations), which in turn is related to better physical functioning and better adjustment to cancer.

A second aim was to examine the degree of the patient–physician agreement on the illness and treatment-related information provided by physicians, as well as whether agreement moderates the relationship between the amount of information provided, patients' illness representations and patients' adaptation to illness. Information that is provided by the physician and, at the same time, is acknowledged as received by the patient may point toward knowledge that has been better retained or decoded by the patient. Therefore, there is a possibility that this information has a stronger impact on the ways which patients understand and react to illness. In this regard, we expected the amount of information provided by physicians to be more strongly associated with patients' illness representations and, in turn, adaptation to illness, when more information is reported as both provided (by physicians) and received (by patients).

## Methods

### Participants and procedure

The study was conducted at the oncology clinic of a public hospital. Consecutive patients who were visiting the hospital to receive treatment at an outpatient basis were invited to participate. Inclusion criteria were age over 18 years, ability to speak or read Greek, ability to understand

the study protocol and provide informed consent. Measures were completed during patients' stay at the hospital premises. At the same time, the physician responsible for the care of each participant completed a questionnaire regarding the information provided to the patient. The study was approved by the ethics committee of the hospital.

One hundred and forty-one patients were identified as eligible for participation. However, 13 of them refused to participate because they were not interested or felt unable to participate, and 13 did not return all questionnaires completed. Also, for 22 of the patients, only partial information was provided by their physicians. The final sample consisted of 93 dyads (patients and physicians). Ten physicians provided information for the participating patients.

## Measures

### Information provision

To assess physicians' provision of information, we used Phillips *et al.*'s scale [6]. It consists of seven items, which cover all domains of illness and treatment representations (information topics): causes, identity, timeline, control and consequences (e.g., The doctor told me what to expect when taking my medication/treatment). Patients were asked whether their physicians provided information on each topic in the past with a Yes (=1)/No (=0)/Not Applicable answer choice. Answers were summed up to a total score ranging from 0 to 7 (for the applicable items). Physicians also completed the same questionnaire in a slightly reworded version in order to assess their perception of the information provided to each patient (i.e., I have discussed with my patient...). Although this is a newly developed scale, it has been reported to be both reliable and valid [6]. The Cronbach's *a* coefficients for all scales are presented in Table 1.

In addition, patients' and physicians' reports on the information provided were combined in a new scale indicating patient-physician agreement on whether each information topic was discussed (1 = information provided and received (i.e., both parts reported that the topic was discussed); 0 = all other possibilities). The total score was ranging from 0 (*no agreement*) to 7 (*full agreement*).

### Illness representations

Patients' illness representations were assessed with the Revised Illness Perception Questionnaire [25]. The illness representations assessed were timeline acute/chronic (six items; e.g., My illness will last for a long time); consequences (six items; e.g., My illness has major consequences on my life); personal control (six items; e.g., The course of my illness depends on me); treatment control (five items; e.g., My treatment can control my illness); illness coherence, which reflects the patient's ability to make sense of the illness (five items; e.g., I have a clear picture or understanding of my illness); timeline-cyclical that consists of beliefs regarding illness predictability

and variability (four items; e.g., My illness is very unpredictable); and emotional representations (six items; e.g., My illness makes me feel afraid).

Moreover, 13 items were used to assess representations about the potential causes of illness. These items, which were used in previous studies with Greek patients (e.g., [26]), correspond to three factors/potential causes: emotional causes/stress (five items, e.g., anxiety); biological causes (five items, e.g., immune deficiency); and personal behavior (three items, e.g., smoking). To answer the questionnaire, respondents used a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

### Physical functioning

Patients' physical functioning was assessed with the Physical Functioning Scale from the Greek version [27] of the Quality of Life Questionnaire-Core 30 [28]. The scale consists of five items examining patients' assessment of their current ability to perform everyday activities (e.g., Do you have any trouble doing strenuous activities, like carrying a heavy shopping bag or a suitcase?). Participants were asked to respond using a yes (=1)/no (=0) answer choice. Responses were transformed into a 0–100 scale, with higher scores indicating better physical functioning.

