

# The association between communication behavior and psychological distress among couples coping with cancer: Actor-partner effects of disclosure and concealment

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## ABSTRACT

**Objective:** This study applies the Actor-Partner Interdependence Model (APIM) to explore the associations between disclosure and concealment with depression and anxiety among patients with cancer and their partners. **Method:** 90 patient-spouse dyads completed the Self-Disclosure Index (SDI), the Self-Concealment Scale (SCS), the Couples Illness Self-Concealment (CISC) questionnaire, and anxiety and depression via the Patient-Reported Outcomes Measurement Information System (PROMIS) and the Hospital Anxiety and Depression Scale (HADS). **Results:** Significant actor effects were found for most variables, showing disclosure is negatively and concealment is positively associated with depression and anxiety ( $\beta$  between  $|0.29|$  to  $|0.65|$ ,  $p \leq .029$ ). Partner's effect showed a negative association between patients' self-disclosure and their spouses' depression ( $\beta = -0.35$ ,  $p = .043$ ). Patients' anxiety was negatively associated with similarity in all communication variables ( $\beta$  between  $-0.21$  to  $-0.22$ ,  $p = .042$ ).

**Conclusions:** Dyadic communication is an important correlate of distress among couples coping with cancer. Specifically, concealment behaviors have a positive association with distress, whereas disclosure is related to lower levels of anxiety and depression among both partners. In addition, whereas patients are affected more strongly than their spouses by the dyadic similarity, spouses seem to be more attuned to their partners' behaviors and therefore potentially more related to patients' propensity for sharing.

## 1. Introduction

Positive relational communication plays an important role in people's management of various life obstacles and maintaining satisfaction and quality of life [1]. For people coping with exceptional stressors, such as cancer, open supportive communication around illness-related issues may be particularly essential for their adjustment [2]. In addition, as cancer is considered a shared adversity in a couple's life, and is often recognized as a "we disease" [3], studying stress-related correlates of couples' communication is important.

For couples who face cancer, psychological outcomes are influenced by illness characteristics (e.g., stage of illness) as well as by personality

and relational factors (e.g., attachment style, support). Of these, couples' communication has gained empirical attention and is thought to play a major role in one's adjustment to cancer [3,4]. However, although open communication is considered a positive behavior, a recent systematic review of cross-sectional and longitudinal studies [5] showed that whereas concealment often has negative effects, positive effects of disclosure are dependent on different variables, including partners' responsiveness and similarities in the need to share.

There are several concepts that are used in research to assess concealment- and disclosure-based behaviors such as holding back, protective buffering, self-disclosure, self-concealment and open communication [6–9]. Of these, self-disclosure is traditionally defined

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as a personal inclination to share to others personal information [10], whereas self-concealment is described as a personal tendency to keep to oneself information that might be considered intimate, adverse, or distressing [11].

Both concealment and disclosure behaviors are traditionally referred to as personal characteristics presented across different contexts [9,10]. However, studies that have differentiated between these communication behaviors show that in certain contexts, such as romantic relationships [12] or coping with cancer [13], contextual communicative behavior may better predict outcome than trait-based communicative variables. With this in mind, in the current study we used measures of both self-disclosure and self-concealment as personal tendencies, as well as a measure of contextual concealment specifically developed for the context of coping with an illness [14].

In addition to applying a contextual perspective, when assessing communication behavior among couples it seems important to address similarities in their levels of communication. Indeed, previous findings have suggested that a mismatch in communication between couples coping with cancer may serve as a potential hurdle [8], whereas mutual or reciprocal self-disclosure has been found to be related to positive outcomes [15,16].

