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Stress and self-efficacy predict psychological adjustment at diagnosis of prostate cancer

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QUALITY OF LIFE
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Prostate cancer is the most frequently non-skin cancer diagnosed among men. Diagnosis, a significant burden, generates many challenges which impact on emotional adjustment and so warrants further investigation. Most studies to date however, have been carried out at or post treatment with an emphasis on functional quality of life outcomes. Men recently diagnosed with localised prostate cancer (N = 89) attending a Rapid Access Prostate Clinic to discuss treatment options completed self report questionnaires on stress, self-efficacy, and mood. Information on age and disease status was gathered from hospital records. Self-efficacy and stress together explained more than half of the variance on anxiety and depression. Self-efficacy explained variance on all 6 emotional domains of the POMS (ranging from 5–25%) with high scores linked to good emotional adjustment. Perceived global and cancer specific stress also explained variance on the 6 emotional domains of the POMS (8–31%) with high stress linked to poor mood. These findings extend understanding of the role of efficacy beliefs and stress appraisal in predicting emotional adjustment in men at diagnosis and identify those at risk for poor adaptation at this time. Such identification may lead to more effective patient management.

Prostate Cancer is the most frequently diagnosed non-skin cancer among men¹. The majority of men are diagnosed with early stage disease. In Ireland, 2,400 men are diagnosed with prostate cancer annually with 550 dying each year². There is no national screening programme for prostate cancer in Ireland. The National Cancer Control Programme developed standards for access to diagnostics and treatment of prostate cancer resulting in 6 Rapid Access Prostate Cancer clinics (RAPC) in the country allowing easier and faster access to specialist urological opinion for men suspected of having prostate cancer³.

Treatments for early stage disease include radical prostatectomy (RP), external beam radiation (EBR), brachytherapy, hormone therapy, a combination of these treatments, active surveillance, or watchful waiting. Each of the active treatments has side effects, the most common of which are urinary, bowel and sexual dysfunction^{4,5}. Due to the high survival rates associated with diagnosis and treatment of early stage disease and studies indicating that many men experience these long term side effects⁶ it is essential to examine psychological adjustment at each stage of the journey. Added impetus for such research comes from the International Psycho-oncology Society who launched a new standard of Quality Cancer Care proposing that the psychosocial domain be integrated into routine care and that distress be assessed as the sixth vital sign after temperature, blood pressure, pulse, respiration and pain⁷. This, together with the recent validation of the Distress Thermometer by Chambers⁸ will focus attention on emotional indices. This is timely as the majority of research in men with prostate cancer tends to focus on physical and functional issues rather than on immediate emotional experience following diagnosis^{9,10}.

There has been debate on the existence of elevated psychological distress among patients with prostate cancer, with one review reporting no real difference between patients and non patient peers⁹ and two other reviews reporting elevated levels of anxiety and depression^{11,12}. In a subsequent review Sharpley et al¹³ concluded that receiving a diagnosis of prostate cancer “is highly likely to be a significantly distressing occasion for a substantial proportion of men” (p 571) and in the first meta-analysis of psychological distress in men with prostate cancer, Watts et al.¹⁴ reported that the prevalence of depression and anxiety in men with prostate cancer at diagnosis and across the treatment spectrum was relatively high (e.g. pretreatment depression 17.2% and anxiety 27.4%), thus identifying those psychological predictors which explain variability in emotional adjustment is of value.

General perceptions of prostate cancer may predict which individuals have better or worse psychological and physical adjustment during the course of cancer management⁵. A focus on perceived stress, therefore, may be of greater importance to adaptation than the actual disease stressors themselves^{15,16}. Perceived stress is based on the



relationship between the person and the environment and emphasises appraisal of stress. The perception of stress as a threat elicits negative emotional states and maladaptive coping, whereas the perception of stress as a challenge is associated with favourable emotional reactions and greater confidence in coping¹⁷. A number of studies have reported significant associations between perceived stress and overall quality of life in mixed cancer groups¹⁸ and in men with localised prostate cancer^{19,20}. In the emotional domain, Hsaoi et al.²¹ found a significant association between global perceived stress and greater prostate cancer symptom distress one to three months post treatment and stress appraisal predicted total mood disturbance in a group of men two years post treatment²². While research in this area is limited, the evidence suggests a link between perceived stress and later psychological adjustment. An exception is a study by Hyacinth et al.²³ who found no association between these variables in a convenience sample of military personnel.