### Adaptation to illness

Overall, adaptation to cancer was assessed with the Mental Adjustment to Cancer Scale [29]. The original Greek adaptation of the scale [30] is faced with certain psychometric limitations (e.g., low internal consistency in certain scales, noticed also in this study). Therefore, we employed the factor structure of the scale proposed by Watson and Homewood [31], which was based on a review of previous studies (including the Greek adaptation) and a large cohort study. According to this analysis, there are two broad subscales: the 'summary positive' and the 'summary negative adjustment'. The first is composed mostly of items referring to a determination to deal with illness while maintaining a positive attitude toward the situation (17 items; e.g., I try to carry on with my life as I have always done). The negative adjustment scale is composed of items referring to avoidance/denial, anxious preoccupation with the disease and helplessness/hopelessness (16 items; e.g., I feel completely at a loss about what to do). Respondents were asked to use a 4-point Likert-type scale (definitely does not apply to me—definitely applies to me) with higher scores indicating higher level of each type of adaptation.

### Statistical analysis

The relationships between the study variables were examined using Pearson product-moment correlations (two-tailed significance). Paired *t*-test and the Cohen's kappa coefficient were used to examine the agreement between patients' and their physicians' reports of the type and

**Table 1.** Descriptive statistics and intercorrelations of information provided by physicians, information received by patients, patients' illness representations and patients' physical functioning and positive and negative adjustments to cancer (N = 93)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Information provided (physicians' report)	1.00														
2. Information received (patients' report)	0.17	1.00													
3. Timeline	-0.10	-0.26*	1.00												
4. Timeline—cyclical	-0.16	-0.03	0.25*	1.00											
5. Consequences	-0.31**	-0.22*	0.42**	0.41**	1.00										
6. Personal control	0.18	0.13	-0.26*	-0.04	-0.17	1.00									
7. Treatment control	0.16	0.14	-0.10	-0.15	-0.19	0.35*	1.00								
8. Illness coherence	0.20	0.25*	-0.24*	-0.48*	-0.34**	0.16	0.25*	1.00							
9. Emotional representations	-0.25*	-0.15	0.19	0.35**	0.38**	-0.14	-0.11	-0.54**	1.00						
10. Illness causes—emotional	-0.08	-0.15	-0.06	0.16	0.11	0.06	-0.26*	-0.28**	0.25*	1.00					
11. Illness causes—biological	-0.12	-0.13	0.11	0.28**	0.17	-0.03	-0.25*	-0.37**	0.23*	0.46**	1.00				
12. Illness causes—behavior	-0.15	-0.01	-0.06	0.04	0.18	0.09	-0.16	-0.05	0.12	0.35**	0.39**	1.00			
13. Physical functioning	0.04	0.03	-0.33**	-0.42**	-0.34**	0.24*	0.02	0.15	0.11	0.07	-0.06	0.05	1.00		
14. Summary positive adjustment to illness	0.24*	0.07	-0.25*	-0.04	-0.19	0.38*	0.14	0.08	-0.15	0.12	-0.05	-0.05	0.17	1.00	
15. Summary negative adjustment to illness	-0.15	-0.14	0.43**	0.51**	0.43**	-0.29*	-0.26*	-0.53**	0.57**	0.26*	0.23*	-0.02	-0.38**	-0.15	1.00
Mean	4.99	4.81	17.19	11.69	19.66	20.49	19.24	17.61	19.30	8.15	13.57	8.15	70.11	2.91	2.11
Standard deviation	1.77	1.81	4.73	2.88	4.14	4.03	2.92	3.50	5.60	2.64	2.73	2.64	28.68	0.38	0.45
Cronbach's $\alpha$	0.75	0.71	0.87	0.72	0.78	0.84	0.82	0.66	0.91	0.75	0.61	0.64	0.74	0.78	0.85

\* $p < 0.05$ .  
\*\* $p < 0.01$ .



amount of the CS-SRM-related information provided. Indirect (mediation) effects were assessed with PROCESS, a freely available computational tool for SPSS and SAS [32]. Among others, PROCESS can be used to assess and compare indirect effects in multiple mediator models. This method calculates the bootstrapped confidence intervals for the total indirect effect of the independent variables (i.e., all illness representations, as a set) to the dependent and the *specific* indirect effects (i.e., the extent to which each one particular mediator mediates the relationship, after controlling for all other mediators and covariates). Estimates are calculated using ordinary least squares regressions.

Finally, with PROCESS, we examined whether the aforementioned indirect relations are moderated by the level of the patient–physician agreement regarding information provided by physicians. Specifically, we examined whether patient–physician agreement moderates the relation of the amount of the provided information to illness representations, as well as the direct relation of the information to outcome measures (i.e., physical functioning and summary positive and negative adjustments). PROCESS determines whether indirect effects vary at different levels of the moderator (by default, indirect effects are reported at mean ( $M$ ) and  $\pm 1$  standard deviation ( $SD$ ) of the moderator). Predictors were mean centered before the analysis. A *post hoc* examination revealed a statistical power greater than 0.80 at an alpha level equal to 5% and a medium effect size for the analyses performed.

