

# We think we can: development of the Dyadic Efficacy Scale for Cancer

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## Abstract

**Background:** Measurement advances are needed to enable the study of dyadic-level processes impacting couples coping with cancer. This study sought to develop and empirically examine a Dyadic Efficacy Scale for Cancer (DESC). Cancer-related dyadic efficacy is an individual's confidence to work together with a partner to cope with cancer and its treatment. **Methods:** The DESC was developed using an exploratory sequential mixed methods design. This paper outlines the psychometric evaluation phase. Individuals with cancer ( $N=261$ ) and their partners ( $N=217$ ) completed 50 items. Item-level analyses reduced this set to 26 items. Using the dyad as the unit of analysis, confirmatory factor analysis with mirrored patient and partner bifactor structure tested for the presence of a general factor and 3 secondary factors, that is, illness intrusions, patient affect, partner affect. **Results:** Goodness-of-fit indices supported the identified model,  $\chi^2(1170)=2090, P < .001$ ; RMSEA = .05,  $P = .14$ , 90% CI .05–.06; SRMR = .05; CFI = .90. Multidimensionality differed for patients and partners. A general dyadic efficacy factor and secondary factors for managing affect were present for both dyad members, whereas the secondary factor of managing illness intrusions was confirmed for patients only. The model explained 72% and 64% of the variance in patients' and partners' dyadic efficacy. Evidence of convergent validity was presented. **Conclusions:** This study is the first to provide a tool to assess dyadic efficacy among couples coping with cancer. The assessment of cancer-related dyadic efficacy enables new discoveries into couples' adjustment to cancer.

**Keywords:** couples, dyadic efficacy, measurement, neoplasm, self-efficacy

Measurement advances are needed for research to keep pace with the growing conceptual acceptance that patients' and partners' responses to a cancer diagnosis occur within a dynamic interdependent system.<sup>[1,2]</sup> As conceptualized in Berg and

Upchurch's developmental-contextual model,<sup>[3]</sup> this approach involves the adoption of a dyadic lens when considering the appraisal, coping and adjustment of patients and their partners following a cancer diagnosis. In keeping with the need for dyadic conceptualizations, Sterba et al<sup>[4]</sup> expanded on existing individually focused models of self-efficacy by developing a model of dyadic efficacy among couples ( $N=190$ ) managing rheumatoid arthritis. In the context of coping with a chronic illness, dyadic efficacy was defined as "an individual's perceptions of confidence about his or her shared ability with a partner to manage (illness)-related problems."<sup>[4]</sup> Sterba et al discovered that higher dyadic efficacy was associated with fewer depressive symptoms for both women with rheumatoid arthritis and their husbands. In this same study, dyadic efficacy was also positively associated with relationship satisfaction and quality for both patients and partners. Dyadic efficacy rests on systemic principles that highlight the relational embeddedness of confidence appraisals. For individuals embedded in a patient-partner dyad, understandings of efficacy need to not only acknowledge confidence in the individual's ability to cope with cancer and its treatment but also assess efficacy for the abilities of the couple as a unit.

To our knowledge, dyadic efficacy has not yet been investigated among cancer patients or their partners. Researchers have, however, examined self-efficacy generally and with respect to several processes of adaptation to cancer including communication, symptom management, emotional functioning, and coping.<sup>[5,6]</sup> The term self-efficacy was first coined by Bandura<sup>[7]</sup> and refers to individuals' "judgments of their capabilities to organize and execute courses of actions required to attain designated types of performances."<sup>[8]</sup> Higher self-efficacy expectations have predominantly been associated with lower levels of psychological distress and higher ratings of quality of life among patients and their partners following a cancer diagnosis.<sup>[9,10]</sup> Researchers have also begun to demonstrate that psychosocial interventions can be used to improve cancer

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*Data Availability:* Research data for this manuscript are not shared.

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patients' and their partners' self-efficacy.<sup>[11–13]</sup> More specifically, researchers have demonstrated that educational or skills-based interventions could be used to improve spousal caregivers' confidence to support their partner, care for themselves<sup>[11]</sup> and to manage stress and other changes associated with cancer<sup>[12]</sup>. Northouse et al<sup>[13]</sup> increased the self-efficacy of both patients with advanced cancer and their family caregiver using a dyadic intervention which provided information and support.

Applying Sterba et al's work<sup>[4,14]</sup> and the efficacy component of social cognitive theory<sup>[8]</sup> to the cancer context, cancer-related dyadic efficacy represents an individual's judgment of his or her joint capability with a partner to manage challenges posed by cancer and its treatment. An empirically based measure of dyadic efficacy will enable examinations of the role dyadic efficacy plays in couples' relational and psychological outcomes following a cancer diagnosis.

**Objectives and hypotheses**

The objective of this study was to evaluate the Dyadic Efficacy Scale for Cancer (DESC). This objective was accomplished by: conducting item-level analyses, confirming the factor structure, and presenting evidence of the scale's reliability and validity. It was anticipated that cancer-related dyadic efficacy would be negatively correlated with psychological distress, and positively correlated, but not synonymous with, relationship functioning, and self-efficacy. All hypotheses relate to both patient and partner data.

**Methods**

**Scale development**

The DESC was developed using an exploratory sequential mixed methods design. Gehlbach and Brinkworth's<sup>[15]</sup> and DeVellis<sup>[16]</sup> guidelines informed the item and scale development procedures which included 3 phases: construct and content development, the development of an item pool that was evaluated through expert review and pilot testing, and administration of the scale to a development sample for psychometric testing. Phase 3, the psychometric evaluation of the DESC, is the focus of the present paper.

