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Integrating PROMIS® Computerized Adaptive Tests Into a Web-Based Intervention for Prostate Cancer

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Objective: This study outlined the implementation and feasibility of delivering PROMIS® computer adaptive tests (CATs) using a web-based method to evaluate the impact of a technological adaptation of Cognitive-Behavioral Stress Management (CBSM) on the psychosocial functioning of men with advanced prostate cancer (APC) undergoing hormone therapy. ***Method:*** Patients were randomized to a CBSM group intervention ($n = 95$) or a health promotion (HP) attention-matched control condition ($n = 97$). Participants attended all sessions via video conference using tablets, and completed PROMIS® computer adaptive tests (CATs) assessing anxiety, depression, fatigue, pain interference, and physical function weekly during the 10-week intervention. ***Results:*** Assessment completion rates >50% at week 1 and week 10 demonstrated moderate feasibility of repeatedly administering PROMIS® CATs using a web-based method. Multilevel modeling demonstrated no significant group-by-time interactions from week 1 to week 10 for any of the assessed PROMIS® domains adjusting for sociodemographic and medical covariates. However, simple effects demonstrated decreases in PROMIS® anxiety scores from week 1 to 10 for both groups. Results also demonstrated significant relationships of medical variables to psychosocial functioning across time points. ***Conclusions:*** Results highlight the feasibility and benefits of utilizing PROMIS® CATs to repeatedly assess psychosocial functioning using a web-based method and indicate that web-based interventions may be effective for decreasing psychosocial distress and adverse symptoms among men with APC undergoing hormone therapy.

Keywords: distress, eHealth, PROMIS®, prostate cancer, psychosocial

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Prostate cancer is the most commonly diagnosed nonskin cancer among men living in the United States, accounting for nearly 1 in 5 estimated incident diagnoses in 2017 (Siegel, Miller, & Jemal, 2017). The 5-year survival rate for men with early stage prostate cancer is nearly 100%; however, for men with advanced prostate cancer (APC; Stage III–IV) this rate is significantly lower, at only

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approximately 29% (Siegel et al., 2017). To suppress tumor growth, hormone therapy (i.e., androgen-ablation, androgen-deprivation, chemical castration) is prescribed to approximately 70% of men with advanced prostate cancer. Though this treatment is effective at increasing survival and diminishing certain cancer symptoms such as pain, it introduces a myriad of distressing side effects. Many side effects associated with hormone therapy (HT) are psychosocial in nature or have psychosocial implications, such as depression, fatigue, loss of sexual desire, sexual and urinary dysfunction, and impaired cognitive functioning (Higano, 2003). As such, men with APC who receive HT often experience more severe decrements in health-related quality of life compared with those who do not receive this treatment (Eton & Lepore, 2002; Potosky et al., 2002).

Previous research demonstrates that cognitive–behavioral therapy (CBT)–based stress- and self-management interventions (e.g., Cognitive-Behavioral Stress Management [CBSM]) can mitigate the physical and psychological symptoms experienced by men with localized prostate cancer (Penedo et al., 2006). When delivered through a 10-week in-person group format, CBSM leads to significant improvements in health related quality of life, stress management, and psychological adaptation among men with localized prostate cancer (Penedo et al., 2004, 2006). Moreover, participation in psychosocially oriented groups has been related to increased knowledge about prostate cancer, increased involvement in treatment, increased expression of emotion, diminished anxiety, diminished distress, and a more positive outlook (Gregoire, Kalogeropoulos, & Corcos, 1997). However, no evidence-based interventions have been developed specifically for men with APC, and it is not clear whether interventions delivered in-person are feasible for men with APC because of greater burden of disease, more severe decrements in quality of life, increased comorbidities, and more functional limitations as compared with men with localized disease (Eton & Lepore, 2002; Fitch, Gray, Franssen, & Johnson, 2000).

Web-based interventions can increase access for men with APC by removing barriers related to disease burden and travel, and enabling patients to participate from the location of their choosing. Web-based interventions also afford the opportunity to utilize computer adaptive testing (CAT) approaches, such as those available through the Patient-Reported Outcomes Measurement Information System® (PROMIS®), to repeatedly assess psychosocial functioning and the impact of electronically delivered interventions while minimizing response burden across repeated questionnaire administration. This approach has the potential to not only allow researchers to examine intervention efficacy, but also to identify individuals at high risk for decrements in quality of life.

The present study outlined the implementation and feasibility of delivering PROMIS CATs using a web-based method to evaluate the impact of a 10-week, group, web-based adaptation of CBSM on multiple domains of psychosocial functioning among men with APC on HT. In addition, as an example of how PROMIS CATs can be used to assess a web-based intervention, this analysis examined changes in patient-reported symptoms of anxiety, depression, fatigue, pain interference, and physical function over the course of the 10-week intervention period. It was hypothesized that men randomized to CBSM would demonstrate significantly greater improvements during the intervention period in psychosocial functioning, as measured by PROMIS CATs, than men randomized to the control condition. An additional aim was to identify risk factors associated with worse psychosocial functioning in men with APC. Risk factors evaluated included sociodemographic and medical variables likely to impact psychosocial functioning in oncologic populations (Eton & Lepore, 2002; Kinsinger et al., 2006; Nelson et al., 2009; Schag, Ganz, Wing, Sim, & Lee, 1994).

