

# Self-reported distress and problems after treatment for gynecological cancer – Correlation between a short screening tool and longer measures of anxiety/depression and health-related quality of life

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## Abstract

**Introduction:** The National Comprehensive Cancer Network (NCCN) distress thermometer and problem list (DTPL) is a brief self-report screening measure for use in follow-up cancer care. The aims of this study were to explore the correlations between scores on the DTPL and scores on longer measures of anxiety/depression and health-related quality of life among women treated for gynecological cancer, and to define a cutoff score on the DT representing high levels of psychological distress in this patient group.

**Material and methods:** During outpatient visits, 144 women filled in the DTPL, the Hospital Anxiety and Depression Scale (HADS) and the RAND-36-Item Short Form Health Survey (RAND-36) between October 2019 and March 2020. We assessed the agreement between the DT-scores and the HADS scores, explored variables associated with high levels of distress on the DT, and studied the associations between DTPL-scores and scores of health-related quality of life (HRQoL) from RAND-36.

**Results:** In receiver operating characteristic curve analysis between the distress score from the DT and a HADS total score  $\geq 15$  (defining high levels of anxiety/depression symptoms), the area under the curve was 0.81 (95% CI: 0.74–0.89). Using a cutoff of  $\geq 5$  on the DT (scale 0–10), we found a balanced level of sensitivity (81%) and specificity (71%) towards a HADS total score of  $\geq 15$ . The scores of distress and problems reported on the DTPL correlated significantly with the majority of HRQoL function scales from RAND-36.

**Conclusions:** The NCCN DTPL can be used as a screening measure for self-reported distress and problems after treatment for gynecological cancer. A score of  $\geq 5$  on DT may indicate high level of anxiety/depression as measured by HADS. The tool

**Abbreviations:** DT, distress thermometer; DTPL, distress thermometer and problem list; HADS, Hospital Anxiety and Depression Scale; HRQoL, health-related quality of life; NCCN, National Comprehensive Cancer Network; PL, problem list; RAND-36, RAND-36-Item Short Form Health Survey; ROC, receiver operating characteristic; SD, standard deviation.

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may help identify patients in need of referral to supportive care and rehabilitation facilities.

#### KEYWORDS

distress thermometer aftercare, gynecological neoplasms, health-related quality of life, psychological distress, psychometrics

## 1 | INTRODUCTION

Women treated for gynecological cancer may experience physical and psychological adverse effects after treatment such as pain, fatigue, polyneuropathy and anxiety.<sup>1-3</sup> These symptoms can negatively affect patients' daily function and quality of life.<sup>4,5</sup> Psychosocial support and rehabilitation services may help alleviate patients' level of distress and problems.<sup>6-8</sup> Identifying patients in need of supportive care and rehabilitation by systematic assessment of symptoms is recommended, but can be difficult to accomplish in a busy hospital setting.<sup>9-11</sup> Short screening measures can be helpful in this practice.

The National Comprehensive Cancer Network (NCCN) definition of the concept *distress* includes unpleasant experiences of psychological, social, spiritual, and/or physical nature that may interfere with the ability to cope effectively with the disease.<sup>12</sup> The NCCN has developed the distress thermometer (DT) and problem list (PL), a brief one-page self-report tool to assess patients' subjective level of distress and problems.<sup>12</sup> The DT is a single-item 11-point Likert scale visually resembling a thermometer and ranging from no distress (score 0) to extreme distress (score 10). The PL presents a list of psychosocial and physical problems that may impact on the level of distress. The NCCN DTPL has been translated and validated into more than 60 languages.<sup>3,13-21</sup>

A predefined cutoff score on the brief DT-scale indicating a high level of psychological distress may be useful for screening purposes in clinical practice. Several studies have examined the correlation between the distress-score of DT and levels of self-reported symptoms of anxiety/depression measured by the 14 item Hospital Anxiety and Depression Scale (HADS). Analyses to explore the agreement between various cutoff levels on the DT and the established cutoff level of high level of anxiety/depression on HADS have been performed. The optimal cutoff score on DT for a high level of psychological distress has ranged from 2 to 7 across studies.<sup>10,13,17,19</sup> This diversity in findings may represent differences across patient samples (cancer diagnosis and time point evaluated), wording in the translated versions, demographic and cultural factors. Only one published study has explored the agreement between the DT and the HADS-scores among gynecological cancer patients.<sup>22</sup>