Phases 1 and 2, encompassing construct and item pool development were completed through a multi-step process of consultation with lay and content experts. A detailed account of the conceptual grounding for this scale and procedures related to item development and evaluation have been provided by Brosseau et al<sup>[17]</sup> elsewhere. To sum, the exploratory phase of the study involved focus group (N=5) consultations with lay experts—individuals diagnosed with cancer and their partners (N=17)—to establish a description of dyadic efficacy as it applied to the process of coping with cancer and its treatment and to identify content domains for the assessment of cancer-related dyadic efficacy. Reflexive thematic analysis<sup>[18]</sup> was used to identify 3 main conceptual themes: cancer-related dyadic efficacy is multidimensional, consistent with relational functioning and distinct from self-efficacy. Three main content themes were also identified. Items were developed to assess cancer-related dyadic efficacy across the following 3 content domains: dyadic efficacy for managing illness intrusions, the emotional response of the patient and the partner, and communication and care for children. The pool of scale items was then evaluated for relevance, clarity, and content breadth by experts in psychosocial

oncology (N=5) and by a second sample of individuals diagnosed with cancer and their partners (N=41). Ethical approval for this multi-site study (MP-05-2015-254, 14-078) was obtained from the research ethics committee of le center intégré universitaire de santé et de services sociaux du Centre-Ouest-de-l'Île-de-Montréal, Québec, Canada.

**Participants**

Two hundred eighty-seven dyads were represented in the sample (Table 1). Although efforts were made to recruit complete dyads, eligible patients and partners were able to participate alone. Data were received from 191 complete dyads leaving 96 dyads represented by a patient (n=70) or a partner (n=26) alone. In sum, data from 261 patients and 217 partners were available for

**Table 1**  
Demographic and medical characteristics of the sample presented by role.

Characteristic	Patients (n=261)		Partners (n=217)	
	n	%	n	%
Sex				
Female	149	57	98	45
Male	109	42	119	55
Marital status				
Married	202	77	171	79
Common-law	36	14	32	15
Cohabiting	12	5	6	3
Dating	8	3	7	3
Highest level of education				
Primary school (grades 1–6)	2	1	4	2
Secondary school (grades 7–11)	53	20	50	23
Vocational or technical training	78	30	59	27
University degree	123	47	102	47
Employment status				
Full-time work	50	19	76	36
Part-time work	21	8	18	8
Leave from work	35	13	8	4
Retired/not employed outside home	105	40	101	47
Unemployed	9	3	7	3
Disability assistance	35	13	3	1
Social assistance	—	—	1	.5
Annual household income				
<\$40,000	51	19	39	20
>\$40,000–<\$60,000	36	14	30	16
>\$60,000–<\$80,000	32	12	29	15
>\$80,000–<\$100,000	35	13	30	16
>\$100,000	75	29	63	33
Ethnicity				
White	214	82	187	87
Chinese	2	1	1	.5
Asian (South/Southeast/West)	5	2	6	3
Black	9	3	6	3
Indigenous, First Nations, Inuit & Métis	2	1	1	.5
Filipino	7	3	2	1
Latin American	6	2	2	1
Arab	2	1	3	1
Korean	1	1	1	.5
Other	12	5	7	3
Cancer type				
Breast	84	32	(64)	(30)
Gastrointestinal	44	17	(34)	(16)
Blood	26	10	(26)	(12)

(continued)

**Table 1**  
(continued).

Characteristic	Patients (n=261)		Partners (n=217)	
	n	%	n	%
Lung	20	8	(19)	(9)
Prostate	18	7	(17)	(8)
Gynecological	16	6	(14)	(7)
Head and neck	11	4	(8)	(4)
Melanoma	11	4	(8)	(4)
Kidney	5	2	(4)	(2)
Bladder	3	1	(2)	(1)
Brain	2	1	(2)	(1)
Other	11	4	(8)	(4)
Stage at diagnosis				
0	10	4	(5)	(2)
I	23	9	(24)	(12)
II	49	19	(30)	(15)
III	43	17	(36)	(18)
IV	51	20	(51)	(25)
Unknown/alternate staging	75	29	(59)	(29)
Treatment Received				
Chemotherapy	196	75	(159)	(74)
Radiation therapy	127	49	(100)	(47)
Surgery	93	36	(75)	(35)
Transplant	3	1	(5)	(2)
Hormonal therapy	47	18	(34)	(16)
Other	39	15	(31)	(14)

Category totals may not equal 100% due to missing values and/or rounding. Partner data displayed in parentheses indicate medical information about the partner's spouse.

analysis. Four percent of the participating couples represented homosexual partnerships ( $n=4$  male/male,  $n=3$  female/female). The sexual orientation of patients and partners who participated alone was unknown. Eligible patient participants were diagnosed with cancer within the past 2 years, were presently receiving treatment (or within 6 months of completion) and were involved in a committed relationship of at least one year (ie, dating, common-law, married). Partners meeting the relationship criterion were eligible provided their spouse met medical criteria. All eligible participants were 18 years of age or older (patient age,  $M=60$  years, range=18–93 years; partner age,  $M=59$  years, range=19–85 years), able to read and comprehend English, and able to provide informed consent.

