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TITLE: Agreement between HADS classifications and single-item screening questions for anxiety and depression: A cross-sectional survey of cancer patients

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ABSTRACT

Background: We assessed agreement between reported anxiety and depression levels of cancer patients using a) single self-report items and b) the Hospital Anxiety and Depression Scale (HADS). We also explored whether anxiety and depression assessment by a) single self-report items or b) the HADS was most strongly associated with a preference to be offered professional assistance. The proportion of patients indicating that they would accept (or were currently using) professional support if they were experiencing anxiety or depression was also examined.

Patients and methods: A consecutive sample of cancer patients undergoing radiotherapy at four metropolitan public hospitals in Australia completed a touchscreen computer survey. A consecutive subsample of patients attending three of these treatment centres answered additional questions about psychological support preferences.

Results: Of 304 respondents, 54% (95% CI: 48%, 60%) perceived that they were currently experiencing mild to severe anxiety and depression. 22% (95% CI: 18%, 27%) indicated a preference to be offered professional help. There was moderate agreement between the HADS and single-item responses for categorisation of anxiety and depression. Patient-perceived mild to severe anxiety and depression levels appeared to be the best measure for identifying those with a preference to be offered professional assistance. Of a subsample of 193 respondents, 89% (95% CI: 84, 93%) indicated that if they were experiencing anxiety or depression, they would accept (or were currently using) professional support.

Conclusions: Single item screening in a cancer care setting may not adequately capture clinical anxiety and depression. However, single items assessing patients' perceived levels of anxiety and depression are useful indicators of whether patients want to be offered, and are likely to accept, psychosocial care.

Keywords: anxiety, depression, HADS, oncology, questionnaire, single-item question

Key message:

Compared with HADS classifications, cancer patients' perceived levels of anxiety and depression were more strongly associated with a preference to be offered professional support. Responding to patients' perceived anxiety, depression and preferences for professional help may be an appropriate patient-centred approach. However, this approach would need to consider priorities for limited psychosocial resources.

INTRODUCTION

Psychosocial issues are under-recognised and under-treated in cancer patients [1, 2]. Resource efficient and effective methods of detection and treatment of psychosocial distress are needed. Ultra-short measures of anxiety and depression have potential to improve timely recognition of these conditions [3, 4].

Ultra-short measures such as the Distress Thermometer (DT) require patients to provide a numerical index of perceived distress [3, 5]. Ultra-short screening questions require patients to provide a yes or no response to single questions such as 'Are you depressed?' [4]. The DT and ultra-short screening questions have been found to have good ability to exclude non-cases (specificity), but a poorer ability to detect possible cases (sensitivity) [6, 7]. Increasing the number of response categories in single item measures may help improve sensitivity [8]. We aimed to assess agreement between a single item asking patients to indicate their perceived level of anxiety and depression, and similar categories recommended for the Hospital Anxiety and Depression Scale (HADS) [4, 8, 9]. Despite psychometric shortcomings [10, 11], the HADS is recommended for brief screening for anxiety and depression in oncology [9].

Cancer patients' perception of their own level of anxiety and depression may impact on their uptake of psychosocial service referrals [2, 12-15]. We aimed to explore whether the HADS or patients' perceived levels of distress provided the best indicator for identifying those with a preference to be offered professional help for anxiety and/or depression. We also describe the proportion of patients indicating that,

if they were experiencing anxiety or depression, they would accept professional psychosocial support.

METHOD

Ethics approvals

Ethics approvals were obtained from the University of Newcastle and New South Wales Population & Health Services Research Ethics Committees.

Design and Setting

A cross sectional survey was conducted at four radiation oncology treatment centres attached to metropolitan public hospitals in the Australian state of New South Wales. Each participating centres had a minimum of two linear accelerators available for radiotherapy, with average treatment throughput varying between 60 and 140 patients per day.

Participants

Cancer patients attending radiotherapy appointments; aged 18 years or older; able to complete the survey in English; and give informed consent were eligible for the study.

Procedure

A research assistant provided written and verbal information about the study. Completion of the touch screen computer survey was taken as informed consent.

Measures

The following were included in a larger survey examining perceptions of and preferences for patient centred cancer care [16, 17]:

Participant demographic and medical characteristics

Participants reported their age, gender, postcode, region of birth, who they live with, when they were first diagnosed with cancer, if they had experienced a second cancer diagnosis or recurrence, most recent primary cancer diagnosis, and perceived aim of current treatment.

Patients' perceptions of their psychological distress

Participants were asked 'What level of anxiety have you been experiencing in the last week?' and 'What level of depression have you been experiencing in the last week?'. Response options were 'No anxiety; Mild anxiety; Moderate anxiety; or Severe anxiety' and 'No depression; Mild depression; Moderate depression; Severe depression' respectively.

Psychological distress

The HADS contains two 7-item subscales that measure depression (HADS-D) and anxiety (HADS-A) in the prior week. Scores were categorised as normal (0-7), mild (8-10), moderate (11-14), and severe (15-21) [18]. The characteristics of participants meeting HADS threshold scores are reported elsewhere [16].

Preference to be offered professional support

Participants were asked: 'Given your current levels of anxiety and/or depression; would you like to be offered some professional help?' Those who responded 'no' were asked 'Why don't you want professional support for anxiety and/or depression?'

Willingness to accept professional help for anxiety or depression

A subsample of consecutive patients attending the first three participating treatment centres were asked "If you were experiencing anxiety or depression; would you accept the following types of professional help?" in reference to: Group counselling at the cancer centre; individual counselling at the cancer centre; treatment/counselling from my cancer doctor; group counselling outside the cancer centre; individual counselling outside the cancer centre; treatment/counselling from my GP; internet (online) support. All support types were listed on a single question screen in a matrix format, with the response options i) no, definitely not; ii) no, probably not; iii) yes, probably; and iv) yes, currently using.