Different studies have used different definitions and terms that may represent similarities in couples' communication tendencies. Among these are: reciprocal self-disclosure [16], mutual constructive communication, mutual avoidance [16,17], mutual self-disclosure [8], and congruence communication [18]. Different research methodologies have also been used, such as observational methods [8,16], and adjusted or specified questionnaire tools [17,18]. It should be noted that similarity in communication may be related to broader concepts of relational mutuality, and not focused solely on communication, such as reciprocal influence and caregiver-patient congruence [19]. In the current study, the measure of similarity we used was the distance between couples' reports of the above mentioned communication variables to address the association between this similarity and partners' distress.

It is well established that the cancer experience affects both patients and spouses, and therefore dyadic approaches such as the Actor-Partner Interdependence Model (APIM), which assesses both partners' effects, seems most suitable [5]. In the current study we used the APIM [20] aiming to explore the associations between different communication variables of both patients and spouses and their own and their partners' depression and anxiety. Specifically, personal tendencies of disclosure and concealment behaviors as well as the contextual behavior of concealment served as the independent variables. Moreover, we assessed whether the similarity between couples' reports of communication was related to both partners' levels of depression and anxiety. While the majority of previous studies on couples' communication in the context of psycho-oncology were limited in addressing either personal tendency to disclose or conceal, the current study includes in addition to these, a contextual measure of concealment, as well as a similarity measurement between partners' reports, as described above.

## 2. Method

### 2.1. Study design and participants

Participants were 90 heterosexual patient-spouse dyads (180 individuals), who took part in two studies in psycho-oncology. A group of 61 dyads took part in a study conducted five years ago [13] and a second group of 29 couples took part in an ongoing study examining dyadic communication behaviors. Both studies included similar inclusion criteria: 1) participants being over 18 years of age; 2) patients coping with diverse cancer types and their spouses; 3) couples being in a committed relationship; 4) no comorbidity with severe cognitive or mental disorders or severe organic diseases; and 5) a proper understanding of the Hebrew language. The recruitment procedures of both studies received the approval of the institutional review board (IRB) of

Sheba Medical Center (1st approval no 0897–13-SMC, 3252–16-SMC, 2nd approval no 7673–20-SMC). The second study was funded by the Israel Cancer Association, and participants were modestly remunerated for their participation (50\$ per couple). The recruitment procedure included approaching potential participants during their visits to the hospital and having them fill out anonymous online surveys after consent.

### 2.2. Instruments

**Self-Disclosure Index (SDI)** [10], a ten-item self-report in its Hebrew version [14], was used to assess the personal tendency to share private matters. We used an adapted version so that the target individual would be the spouse. Responses are coded on a 5-point Likert scale, with higher scores indicating greater disclosure behaviors. This scale previously showed adequate reliability and validity [10], and did so in our current database as well ( $\alpha = 0.917$  for patients,  $\alpha = 0.929$  for spouses).

**Self-Concealment Scale (SCS)** [11], a ten-item self-report questionnaire in its Hebrew version [14], was used to evaluate one's propensity to keep personal information to oneself, especially negative or distressing. Responses are coded on a 5-point Likert scale, with higher scores expressing higher levels of self-concealment. Cronbach's alpha coefficients in our data were high,  $\alpha = 0.858$  for patients and  $\alpha = 0.891$  for spouses.

**Couples Illness Self-Concealment (CISC) scale** [14], a 13-item self-report scale that assesses dyadic self-concealment behaviors in the context of coping with a chronic illness, was used to measure the active processes invested in concealment related to the illness. Responses are coded using a 7-point Likert scale, with higher scores representing greater self-concealment behaviors. Cronbach's alphas in the current study were  $\alpha = 0.868$  for patients and  $\alpha = 0.903$  for spouses.