### Procedures

A multimodal recruitment strategy was used to facilitate paper-and-pencil or online survey completion. The most effective recruitment strategy occurred face-to-face in clinic and treatment waiting rooms at 2 urban cancer centers in Québec, Canada. Of the 612 eligible dyads (or patient/partner representative of a dyad) recruited in person, 45% completed participation in the study (Fig. 1). This response rate was well within the range (25%–90%) of response rates from similar populations reported in a recent systematic review.<sup>[19]</sup> It was not possible to compute a comprehensive response rate because the number of eligible participants who received an email invitation, viewed a paper advertisement, or were informed about the study by a health care professional was unknown. Data were not collected regarding the reasons why 55% of those who were eligible and accepted a participation package did not go on to complete the study. Some of these potential participants were never reached upon

follow-up, others expressed an ongoing intent to complete participation and others indicated that they were no longer interested.

Although waiting room recruitment was the most effective strategy employed, 23% of individuals approached in the waiting room declined to be screened. It is possible that this result reflects the broad recruitment strategy used. Research assistants approached individuals waiting for a clinic or treatment appointment, provided information about the research project and asked if the individual was interested in learning more about the study. Reasons for declining screening were not systematically recorded but included factors such as obvious ineligibility (ie, the individual approached was not a patient or a partner, the patient was not partnered) or a lack of interest in research on couples coping with cancer. Potential participants who expressed interest in the study were screened for eligibility and provided with a participant package (consent forms, surveys, follow-up survey invitation and a pre-addressed stamped return envelope). Up to 3 follow-up calls/emails were attempted (1 week apart) if questionnaires were not received after 1 week. Participants invited via email were provided with a URL link to the online survey and instructed to complete eligibility screening, consent and the study questionnaires using the web-based Qualtrics software.<sup>[20]</sup>

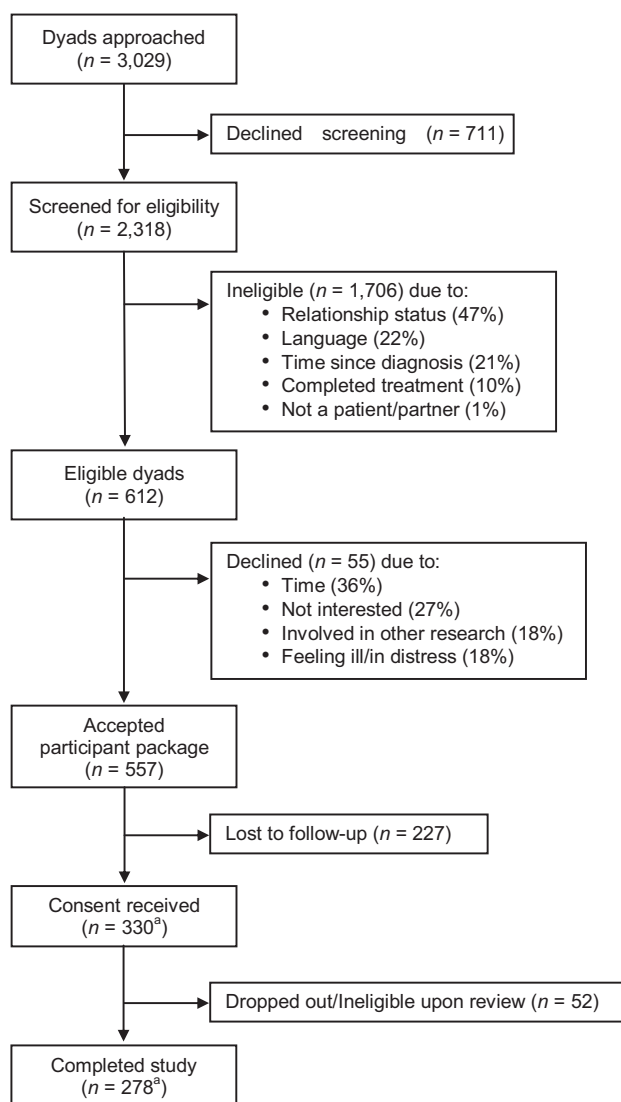
### Measures

All participants first completed a demographic and medical questionnaire followed by the dyadic efficacy scale. To limit the influence of carry over effects, a balanced Latin Square design was used to establish an incomplete counterbalanced order (5 options) for the remaining measures.

**Demographics and medical history.** The demographic and medical questionnaire included questions about participants' basic demographics (ie, age, sex, ethnicity), relational and family factors (ie, relationship status, relationship length, parental status), education and employment (ie, household income, level of education, employment status), and physical and psychiatric history (eg, cancer diagnosis, cancer treatments, psychiatric diagnosis).

**Dyadic efficacy.** Patients and partners were presented with 50 parallel items. Each item began with the following item stem, I am confident that we can work together as a team to ... . The items were presented in 4 sections: dyadic efficacy for managing illness intrusions (related to the patient's physical experience, the medical system, social life, couple life and ongoing responsibilities), patient affect, partner affect, and childcare. It was anticipated that the scale would elicit a general factor due to the theoretical proposal that cancer-related dyadic efficacy rests on the couples' relational functioning and multidimensionality reflective of the 4 domains queried. Participants responded using a 9-point numeric scale with descriptive labels identifying each end point, 1 (*not at all confident*), 9 (*completely confident*) and the midpoint, 5 (*somewhat confident*). Higher scores reflected higher dyadic efficacy.