Statistical Analysis

Agreement between HADS and patients

Agreement between HADS categories (normal, mild, moderate and severe) [18] and self-classification of anxiety and depression (none, mild, moderate and severe) was assessed using weighted κ (bias adjusted), with bootstrapping techniques to estimate 95% confidence intervals (CIs). The Stuart-Maxwell test for marginal homogeneity was used to assess whether cancer patients tend to self-rate their anxiety or depression higher or lower than the HADS ratings.

Indicators of a preference for being offered support

Univariate logistic regression analyses were used to identify factors associated with a preference to be offered professional support. Variables included: age category, sex, country of birth, cancer type, perceived treatment aim, anxiety and depression. Variables with a p value of 0.2 or less were included in four separated non-nested multiple logistic regression models. Each model included one of the four different anxiety and depression terms (see S1 for description of terms a-d). Recruitment site was included as an adjustment for the sampling strategy. The backward stepwise method was used to remove variables with a $p \geq 0.1$ on the likelihood ratio test. To ensure comparability of models, any explanatory variable retained in the final model was included in all models. Odds ratios with 95% CIs are reported. The most appropriate measure for investigating the relationship with preference for professional support was assessed by: i) the amount of missing data; ii) the significance of the likelihood ratio test terms in the models; iii) the Hosmer-Lemeshow goodness of fit measure; and iv) the relative fit of the models using the Akaike Information Criterion (AIC).

Willingness to accept support

The proportion of patients with a willingness to accept professional support for anxiety and depression is reported with 95% CIs. See S1 for detail of supplementary analyses and S2 for supplementary sample size calculations. All analyses were conducted using Stata version 11.2 (StataCorp, Texas, USA), applying a significance level of 5%.

RESULTS

Of 529 patients screened for inclusion in the study, 98 were excluded due to: insufficient English proficiency ($n = 45$); not currently receiving radiotherapy ($n = 29$);

already having been approached about the survey ($n = 6$), clinic staff concern about patient burden or capacity to give informed consent ($n = 3$); being under the age of 18 ($n = 2$); not having a cancer diagnosis ($n = 1$) or an unspecified reason ($n = 12$). Of the 431 eligible patients, 369 consented (86%), and 304 (71%) completed the survey. Non-completion was typically due to patients having insufficient time prior to their treatment appointment. Only surveys with complete data are included in the analyses. On average, respondents were 61.6 years old (SD = 13.8, minimum = 18.9, maximum = 91.4). Additional sample characteristics are in Table 1.

Agreement between patients' perceptions and HADS classifications

164 participants (54%, 95% CI: 48%, 60%) perceived that they were experiencing mild to severe anxiety or depression. Tables 2 and 3 provide the numbers of patients with each self-perceived and HADS level of anxiety, and depression, respectively.

Table 2 indicates the level of agreement between HADS anxiety classifications and patients' self-reported levels. The observed proportion of agreement was 93%, with weighted κ of 0.5 (95% CI: 0.4-0.6) indicating moderate agreement between patients' perceptions and the HADS ($p < 0.0001$). The Stuart Maxwell test of marginal homogeneity was significant ($\chi^2(3) = 49, p < 0.0001$); patients generally reported higher levels of anxiety than was indicated by HADS-A classification levels (see Table 2).

Table 3 shows the level of agreement between HADS depression classifications and patients' self-reported levels. The observed proportion of agreement was 95%, with weighted κ of 0.5 (95% CI: 0.4-0.6) indicating moderate agreement ($p < 0.0001$). The

Stuart Maxwell test of marginal homogeneity was significant ($\chi^2 (3) = 30, p < 0.0001$); patients generally reported higher levels of depression than what was determined from their HADS-D score.

Patient preference to be offered professional support

Sixty-seven participants expressed a preference to be offered professional support for their anxiety and/or depression (22%, 95% CI: 18%, 27%). Of these, 51% ($n = 34$, 95% CI: 38-63%) met HADS threshold scores for mild to severe anxiety and/or depression. Reasons for preferring not to be offered support are presented in S3. These findings suggest that self-reported anxiety and depression levels may better predict a preference to be offered professional support than HADS classifications.

Table 4 presents the results of the univariate analysis for all included variables, and the multivariate analysis of Models a-d (See S1). The full number of observations ($n = 304$) was available for all models. In Models a-d, patients classified with anxiety had significantly higher odds of a preference to be offered professional support for current anxiety and/or depression. In Model c patients classified with depression had significantly higher odds of a preference to be offered professional support for current anxiety and/or depression. This was not the case for Models a; b; and d. The Hosmer-Lemeshow test results indicated that all models fit the data well. The relative fit of the models using the AIC indicated that Model c was marginally the strongest model, followed by Model d; a; and b. Based on the specified criteria, Model c (patient-perceived mild-severe anxiety and depression) has the strongest association with a patient preference to be offered professional support for current levels of anxiety and/or depression.

Willingness to accept professional help for anxiety and/or depression

Of 193 respondents to these questions, 89% ($n = 172$; 95% CI: 84-93%) indicated that if they were experiencing anxiety or depression, they either would probably or were currently, using at least one support service. S4 shows the proportions of patients willing to accept support and S5 shows the final multiple logistic regression models assessing factors associated with accepting different types of support. S6 shows the proportion of respondents who would probably accept or were currently using support, grouped by different distress assessment methods. All respondents with a preference to be offered professional support indicated they would probably accept (or were using) at least one form of professional support if they were experiencing anxiety or depression.