**Depression and anxiety** were assessed by different scales in the two original studies from which the data were combined. Assessment was done via the **Patient-Reported Outcomes Measurement Information System (PROMIS)** [21,22] or by the **Hospital Anxiety and Depression Scale (HADS)** [23] whose scores were converted to PROMIS T-scores according to the official the National Institute of Health (NIH) manual and validated conversion tables [24]. The PROMIS scale consists of 16 self-reported items with 8 items for each domain (depression/anxiety), whereas the HADS questionnaire consists of 14 items, 7 for each domain, with higher scores indicating greater reported symptoms. The PROMIS scale was developed collaboratively between the NIH and academic researchers, and is viewed as a psychometrically acceptable tool [25,26]. We used the Hebrew translation [27], and in line with scoring manuals, the PROMIS T-scores are standardized between the range of 36.3 to 82.7 (mean = 50, SD = 10), and therefore all PROMIS raw scores were converted to T-scores [24]. In the present study, Cronbach's alpha coefficients showed adequate scores ( $\alpha = 0.85$  for anxiety,  $\alpha = 0.835$  for depression).

### 2.3. Data analysis

To assess the dyadic effects of patients' and spouses' communication behaviors on their depression and anxiety, we applied the APIM, using a mixed-effects linear regression [20]. Fixed factors included both actors' and partners' measures of SDI, SCS, and CISC. The dyadic effects are categorized as actor effects – which refer to the association between a person's (either patient or spouse) own reported communication behavior and their levels of anxiety or depression – and partner effects, which represent the association between a person's own reported communication behavior and their partner's levels of anxiety and depression. These effects were examined for both patients and spouses.

Covariates included gender (as a fixed effect) and specific cancer diagnosis (random effect), which was introduced after an early exploratory analysis that showed associations of different cancer types with psychiatric outcomes. Due to the described differences in the cohorts'

original outcome measures, we modeled the cohorts as random effects to avoid possible biases. For each group (patients and spouses) we conducted two separate models with depression and anxiety (using PROMIS scores and converted HADS scores) as dependent variables. We controlled for the false discovery rate (FDR) with Benjamini and Hochberg's FDR correction [28].

To examine the effects of dyadic similarity in scoring of communication behaviors on depression and anxiety, we calculated dyadic similarity using the following formula, which is shown here for the SDI but was applied to the SCS and CISC as well:

$$\text{Similarity} = -1^* |(SDI \text{ Actor} - SDI \text{ partner})|.$$

A value of zero represents perfect similarity (i.e., both actor and partner have the exact same rates), whereas lower values represent a larger distance between the actor's and partner's scorings. We then introduced the three similarity measures into a separate model which included the same covariates as the previous models. Finally, we examined inter-dyadic differences (i.e., differences between patients and spouses) in the SDI, SCS, and CISC with paired *t*-tests.

A power analysis using the *APIMPowerR* power calculator [29] indicated that to detect actor effects of medium size (i.e.,  $\beta \sim 0.40$ ) and partner effects of small size (i.e.,  $\beta \sim 0.20$ ) we will need at least 77 couples to achieve a power of 0.80 with a standard  $\alpha < 0.05$ . To account for potential dropout and FDR corrections, we aimed to recruit ~15% more than that suggested number, resulting in 89 couples in the final power calculation.

In all models, we de-trended variables from shared variance to control for contamination by multicollinearity, by regressing the independent variables off one another and then using their standardized residuals in the actual models [30]. We used the standard  $\alpha < 0.05$  chance of a Type I error after adjusting for the false discovery rate. The analysis was conducted using the 'stats' [31] and 'lmerTest' [32] packages in R.

### 3. Results

#### 3.1. Sample description

Of the 90 couples who participated in the study, 47 contained a male patient and a female spouse while 43 contained the opposite. Mean age was 54.98 years for patients (SD = 11.54) and 54.42 years for spouses (SD = 11.34). Fifty-five (61.1%) patients and spouses had a college/university degree, and 34 (37.8%) either had an elementary or secondary school education. Mean length of the relationship was 27.53 years (SD = 14.18). Among the patients, half had been diagnosed with gastrointestinal cancer (50.5%), whereas the rest were either being treated for breast cancer (21.1%) or for other types (23.3%). Moreover, 37.8% of the patients reported stage IV illness, 17.7% reported stage III and the others reported either stage I, II, or unknown. The mean time since diagnosis was 18.36 months (SD = 20.02).