**Self-efficacy.** Patients' self-efficacy was assessed using the Cancer Behavior Inventory—Brief (CBI-B).<sup>[21,22]</sup> The CBI-B is a unidimensional scale containing 14 items that assess 4 domains of cancer-related self-efficacy: maintaining independence and positive attitude, participating in medical care, coping and stress management, and managing affect. Cronbach  $\alpha = .91$ . Partners'



**Figure 1.** Face-to-face recruitment rate. Recruitment was tracked based on dyads. Data totals indicate dyads represented by both members or a solo patient or a solo partner participant. <sup>a</sup>An additional 13 dyads consented online and 10 of these completed the study. These dyads were not included in the totals displayed above to avoid inflating the response rate for face to face recruitment.

self-efficacy was assessed using the Caregiver Inventory (CGI).<sup>[2,3]</sup> The CGI consists of 21 items related to self-efficacy for managing medical information, caring for the patient, caring for oneself, and managing difficult interactions and emotions. Cronbach  $\alpha = .93$ . Higher scores indicated higher self-efficacy for both measures.

**Relationship functioning.** The Revised Dyadic Adjustment Scale (RDAS) was used to assess relationship functioning.<sup>[24,25]</sup> The RDAS includes 14 items assessing dyadic consensus, dyadic satisfaction, and dyadic cohesion. Higher scores reflected higher functioning. Patients' Cronbach  $\alpha = .87$ ; partners' Cronbach  $\alpha = .89$ .

**Psychological distress.** Participants' psychological distress was measured using the Hospital Anxiety and Depression Scale (HADS).<sup>[26]</sup> The HADS is a 14-item scale divided into two 7-item subscales (anxiety and depression). Higher scores indicated higher symptom levels. The anxiety symptoms subscale

Cronbach's  $\alpha_{\text{patients}} = .83$ ;  $\alpha_{\text{partners}} = .84$ . The depressive symptoms subscale Cronbach  $\alpha_{\text{patients}} = .84$ ;  $\alpha_{\text{partners}} = .82$ .

### Data analyses

**Preliminary analyses.** Item-level analyses were conducted to select the best candidate items for inclusion in model testing. Statistical data, conceptual considerations (ie, content redundancy, clarity) and readability informed the exclusion of items. Intercorrelations among items were examined using a correlation matrix. Corrected item-total correlations and item distribution data (ie, measures of central tendency, SD) were computed and reviewed. Statistical reasons for item exclusion focused on items with poor inter-item correlations, low item-scale correlations, a noncentral mean, or poor variability. Based on DeVellis<sup>[16]</sup> recommendations, item correlations were prioritized over item reduction based on means and variances. The statistical performance of item pairs with highly similar conceptual content was compared. Items with better performing distributions or when equivalent, items evaluated as clearer by consensus of the

research team were retained. Items demanding higher reading comprehension (> grade 9) based on Lexile scores of readability were excluded. To ensure parallel patient/partner measures, item decisions were applied identically to each item set.

**Factor analysis.** Using the dyad as the unit of analysis, a confirmatory factor analysis (CFA) with a mirrored bifactor model structure among both patients and partners was conducted (Fig. 2).<sup>[27]</sup> The model was tested using 26 retained items from the initial pool that reflected the 3 components of the scale design (ie, illness intrusions, patient-affect, and partner-affect). In the bifactor structure, all 26 items were constrained to load on a general primary factor and also on one of the 3 correlated secondary factors, orthogonal to the primary factor. Items presented in the same questionnaire section loaded on the same secondary factor. This bifactor structure was mirrored between patients and partners. To account for the dyadic study design, correlations among residual terms of the patient and partner side pertaining to the same item were included and the common factors from both sides were allowed to intercorrelate. A variance decomposition based on the bifactor model was conducted to investigate the dimensionality and reliability of the scale. A CFA, rather than an exploratory factor analysis, was warranted due to the substantial conceptual research done to identify a theoretical scale structure.<sup>[17]</sup>

Full information maximum likelihood was used to handle missing data under the missing at random assumption and made use of all available information for each individual. Robust