DISCUSSION

Patients' perceived levels of both anxiety and depression agreed moderately well with the levels outlined by the HADS developers. However there were some discrepancies, with patients generally reporting higher levels relative to HADS. Screening tools either over- or under-detect likely cases depending on the threshold scores applied [10]. In this study, using ultra-short items, 50% of radiotherapy patients perceived that they were currently experiencing mild to severe levels of anxiety; and 31% mild to severe depression. Other research has reported the proportion of cancer patients perceiving they were experiencing anxiety was 58% [4], whilst depression was between 6% [8] and 37% [4]. Responses to ultra-short assessments of anxiety and depression reflect respondents' understanding of the terms [19]. This may differ from the definitions used by the HADS. Additionally, a

patient rating of 'none' was compared with a HADS rating for 'normal' for both anxiety and depression. The HADS categorisations of 'normal anxiety' and 'normal depression' do include some level of anxiety and depression, and this potential discrepancy could in part explain why some respondents rated themselves as having mild anxiety or depression, but scored in the normal category on HADS.

Similar to other studies [20, 21], we found that 22% of patients expressed a preference to be offered professional support. This preference was more strongly associated with a patient perception of mild to severe anxiety and depression (Model c) than with HADS classifications. All respondents with a preference for professional support indicated that they were currently using or would accept one or more types of professional support (S6). Patients' perceived level or severity of anxiety and depression is likely to be an important factor in determining referral uptake.

The findings from this study pose two dilemmas for psychosocial service delivery in oncology settings: How can we ensure that those experiencing clinical levels of anxiety and depression are provided with appropriate services; and what sorts of services should be delivered to those with perceived anxiety or depression which does not reach 'threshold' levels according to the HADS?

If psychosocial resources are limited, there may be a need to prioritise specialised services so that they reach those with clinically significant levels of anxiety and depression. Respondents indicated that individual support methods were more considered to be more acceptable than group and online support, and support provided at the cancer centre was more acceptable than support provided external to

the cancer centre (S4). Lower intensity and cost self-help strategies have been found beneficial in reducing the symptom burden in individuals with 'sub-threshold' depression [22], and may be appropriate for those reporting self-perceived, but not clinically significant, anxiety and depression [23]. This approach has been recommended in stepped-care models of psychosocial care [15]. As older adults had lower odds of endorsing group and online strategies (S5), these potentially cost-effective interventions may be better suited to younger cancer patients.

For those who are identified as at-risk by the HADS but who do not self-report elevated anxiety or depression, it is important to determine whether the symptoms identified by the HADS are due to other causes. If these symptoms interfere with the patients' functioning, then the potential benefits of seeking evidence-based treatments should be discussed [3].

These findings may be a cause to reconsider how screening can be best used to provide patient-centred cancer care [12, 20, 24]. Combining ultra-short screening with an assessment of preference to be offered psychological support may allow the detection of patients who may benefit from some form of psychosocial intervention. However, screening instruments and clinical judgement remain crucial for identifying potentially vulnerable patients who may not have insight into the severity of their emotional distress. The implications of considering patients' perceived distress and preferences for support, rather than relying solely on screening and clinical diagnosis, should be explored. Future research could assess links between patients'

preferences for psychological support and outcomes such as uptake and effectiveness of support services.

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DISCLOSURE

The authors have declared no conflicts of interest.

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S1. Supplementary Statistical Analysis

The anxiety and depression terms included in logic regression models were as follows: a) HADS classified mild-severe anxiety and/or depression; b) HADS classified moderate-severe anxiety and/or depression, c) perceived mild-severe anxiety and/or depression, or d) perceived moderate-severe anxiety and/or depression.

The number and proportion of respondents with a preference not to be offered professional support for anxiety and/or depression, endorsing each reason for this (single forced choice response options) is reported with 95% CIs for groups with and without a likely presence of anxiety and/or depression.

To explore the characteristics of patients indicating that if they were experiencing anxiety or depression, they would accept (or were currently using) specific types of professional support, for each of the psychological support options assessed, respondents were dichotomised on the basis of endorsement of being: a) willing to accept (patients who selected “Yes, probably” or “Yes, currently using”) or b) not willing to accept (patients who selected “No, definitely not” or “No, probably not”) that support). Univariate logistic regression analyses were used to investigate the relationship between explanatory variables (including age [18-49, 50-59, 60-69, 70 plus], sex [male, female], cancer diagnosis [breast, prostate, other/don’t know], living with a partner [no, yes], HADS classified likely anxiety [no, yes], and HADS classified likely depression [no, yes]) and patient endorsement of a willingness to accept help. Variables with a *p* value of 0.2 or less were then included in a multiple logistic regression model. The backwards stepwise method was then used to remove all

variables with a p value of 0.1 or more on the likelihood ratio test, with treatment centre included in all multiple regression models. Odds ratios with 95% confidence intervals are reported for the final multiple regression models. The fit of the final models was assessed using the Hosmer-Lemeshow goodness of fit test.

S2. Supplementary Sample Size Calculations

A sample of 300 patients would allow estimation of prevalence with 95% CI's within $\pm 5\%$ of the point estimate, weighted κ with 95% CI's within $\pm 0.1\%$ (assuming κ of 0.5 or more) and detection of differences in characteristics of 20% for binary explanatory variables (between patients who did and did not indicate a preference), with 5% significance level and 80% power. Based on 25%-75% of respondents being willing to accept each type of professional support, a sample size of 200 would allow prevalence estimates with 95% CI's within $\pm 7\%$ of the point estimate. Based on 20-80% of patients being willing to accept each type of support, a sample size of 200 was sufficient to detect differences of approximately 25% in characteristics between those indicating that they probably would and would not accept professional help with 80% power at 5% significance level.