One of the few studies to date carried out at diagnosis reported that stress appraisal predicted distress a year later²⁴. This concurs with other findings that perceived stress at time of diagnosis is a key predictor of later distress in women with breast cancer^{16,25}. There has been little research on the specific impact of stress appraisals (global or cancer specific) on subsequent health and mood in the prostate cancer population.

Given that cancer in general is an unpredictable illness, its impact on personal mastery beliefs is important²⁶. A number of investigations have examined self-efficacy in relation to patients' adjustment to cancer^{27,28}. Self-efficacy is a broad disposition rooted in the patient's personality and life experience²⁹. It refers to both perception of controllability of self management tasks and sense of efficacy to use skills effectively under difficult circumstances¹⁹. Typically in prostate cancer studies, self-efficacy is related to quality of life post-treatment^{19,30,31}. Only two studies to date, have examined the impact of self-efficacy on mood in men with prostate cancer, one demonstrating a link with depression³² and in the other, self-efficacy did not contribute directly to mood disturbance²². Self-efficacy measures used in these studies, however, were, mainly symptom related and men were assessed in the post treatment phase. It would be of value to understand patients' generalised self-efficacy on mood at time of diagnosis before the impact of treatment effects.

Adjustment of men with prostate cancer has usually been assessed in terms of their quality of life, with an emphasis on functional status and physical symptoms. Such measures of quality of life are more relevant during, or post-treatment as at diagnosis many men are asymptomatic. Assessment of mood states, rather than functional adjustment may be more useful at diagnosis.

This study, controlling for age and disease status, examined the role of perceived stress (global and cancer specific) and self-efficacy in predicting emotional adjustment, in men recently diagnosed with localised prostate cancer, who are attending a Rapid Access Prostate Clinic to discuss treatment options.

Methods

Participants. Consecutive men attending the Rapid Access Prostate Clinic, in a university-affiliated hospital over an 8 month period were eligible to participate. The study protocol, which was developed in accordance with the Institutional ethical guidelines for research of the University Hospital, was approved by the Institutional Research Ethics Committee of the University Hospital. Written informed consent was obtained from all patients who participated in the study. Inclusion criteria were all those newly diagnosed with localised prostate cancer, awaiting treatment, who had completed at least second level education. Exclusion criteria were prior cancer diagnosis or other comorbidities, diagnoses of intellectual disability or psychopathology and lack of literacy skills. An envelope of self report questionnaires including a study stamped addressed envelope was given to them by research assistants (who were health psychology graduates) and the men either filled them in then or returned them within a week. Information on age, medical history and Gleason scores were obtained from hospital records. (Gleason scores consist of 2 numbers, a primary grade and a secondary grade. Each is given a value from 1–5, the higher numbers indicating a more aggressive cancer. The most common score is a 3 + 3 known as Gleason 6)³³.

Ethics Statement. We adhere to the guidelines in 'Use of experimental animals and human subjects' for articles in Scientific reports. The study protocol adhered to the Institutional ethical guidelines of University Hospital Galway, Ireland and we submitted it for approval to the Institutional Research Ethics Committee of University Hospital Galway, Ireland. Written informed consent was obtained from all patients at the hospital who participated in the study. We wish to state that this study was conducted with a clinical sample but only group data is provided in the paper. There is no identifying information relating to participants (including patients' details images or videos).

One hundred and five out of 190 patients attending agreed to participate giving a 55% response rate. On checking hospital records, however, 14 of these men satisfied some aspect of the exclusion criteria. Resulting analysis is thus based on 89 eligible men. The non-responders were compared to participants on age and disease status and no differences were found (p 's > .05).