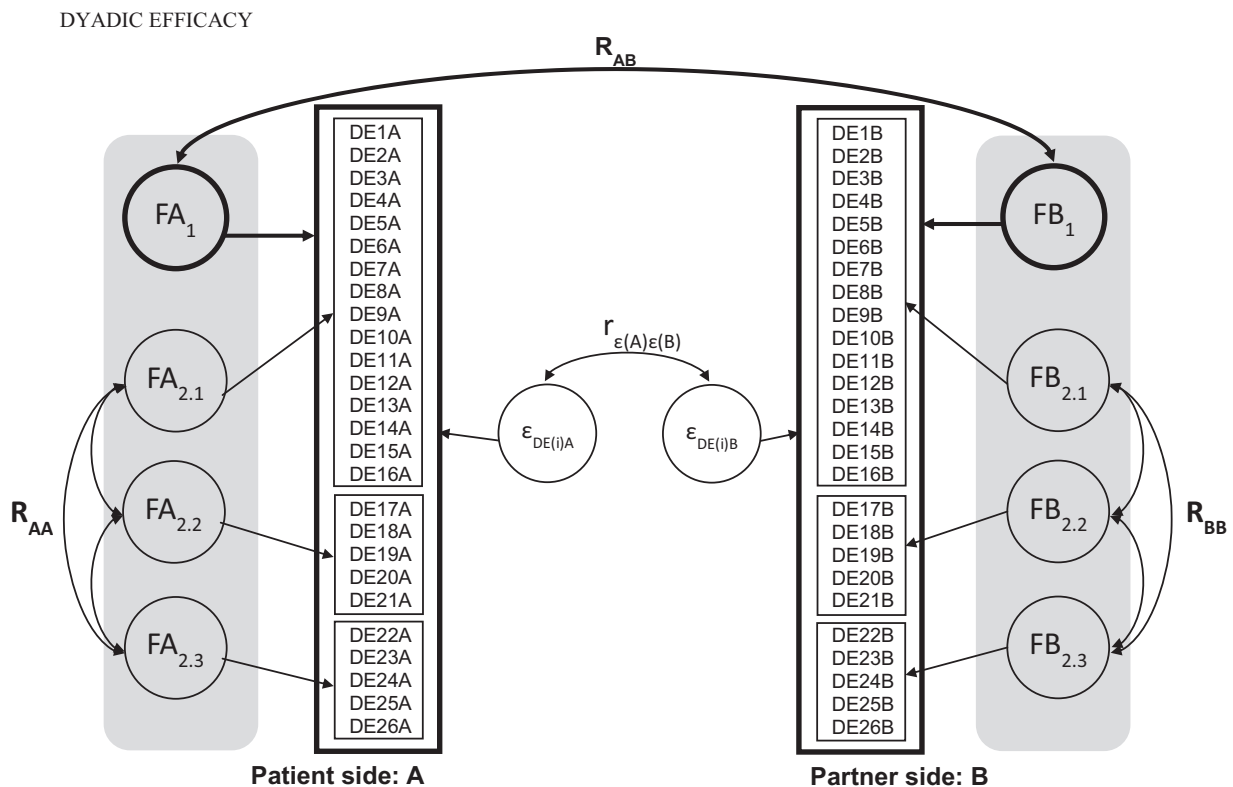
(Huber-White) standard errors for all estimated parameters and a scaled goodness-of-fit  $\chi^2$  for statistical inference were applied. Model fit was evaluated based on commonly recommended goodness-of-fit indices,<sup>[28]</sup> including the  $\chi^2$  test of exact model fit, the root mean square error of approximation (RMSEA:  $\leq .08$  = acceptable,  $\leq .05$  = good) to assess close fit, the comparative fit index (CFI:  $\geq .90$  = acceptable,  $\geq .95$  = good) contrasting to a null independence model, and the standardized root mean square residual (SRMR:  $\leq .08$  = acceptable,  $\leq .05$  = good). CFA was conducted using Mplus (Version 8).<sup>[29]</sup>

**Reliability and validity.** Given the strengths of model-based reliability indices over measures of internal consistency,<sup>[30]</sup> McDonald’s omega ( $\geq .70$  = adequate) was used to assess the reliability of the unit-weighted total and subscale scores. Convergent validity of the DESC was evaluated by examining Pearson product moment correlations of the hypothesized relationships between dyadic efficacy and established measures of related constructs.<sup>[16]</sup> Reliability and validity analyses were conducted using IBM SPSS software (Version 24).

**Results**

**Preliminary analyses**

Data screening were conducted to identify entry errors and assess missing values and normality assumptions. Due to a small number of participants with dependent children living at home ( $n=49$  patients,  $n=33$  partners), 5 items specific to dyadic



**Figure 2.** Standardized path diagram of the mirrored bifactor model for the Dyadic Efficacy Scale for Cancer (DESC). There are 26 items in total in the questionnaire for both patients (A) as well as partners (B): DE1 to DE26 (see bold block containers).  $FA_1$  is a primary factor on which all items load on that were responded to by the patient group (A);  $FA_{2.1}$  to  $FA_{2.3}$  are correlated secondary factors (see  $R_{AA}$  and  $R_{BB}$ ) orthogonal to the primary factor, for which only items with the same stem / from the same questionnaire component load on (see sub-blocks inside the bold block). This bifactor structure is mirrored in similar fashion for the partner group (B). To account for the dyadic study design (ie, patient-partner couples), correlations ( $r_{\epsilon(A)\epsilon(B)}$ ) among residual terms pertaining to the same item ( $\epsilon_{DE(i)A}$  &  $\epsilon_{DE(i)B}$ ) are allowed, as well as correlations among the common factors from both sides ( $R_{AB}$ ).



efficacy for communicating with and caring for children were excluded from this analysis. Descriptive statistics and item-level analyses were conducted on the remaining 45 equivalent patient and partner items. Age, sex, relationship length, relationship quality, and distress were compared between complete dyads and those represented by a patient or partner only. The only group difference found was for partner sex,  $\chi^2(1, N=217)=4.89, P=.03, \phi=.15$ . The percentage of male partners was higher (58%) among complete dyads than among the sample of partners participating alone (35%).

Corrected item-total correlations and item means were of limited use for item reduction purposes due to highly similar results across items. Five items with limited response ranges were candidates for exclusion but were retained for the current analysis given this stage of scale evaluation and due to their conceptual relevance as previously evaluated by lay and expert reviewers.<sup>[17]</sup> Nineteen grouped or paired items with high inter-item correlations and conceptual similarity were reduced to 8 items (eg, “discuss our concerns with my doctor(s)” was retained over “talk openly with my medical team”). When possible, the item with greater variance was retained; when item variance was identical or negligibly different, the item that authors DB and AK judged to be more direct was retained. An additional 4 items that had content similarity with retained items but were more broadly worded were excluded by authors DB and AK. For example, an item querying patients’ and partners’ confidence in their conjoint ability to “make sense of their feelings about cancer” was more

specifically addressed by items querying patients’ and partners’ confidence to manage fears, worries or low mood. The 4 items with the highest Flesch-Kincaid Grade Level<sup>[31]</sup> (FKGL) scores were also removed. The FKGL scores of these items ranged from 9.8 to 13.4, suggesting that a reading comprehension level typically achieved at the end of grade 9 or later was required for accurate understanding. The above-described item-level analyses led to the exclusion of 19 items, leaving 26 patient and 26 partner items to be carried forward for model testing (see Appendix A for DESC–Patient version, <http://links.lww.com/OR9/A30>). Descriptive statistics, including item-level missing values were reviewed before model testing (see supplement digital content SDC Table 1, <http://links.lww.com/OR9/A29>).