S3. Number and proportion of respondents who did not want an offer of professional support for current levels of anxiety/depression endorsing different reasons for this (Normal distress vs Mild to severe distress) (*n* = 237)

Reason	Normal distress HADS-D <8 and HADS-A <8 (<i>n</i> = 164) <i>n</i> (%; 95% CI)	Mild to severe distress HADS-D ≥8 or HADS-A ≥8 (<i>n</i> = 73) <i>n</i> (%; 95% CI)
Not experiencing much anxiety/depression	119 (73%; 65-79%)	25 (34%; 24-46%)
Anxiety/depression is normal for someone in my situation	9 (5.5%; 2.5-10.1%)	25 (34%; 24-46%)
My anxiety/depression is not much higher than usual	12 (7.3%; 3.8-12%)	8 (11%; 4.9-20%)
Don't think professional assistance would help	10 (6.1%; 3.0-11%)	5 (6.9%, 2.3-15%)
My anxiety/depression will reduce once this phase of treatment is over	14 (8.5%; 4.7-14%)	10 (14%, 6.8-24%)

S4. Self-reported willingness to accept different types of professional support if experiencing anxiety or depression (*n* = 193)

TYPE OF PROFESSIONAL ASSISTANCE:	No, definitely not <i>n</i> % (95% CI)	No, probably not <i>n</i> % (95% CI)	Yes, probably <i>n</i> % (95% CI)	Yes, currently using <i>n</i> % (95% CI)
Group counselling at the cancer centre	46 24% (18-30%)	72 37% (30-45%)	69 36% (29-43%)	6 3.1% (1.1-6.6%)
Individual counselling at the cancer centre	28 15% (9.9-20%)	33 17% (12-23%)	116 60% (53-67%)	16 8.3% (4.8-13%)
Treatment/ counselling from my cancer doctor	15 7.8% (4.4-12%)	21 1% (6.9-16%)	127 66% (59-72%)	30 16% (11-21%)
Group counselling outside the cancer centre	51 26% (20-33%)	81 42% (35-49%)	59 31% (24-38%)	2 1.0% (0.1-3.7%)
Individual counselling outside the cancer centre	38 20% (14-26%)	53 27% (21-24%)	94 49% (41-56%)	8 4.1% (1.8-8.0%)
Treatment/ counselling from my GP	25 13% (8.6-19%)	31 16% (11-22%)	117 61% (53-68%)	20 10% (6.4-16%)
Online/Internet support	96 50% (42-57%)	48 25% (19-32%)	43 22% (17-29%)	6 3.1% (1.1-6.6%)

S5. Univariate and multiple logistic regression analysis of characteristics associated with preferences for professional support (n = 193)

Type of support	Patients indicating they would accept or currently were accepting support n, % [95% CI]	Characteristic	Patient in each category indicating they would accept or current were accepting support n (%)	Univariate analysis LR Chi ² , p Unadjusted OR (95% CI)	Final multiple logistic regression model Hosmer Lemeshow p LR Chi ² , p Adjusted OR (95% CI)
Group counselling at the cancer centre	75, 39% [32-46%]	Hospital			$p = 0.9986$
		Site 1	17 (27%)	$\chi^2(2) = 5.2, p = 0.0749^c$ 1	$\chi^2(2) = 5.3, p = 0.0692$ 1
		Site 2	37 (45%)	2.1 (1.1-4.3)	2.7 (1.3-5.7)
		Site 4	21 (44%)	2.1 (0.9-4.6)	1.2 (0.5-2.6)
		Age group		$\chi^2(3) = 11.3, p = 0.0102^c$ 1	$\chi^2(3) = 11.5, p = 0.0095^*$ 1
		18-49 years	19 (49%)	1.3 (0.5-3.4)	0.4 (0.1-1.2)
		50-59 years	19 (56%)	0.6 (0.3-1.4)	0.3 (0.1-0.9)
		60-69 years	23 (37%)	0.3 (0.1-0.8)	0.2 (0.1-0.7)
		70 years plus	14 (24%)		
		Sex		$\chi^2(1) = 0.5, p = 0.4652$ 1	
		Male	36 (36%)	1.3 (0.7-2.2)	
		Female	39 (41%)		
		Cancer diagnosis		$\chi^2(2) = 1.0, p = 0.6019$ 1	
		Breast	23 (43%)	0.9 (0.4-2.0)	
		Prostate	18 (41%)	0.7 (0.4-1.4)	
		Other/don't know ^a	34 (35%)		
		Living with a partner		$\chi^2(1) = 1.3, p = 0.2521$ 1	
		No	25 (34%)	1.4 (0.8-2.6)	
		Yes	50 (42%)		
		Anxiety ^b		$\chi^2(1) = 1.5, p = 0.2152$ 1	
		No	62 (37%)	1.7 (0.7-3.9)	
		Yes	13 (50%)		
		Depression ^b		$\chi^2(1) = 0.1, p = 0.8260$ 1	
		No	72 (39%)	1.2 (0.3-5.5)	
		Yes	3 (43%)		