#### 3.2. Actor-partner model: communication and depression

In the actor-partner models, patients' depression was negatively associated with their own SDI (standardized  $\beta = -0.63$ , 95% CI =  $-0.90$  to  $-0.37$ ,  $p < .0001$ ) and positively associated with their own SCS ( $\beta = 0.65$ , 95% CI =  $0.41$  to  $0.88$ ,  $p < .0001$ ) and CISC ( $\beta = 0.29$ , 95% CI =  $0.08$  to  $0.51$ ,  $p = .026$ ), demonstrating significant actor effects. Conversely, patients' depression was not associated with any of the spouse measures, showing no partner effects. Among spouses, depression was negatively associated with their own SDI ( $\beta = -0.39$ , 95% CI =  $-0.64$  to  $-0.14$ ,  $p = .013$ ) and positively associated with their own CISC ( $\beta = 0.45$ , 95% CI =  $0.23$  to  $0.67$ ,  $p = .001$ ) but not associated with spouses' own SCS. Spouses' depression was also negatively associated with their partners' (i.e., the patients') SDI ( $\beta = -0.35$ , 95% CI =  $-0.64$

to  $-0.08$ ,  $p = .043$ ); that is, there was a partner effect. Patients' CISC and SCS were not associated with spouses' depression. The results are depicted in Fig. 1 and summarized in Table 1.

#### 3.3. Actor-partner model: communication and anxiety

Patients' anxiety was significantly negatively associated with their own SDI ( $\beta = -0.37$ , 95% CI =  $-0.64$  to  $-0.11$ ,  $p = .029$ ) and positively with SCS ( $\beta = 0.40$ , 95% CI =  $0.16$  to  $0.63$ ,  $p = .009$ ) and had a marginally significant positive association with their own CISC after the FDR correction ( $\beta = 0.24$ , 95% CI =  $0.03$  to  $0.45$ ,  $p = .055$ ), meaning significant actor effects. Of note, patients' anxiety was significantly positively associated with their own CISC before applying the FDR correction ( $p = .031$ ) but became marginally significant afterwards. None of the partner measures significantly associated with patients' anxiety, meaning there were no partner effects. Among spouses, actor effects were found, as anxiety was significantly positively associated with spouses' own SCS ( $\beta = 0.35$ , 95% CI =  $0.16$  to  $0.54$ ,  $p = .002$ ) and CISC ( $\beta = 0.39$ , 95% CI =  $0.19$  to  $0.59$ ,  $p = .002$ ) but not with their own SDI. As with patients, partner effects were not observed, as none of the partner measures were significantly associated with spouses' anxiety. The results are depicted in Fig. 2 and summarized in Table 2.

#### 3.4. Dyadic similarity models

In the dyadic similarity models, patients' anxiety was significantly negatively associated with similarity in SDI ( $\beta = -0.22$ , 95% CI =  $-0.42$  to  $-0.04$ ,  $p = .042$ ), SCS ( $\beta = -0.21$ , 95% CI =  $-0.39$  to  $-0.00$ ,  $p = .042$ ), and CISC ( $\beta = -0.21$ , 95% CI =  $-0.39$  to  $-0.00$ ,  $p = .042$ ), meaning that the more anxiety the patients reported the less similar scores of SDI and CISC was reported by patients and spouses. Patients' depression, spouses' depression, and spouses' anxiety were not associated with any of the similarity measures. The full results of the dyadic similarity models and the actor-partner models are depicted in Figs. 1 and 2, and summarized in Tables 1 and 2.