Materials. Generalised Self-Efficacy Scale (GSES)³⁴ includes 10 items (e.g. 'I can always manage to solve difficult problems if I try hard enough') and the responses for each range from strongly disagree (1) to strongly agree (4). The scale provides one overall summative score and has been shown to have high reliability ($\alpha = .96$). In this study Cronbach's alpha was .89.

The Perceived Stress Scale (PSS)³⁵ taps the degree to which respondents find their lives unpredictable, uncontrollable, and overloaded. It is a 14-item scale which refers to events occurring within a one month time frame. Respondents are asked to indicate how often they thought or felt a certain way on a five point Likert scale from 0 "never" to 4 "very often". Scores can range from 0–56 with higher scores indicating more perceived stress. Cronbach's alpha coefficient was in the acceptable range in the current study ($\alpha = .78$).

The Impact of Events Scale (IES)³⁶ is a 15-item self report measure of stress related intrusive thoughts, denial of thoughts, and avoidant behaviours. It generates a total score based on two subscale scores (intrusion and avoidance). Participants rated each item as experienced in the previous week by using a 4 point Likert scale 0 (not at all), 1 (rarely), 3 (sometimes), 5 (often). Higher scores (0–75) indicate higher levels of cancer related stress. In the present sample, the internal consistency was very good, the coefficient alpha reliability estimate was .92.

The Profile of Moods Scale-Brief (POMS-B)³⁷ is a 30 item indicator of psychological state, used to measure mood disturbance across 6 dimensions: tension/anxiety, depression/dejection, anger/hostility, fatigue/inertia, confusion/bewilderment, and vigor/activity. It provides individual subscale scores and a total mood disturbance score. The POMS has been widely used in cancer studies and its psychometric properties are well supported in the literature³⁸. The POMS-B is made up of the 5 highest loading items per subscale based on 6 previous investigations of the POMS³⁷. In this study Cronbach's alpha ranged from .59–.91 for the 6 subscales. The total scale score reliability estimate was .91.

Statistical analyses. A power analysis was conducted using the subject to variable ratio of Tabachnick and Fidell³⁹ and 90 participants were deemed sufficient for a hierarchical multiple regression equation with 5 predictors.

Inspection of histograms and analysis of skewness and kurtosis values for all variables revealed that data were normally distributed. Multicollinearity was assessed among all subscales. Variance Inflation Factor and Tolerance scores for the predictor and outcome variables were acceptable (<10, and >.10 respectively) and can thus be included in a single regression equation. Pearson correlation coefficients assessed relationships between predictors and outcomes.

Hierarchical regression analyses identified sets of variables which significantly predicted adjustment on the 6 indices (tension/anxiety, anger, vigour, fatigue, confusion, depression). The order of entry takes account of self-efficacy beliefs before the impact of stress on adjustment is considered. Steps 1–3 were age and disease status, self-efficacy, stress. Missing data varied from 3% to 9% across the variables. Using Little's MCAR test data was found to be missing completely at random ($p > .05$) and

Table 1 | Descriptive Statistics for Predictor and Outcome variables

	Test Range	Sample Range	M	SD
Age		43–82	64.62	8.02
Gleason Score	2–10	6–8	6.44	.56
PSS	0–56	4–42	21.38	8.25
IES	0–75	0–68	21.30	1.74
GSES	10–40	15–40	30.60	5.64
POMS				
Tension	0–20	0–14	4.82	4.82
Depression	0–20	0–12	3.53	3.90
Anger	0–20	0–11	3.35	3.62
Vigor	0–20	0–20	8.58	4.25
Fatigue	0–20	0–12	4.47	3.96
Confusion	0–20	0–13	4.92	3.16

Note; PSS; Perceived Stress Scale, IES; Impact of Events Scale, GSES; General Self-Efficacy Scale, POMS; Profile of Moods States.