Type of support	Patients indicating they would accept or currently were accepting support <i>n</i> , % [95% CI]	Characteristic	Patient in each category indicating they would accept or current were accepting support <i>n</i> (%)	Univariate analysis LR Chi², <i>p</i> Unadjusted OR (95% CI)	Final multiple logistic regression model Hosmer Lemeshow <i>p</i> LR Chi², <i>p</i> Adjusted OR (95% CI)
Individual counselling at the cancer centre	132, 68% [61-75%]	Hospital Site 1 Site 2 Site 4 Age group 18-49 years 50-59 years 60-69 years 70 years plus Sex Male Female Cancer diagnosis Breast Prostate Other/don't know ^a Living with a partner No Yes Anxiety ^b No Yes Depression ^b No Yes	37 (60%) 65 (78%) 30 (63%) 33 (85%) 24 (71%) 41 (66%) 34 (59%) 66 (67%) 66 (70%) 40 (75%) 28 (64%) 64 (67%) 48 (65%) 84 (71%) 111 (66%) 21 (81%) 128 (69%) 4 (57%)	$\chi^2(2) = 6.9, p = 0.0320$ ^c 1 2.4 (1.2-5.1) 1.1 (0.5-2.4) $\chi^2(3) = 8.1, p = 0.0445$ ^c 1 0.4 (0.1-1.4) 0.4 (0.1-1.0) 0.3 (0.1-0.7) $\chi^2(1) = 0.3, p = 0.5962$ 1 1.2 (0.6-2.2) $\chi^2(2) = 1.9, p = 0.3932$ 1 0.6 (0.2-1.4) 0.7 (0.3-1.4) $\chi^2(1) = 0.7, p = 0.4072$ 1 1.3 (0.7-2.4) $\chi^2(1) = 2.3, p = 0.1293$ ^{c, d} 1 2.1 (0.8-5.9) $\chi^2(1) = 0.4, p = 0.5246$ 1 0.6 (0.1-2.8)	$p = 0.7654$ $\chi^2(2) = 7.9, p = 0.0197^*$ 1 2.7 (1.3-5.7) 1.2 (0.5-2.6) $\chi^2(3) = 69.0, p = 0.0287^*$ 1 0.4 (0.1-1.2) 0.3 (0.1-0.9) 0.2 (0.1-0.7)

Type of support	Patients indicating they would accept or currently were accepting support <i>n</i> , % [95% CI]	Characteristic	Patient in each category indicating they would accept or current were accepting support <i>n</i> (%)	Univariate analysis LR Chi², <i>p</i> Unadjusted OR (95% CI)	Final multiple logistic regression model Hosmer Lemeshow <i>p</i> LR Chi², <i>p</i> Adjusted OR (95% CI)
Treatment/ counselling from my cancer doctor	157, 81% [75-87%]	Hospital Site 1 Site 2 Site 4 Age group 18-49 years 50-59 years 60-69 years 70 years plus Sex Male Female Cancer diagnosis Breast Prostate Other/don't know ^a Living with a partner No Yes Anxiety ^b No Yes Depression ^b No Yes	47 (76%) 68 (82%) 42 (88%) 30 (77%) 28 (82%) 49 (79%) 50 (86%) 81 (82%) 76 (81%) 43 (81%) 37 (84%) 77 (80%) 60 (81%) 97 (82%) 135 (81%) 22 (85%) 151 (81%) 6 (86%)	$\chi^2(2) = 2.5, p = 0.2848$ ^c 1 1.5 (0.6-3.2) 2.2 (0.8-6.3) $\chi^2(3) = 1.7, p = 0.6404$ 1 1.4 (0.4-4.4) 1.1 (0.4-3.0) 1.9 (0.7-5.4) $\chi^2(1) = 0.03, p = 0.8631$ 1 0.9 (0.5-1.9) $\chi^2(2) = 0.3, p = 0.8566$ 1 1.2 (0.4-3.6) 0.9 (0.4-2.2) $\chi^2(1) = 0.01, p = 0.9404$ 1 1.0 (0.5-2.2) $\chi^2(1) = 0.2, p = 0.6387$ 1 1.3 (0.4-4.0) $\chi^2(1) = 0.1, p = 0.7550$ 1 1.4 (0.2-11.9)	$p = 1.0$ $\chi^2(2) = 2.5, p = 0.2848$ 1 1.4 (0.6-2.2) 2.2 (0.8-6.3)

Type of support	Patients indicating they would accept or currently were accepting support <i>n</i> , % [95% CI]	Characteristic	Patient in each category indicating they would accept or current were accepting support <i>n</i> (%)	Univariate analysis LR Chi², <i>p</i> Unadjusted OR (95% CI)	Final multiple logistic regression model Hosmer Lemeshow <i>p</i> LR Chi², <i>p</i> Adjusted OR (95% CI)
Group counselling outside the cancer centre	61, 32% [25-39%]	Hospital Site 1 Site 2 Site 4 Age group 18-49 years 50-59 years 60-69 years 70 years plus Sex Male Female Cancer diagnosis Breast Prostate Other/don't know ^a Living with a partner No Yes Anxiety ^b No Yes Depression ^b No Yes	16 (26%) 28 (34%) 17 (35%) 16 (41%) 16 (47%) 19 (31%) 10 (17%) 28 (28%) 33 (35%) 16 (30%) 12 (27%) 33 (34%) 18 (24%) 43 (36%) 49 (29%) 12 (46%) 58 (31%) 3 (43%)	$\chi^2(2) = 1.5, p = 0.4750$ ^c 1 1.5 (0.7-3.0) 1.6 (0.7-3.6) $\chi^2(3) = 11.3, p = 0.0104$ ^c 1 1.3 (0.5-3.2) 0.6 (0.3-1.5) 0.3 (0.1-0.8) $\chi^2(1) = 1.0, p = 0.3080$ 1 1.4 (0.7-2.5) $\chi^2(2) = 0.8, p = 0.6778$ 1 0.9 (0.4-2.1) 1.2 (0.6-2.5) $\chi^2(1) = 3.0, p = 0.0829$ ^{c, d} 1 1.8 (0.9-3.4) $\chi^2(1) = 2.8, p = 0.0947$ ^{c, d} 1 2.1 (0.9-4.8) $\chi^2(1) = 0.4, p = 0.5246$ 1 1.7 (0.4-7.6)	$p = 0.9237$ $\chi^2(2) = 1.5, p = 0.4663$ 1 1.5 (0.7-3.1) 1.6 (0.7-3.8) $\chi^2(3) = 11.3, p = 0.0102^*$ 1 1.2 (0.5-3.1) 0.6 (0.3-1.4) 0.3 (0.1-0.7)