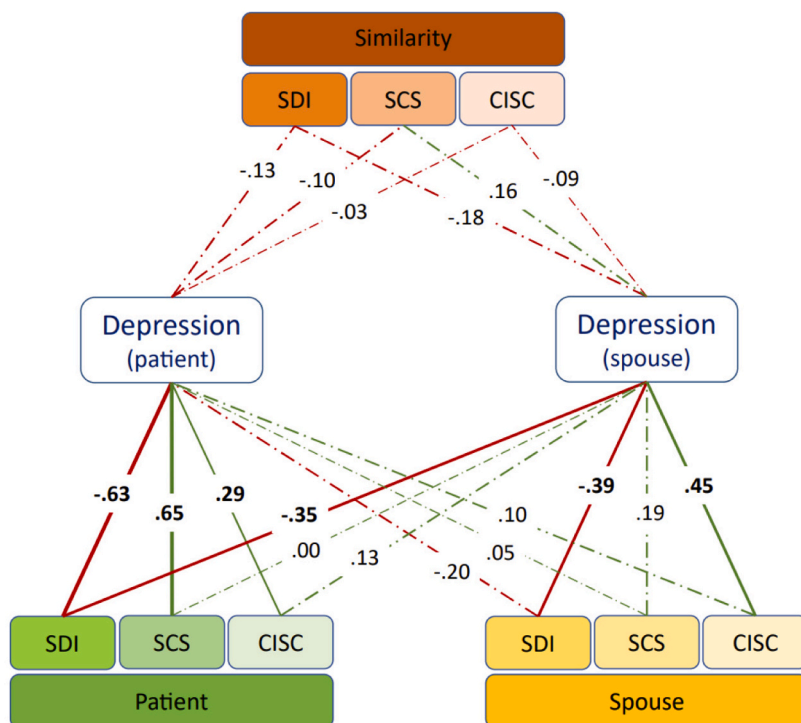
#### 3.5. Inter-dyadic differences in reported communication behavior

Spouses scored higher than patients on CISC ( $M \pm SD = 2.6 \pm 1.2$  vs.  $1.9 \pm 0.8$ ,  $t(89) = 4.89$ ,  $p < .001$ ), but did not significantly differ on SDI ( $4.9 \pm 1.0$  vs.  $5.1 \pm 0.9$ ,  $p = .17$ ) or SCS ( $2.2 \pm 0.9$  vs.  $2.1 \pm 0.8$ ,  $p = .16$ ).

### 4. Discussion

In the current study we aimed to expand the existing literature on dyadic communication in psycho-oncology. We did so by exploring the interdependence associations of patients' and spouses' different reported communication behaviors on their depression and anxiety outcomes. Furthermore, we investigated the similarity in couples' reported communication behaviors to assess the effect of this similarity on each partner's psychological distress.

Results showed that one's own SDI was negatively associated with one's own anxiety and depression, and one's own SCS and CISC were positively related to these outcomes (with the exceptions of no significant association between SCS and depression and SDI and anxiety among spouses), indicating significant actor effects for both patients and spouses. Furthermore, among spouses, their own levels of depression were negatively associated with their partners' SDI levels; that is, the more that was disclosed by the patient, the less depression was reported by the healthy spouse, providing evidence for a significant partner effect. Lastly, similarity in levels of all examined communication variables was negatively related to patients' levels of anxiety. Thus, the more similar levels of reported disclosure or concealment between partners, the less anxiety patients reported. While these findings suggest that disclosing is beneficial for both partners while concealment is not, it is also possible that high depression and anxiety leads to less engagement



**Fig. 1.** Path diagram for the actor-partner and dyadic similarity models, dependent variable = *Depression*. SDI (Self-Disclosure Index), SCS (Self-Concealment Scale), CISC (Couples Illness Self-Concealment), bold indicates significance.