According to NCCN the concept distress is broader than psychological distress as it includes also the burden from physical, social and existential challenges. Hence, the correlation between distress/problems reported on the DTPL and various dimensions of

### Key message

The scores on the brief distress thermometer (DT) and problem list showed high correlations with scores of anxiety/depression and health related quality of life among gynecological cancer patients. A DT-score of  $\geq 5$  (range 0-10) indicate high level of psychological distress.

health-related quality of life (HRQoL) are interesting to explore, but have rarely been published.<sup>18,23</sup>

The aims of this study were (1) to identify the optimal cutoff score for high level of psychological distress on the Norwegian version of NCCN DT among women treated for gynecological cancer, and to explore demographic and cancer-related factors associated with distress above this cutoff level, and (2) to examine the correlation between the NCCN DTPL-scores and the scores from an established measure of HRQoL.

## 2 | MATERIAL AND METHODS

### 2.1 | Setting and patients

The study was performed at the outpatient clinic of the Department of Gynecological Cancer at Oslo University Hospital. Patients who had received treatment during the last 2 years, and who were scheduled for a follow-up consultation in the clinic between October 2019 and March 2020, were eligible for inclusion in the study. The inclusion criteria were cancer of the ovaries/tubes, uterus, cervix or vulva, 18 years of age or older and able to understand Norwegian language. Exclusion criteria were severe cognitive impairment, severe psychiatric illness, and/or insufficient Norwegian language capacity interfering with the ability to complete the questionnaires.

### 2.2 | Measures

Patients filled in a questionnaire including demographic variables, the NCCN DTPL, the HADS and a measure of HRQoL: the RAND-36-Item Short Form Health Survey (RAND-36) before the follow-up consultation. The medical doctor/gynecologist noted if the patients were referred to any supportive care or rehabilitation

facilities after the consultation, and recorded the cancer-related data.

### 2.3 | Demographic and medical data

Demographic data included marital/cohabitant status, child care, education and employment status. Cancer-related data included type of cancer (ovarian/tube cancer, cervical cancer, corpus cancer or vulvar cancer), stage of cancer (I–IV), type of treatment ([a] surgery only, [b] chemotherapy only or in combination with surgery or [c] radiotherapy only or in combination with surgery and/or chemotherapy), relapse (yes/no) and month of initiation of their last treatment (cycle).

### 2.4 | The distress thermometer and problem list

NCCN DTPL (version 2.2017) includes a DT and a PL. The DT is an 11-point visual Likert scale from 0 (no distress) to 10 (extreme distress), and respondents are asked to circle the number that describes their level of distress during the past week. The PL includes 39 problems divided into practical problems ( $n=6$ ), family problems ( $n=4$ ), emotional problems ( $n=6$ ), spiritual/religious concerns ( $n=1$ ) and physical problems ( $n=22$ ), and by each problem respondents tick off yes/no if they have experienced this problem during the last week.<sup>12</sup> The forward- and back translated Norwegian version of the NCCN DTPL version 2.2017 was verified and approved by NCCN in 2017.<sup>3</sup> In our sample, a Cronbach's alpha internal reliability analysis between the DT-score and the number of problems in four problem areas of the PL (practical, familial, emotional and physical problems) gave an alpha of 0.74.<sup>24</sup>

### 2.5 | Hospital Anxiety and Depression Scale

The HADS has 14 items, in which seven measure symptoms of anxiety and seven measure depressive symptoms. Each item has four response alternatives graded from 0 (no symptom) to 3 (severe symptom), with the total summary score ranging from 0 to 42.<sup>25</sup> A total score of  $\geq 15$  indicates a state of anxiety and/or depressive symptoms that may need further handling.<sup>26</sup>

The subscores of anxiety and depression range from 0 to 21, respectively.

### 2.6 | RAND-36-Item Short Form Health Survey

The RAND-36 is a generic health-related quality of life measure and consists of 36 questions on physical, emotional and social functioning in daily life during the past 4 weeks. By established manuals the scores are transformed to eight different linear function scales ranging from 0 (low function) to 100 (high function): physical functioning,

role physical, bodily pain, general health, vitality, social functioning, role emotional and mental health. In addition, one question assesses perception of change in health during the past year (health change index).<sup>27,28</sup>

### 2.7 | Statistical analyses

Descriptive statistics included numbers and percentages for categorical variables and means, standard deviations (SD) and median and ranges for continuous variables.