Table 2 | Summary of Intercorrelations between Age, Disease Status, Self-Efficacy, Stress, and Mood for 89 Men Diagnosed with Prostate Cancer

	1	2	3	4	5	6	7	8	9	10	11
1. Age	-										
2. Gleason Score	.15	-									
3. GSES	.05	.00	-								
4. PSS	-.21	-.09	-.50***	-							
5. IES	-.14	.05	-.28**	.48***	-						
6. Tension	-.14	.03	-.50***	.68***	.58***	-					
7. Anger	-.01	-.07	-.24*	.54**	.40***	.58***	-				
8. Vigor	-.07	.01	.36**	-.42***	-.23*	-.35**	-.32**	-			
9. Fatigue	.03	.06	-.21*	.50***	.42***	.66***	.56***	-.49***	-		
10. Confusion	-.11	.08	-.32**	.55***	.57***	.72***	.49***	-.19	.68***	-	
11. Depression	-.22*	.08	-.51***	.69***	.57***	.83***	.64***	-.42***	.70***	.72***	-

Note; * $p < .05$;

** $p < .01$;

*** $p < .001$.

PSS; Perceived Stress Scale, IES; Impact of Events Scale, GSES; General Self-Efficacy Scale. 6–11 subscales of the Profile of Moods States.

therefore, the Expectation Maximization algorithm was used to substitute missing values.

Results

The descriptive data are presented in Table 1. The sample scored in the low to moderate range on the stress and mood indices and in the upper range on self-efficacy. The intercorrelations between variables are shown in Table 2 and reveal that relationships between all stress and mood variables are in the expected direction with both high global and cancer specific stress related to high tension, anger, fatigue confusion, and depression, and high global and cancer specific stress correlated with low vigor. High self-efficacy correlated with good mood across the six scales. The results of the regression analyses are presented in Tables 3 and 4.

Variables in step 1 (age and total Gleason score) did not explain a significant amount of variance on any of the mood domains. On step 2, self-efficacy explained variance on six domains; tension (24%), anger (5%), vigor (12%), fatigue (4%), confusion (9%), depression (25%) with beta weights showing relationships in expected directions. The stress set explained additional variance on six domains namely tension (31%), anger (27%), vigor (8%), fatigue (26%), confusion (31%), and depression (29%). In all cases, the beta weights for general stress reached significance showing it was related to poor mood scores. Cancer related stress significantly predicted all mood outcomes, with the exception of vigor. The total amount of variance explained by all predictors for each mood index was as follows; tension (55%), anger (30%), vigor (18%), fatigue, (28%), confusion (40%), and depression (57%).

Discussion

This study focuses on emotional adjustment in men with early localised prostate cancer. A diagnosis of prostate cancer carries a significant emotional burden given the myriad of challenges generating from cancer and its treatment. It is important that health professionals understand men's emotional responses to diagnosis so that they can provide optimal information and psychological care at this time.

In the present study neither disease status or age explained variance on any of the outcomes. This is in line with the finding by Bisson et al.⁴⁰ that disease status did not predict psychological functioning but contrasts with their finding that younger age was predictive of poor psychological functioning. It is of interest that younger age did not predict mood in the current study given the potential disruptions to family and work life posed by the disease but perhaps in this early phase such disruption had not yet manifested itself. Self-efficacy and stress together explained more than half of the variance on distress (tension and depression) indicating their importance as predictors of mood for this population. Many studies describe levels of emotional distress after diagnosis but rarely focus on psychological predictors of that distress^{13,41}.

Self-efficacy on its own explained variance on all the adjustment indices but particularly on tension and depression with approximately one quarter of the variance being explained on each outcome. This demonstrates the significance of beliefs about personal mastery on adjustment in cancer in line with findings by Pudrovsk⁴². This construct equalled the explanatory impact of stress on distress. The reported relationship in this study between self-efficacy and mood at

Table 3 | Hierarchical Multiple Regression of the Role of Age, Disease Status, Self-Efficacy, and Stress on subscales of Profiles of Mood States

Predictors	Tension			Anger			Vigor		
	β	Fchange	Adj R ² ch	β	Fchange	Adj R ² ch	β	Fchange	Adj R ² ch
(1) Demographic Variables		.92	-.00		.19	-.02		.24	-.02
Age	-.14			-.01			-.07		
Total Gleason Score	-.05			-.07			.03		
(2) Self-Efficacy (GSES)	-.49***	27.76***	.24	-.24*	5.25*	.05	.36***	12.70***	.12
(3) Stress		30.68***	.31		17.22**	.27		5.04	.08
Global Stress (PSS)	.43***			.50***			-.35**		
Cancer related Stress (IES)	.44***			.20*			-.03		
Total R ²			.55			.30			.18

Note; * $p < .05$;

** $p < .01$;

*** $p < .001$;

N = 89. GSES; General Self-Efficacy Scale. PSS; Perceived Stress Scale. IES; Impact of Events Scale.