**Factor analysis**

The overall fit of the CFA reflected adequate to strong goodness-of-fit indices:  $\chi^2(1170)=2090, P<.001$ ; RMSEA=.05,  $P=.14, 90\% \text{ CI } .05 \text{ to } .06$ ; SRMR=.05; CFI=.90. All 26 patient items loaded significantly on the patient primary factor (FA<sub>1</sub>) with factor loadings ranging from .52 to .86 (Table 2). Apart from 3 items (DE4B, DE16B, and DE19B), all partner items loaded significantly on the partner primary factor (FB<sub>1</sub>) with factor loadings ranging from .56 to .79. The primary factors explained 54% and 43% of the variance in patients’ and partners’ dyadic efficacy respectively (see SDC Table 2, <http://links.lww.com/OR9/A29> for variance decomposition).<sup>[32]</sup> Item responses were

**Table 2**  
Mirrored bifactor model for the Dyadic Efficacy Scale for Cancer.

Item	Patients				$r_{\epsilon(A)\epsilon(B)}$	Partners			
	FA1	FA2.1	FA2.2	FA2.3		FB1	FB2.1	FB2.2	FB2.3
1	.70*	.20			.03	.70*	-.21		
2	.74*	.19			.14	.68*	-.18		
3	.74*	.23***			.31*	.67*	-.06		
4	.52*	.48**			.32**	.47	-.30		
5	.58*	.28**			.71*	.59*	-.15		
6	.66*	.39*			.33*	.66*	-.16		
7	.81*	.06			.38*	.79*	-.01		
8	.74*	.43*			.16	.67*	-.22		
9	.79*	.27**			.13	.79*	-.19		
10	.60*	.67*			.35*	.69*	-.17		
11	.72*	.45**			.34*	.69*	-.32		
12	.75*	.35**			.18*	.77*	-.15		
13	.78*	.08			.43*	.75*	-.14		
14	.73*	.24***			.09	.72*	-.24		
15	.80*	.24			-.11	.56	-.51		
16	.74*	.45**			-.11	.58	-.62		
17	.86*		.30***		.03	.65***		.61**	
18	.77*		.47*		.04	.59***		.56	
19	.76*		.57*		-.01	.54		.77**	
20	.75*		.55*		.15	.61***		.68**	
21	.83*		.35*		.16	.63**		.55***	
22	.79*			.47*	.01	.66*			.62*
23	.75*			.55*	.04	.63*			.68*
24	.70*			.67*	-.06	.64*			.70*
25	.69*			.66*	-.08	.59*			.72*
26	.67*			.57*	-.07	.61*			.61*

Model fit indices:  $\chi^2(1170)=2090, P<.001$ ; RMSEA=.05,  $P=.143, 90\% \text{ CI } .05-.06$ ; SRMR=.05; CFI=.90. F1 is a primary factor, F2.1 to F2.3 are secondary factors, orthogonal to the primary factor, on which only items from the same questionnaire component load on. The bifactor structure is mirrored between patients and partners, with additional residual correlations ( $r_{\epsilon(A)\epsilon(B)}$ ) among all item residuals and inter-factor correlations to account for the dyadic design (ie, patient-partner couples). Residual correlations were allowed for item pair 1 and 2 ( $r_{\epsilon(A)\epsilon(A)}=.47(.08), P<.001$ ;  $r_{\epsilon(A)\epsilon(A)}=.24(.09), P=.008$ ) and item pair 21 and 26 ( $r_{\epsilon(A)\epsilon(A)}=.33(.08), P<.001$ ;  $r_{\epsilon(A)\epsilon(A)}=.32(.12), P=.006$ ).

\*  $P<.001$ .  
 \*\*  $P<.01$ .  
 \*\*\*  $P<.05$ .

more strongly correlated for patients than for partners across the full scale and within each secondary factor item set. The 3 secondary factors examined were supported in the patient but not in the partner model. For patients, item sets reflecting dyadic efficacy for managing illness intrusions (FA<sub>2,1</sub>), one's own affect (FA<sub>2,2</sub>) and a partner's affect (FA<sub>2,3</sub>) demonstrated residual common variance within each item set, above that which was explained by the general factor (known as local item dependencies). This multidimensionality accounted for an additional 18% of the variance in patients' dyadic efficacy. In the partner sample, there was evidence for secondary factors with respect to partners' dyadic efficacy for managing the patient's affect (FB<sub>2,2</sub>) and their own affect (FB<sub>2,3</sub>), but not for illness intrusions (FB<sub>2,1</sub>). Secondary factors accounted for 21% of the variance in partners' dyadic efficacy. To sum, the model was able to account for a total of 72% and 64% of the variance in patients' and partners' cancer-related dyadic efficacy.