A receiver operating characteristic (ROC) curve analysis was performed to study the agreement between various DT scores and the presence of a high level of anxiety/depression on HADS (i.e. a total score of  $\geq 15$ ), with the presence of a total score  $\geq 15$  on HADS (yes/no) as the criterion measure and the DT-scale as the screening measure. From a ROC curve analysis an area under the curve is computed, and values between 0.70–0.80, 0.80–0.90 and 0.90–1.00 represent fair, good and excellent agreement between two measures respectively.<sup>29</sup> Further, a ROC curve analysis gives values for sensitivity and 1-specificity on all possible scores on the screening measure (here DT). From the literature we defined that a DT score that gave a sensitivity  $\geq 85\%$  and a specificity  $\geq 75\%$  for an agreement with a HADS-score of  $\geq 15$  would be appropriate for a cutoff score for high level of psychological distress on the DT.<sup>30</sup> The positive predictive value and the negative predictive value for the most optimal cutoff level(s) on DT from the ROC curve analysis were calculated.

To explore the associations between the presence of a score above cutoff on DT and various factors (demographic factors, cancer-related factors, prevalence of frequent problems on PL, scores of anxiety, depression and HRQoL), the Independent sample *t*-test was used for continuous parametric data, the Independent samples Mann Whitney U test for continuous nonparametric data and the chi-square test for categorical variables.

The associations between DTPL scores and RAND-36 summary scores were explored by correlation analyses between the scales of the two measures.<sup>31</sup> The RAND-36 summary scores in our sample had nonparametric distributions so we used Spearman's rank order correlations in these analyses.

To adjust for multiple testing, *p*-values  $< 0.01$  were considered statistically significant, and all tests were two-sided.<sup>32,33</sup> Statistical analyses were performed using the SPSS version 26 for Windows.

### 2.8 | Ethics statement

This study was part of a quality improvement project at the Department of Gynecologic Cancer at Oslo University Hospital. Quality improvement projects are not in the mandate of the Committees for Medical and Health Research Ethics in Norway. The legal basis for processing the personal and health information

was the General Data Protection Regulation article 6 number 1 (a) and article 9 number 2 j, in accordance with the Personal Data Act. The Privacy and Data Protection Officer at Oslo University Hospital recommended the data collection and the information processing in the study (ePhorte number 19/07212, ref. 2017/3064). All included patients in the study signed a written informed consent.

### 3 | RESULTS

#### 3.1 | Patients and characteristics

Of 232 patients, 72 did not respond or were not included due to logistical reasons, 16 were excluded because of written consent or DT and/or HADS were missing, leaving 144 women (62%) included in the analyses. The mean age was 56.6 years (SD 15.2, range 26–88), and the mean time since initiation of the last cancer treatment was 9.5 months (SD 6.2, range 0.9–24.7). The majority (79%) had received primary treatment for their gynecological cancer while 21% had experienced a relapse. A total of 38 women (26%) were referred to a supportive care or rehabilitation service after the consultations. Other patient- and cancer-related variables are reported in [Table 1](#).

The mean level of distress on DT among the included women was 4.1 (SD 2.6) and the mean number of reported problems on PL was 8.4 (SD 6.2). The seven most frequent problems from the 39 items on PL in the total sample were fatigue (60%), worry (54%), memory/concentration (53%), sleep (43%), sadness (42%), fears (41%) and tingling in hands/feet (37%) ([Table 1](#)).

The mean HADS total score in the total sample was 9.6 (SD 7.2), and 37 women (26%) had a total score of  $\geq 15$  on anxiety/depression symptoms in HADS. The mean scores for the nine summary scales of HRQoL from RAND-36 are listed in [Table 1](#). The lowest mean function scores were found for role physical (46.1 [SD 43.1]) and vitality (49.9 [SD 24.0]).