Type of support	Patients indicating they would accept or currently were accepting support <i>n</i> , % [95% CI]	Characteristic	Patient in each category indicating they would accept or current were accepting support <i>n</i> (%)	Univariate analysis LR Chi², <i>p</i> Unadjusted OR (95% CI)	Final multiple logistic regression model Hosmer Lemeshow <i>p</i> LR Chi², <i>p</i> Adjusted OR (95% CI)
Individual counselling outside the cancer centre	102, 53% [46-60%]	Hospital Site 1 Site 2 Site 4 Age group 18-49 years 50-59 years 60-69 years 70 years plus Sex Male Female Cancer diagnosis Breast Prostate Other/don't know ^a Living with a partner No Yes Anxiety ^b No Yes Depression ^b No Yes	33 (53%) 45 (54%) 24 (50%) 25 (64%) 23 (68%) 32 (52%) 22 (38%) 45 (45%) 57 (49%) 35 (66%) 19 (43%) 48 (50%) 37 (50%) 65 (55%) 86 (52%) 16 (62%) 97 (52%) 5 (71%)	$\chi^2(2) = 0.2, p = 0.8949$ ^c 1 1.0 (0.5-2.0) 0.9 (0.4-1.9) $\chi^2(3) = 10.3, p = 0.0160$ ^c 1 1.2 (0.4-3.1) 0.6 (0.3-1.4) 0.3 (0.1-0.8) $\chi^2(1) = 4.5, p = 0.0343$ ^{c, d} 1 1.8 (1.0-3.3) $\chi^2(2) = 5.7, p = 0.0566$ ^{c, d} 1 0.4 (0.2-0.9) 0.5 (0.3-1.0) $\chi^2(1) = 0.4, p = 0.5318$ 1 1.2 (0.7-2.2) $\chi^2(1) = 0.9, p = 0.3376$ 1 1.5 (0.6-3.5) $\chi^2(1) = 1.05, p = 0.3066$ 1 2.3 (0.4-12.1)	$p = 0.4152$ $\chi^2(2) = 0.2, p = 0.9083$ 1 1.0 (0.5-2.0) 0.9 (0.4-1.9) $\chi^2(3) = 10.3, p = 0.0162^*$ 1 1.2 (0.4-3.1) 0.6 (0.3-1.4) 0.3 (0.1-0.8)

Type of support	Patients indicating they would accept or currently were accepting support <i>n</i> , % [95% CI]	Characteristic	Patient in each category indicating they would accept or current were accepting support <i>n</i> (%)	Univariate analysis LR Chi², <i>p</i> Unadjusted OR (95% CI)	Final multiple logistic regression model Hosmer Lemeshow <i>p</i> LR Chi², <i>p</i> Adjusted OR (95% CI)
Online/Internet support	49, 25% [19-32%]	Hospital			<i>p</i> = 0.4663
		Site 1	15 (24%)	χ²(2) = 0.1, <i>p</i> = 0.9487	χ²(2) = 0.1, <i>p</i> = 0.9533
		Site 2	22 (27%)	1 (0.5-2.4)	1 (0.5-2.6)
		Site 4	12 (25%)	1.0 (0.4-2.5)	1.1 (0.4-2.7)
		Age group		χ²(3) = 23.9, <i>p</i> < 0.0001	χ²(3) = 23.9, <i>p</i> < 0.0001*
		18-49 years	16 (41%)	1	1
		50-59 years	15 (44%)	1.1 (0.4-2.9)	1.1 (0.4-2.8)
		60-69 years	14 (23%)	0.4 (0.2-1.0)	0.4 (0.2-1.0)
		70 years plus	4 (6.9%)	0.1 (0.03-0.4)	0.1 (0.03-0.4)
		Sex		χ²(1) = 0.4, <i>p</i> = 0.5368	
		Male	27 (27%)	1	
		Female	22 (23%)	0.8 (0.4-1.6)	
		Cancer diagnosis		χ²(2) = 1.72, <i>p</i> = 0.4230	
		Breast	10 (19%)	1	
		Prostate	12 (27%)	1.6 (0.6-4.2)	
		Other/don't know ^a	27 (28%)	1.7 (0.7-3.8)	
		Living with a partner		χ²(1) = 0.4, <i>p</i> = 0.5414	
		No	17 (23%)	1	
		Yes	32 (27%)	1.2 (0.6-2.4)	
		Anxiety ^b		χ²(1) = 4.2, <i>p</i> = 0.0417	
		No	38 (23%)	1	
		Yes	11 (42%)	2.5 (1.1-5.9)	
		Depression ^b		χ²(1) = 1.1, <i>p</i> = 0.3055	
		No	46 (25%)	1	
		Yes	3 (43%)	2.3 (0.5-10.6)	