**Within-dyad correlations.** The primary factors were strongly correlated between patients and partners ( $r = .67, P < .001$ ; see SDC Table 3, <http://links.lww.com/OR9/A29>). Within-dyad correlations among the secondary affect management factors were approximately  $\geq .3$ , with only the correlations between a patient's dyadic efficacy for managing partner affect (FA<sub>2,3</sub>) and the 2 affect management factors among partners (FB<sub>2,2</sub> and FB<sub>2,3</sub>) significantly different from 0 ( $r = .39, P < .01$ ;  $r = .37, P < .01$ ). Significant local dyadic dependencies were demonstrated for 9 items reflecting dyadic efficacy for managing multiple illness intrusions (Table 2). Responses to these items were correlated more strongly within dyads than was anticipated based on inter-factor correlations. In other words, the residual variance associated with these 9 patient and partner items may be explained, at least in part, by a dyadic-level factor not accounted for by the model. Items related to affect management did not demonstrate such residual within-dyad dependencies.

**Reliability and validity**

The reliability of the unit-weighted total score was estimated to be  $\Omega_A = .72$  and  $\Omega_B = .64$  for patients and partners, respectively. Reliability for the unit-weighted subscale scores among patients was estimated to be  $\Omega_{A2,1} = .63$  for illness intrusions,  $\Omega_{A2,2} = .84$  for patient-affect and  $\Omega_{A2,3} = .87$  for partner-affect. Reliability

among partners was estimated to be  $\Omega_{A2,2} = .71$  for patient-affect and  $\Omega_{A2,3} = .84$  for partner-affect. The reliability results presented here support multiple unit-weighted scoring options for the DESC.<sup>[33]</sup> Among patients, reliability indices support the use of a total DESC score and the computation of patient affect and partner affect subscale scores. Support for scoring the illness intrusions subscale among patients was near adequate. Among partners, support for a total DESC score was near adequate. Computations of subscale scores for patient and partner affect among partners were well-supported. Dyadic efficacy for managing illness intrusions was not an identified secondary factor among partners. Convergent validity of the DESC was examined by considering hypothesized relationships between cancer-related dyadic efficacy and psychological distress, self-efficacy, and relationship quality. The hypothesized relationships and the direction of association were confirmed for each of the correlations examined (Table 3).

**Discussion**

The DESC was developed using a rigorous multiphase design with careful attention to foundational construct and item development procedures. The bifactor model identified is consistent with conceptual work that highlighted both the stability of cancer-related dyadic efficacy as a function of couples' preexisting relational functioning and an anticipated multidimensionality of efficacy based on the challenge being managed.<sup>[17]</sup> The strength of the general factor, particularly among patients, may suggest that patients' perceptions of cancer-related dyadic efficacy were more strongly influenced by an overarching confidence in the dyad's capability than by differences in the specific type of challenge encountered. However, the additional variance captured by the secondary factors suggests that subtle differences in dyadic efficacy across domains were present. The suggestion that cancer-related dyadic efficacy reflects both a general dyadic efficacy and a domain-specific dyadic efficacy echoes an unresolved discussion in the literature surrounding the presence of a stable sense of self-efficacy in one's capability versus domain-specific appraisals.<sup>[7,34]</sup> Results based on the DESC indicate that a general perception of the dyad's efficacy may be a stronger underlying contributor to patients' perceptions of confidence than to partners.

**Table 3**  
Correlations between the DESC total, DESC subscales, and measures of psychological distress, relationship quality and self-efficacy by patient (N=261) and partner (N=217) role.

Measure	1	2	3	4	5	6	7	8	M <sub>Pt</sub>	SD <sub>Pt</sub>
1. DESC total	—	—	—	—	-.42*	-.42*	.47*	.62*	7.36	1.42
2. Illness intrusions DE	—	—	.83*	.77*	-.38*	-.41*	.43*	.59*	7.49	1.49
3. Patient affect DE	—	—	—	.82*	-.43*	-.39*	.45*	.60*	7.24	1.72
4. Partner affect DE	—	—	—	—	-.41*	-.35*	.46*	.57*	7.07	1.70
5. Anxiety symptoms	-.41*	—	-.36*	-.47*	—	.59*	-.26*	-.53*	6.25	3.86
6. Depressive symptom	-.50*	—	-.45*	-.52*	.59*	—	-.22*	-.54*	4.63	3.72
7. Relationship quality	.52*	—	.50*	.45*	-.17**	-.29*	—	.35*	50.83	9.96
8. Self-efficacy	.77*	—	.73*	.67*	-.40*	-.50*	.51*	—	7.21	1.29
M <sub>Sp</sub>	7.46	—	7.21	6.98	7.17	4.52	51.35	7.26	—	—
SD <sub>Sp</sub>	1.62	—	1.47	1.71	3.74	3.28	8.72	1.07	—	—

DE=dyadic efficacy, Pt=patient, Sp=spouse/partner. Correlations for the patient sample are presented above the diagonal, and correlations for the partner sample are presented below the diagonal. Correlations for disease management in the partner sample were not calculated as there was no evidence to support this secondary factor. Correlations between DESC total scores and secondary DESC factors were not presented due to the overlap of items underlying their score.

\* P < .001.  
\*\* P < .05.

Dyadic efficacy for affect-management was well accounted for by the respective patient and partner factors. Items reflecting the management of illness intrusions resulted in higher item residuals and the presence of residual interdependence within dyads. Confidence to conjointly manage illness intrusions may be more strongly influenced by idiosyncratic differences specific to the functioning of a couple or by disease-related factors that were not accounted for by this model. For example, differences in the extent of change to a patient's physical appearance are strongly influenced by cancer type and treatment. Patients diagnosed with cancers of the head and neck and younger breast cancer patients commonly report higher levels of body image dissatisfaction.<sup>[35,36]</sup> These initial results suggest that the influence of shared demographic, relational or disease factors on couples' dyadic efficacy may be more substantial for illness intrusions than for items reflecting efficacy for affect management.