#### 3.2 | The optimal cutoff score on DT to detect high level of psychological distress

In a ROC curve analysis of agreement between the scores of DT and HADS, the area under the curve for the DT-score to detect the presence of a total score  $\geq 15$  on HADS was 0.81 (95% CI: 0.74–0.89) ([Figure 1A](#)). This represents an overall good accuracy between the two measures. A cutoff score of  $\geq 5$  on the DT gave the values of sensitivity and specificity closest to our predetermined levels of an agreement with a HADS total score  $\geq 15$ , with a sensitivity of 87% and a specificity of 71% ([Figure 1B](#)). With this cutoff level on DT the positive predictive value was 51% and the negative predictive value was 94% towards a HADS total score  $\geq 15$  ([Table 1](#)). Using the cutoff of  $\geq 4$  on the DT in our sample gave a slightly higher sensitivity of 92%, however, the specificity dropped to 54%, ([Figure 1B](#)), with a positive predictive value of 41% and a negative predictive value of 95% (data not shown).

#### 3.3 | Variables associated with high distress (DT score $\geq 5$ )

A total of 63 women (44%) had a high level of psychological distress as defined by a DT-score  $\geq 5$  ([Table 1](#)). None of the demographic variables or cancer-related variables were significantly associated with a DT-score  $\geq 5$ . A DT-score  $\geq 5$  was significantly associated with higher prevalence of the six most frequent problems on the PL (fatigue, worry, memory/concentration, sleep, sadness and fears) compared to a DT score  $< 5$  ([Table 1](#)).

#### 3.4 | Correlation between scores of DTPL, HADS and RAND-36

The presence of DT-score  $\geq 5$  was significantly associated with higher levels of anxiety/depression on HADS (total score 14.2 [SD 7.3] vs. 6.0 [SD 4.6],  $p < 0.01$ ) and lower scores on the following function scores from RAND-36: Role physical, bodily pain, general health, vitality, social functioning, role emotional and mental health ([Table 1](#)).

The DT-score and the total number of problems on PL correlated significantly with all eight function scales from RAND-36 ([Table 2](#)). The DT-score had correlation coefficients above 0.5 with the RAND-36 scales for vitality, social functioning and mental health, while the total number of problems on PL had correlation coefficients above 0.5 for role physical, general health, vitality, social functioning and mental health ([Table 2](#)). High correlation coefficients ( $\rho \geq \pm 0.5$ ) were found between number of emotional problems on PL and social functioning and mental health from RAND-36, as well as between number of physical problems on PL and physical functioning, role physical, bodily pain, general health, vitality and social functioning from RAND-36 ([Table 2](#)).

### 4 | DISCUSSION

In this study among women treated for gynecological cancer, we found that a cutoff score of  $\geq 5$  on the NCCN DT discriminated well for high level of psychological distress as defined by a HADS total score  $\geq 15$ . A DT-score  $\geq 5$  correlated significantly with more problems on PL and lower scores on the majority of the HRQoL function scales on RAND-36, compared to those below cutoff. These findings indicate that the brief NCCN DTPL tool can be valuable to use in clinical practice to identify patients with a high burden of distress and problems, and that patients scoring  $\geq 5$  on the DT should be of extra concern.

In a Danish study among gynecological cancer survivors after surgical treatment, Olesen and colleagues found the optimal cutoff level on DT for screening of distress was  $\geq 2$ , with the corresponding levels of sensitivity and specificity of 93% and 40%, respectively.<sup>22</sup> With this low level of specificity there will be a high number of “false positives,” and a second follow-up from the initial screening is necessary in clinical practice. If we had used  $\geq 2$  as the cutoff level on DT

TABLE 1 Patient characteristics and scores on the NCCN DTPL, HADS and RAND-36.