Note. Observations within each variable may not add to the total due to missing values

- a. Including brain, colorectal, head and neck, lung, non-Hodgkin's lymphoma, and other cancer types
- b. Assessed using the Hospital Anxiety and Depression Scale (HADS)
- c. Included in initial multiple logistic regression model
- d. Eliminated during backwards stepwise multiple logistic regression analysis

S6. Number and proportion (with 95% CIs) of patients indicating that if experiencing anxiety or depression, they would be willing to accept professional support, by distress assessment method ($n = 193$)

Distress assessment method (n)	Combined willingness to accept support n % [95% CI]
a) HADS Mild-Severe Anxiety & Depression ($n = 66$)	62 94% [85%, 98%]
b) HADS Moderate-Severe Anxiety & Depression ($n = 29$)	27 93% [77%, 99%]
c) Perceived Mild-Severe Anxiety & Depression ($n = 109$)	103 94% [88%, 98%]
d) Perceived Moderate-Severe Anxiety & Depression ($n = 33$)	33 100% [89%, 100%]
e) Patient preference to be offered professional support for current levels of anxiety and/or depression ($n = 54$)	54 100% [93%, 100%]

Table 1. Characteristics of the sample

	<i>Overall sample</i> <i>(n = 304)</i>	<i>Support preferences</i> <i>subsample</i> <i>(n = 193)</i>
Characteristic	<i>n (%)</i>	<i>n (%)</i>
Males	158 (52)	99 (51)
Age group		
18-49	64 (21)	39 (20)
50-59	58 (19)	34 (18)
60-69	99 (33)	62 (32)
70+	83 (27)	58 (30)
Australian born	202 (66)	132 (68)
Living with:		
Husband/wife/partner	187 (62)	119 (62)
Children/step-children	65 (21)	42 (22)
Other family	22 (7.2)	12 (6.2)
Friend/s	8 (2.6)	6 (3.1)
Unrelated flatmate/co-tenant	4 (1.3)	4 (2.1)
Living alone	62 (20)	38 (20)
Cancer type		
Breast	77 (25)	53 (27)
Prostate	68 (22)	44 (23)
Head and neck	31 (10)	17 (8.8)
Colorectal	17 (5.5)	9 (4.7)
Lung	16 (5.3)	8 (4.1)

Brain	12 (3.9)	8 (4.1)
Non Hodgkin's Lymphoma	11 (3.6)	7 (3.6)
Melanoma	10 (3.3)	5 (2.6)
Other	56 (18)	38 (20)
Don't know	6 (2.0)	4 (2.1)
Perceived palliative treatment aim	48 (16)	35 (19)
Second diagnosis or recurrence	93 (32)	59 (32)
Hospital site		
Site 1	62 (20%)	62 (32%)
Site 2	83 (27%)	83 (43%)
Site 3	75 (25%)	0 (0%)
Site 4	84 (28%)	48 (25%)
	Median (Q1, Q3)	Median (Q1, Q3)
Number of outpatient clinic appointments	3 (2, 4)	3 (2, 4)
Number of radiotherapy treatment appointments	8 (3, 16)	7 (3, 15)
Weeks since diagnosis	28.2 (15.9, 69.0)	29.2 (15.9, 74.1)

Notes

Due to missing values, non-mutually exclusive categories and rounding, numbers for some variables may not add to total sample size.

Table 2. Number and percentage of patients whose HADS anxiety levels agree with their perceived anxiety levels

	HADS-A Classification				
Perceived level of anxiety	Normal Anxiety	Mild Anxiety	Moderate Anxiety	Severe anxiety	TOTAL
No Anxiety	138 (90%)	14	1	0	153
Mild Anxiety	62	21 (21%)	15	1	99
Moderate Anxiety	16	10	18 (36%)	6	50
Severe Anxiety	0	0	1	1 (50%)	2
TOTAL	216	45	35	8	304

Table 3. Number and percentage of patients whose HADS depression levels agree with their perceived depression levels

	HADS-D Classification				
Perceived level of depression	Normal Depression	Mild Depression	Moderate Depression	Severe Depression	TOTAL
No Depression	195 (93%)	13	1	0	209
Mild Depression	46	15 (23%)	3	1	65
Moderate Depression	9	10	9 (31%)	1	29
Severe Depression	1	0	0	0 (0%)	1
TOTAL	251	38	13	2	304

Table 4. Likelihood ratio univariate and multiple logistic regression results from four logistic regression models of the outcome “current preference to be offered professional support for anxiety and/or depression” (*n* = 304)