Adequate to strong evidence was provided for the reliability and validity of computing a DESC total score and the 3 patient subscales and 2 partner subscales. Following this initial evaluation, well-supported DESC scoring options include: unidimensional total score for patients and affect management subscale scores for patients and partners. Additional scale development efforts should reevaluate and consider adjustments to improve the reliability of a DESC total score among partners and the illness intrusion items among both groups. Consistent with previous research on dyadic or collective efficacy, the DESC performed as expected in relation to related constructs.<sup>[4,14,37]</sup> Sterba et al<sup>[4]</sup> reported that dyadic efficacy for rheumatoid arthritis management was highly correlated with relationship quality, noting that further examination of the constructs' distinctiveness should be reviewed. Greater distinctiveness was achieved in our sample with more moderate associations found between cancer-related dyadic efficacy and relationship quality. Dyadic efficacy and self-efficacy were highly correlated in our samples, particularly among partner participants. It will be essential to further examine this association to ensure adequate differentiation between a partner's dyadic efficacy and a partner's self-efficacy for caregiving has been achieved.

### **Clinical research and applications**

The study of couple-focused interventions is young when compared to other areas of clinical focus in psychosocial oncology. The consideration of cancer-related dyadic efficacy adds an additional dimension to the commonly examined individual and social resources studied among couples coping with cancer (eg, self-efficacy, relationship functioning).<sup>[6,38]</sup> With theoretical and empirical support for the association of efficacy and psychological outcomes following illness,<sup>[4,39]</sup> the DESC provides a promising new systemic target for psychosocial researchers to pursue. The development of the DESC opens up possibilities for the design and evaluation of dyadic efficacy enhancing interventions in cancer care and enables the assessment of a novel outcome when evaluating existing couples' interventions. Adherence to the notion of, "*we think we can*" may have dynamic influences on couples' adjustment to cancer. According to Badr and Acitelli,<sup>[40]</sup> dyadic efficacy may also help to explain the influence of dyadic coping behaviors on individual and relational outcomes among couples coping with illness. Further experimental research would be useful here as cancer-related dyadic efficacy could be conceptualized as an appraisal within the developmental-contextual model of couples' coping,<sup>[3]</sup> thereby influencing the couples' enactment of individual or dyadic coping strategies.

The 26-item DESC can be completed by most respondents in 10 minutes. The DESC could be a valuable assessment tool for clinicians providing support for couples coping with cancer. Knowledge of patients' and partners' baseline appraisals of confidence to manage the effects of cancer and more specifically, their own and their partners affect, would be a valuable component of the early clinical picture of a couples' functioning. The structure of the DESC also responds to the need to consider partners' responses to a loved one's disease in their own right, rather than holding a more restricted view of partners as unidimensional care providers.<sup>[3]</sup> This was accomplished as equivalent patient/partner versions of the DESC were examined and perhaps more uniquely, through the assessment of the couples' confidence to manage the partner's emotional response to cancer as well.

### **Study limitations**

The model confirmed in this administration of the DESC should be further corroborated in a distinct sample. On average, respondents in the current sample had higher socioeconomic status and reported high levels of cancer-related dyadic efficacy and relationship quality. This may be due to a self-selection bias whereby individuals in higher functioning relationships are more likely to participate in a study examining couple-level outcomes. Efforts were made to limit this phenomenon by allowing patients and partners to participate alone but it is unknown if this strategy improved the sample heterogeneity. It may be advantageous to administer the DESC in a study examining either patients or partners, thereby minimizing the emphasis on couples when advertising and actively recruiting participants. The high levels of dyadic efficacy reported here may also reflect ceiling effects in the items themselves. The sample used for this study included 18% of patients and 13% of partners who were Indigenous, Black, persons of color. Furthermore, only 4% of complete dyads represented male/male or female/female partnerships. Additional inquiry is needed to consider whether the DESC is an accurate measure of cancer-related dyadic efficacy among more diverse patient and partner populations. Participation in the study was limited to those who could read and write in English. This eligibility criterion further influences the generalizability of the reported findings.

To ensure the DESC covered content domains most commonly experienced by individuals with cancer regardless of cancer diagnosis, necessary generality was used for items concerning physical symptoms and side-effects. The design and testing of supplementary subscales specific to a particular type of cancer would enable a more thorough assessment of dyadic efficacy for the management of physical symptoms. The use of subscales specific to cancer type has been used successfully for other scale sets (ie, Functional Assessment of Cancer Therapy scales).<sup>[41]</sup> An assessment of the scale's test-retest reliability and sensitivity to change would also need to be investigated before this tool could be used to evaluate interventions or be employed in clinical settings.

### **Conclusions**

In his writings on self-efficacy, Bandura<sup>[8]</sup> asserted that enhancing efficacy not only reduces distress but also has the potential to increase one's capacity to persevere in the face of obstacles. In a setting where uncertainty ranks among the most common psychological stressors of cancer,<sup>[42]</sup> this assertion deserves



further empirical inquiry. The DESC is a newly developed scale with initial evidence of its reliability and validity for assessing couples' confidence to cope with the effects of a cancer diagnosis and its treatment. The DESC is thoroughly systemic in structure and design and will enable investigations of dyadic-efficacy interventions to better meet the interpersonal needs of cancer patients and their family members.

### Conflicts of interest

The authors report no conflicts of interest.

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