Method

Participants and Procedure

Racially diverse patients with APC ($N = 192$) were recruited from Northwestern Medicine–affiliated hospitals, the Jesse Brown VA Medical Center, and Rush University Medical Center. The institutional review boards approved this study prior to enrollment at each site. All patients met the following inclusion criteria: (a) age ≥50 years, (b) English proficiency ≥6th grade level, (c) Stage III or IV prostate cancer, (d) received HT at least once within the past year, and (e) Mini-Mental State Examination (MMSE) score ≥20 (Folstein, Folstein, & McHugh, 1975).

Participants enrolled and provided written informed consent from January 2013 through November 2016, and were randomly assigned to a CBSM intervention condition or a health promotion (HP) attention-control condition. Groups were stratified by metastatic status, with men who had bone metastases assigned to groups separate from those with no metastases or metastases only to lymph nodes. All weekly group sessions were held through WebEx, a secure, IRB-compliant, videoconferencing website. Each participant was provided with a Samsung Galaxy tablet with a 6G data plan for the duration of study participation, and study staff reviewed basic procedures for using the tablets with each participant prior to group participation. Participants accessed the WebEx groups through a study-specific website, constructed using the Purple Development Environment (Schueller, Begale, Penedo, & Mohr, 2014), that was made available through a direct link on the home screen of the tablets. Participants received monetary compensation as a token of appreciation for study participation.

CBSM treatment condition. The manualized CBSM intervention (Penedo, Antoni, & Schneiderman, 2008) was adapted to include didactic information and situational examples relevant to APC. Relevant topics addressed throughout the intervention included challenges with sexual functioning, communication in intimate relationships, and urinary and bowel incontinence. Additional adaptations sought to address the concerns of older cancer survivors, such as acceptance, life review, the impact of illness on loved ones, and concerns around death and dying. The first 30 min of each group meeting were dedicated to facilitator-led relaxation exercises (e.g., deep breathing, progressive muscle relaxation, mindfulness meditation, guided imagery). The remaining 60 min of each session were devoted to psychoeducational content related to stress management. Session themes included (a) stress awareness (i.e., learning to recognize physical and emotional cues related to stress), (b) negative appraisals of stressors, (c) strategies for reframing such appraisals (e.g., restructuring cognitive distortions), (d) problem-focused and emotion-focused coping, (e) improving interpersonal communication with family, friends, and health care providers, and (f) effective use of social support networks. Homework assignments were given following each session, encouraging participants to practice the skills introduced during

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the group sessions later during the week. See Yanez et al. (2015) for additional information regarding the adapted CBSM treatment protocol.

Health promotion (HP) control condition. Participants assigned to the manualized HP condition took part in a 10-week, attention-control group. Patients met for approximately 60 min each week and were not exposed to any of the CBSM techniques included in the intervention. Instead, they received a general overview of prostate cancer and its treatment, information on other diseases of aging (including common comorbidities such as hypertension, diabetes, osteoporosis, and dementia), the importance of sleep, and moderation of substances such as alcohol and nicotine. Participants also discussed healthy habits related to nutrition and exercise, as outlined by the National Heart, Lung, and Blood Institute and National Cancer Institute. See Yanez et al. (2015) for additional information regarding the HP control protocol.

Integration of PROMIS CATs. Following each of the weekly group meetings, participants were instructed to complete questionnaires via the study-specific website, which was made available to them through a direct link posted to the home screen of the tablets. Opening this link initiated an instance of Assessment Center℠, which is a HIPAA-compliant, online data-capture tool. Within this instance of Assessment Center℠, a battery of PROMIS CATs assessing anxiety, depression, fatigue, pain interference, and physical function was presented for participants to complete. Should they have difficulty completing the PROMIS CATs, participants had access to previously developed resources and assistance via the tablet's home screen. Additionally, study staff provided weekly technical support phone calls to participants in need of assistance with logging on to their group meetings and/or completing the weekly PROMIS CAT assessments. Participants were asked to complete only five CAT assessments to minimize response burden, as all participants also answered questions regarding their confidence using information presented in the sessions, and participants randomized to the CBSM condition responded to additional weekly questions about group dynamics.

Measures

Sociodemographic and medical variables. Sociodemographic variables including age, race, ethnicity, income, and marital status were patient reported. Medical variables including metastatic status, history of prostatectomy, receipt of chemotherapy or radiation therapy during the six months prior to participation, and years since cancer diagnosis were abstracted from the medical chart. Medical comorbidities were patient reported and combined into a single, weighted index score using the weighting scheme from the Charlson Comorbidity Index (Charlson, Szatrowski, Peterson, & Gold, 1994).