Table 4 | Hierarchical Multiple Regression of the Role of Age, Disease Status, Self-Efficacy, and Stress on subscales of Profiles of Mood States

Predictors	Fatigue			Confusion			Depression		
	β	Fchange	Adj R ² ch	β	Fchange	Adj R ² ch	β	Fchange	Adj R ² ch
(1) Demographic Variables		.19	-.02		.86	-.00		2.31	.03
Age	.02			-.12			-.21*		
Total Gleeson Score	.06			.09			-.05		
(2) Self-Efficacy (GSES)	-.21*	3.96*	.04	-.32**	9.53**	.09	-.50***	30.44***	.25
(3) Stress		16.32***	.26		23.02***	.31		29.35***	.29
Global Stress (PSS)	.45***			.36**			.42***		
Cancer-related Stress (IES)	.24*			.38***			.30***		
Total R ²			.28			.40			.57

Note; * $p < .05$;
 ** $p < .01$;
 *** $p < .001$.
 N = 89. GSES; General Self-Efficacy Scale. PSS; Perceived Stress Scale. IES; Impact of Events Scale.

diagnosis supports the Weber et al.⁴³ finding post treatment while contrasting with a study carried out two years post treatment which found no association between these two variables²². Assessment of this variable at the early phase is of value as it may identify men at risk for poor adaptation at diagnosis. Interestingly, high self-efficacy significantly predicted vigor, (being active and energetic), the only positive emotional index under study. If vigor level can be maintained it may offer resilience for men facing into the treatment phase. Prospective research is needed to ascertain if self-efficacy merits inclusion in psychosocial interventions (enhancing men's ability to manage medical and psychological symptoms). A cancer specific self-efficacy measure administered during treatment would provide important additional data to identify for example, relevant components for an intervention.

In this study the stress set explained variance (ranging from 8%–31%) on all 6 emotional domains, (tension, anger, vigor, fatigue, confusion, and depression) with higher levels of reported stress at diagnosis linked to poor emotional adjustment. This concurs with the only other study to examine the relationship between stress and mood using the POMS²², which was at post treatment. Of particular interest, stress best explained confusion/bewilderment emphasising the need for studies to extend beyond the two classic mood states (anxiety and depression) typically included in the cancer literature^{44,45}. It is important to understand factors that modify confusion as at this time men are facing additional responsibility for treatment decisions. Of the two types of stress assessed, perceived global stress emerged as the most powerful predictor for men with prostate cancer. This is in line with previous findings that global stress rather than cancer specific stress predicted adjustment in women with breast cancer¹⁶. However, cancer related stress emerged as an equally powerful predictor of tension, and explained a greater proportion of variance in confusion than general stress. Thus, measures of intrusion and avoidance may be clinically useful in predicting these particular affective states in men with prostate cancer. It has been reported that avoidance of the threat posed by a cancer diagnosis and treatment is related to poorer, long term adjustment outcomes⁵. Longitudinal studies are also needed to examine the role of global stress on a wide range of mood domains throughout the prostate cancer trajectory.

A limitation of this study is that it is cross-sectional in nature and so it precludes identification of causal relationships among variables. Prospective studies are thus warranted. Furthermore, the modest sample size and relatively low response rate may influence generalisability of the findings. Socioeconomic status, which could be predictive of mood outcomes, was not measured. The study, however, provides useful insights into possible psychological predictors of men's emotional response to a diagnosis of prostate cancer. It identifies that those high in global and cancer specific stress and low in

self-efficacy at diagnosis report poor adjustment and so screening at this early stage may lead to more effective patient management.

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Author contributions

R.C and A.M.G. wrote the main manuscript text. F.S. contributed to recruitment and also reviewed the manuscript.

Additional information

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