		Univariate logistic regression	Multiple logistic regression	Multiple logistic regression	Multiple logistic regression	Multiple logistic regression
			Model a: HADS Mild-Severe Anxiety and/or Depression	Model b: HADS Moderate-Severe Anxiety and/or Depression	Model c: Patient Perceived Mild-Severe Anxiety and/or Depression	Model d: Patient Perceived Moderate-Severe Anxiety and/or Depression
Variable	Desire to be offered professional support <i>n</i> (row %)	Univariate LR $X^2(df)$, <i>p</i> Unadjusted OR (95% CI)	LR $X^2(df)$, <i>p</i> Adjusted OR (95% CI)	LR $X^2(df)$, <i>p</i> Adjusted OR (95% CI)	LR $X^2(df)$, <i>p</i> Adjusted OR (95% CI)	LR $X^2(df)$, <i>p</i> Adjusted OR (95% CI)
Hospital		30.6 (3), <i>p</i><0.0001^c	30.4 (3), <i>p</i><0.0001^e	33.4 (3), <i>p</i><0.0001	30.6 (3), <i>p</i><0.0001^e	31.1 (3), <i>p</i><0.0001^e
Site 1	23 (37%)	1	1	1	1	1
Site 2	28 (34%)	0.9 (0.4-1.7)	0.8 (0.5-1.7)	0.8 (0.4-1.7)	0.8 (0.4-1.7)	1.0 (0.5-2.1)
Site 3	10 (13%)	0.3 (0.1-0.6)	0.2 (0.1-0.6)	0.2 (0.1-0.5)	0.2 (0.1-0.5)	0.3 (0.1-0.6)
Site 4	6 (7%)	0.1 (0.05-0.3)	0.1 (0.1-0.3)	0.1 (0.05-0.3)	0.1 (0.05-1.3)	0.1 (0.04-0.3)
Age group		0.2 (3), <i>p</i>=0.9780				
18-49	15 (23%)	1				
50-59	13 (19%)	0.9 (0.4-2.2)				
60-69	22 (33%)	0.9 (0.4-2.0)				
70+	17 (25%)	0.8 (0.4-1.8)				
Sex		0.1 (1), <i>p</i>=0.8199				
Male	34 (22%)	1				
Female	33 (23%)	1.1 (0.6-1.8)				
Australian born		2.6 (1), <i>p</i>=0.1100^c	2.0 (1), <i>p</i>=0.1554^d	1.4 (1), <i>p</i>=0.2307^d	1.2 (1), <i>p</i>=0.2706^d	1.0 (1), <i>p</i>=0.3211^d
Yes	39 (19%)	1	1	1	1	1
No	28 (27%)	1.6 (0.9-2.8)	1.6 (0.8-2.9)	1.5 (0.8-2.9)	1.4 (0.8-2.7)	1.4 (0.7-2.7)

Perceived palliative treatment aim		2.1 (1), $p=0.1463^c$	1.6 (1), $p=0.2084^d$	1.6 (1), $p=0.2126^d$	0.9 (1), $p=0.3342^d$	1.2 (1), $p=0.2733^d$
No	48 (20%)	1	1	1	1	1
Yes	14 (29%)	1.7 (0.8-3.4)	1.6 (0.8-3.5)	1.6 (0.8-3.5)	1.5 (0.7-3.3)	1.6 (0.7-3.4)
Cancer type		1.9 (2), $p=0.3860$				
Breast	19 (25%)	1				
Prostate	11 (16%)	0.6 (0.3-1.3)				
Other ^a	37 (23%)	0.9 (0.5-1.7)				
HADS mild-severe anxiety ^b		6.6 (1), $p=0.0104^c$	8.4 (1), $p=0.0038^e$			
No	39 (18%)	1	1			
Yes	28 (32%)	2.1 (1.2-3.7)	2.7 (1.4-5.4)			
HADS mild-severe depression ^b		2.3 (1), $p=0.1262^c$	0.01 (1), $p=0.9214$			
No	51 (20%)	1	1			
Yes	16 (30%)	1.7 (0.9-3.3)	1.0 (0.4-2.1)			
HADS moderate-severe anxiety ^b		8.0 (1), $p=0.0048^c$		6.8 (1), $p=0.0089^e$		
No	50 (19%)	1		1		
Yes	17 (40%)	2.8 (1.4-5.5)		2.9 (1.3-6.5)		
HADS moderate-severe depression ^b		1.1 (1), $p=0.3020^c$		0.00 (1), $p=0.9512$		
No	62 (21%)	1		1		
Yes	5 (33%)	1.8 (0.6-5.6)		1 (0.3-3.5)		
Perceived mild-severe anxiety		17.0 (1), $p<0.0001^c$			5.4 (1), $p=0.0199^c$	
No	19 (12%)	1			1	
Yes	48 (32%)	3.3 (1.8-5.9)			2.3 (1.1-4.6)	
Perceived mild-severe depression		16.7 (1), $p<0.0001^c$			6.4 (1), $p=0.0116^c$	
No	32 (15%)	1			1	
Yes	35 (37%)	3.2 (1.8-5.7)			2.4 (1.2-4.9)	

Perceived moderate-severe anxiety No Yes	44 (17%) 23 (44%)	15.9 (1), $p=0.0001^c$ 1 3.7 (2.0-7.1)				7.7 (1), $p=0.0054^c$ 1 3.4 (1.5-7.8)
Perceived moderate-severe depression No Yes	51 (19%) 16 (53%)	15.9 (1), $p=0.0001^c$ 1 5.0 (2.3-10.9)				2.2 (1), $p=0.1372$ 1 2.1 (0.8-5.8)
Hosmer-Lemeshow goodness of fit			Hosmer-Lemeshow $\chi^2 (7) = 9.7$, $p = 0.2092$	Hosmer-Lemeshow $\chi^2 (4) = 3.0$, $p = 0.5557$	Hosmer-Lemeshow $\chi^2 (8) = 9.4$, $p = 0.3134$	Hosmer-Lemeshow $\chi^2 (4) = 2.1$, $p = 0.7119$
Aikake Information Criterion			AIC (df = 6) = 292	AIC (df = 6) = 294	AIC (df = 6) = 279	AIC (df = 6) = 281

Notes.

Observations within each variable may not add to the total due to missing values

^a Including brain, colorectal, head and neck, lung, non-Hodgkin's lymphoma, and other cancer types

^b Assessed using the Hospital Anxiety and Depression Scale (HADS)

^c Included in the initial multiple logistic regression model

^d Eliminated during backwards stepwise multiple logistic regression analysis

^e Significant

Bolded font indicates inclusion in the final multiple logistic regression model