	N	Full sample	DT score $\geq 5$ n = 63 (44%)	DT score $< 5$ n = 81 (56%)	p-value*
<i>Demographic variables</i>					
Age at survey, years	144				
Mean (SD)		56.6 (15.2)	55.8 (14.8)	57.2 (15.6)	0.59
Median (range)		58 (26–88)			
Married/cohabitant, n (%)	142				0.22
Yes		97 (68)	39 (63)	58 (72)	
No		45 (32)	23 (37)	22 (28)	
Children <18 years in the household, n (%)	144				0.24
Yes		28 (19)	15 (24)	13 (16)	
No		116 (81)	48 (76)	68 (84)	
Education, n (%)	143				0.33
>13 years		69 (48)	27 (43)	42 (52)	
$\leq 13$ years		74 (52)	35 (57)	39 (48)	
Employment status, n (%)	143				0.42
Working full or part-time		57 (40)	26 (41)	31 (39)	
Full social benefit		49 (34)	24 (38)	25 (31)	
Retired due to age (pensioners)		37 (26)	13 (21)	24 (30)	
<i>Cancer-related variables</i>					
Months since beginning of last cancer treatment	144				
Mean (SD)		9.5 (6.2)	10.6 (6.8)	8.6 (5.6)	0.05
Median (range)		6.6 (0.9–24.7)			
Gynecological cancer diagnosis, n (%)	144				0.07
Ovarian/tube		41 (29)	11 (18)	30 (37)	
Cervical		74 (51)	39 (62)	35 (43)	
Corpus		20 (14)	9 (14)	11 (14)	
Vulvar		9 (6)	4 (6)	5 (6)	
Treatment, n (%)	144				0.03
Surgery only		39 (27)	12 (19)	27 (33)	
Chemotherapy only or combined with surgery		47 (33)	18 (29)	29 (36)	
Radiotherapy only or combined with surgery, chemotherapy or both		58 (40)	33 (52)	21 (31)	
Relapse, n (%)	144				0.64
Yes		30 (21)	12 (19)	18 (22)	
No		114 (79)	51 (81)	63 (78)	
Referred to supportive care/rehabilitation services	144				0.10
Yes		38 (26)	21 (33)	17 (21)	
No		106 (74)	42 (67)	64 (79)	
<i>NCCN DTPL, HADS and RAND-36</i>					
Level of distress on NCCN DT (range 0–10)	144				
Mean (SD)		4.1 (2.6)	6.5 (1.6)	2.3 (1.4)	<0.01
Median (range)		4 (0–10)			
Number of patients with DT score, n (%)					
$\geq 2$		116 (81)			
$\geq 3$		103 (72)			
$\geq 4$		83 (58)			

(Continues)

TABLE 1 (Continued)

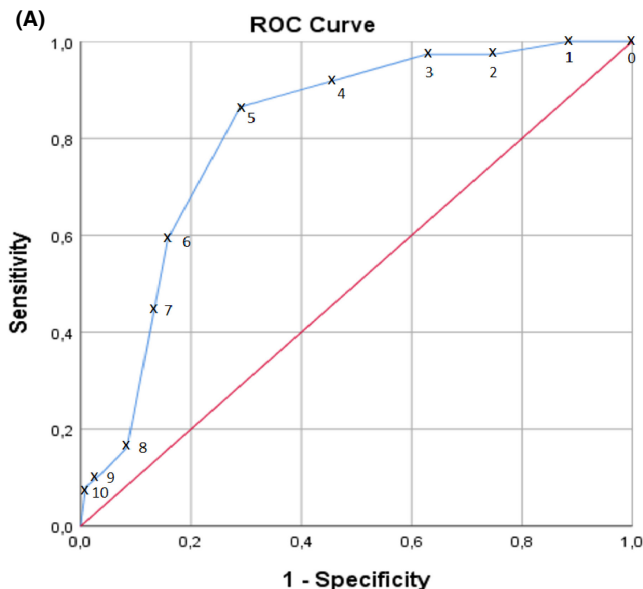
	N	Full sample	DT score $\geq 5$ n = 63 (44%)	DT score $< 5$ n = 81 (56%)	p-value*
$\geq 5$		63 (44)			
$\geq 6$		39 (27)			
$\geq 7$		30 (21)			
Problems on NCCN PL, mean (SD)	144				
Total no. of problems (range 0–39)		8.4 (6.2)	12.5 (6.1)	5.2 (3.9)	<0.01
No. of practical problems (range 0–6)		0.7 (1.2)	1.2 (1.4)	0.3 (0.7)	<0.01
No. of family problems (range 0–4)		0.4 (0.7)	0.6 (0.8)	0.2 (0.4)	<0.01
No. of emotional problems (range 0–6)		2.1 (1.9)	3.4 (1.8)	1.1 (1.3)	<0.01
No. of physical problems (range 0–22)		5.2 (3.9)	7.2 (3.9)	3.5 (3.0)	<0.01
Most frequent reported problem with, n (%)					
Fatigue		87 (60)	49 (78)	38 (47)	<0.01
Worry		77 (54)	49 (78)	28 (35)	<0.01
Memory/concentration		76 (53)	50 (79)	26 (32)	<0.01
Sleep		62 (43)	38 (60)	24 (30)	<0.01
Sadness		61 (42)	42 (67)	19 (24)	<0.01
Fears		59 (41)	42 (67)	19 (24)	<0.01
Tingling in hands/feet		53 (37)	28 (44)	25 (31)	0.09
HADS score, mean (SD)	144				
HADS total score (range 0–42)		9.6 (7.2)	14.2 (7.3)	6.0 (4.6)	<0.01
HADS anxiety (range 0–21)		5.8 (4.2)	8.2 (4.3)	4.0 (3.1)	<0.01
HADS Depression (range 0–21)		3.7 (3.9)	6.0 (4.3)	1.9 (2.3)	<0.01
HADS total score – dichotomized, n (%)	144				<0.01
Total score $\geq 15$		37 (26)	32 (51) (PPV)	5 (6)	
Total score $< 15$		107 (74)	31 (49)	76 (94) (NPV)	
RAND-36 summary scores, mean (SD)					
Physical functioning (range 0–100)	143	72.6 (25.4)	67.0 (27.0)	76.9 (23.3)	0.02
Role physical (range 0–100)	136	46.1 (43.1)	29.9 (40.3)	59.2 (41.0)	<0.01
Bodily pain (range 0–100)	144	69.1 (26.8)	61.1 (28.9)	73.3 (23.4)	0.001
General health (range 0–100)	135	63.9 (19.5)	54.3 (19.1)	71.8 (16.1)	<0.01
Vitality (range 0–100)	141	49.9 (24.0)	36.8 (22.2)	60.2 (20.2)	<0.01
Social functioning (range 0–100)	144	66.9 (26.6)	53.4 (25.0)	77.5 (22.8)	<0.01
Role emotional (range 0–100)	137	62.5 (42.7)	42.6 (43.9)	78.5 (34.3)	<0.01
Mental health (range 0–100)	141	73.2 (17.6)	61.5 (17.6)	82.5 (10.9)	<0.01
Health change (range 0–100)	143	44.1 (30.3)	40.9 (33.4)	46.6 (27.5)	0.27