**Table 1**  
Actor-partner and dyadic similarity models, dependent variable = *Depression*.

	Patient			Spouse		
	Actor	Partner	Similarity	Actor	Partner	Similarity
SDI	<b>-0.63</b> (-0.90, -0.37)	-0.20 (-0.44, 0.04)	-0.13 (-0.33, 0.09)	<b>-0.39</b> <sup>*</sup> (-0.64, -0.14)	<b>-0.35</b> <sup>*</sup> (-0.64, -0.08)	-0.18 (-0.38, 0.02)
SCS	<b>0.65</b> <sup>***</sup> (0.41, 0.88)	0.05 (-0.14, 0.26)	-0.10 (-0.32, 0.12)	0.19 (-0.02, 0.39)	0.00 (-0.25, 0.24)	0.16 (-0.06, 0.37)
CISC	<b>0.29</b> <sup>*</sup> (0.08, 0.51)	0.10 (-0.12, 0.30)	-0.03 (-0.24, 0.21)	<b>0.45</b> <sup>**</sup> (0.23, 0.67)	0.13 (-0.10, 0.34)	-0.09 (-0.30, 0.13)

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ , <sup>±</sup> Marginally significant after FDR ( $0.10 > p > .05$ ).

Numbers (parentheses) in the table represent standardized betas (95% confidence intervals).

SDI (Self-Disclosure Index), SCS (Self-Concealment Scale), CISC (Couples Illness Self-Concealment).

in communicative behavior. For example, it might be that if the patient’s spouse is depressed, the patient may not want to burden the spouse with additional information that may make them more depressed and therefore will conceal more information and disclose less.

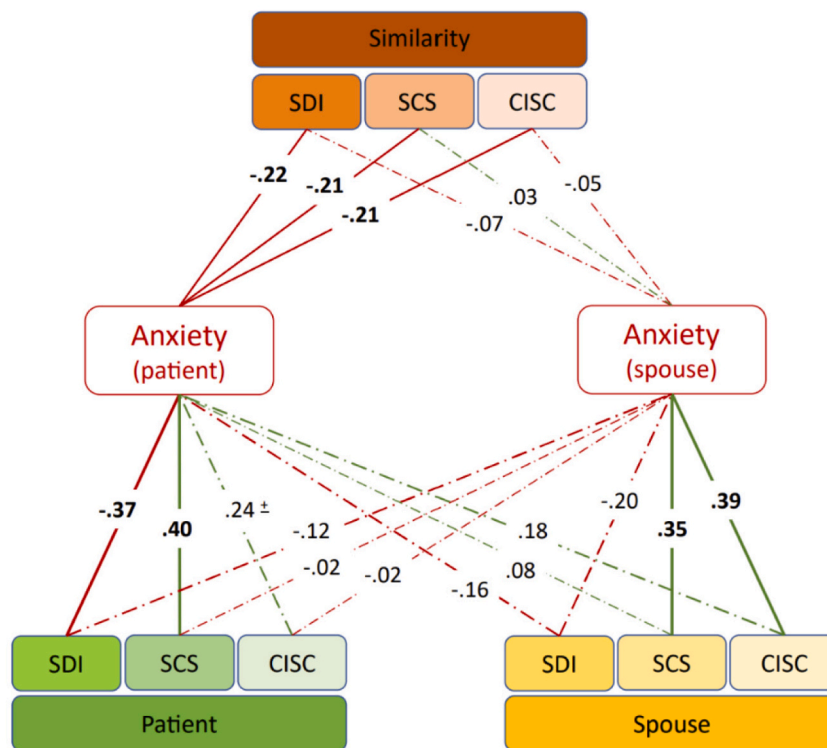
The actor effects described in this study are in line with the well-established finding in cross-sectional studies that higher behaviors of concealment among couples coping with cancer are associated with an increase in psychological distress [14,17,33]. As for disclosure behaviors, our results are consistent with some findings from a cross-sectional study providing evidence for their association with lower levels of distress [33], and therefore highlighting the importance of self-disclosure behaviors for patients and spouses. However, the negative association of disclosure with distress not been proven decisive or conclusive; critical discussions [5,9], as well as longitudinal study [8],

have questioned the beneficial role of self-disclosure and suggested possible mediators or moderators for the effect of disclosure, such as responsiveness- as shown in an experimental study [16] or intimacy- as shown in a cross-sectional study [33]. Hence, these ambiguous findings should be taken into consideration when interpreting our results. Findings in the current study regarding the negative association between outcome and similarity of partners in reported communication behaviors, along with findings from previous study on the positive interaction effect of disclosure and responsiveness using experimental design [16], suggest that disclosure may be more beneficial when it is done mutually.