## Results

### Demographic characteristics and the effects of patient and illness-related factors

The patients' mean age was 58.34 years ( $SD=11.18$ ). Fifty-three of them were women and 40 men; 68 cases were early stage cancers (73.1%), whereas the remainder were metastatic cancers; 28 were diagnosed with breast cancer, 25 with gastrointestinal cancer, 11 with lung cancer, nine with cancer of the reproductive system and 20 with various others types of cancer. Of the patients, 29% had finished up to 9 years of education, 45.2% had finished high school and 25.8% were holders of a higher education degree. Finally, 31.2% were living alone, whereas 68.8% with their family.

The mean frequency of patient visits to their physician during the last year was 9.69 ( $SD=6.57$ ). The mean time of the patient–physician collaboration was 8.24 months ( $SD=6.18$ ).

A series of multivariate analyses of variance of the patients' responses across patient-related and illness-related factors was performed. No statistically significant differences were observed regarding gender, marital status and education level, Wilks  $\lambda$ s  $< 0.90$ ;  $F$ s  $< 1.40$ ,  $p$ s  $> 0.05$ ,  $\eta^2$ s  $< 0.16$ . The type of cancer (early stage vs metastatic) had no overall effect, Wilks  $\lambda=0.85$ ;  $F=0.94$ ,  $p > 0.05$ ,  $\eta^2=0.16$ . Still, it had a statistically significant effect on

timeline, with those suffering from a metastatic cancer scoring higher on this variable,  $F(1, 91)=9.35$ ,  $p < 0.01$ . Age was related to the illness representation of personal control,  $r(93)=-0.28$ ,  $p < 0.05$ , and physical functioning,  $r(93)=-0.21$ ,  $p < 0.05$ , while the time elapsed since diagnosis was related to illness timeline,  $r(93)=0.23$ ,  $p < 0.05$ . Finally, the number of patient visits to physicians and the duration of the patient–physician collaboration were unrelated to patients' responses,  $r$ s(93)  $< 0.15$ ,  $p$ s  $> 0.05$ . Thus, all subsequent analyses were performed after controlling for patients' age, time elapsed since diagnosis and type of cancer.

Regarding the information provided by physicians (as reported by themselves), no statistically significant differences across patients' gender, education level, marital status, as well as the type of diagnosis and the type of cancer were found,  $F$ s  $< 2.15$ ,  $p$ s  $> 0.05$ ,  $\eta^2$ s  $< 0.13$ . Also, the amount of information provided by the physicians was unrelated to any of the other patient or illness-related factors.

### Information provided by physicians and patients' adaptation to illness

The total and the specific indirect effects of the amount of the CS-SRM-related information provided by physicians on patients' physical functioning and adjustment to cancer through their illness representations are presented in Table 2. The total indirect effect was statistically significant for physical functioning and negative adjustment.

Statistically significant specific indirect effects were found for illness consequences in the case of physical functioning, personal control in the case of positive adjustment and personal control and emotional representations in the case of negative adjustment. Overall, information provided by physicians was related to a more adaptive representation of illness (i.e., a representation of more personal control over illness, less illness consequences and less emotional burden), which in turn was related to higher levels of physical functioning and positive adjustment and lower levels of negative adjustment.

### Patient–physician agreement on the information provided and its impact

There was not a statistically significant difference between patients' and their physicians' reports on the amount of CS-SRM-related information provided by the latter (patient  $M=4.81$ ,  $SD=1.81$ ; physician  $M=4.98$ ,  $SD=1.77$ ), paired  $t(92)=-0.76$ ,  $p > 0.05$ . However, as presented in Table 3, there were several differences in patients' and physicians' reports on the type of the information provided.