Abbreviations: DTPL, distress thermometer and problem list; HADS, Hospital Anxiety and Depression Scale; NCCN, National Comprehensive Cancer Network; RAND-36, RAND-36-Item Short Form Health Survey; NPV, negative predictive value; PPV, positive predictive value.

\*Independent samples t-test, independent samples Mann–Whitney U-test or chi-square test.

in our sample then four out of five women (81%) in our study would have been identified with a high level of distress (Table 1), hence the screening procedure would add little to regular clinical practice in identifying patients with a need for further care. From our analyses we found that a cutoff level on DT of  $\geq 5$  compared to  $\geq 4$  raised the level of specificity from 54% to 71%, the latter implying that less than three out of 10 patients who scored 5 or higher on DT were classified as “false positives” in regard to high level of psychological distress as defined by a total HADS-score of  $\geq 15$ .

In a meta-analysis of DT validation studies, the optimal cutoff values on DT across 42 studies from 20 different countries with various cancer populations ranged from  $\geq 2$  to  $\geq 7$ , and a cutoff of  $\geq 4$  on DT maximized the balance between the pooled sensitivity and specificity when using HADS total score as the reference.<sup>13</sup> However, several single studies such as a Dutch study in a mixed cancer sample and a Chinese study among lymphoma patients found the optimal cutoff level for distress of DT to be  $\geq 5$ ,<sup>34,35</sup> in line with our findings. The optimal cutoff values for clinically relevant distress on DT



DT score	Sensitivity (%)	Specificity (%)
0	100	0
≥1	100	11
≥2	97	25
≥3	97	37
≥4	92	54
≥5	87	71
≥6	60	84
≥7	43	87
≥8	16	92
≥9	11	96
10	8	99

FIGURE 1 (A) Receiver operating characteristic (ROC) curve comparing distress thermometer (DT)-score with Hospital Anxiety and Depression Scale (HADS) ≥15. (B) Agreement of the DT-scores against HADS ≥15.

may vary between cancer groups, wording/translations and the time points of assessment. This is the first DT validation study using the Norwegian version of DTPL.

The term distress represents a reaction to multifaceted problems of psychological, social, spiritual, and/or physical origin.<sup>12</sup> We studied the associations between the DTPL and a range of HRQoL function scales derived from the self-reported measure RAND-36, and overall we found high correlations. Similar findings were reported in two other validation studies of DTPL that included a general HRQoL measure in their analyses.<sup>18,23</sup> However, no optimal cutoff from scores on the DT can be used to screen for high versus low HRQoL.