Unlike the actor effects described above, no partner effects were found among patients. This finding aligns with findings from a previous cross-sectional study [5], and critical discussions [32], as actor effects are more common than partner effects in the context of communication behavior effects. Perhaps patients facing cancer are naturally more self-focused and are more affected by their own experience than by the experience of others in their environment. This scenario may eventuate from patients’ struggles to integrate the experience of their illness into their identity, resulting in some self-absorption and a limited amount of attention given to their caregivers’ experience. Patients may also be inaccessible, as they may feel preoccupied with themselves and their illness: factors that may “use up” their coping resources, as suggested in a qualitative study [34].

Interestingly, we did find a partner effect among healthy spouses, as their depression levels were negatively associated with their partners’ (i. e., the patients’) SDI. Namely, the more the patient disclosed, the less depression the healthy partner reported. A possible explanation for this finding is that spouses may benefit to a greater degree than do patients from open dyadic communication, as such communication may reduce their uncertainty levels regarding the illness, whereas for patients, illness-related communication may simply evoke hopelessness [35]. Moreover, as the partner effect was observed only among spouses, it may suggest that caregivers interact with greater sensitivity to their partners’ needs [36] and therefore are more affected by their partners’ behavior.

As mentioned above, whereas in the current study the healthy



**Fig. 2.** Path diagram for the actor-partner and dyadic similarity models, dependent variable = Anxiety. SDI (Self-Disclosure Index), SCS (Self-Concealment Scale), CISC (Couples Illness Self-Concealment), bold indicates significance, ± marginally significant.

**Table 2**  
Actor-partner and dyadic similarity models, dependent variable = Anxiety.

	Patient			Spouse		
	Actor	Partner	Similarity	Actor	Partner	Similarity
SDI	<b>-0.37*</b> (-0.64, -0.11)	-0.16 (-0.40, 0.08)	<b>-0.22*</b> (-0.42, -0.04)	-0.20 (-0.42, 0.03)	-0.12 (-0.38, 0.13)	-0.07 (-0.29, 0.12)
SCS	<b>0.40**</b> (0.16, 0.63)	0.08 (-0.11, 0.28)	<b>-0.21*</b> (-0.39, 0.00)	<b>0.35**</b> (0.16, 0.54)	-0.02 (-0.24, 0.20)	0.03 (-0.17, 0.25)
CISC	0.24± (0.03, 0.45)	0.18 (-0.03, 0.39)	<b>-0.21*</b> (-0.39, 0.00)	<b>0.39**</b> (0.19, 0.59)	-0.02 (-0.23, 0.18)	-0.05 (-0.27, 0.15)

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ , ± Marginally significant after FDR ( $0.10 > p > .05$ ).

Numbers (parentheses) in the table represent standardized betas (95% confidence intervals).

SDI (Self-Disclosure Index), SCS (Self-Concealment Scale), CISC (Couples Illness Self-Concealment).

spouse’s depression was negatively related to the patient’s SDI, the patient’s anxiety was negatively related to the similarity in couples’ reported communication variables. It seems that for patients it is not the partners’ behavior alone that is associated with outcomes, but rather their partners’ behavior aligning with their own behavior. These results are in line with prior findings indicating that patients experienced less distress when their disclosure was followed by their partners’ reciprocal disclosure [16], and when there was mutual constructive communication [17]. Importantly, some findings have indicated that regarding mutual avoidance behaviors, similarity between partners may have a deleterious effect on both partners’ distress [15,17]. Others have not shown an association between mutual self-disclosure and patients’ lower distress [8]. These findings highlight the importance of further examination of whether the benefits of similar patterns of

communication are dependent on specific types of communication behaviors. The need for additional exploration is supported by our findings, which showed significant associations of partner similarity in all communication variables, suggesting the salubrious role of general matching in partners’ communication behaviors, regardless of specific type.