Only regarding treatment expectations and the integration of treatment in daily routine, most patients agreed with their physicians that this topic was discussed. Still, in most cases, the Cohen's kappa coefficient indicated almost no agreement (kappa coefficients  $\leq 0.10$ ; [33]). A clear disagreement was noticed regarding illness timeline

**Table 2.** The effects of information provided by physicians on outcome measures through patients' illness representations

Illness representations	Physical functioning				Summary positive adjustment				Summary negative adjustment			
	Point estimate	SE	Bootstrapping 95% confidence intervals <sup>a</sup>		Point estimate	SE	Bootstrapping 95% confidence intervals <sup>a</sup>		Point estimate	SE	Bootstrapping 95% confidence intervals <sup>a</sup>	
			Lower	Upper			Lower	Upper			Lower	Upper
Total	2.25	1.26	0.05	5.13	0.03	0.02	-0.01	0.07	-0.06	0.02	-0.11	-0.01
Timeline	0.23	0.37	-0.23	1.34	0.004	0.01	-0.004	0.02	-0.01	0.01	-0.03	0.004
Timeline-cyclical	1.14	0.80	-0.19	3.06	-0.002	0.01	-0.02	0.01	-0.01	0.01	-0.03	0.001
Consequences	1.09	0.67	<b>0.14</b>	<b>2.85</b>	0.003	0.01	-0.01	0.03	-0.01	0.01	-0.02	0.01
Personal control	0.79	0.59	-0.07	2.33	<b>0.02</b>	<b>0.01</b>	<b>0.001</b>	<b>0.05</b>	<b>-0.02</b>	<b>0.01</b>	<b>-0.03</b>	<b>-0.001</b>
Treatment control	-0.28	0.42	-1.49	0.22	0.001	0.01	-0.01	0.02	-0.003	0.01	-0.02	0.002
Illness coherence	-0.36	0.53	-1.98	0.29	-0.003	0.008	-0.02	0.01	-0.01	0.01	-0.03	0.003
Emotional representations	-0.31	0.63	-1.95	0.68	0.01	0.01	-0.01	0.03	<b>-0.02</b>	<b>0.01</b>	<b>-0.05</b>	<b>-0.004</b>
Causes—emotional	-0.04	0.28	-0.96	0.32	-0.002	0.01	-0.02	0.004	-0.002	0.01	-0.02	0.01
Causes—biological	-0.002	0.36	-0.84	0.74	0.001	0.01	-0.01	0.02	0.001	0.004	-0.004	0.01
Causes—behavior	-0.01	0.39	-0.75	0.89	0.004	0.01	-0.002	0.02	0.004	0.004	-0.002	0.02

SE, standard error.

<sup>a</sup>Bootstrapping bias corrected and accelerated (5000 bootstrap samples); after controlling for age, type of cancer (i.e., early vs metastatic) and time since diagnosis. Indirect effects are significant at  $p < 0.05$  for the 95% bootstrap confidence intervals, when the derived intervals do not include values of 0.**Table 3.** Patient-physician agreement on whether each specific topic was discussed

CS-SRM-related information topics <sup>a</sup>	Information provided	Information received	Patient-physician agreement		Patient-physician disagreement		Cohen's kappa
	(physician report): cases in which the topic was discussed (%)	(patient report): cases in which the topic was discussed (%)	Topic discussed (%)	Topic not discussed (%)	Reported by physician—not by patient (%)	Reported by patient—not by physician (%)	
	Cause of illness	45.2	43	20.4	32.3	24.7	
Purpose of medical exams	43	84.9	35.5	7.5	7.5	49.5	-0.04
Illness timeline	90.3	39.8	34.4	4.3	55.9	5.4	-0.05
Treatment/control instructions	58.1	92.5	53.8	3.2	4.3	38.7	0.003
Treatment expectations	97.8	86	84.9	1.1	12.9	1.1	0.10
Integrate treatment in daily routine	94.6	75.3	69.9	0	24.7	5.4	0.03
Monitoring treatment effects on illness	69.9	62.4	44.1	11.8	25.8	18.3	0.02

CS-SRM, Common Sense Self-Regulation Model.

Kappa values lower than 0 typically indicate no agreement, while values between 0 and 0.20 indicate only a slight agreement (for an interpretation of the Kappa coefficient see [33]).

<sup>a</sup>For the overall patient-physician agreement scale:  $M = 3.43$ ,  $SD = 2.04$ .

and the purpose of medical exams (kappa = -0.05 and -0.04, respectively).

Furthermore, no statistically significant effect was noticed regarding the moderating role of the patient-physician agreement. The level of agreement did not moderate either the indirect (i.e., through patients' illness representations) or the direct impact of the amount of the information provided by physicians on any of the outcome variables,  $B_s < 0.25$ ,  $T_s 1.85$ ,  $p_s > 0.05$ .