Using self-reported measures such as the DTPL screening for distress and problems among patients in clinical practice can

TABLE 2 Correlations between NCCN DTPL distress score & number of problems versus RAND-36 domains scores.

NCCN DT and PL	Physical functioning (RAND-36)	Role physical (RAND-36)	Bodily pain (RAND-36)	General health (RAND-36)	Vitality (RAND-36)	Social functioning (RAND-36)	Role emotional (RAND-36)	Mental health (RAND-36)	Health change (RAND-36)
N	143	136	144	135	141	144	137	141	143
Distress (DT-score) (range 0-10)	-0.266 <sup>a</sup>	-0.412 <sup>a</sup>	-0.316 <sup>a</sup>	-0.467 <sup>a</sup>	-0.522 <sup>a</sup>	-0.532 <sup>a</sup>	-0.398 <sup>a</sup>	-0.581 <sup>a</sup>	-0.138
Total no. of problems (PL) (range 0-39)	-0.491 <sup>a</sup>	-0.538 <sup>a</sup>	-0.483 <sup>a</sup>	-0.653 <sup>a</sup>	-0.639 <sup>a</sup>	-0.603 <sup>a</sup>	-0.487 <sup>a</sup>	-0.621 <sup>a</sup>	-0.289 <sup>a</sup>
No. of practical problems (0-6)	-0.213	-0.403 <sup>a</sup>	-0.300 <sup>a</sup>	-0.349 <sup>a</sup>	-0.394 <sup>a</sup>	-0.392 <sup>a</sup>	-0.332 <sup>a</sup>	-0.274 <sup>a</sup>	-0.231 <sup>a</sup>
No. of family problems (0-4)	-0.036	-0.138	-0.099	-0.222 <sup>a</sup>	-0.223 <sup>a</sup>	-0.198	-0.269 <sup>a</sup>	-0.317 <sup>a</sup>	0.146
No. of emotional problems (0-6)	-0.214	-0.331 <sup>a</sup>	-0.288 <sup>a</sup>	-0.497 <sup>a</sup>	-0.485 <sup>a</sup>	-0.510 <sup>a</sup>	-0.481 <sup>a</sup>	-0.750 <sup>a</sup>	-0.101
No. of physical problems (0-22)	-0.600 <sup>a</sup>	-0.538 <sup>a</sup>	-0.516 <sup>a</sup>	-0.646 <sup>a</sup>	-0.612 <sup>a</sup>	-0.536 <sup>a</sup>	-0.381 <sup>a</sup>	-0.466 <sup>a</sup>	-0.347 <sup>a</sup>
Spiritual/religious concerns (0-1)	0.007	0.065	0.054	-0.130	0.002	-0.115	-0.153	-0.192	-0.001

Abbreviations: DTPL, distress thermometer and problem list; NCCN, National Comprehensive Cancer Network; PL, problem list; RAND-36, RAND-36-Item Short Form Health Survey.

<sup>a</sup>Correlation is significant at the 0.01 level (2-tailed).

facilitate a systematic approach in follow-up cancer care. Such screening must, however, be accompanied by clinical judgment by the doctors and nurses after direct communication with the patient, as not all patients will express themselves properly through a brief questionnaire. Also some patients may tick off a low score on the DT but report high prevalence of experienced problems.

This study had some limitations. A larger patient sample could have provided more robust estimates and would have allowed for more subanalyses based on type and stage of the initial gynecological cancer diagnosis. Multiple testing in the correlation analyses may also have been a limitation.

## 5 | CONCLUSION

The brief NCCN DTPL can be used as a screening tool to identify patients in need of referral for distress and problems among women treated for gynecological cancer. A score of  $\geq 5$  on DT may indicate a high level of anxiety/depression as measured by HADS in this patient group, and the scores on DTPL correlate well with the majority of domains of HRQoL measured by RAND-36. Systematic screening of distress and problems in gynecological cancer patients may increase awareness of women with a need for a tailored follow-up care.

### AUTHOR CONTRIBUTIONS

**TS:** formal analysis, data curation, writing – original draft. **RB:** conceptualization, supervision. **KL:** investigation, resources. **SS:** conceptualization, supervision. **KB:** investigation, resources. **MS:** conceptualization, methodology. **LT:** conceptualization, methodology, investigation, resources, data curation. All authors contributed to the writing – review and editing of the manuscript.

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