An additional finding of the current study was that spouses reported significantly higher CISC levels than did patients. However, this pattern was not observed regarding personality communication traits (i.e., SDI and SCS). This highlights the caregiver’s protective role in the context of coping with cancer [9]. Specifically, these differences in our study were found only in the context of concealment regarding illness-related issues, indicating the importance of assessing specific contexts.

#### 4.1. Study limitations

A few limitations should be taken into consideration. First, the study made use of two datasets. Although similar exclusion criteria and methodology were used in participant recruitment, some demographic information was lost during the analysis process (such as dropout rates from the first dataset), and recruitment took place over several years. This aspect may have increased the variance between the samples and affected our ability to produce more consistent results. Second, the design of our study was cross-sectional, and therefore causality cannot be inferred. It could be that more distress leads to more concealment and not vice versa, as suggested by Hinnen [37]. Future researchers should assess the effects of dyadic communication over time. An additional limitation is the lack of heterogeneity of the samples, limiting our ability to generalize from the results, as most of our participants were older couples, highly educated, and in relationships that were of long duration. These factors may also have affected the dyadic communication behaviors reported, as younger couples are more likely to display more open communication than older ones [9], whereas long duration of relationships may facilitate more stable communication patterns [38].

Another limitation pertains to illness severity; namely, more than half of the patients were facing cancer in its advanced stages. Therefore, these couples' dyadic communication dynamics may have been influenced by the progression of the disease, as previously suggested [9]. For instance, open dyadic communication may become more intense when the illness is more severe [39], whereas severity may also make the patients' struggles more apparent and evoke in their partners a greater wish to help and communicate [40].

#### 4.2. Clinical implications

Despite these limitations, the present study has many strengths and implications. First, the data were assessed and analyzed at a dyadic level, using the APIM approach, which provided us with a wider perspective of both intrapersonal and interpersonal communication processes. Furthermore, in the current study communication variables were referred to from a contextual perspective, and not only from a predisposition one. Moreover, we were able to control for mixed-gender effects, as the gender distribution of both patients and spouses was similar. Finally, in addition to the assessment of reported communication behaviors by both partners, in the current study we assessed the similarity between their reports, which yielded additional important information regarding the association between communication and outcome.

In light of the findings, we would recommend addressing communication skills during therapy, keeping in mind the positive associations of concealment with outcomes, and the negative ones of partners' similarity in communication behaviors with outcomes. Furthermore, whereas spouses seem to be more attuned to their partners' behaviors and therefore potentially more related to patients' disclosure levels, patients' outcomes seem to be more related to the similarity between their own communication behaviors and those of their partners. Therefore, facilitating matching dyadic communication behaviors within the therapeutic setting may help to promote better communication strategies.

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#### Author statement

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

#### CRedit authorship contribution statement

**Keren Sella-Shalom:** Conceptualization, Data curation, Methodology, Investigation, Project administration, Writing – original draft. **Nimrod Hertz-Palmor:** Formal analysis, Software, Writing – review & editing. **Michal Braun:** Writing – review & editing. **Eshkol Rafaeli:** Writing – review & editing. **Reut Wertheim:** Data curation, Writing – review & editing. **Noam Pizem:** Resources, Writing – review & editing. **Einat Shacham-Shmueli:** Resources, Writing – review & editing. **Ilanit Hasson-Ohayon:** Conceptualization, Investigation, Supervision, Writing – original draft, Writing – review & editing.

#### Declaration of Competing Interest

None.

#### Data availability

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

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