## Discussion

According to the findings, the more illness and treatment-related information was provided by physicians (as reported by themselves), the more positive illness representations

were reported by the patients. In turn, these illness representations were related to better physical functioning and better adjustment to cancer. This finding provides support to the CS-SRM suggestion that the information coming from health professionals is crucial for the development of more adaptive/accurate illness representations in patients and, consequently, for their effective adaptation to illness (e.g., [6,11]). Moreover, provided that previous reactions to cancer are crucial for subsequent adjustment [34,35], the beneficial impact of the CS-SRM-related information provided by physicians may not be limited to current reactions but also extend to the future.

As expected, three illness representations emerged as specific mediators in this association. Two of them were referring to the impact of cancer (i.e., illness consequences

and emotional representations), while the other was referring to cure/control (i.e., personal control). Illness impact and control represent not only basic aspects of the CS-SRM but also important factors for health and health-related behavior as highlighted by several theories (e.g., [36]). They may also reflect patients' main concerns during treatment (e.g., [24]).

A further significant finding refers to the degree of patient–physician agreement on the information provided by physicians (i.e., information reported as provided by the physicians and also reported as received by the patients). Although patients and physicians were found to agree on the amount of the information being provided, they seemed to disagree on whether each specific information topic was discussed. Similar results have also been reported in previous studies (e.g., [21,22]), especially regarding treatment-related issues.

This disagreement on the information provided probably reflects the difficulties in the overall patient–physician communication and may be the result of several factors such as the variation in patients' ability to understand and retain information, and patients' and physicians' difficulty in accurately recalling or reporting issues raised and discussed [21,22,37]. And, although training in communication skills is provided in most medical education programs, the aforementioned problems are still present and strongly affect information exchange [1]. In addition, it should be noted that the physicians, who participated in our study, were not specifically trained in the CS-SRM. In this regard, our findings indicate that, besides the typical training in communication skills, a special training in the CS-SRM is probably also needed in order to achieve an effective exchange of relevant information [14].

It is interesting that far more patients than physicians reported that the topics of the 'purpose of the medical exams conducted' and 'instructions about treatment' were discussed. This finding may indicate that patients pay attention even to simple or trivial instructions that physicians probably do not consider as a systematic provision of information. On the other hand, it is also possible that physicians cannot recall all information provided to each patient across a number of meetings.

Contrary to our hypotheses, the degree of the patient–physician agreement on the information provided by physicians did not affect the relationship between the amount of the information provided, patients' illness representations and their adaptation to cancer. A possible explanation might be that the provision of more CS-SRM-related information may help patients develop a broadly accurate/adaptive (even if not elaborated) understanding of their condition. This, in turn, probably promotes patients' feelings of control and thus facilitates their adaptation to illness, regardless of the exact information they can decode or recall. It should be stressed, however, that the role of the patient–physician agreement may be

more important at later phases of illness and may also depend on the disease progression. In any case, this is a very interesting issue that deserves further examination in future studies.

The results of this study should be considered in relation to certain limitations. As a cross-sectional study, it is possible that patients' illness representations are influenced by their current health condition or even that the information provided or its reporting was influenced by patients' positive illness representations. The patients were suffering from a diversity of cancer diseases with different prognoses, which might have affected the findings. Also, the study was based on self-report measures. Consequently, patients' and physicians' reports may not be accurate. Furthermore, there is a possibility that physicians' and patients' reports of the information provided by physicians are biased and dependent on their overall satisfaction with their relationship as well as illness and treatment-related issues. A final limitation is the small sample size, which may hinder the detection of interaction effects.

Nevertheless, the findings of this study may have significant practical implications. They indicate that health professionals should elicit and address patients' illness representations, as a standard part of their interaction with patients, given that representations seem to play a key role in the association between information delivery and adaptation to cancer. Furthermore, the findings indicate that, at least during treatment, it is the amount of information provided by physicians, rather than the agreement with patients on the information provided, which is crucial for adaptation to cancer. Thus, physicians should probably focus during treatment on the provision of accurate/adaptive information on a range of illness and treatment-related issues (with an emphasis on the impact of illness and its control but always considering each particular patient's needs and wishes, and with caution), so as to help patients develop a generally adaptive representation of their condition.

Finally, our findings underline the need to further examine the specific ways through which information provision and the broader patient–physician communication affects adaptation to illness, as well as the possible impact of other major aspects of the illness experience (e.g., action plans and communication with partner) on this process. This would help develop more effective communication skills training and intervention programs, not only for health professionals, but also for patients given the importance of their perceived communication skills for adaptation to illness and well-being [38].

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## Ethics approval

The protocol has been approved by the Ethics and Scientific committee of the General and Oncological Hospital

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## Conflict of interest

Authors declare that they have no potential conflict of interest with others that might bias their work.

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