PROMIS (Ader, 2007). Patient-reported psychosocial functioning was assessed weekly using the PROMIS Anxiety, Depression, Fatigue, Pain Interference, and Physical Function Item Bank CATs. PROMIS assessments are *t* scored, so that a mean score of 50 with a standard deviation of 10 represents the average U.S. population score for a given measure. Higher scores represent more symptoms of anxiety, depression, fatigue, and pain interference, and better physical function. Cutoff scores ≥55 for anxiety and depression, ≥ 50 for fatigue and pain interference, and <55 for physical function have been suggested to indicate elevated symptomatology in cancer populations (Cella et al., 2014; Wagner et al., 2015).

Analytic Plan

All analyses were completed as intent-to-treat analyses. Independent samples *t* tests and chi-square analyses were first used to compare groups at baseline on sociodemographic and medical characteristics, intervention participation, and week 1 PROMIS CAT scores. Feasibility of administering PROMIS CATs using a web-based method was evaluated through weekly assessment completion rates. Completion was defined as answering a sufficient number of questions to enable scoring. A completion rate of 40% was deemed acceptable to demonstrate feasibility based on a prior web-based administration of PROMIS CATs with cancer patients (Wagner et al., 2015).

To outline an example of how PROMIS CATs can be used to assess a web-based intervention, multilevel modeling was used to examine changes in PROMIS CAT scores across groups over the course of the 10-week intervention, with time as the level-1 variable (reference = week 1) and intervention condition as the level-2 variable (reference = HP). Each PROMIS domain was evaluated in a separate model. To account for multiple testing a Bonferroni correction ($\alpha = .01$) was used in these analyses. All continuous variables were grand mean centered, and all categorical variables were effect coded.

Results

Descriptive characteristics are shown in Table 1. The two groups did not statistically differ on sociodemographic variables, medical variables, intervention participation, or week 1 PROMIS CAT scores. Additionally, no statistically significant differences in within-person variance were found at week 1 or week 10.

Table 1
Sample Characteristics

Variable	Full sample (N = 192)	CBSM (n = 95)	HP (n = 97)
Sociodemographic variables			
Age, *M* (*SD*)	71.31 (8.88)	71.32 (8.45)	71.31 (9.33)
White, *n* (%)	115 (59.9)	57 (60.0)	58 (59.8)
Hispanic, *n* (%)	7 (3.6)	3 (3.2)	4 (4.1)
Married, *n* (%)	127 (66.1)	67 (70.5)	60 (61.9)
Annual income ≥ $50,000, *n* (%)	111 (57.8)	58 (61.1)	53 (54.6)
Medical variables			
Comorbidity index, *M* (*SD*)	1.39 (1.38)	1.41 (1.28)	1.37 (1.48)
Years since diagnosis, *M* (*SD*)	4.71 (5.28)	4.36 (5.16)	5.08 (5.42)
Metastatic disease, *n* (%)	74 (38.5)	34 (35.8)	40 (41.2)
History of prostatectomy, *n* (%)	98 (51.0)	46 (48.4)	52 (53.6)
Chemo within past 6 months, *n* (%)	6 (3.1)	3 (3.2)	3 (3.1)
RT within past 6 months, *n* (%)	39 (20.3)	20 (21.1)	19 (19.8)
Intervention participation			
# sessions completed, *M* (*SD*)	7.69 (2.97)	7.47 (3.09)	7.90 (2.86)

Note. CBSM = Cognitive-Behavioral Stress Management group; HP = Health Promotion group; *M* = mean; *SD* = standard deviation; Chemo = chemotherapy; RT = radiation therapy.

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Feasibility

Information on weekly PROMIS CAT assessment completion can be found in the CONSORT diagram presented in Figure 1, as well as in Tables 2 and 3. Both groups completed the majority of the assessments. Overall, men in the HP condition initiated slightly fewer assessments than men in the CBSM condition (M [SD] = 7.01 [3.12] versus 6.04 [3.28], $d = .30$; $t[190] = 2.10$, $p = .037$). Across both groups participants who completed any PROMIS CAT were likely to complete all five. Of those in the CBSM condition, 54% completed at least one PROMIS CAT and 47% completed all five PROMIS CATs at week 1. Of those in the HP condition, 66% completed at least one PROMIS CAT and 58% completed all five PROMIS CATs at week 1. These values remained relatively stable at week 10, when 53% of CBSM participants and 67% of HP participants completed at least one PROMIS CAT, and 50% of CBSM participants and 62% of HP participants completed all five PROMIS CATs.

Example: Evaluating Web-Based Intervention Efficacy Using PROMIS CATs

Multilevel modeling showed no statistically significant differences by group regarding change in psychosocial functioning from week 1 to week 10. However, despite the lack of omnibus interaction effects, simple effects demonstrated a significant decrease in PROMIS anxiety scores for the HP group ($d = 0.31$, $p = .010$, 95% CI [−0.06, 0.68]) and a nearly significant decrease in PROMIS anxiety scores for the CBSM group ($d = 0.30$, $p = .012$, 95% CI [−0.01, 0.71]). See Table 4 for group means on PROMIS CAT scores. These models also demonstrated significant relationships of medical variables to psychosocial functioning across time points. Men who had undergone prostatectomy demonstrated significantly higher PROMIS physical function scores as compared with those with no history of prostatectomy ($b = 5.39$, $SE = 1.91$, $p = .006$). Men who had received radiation therapy during the six

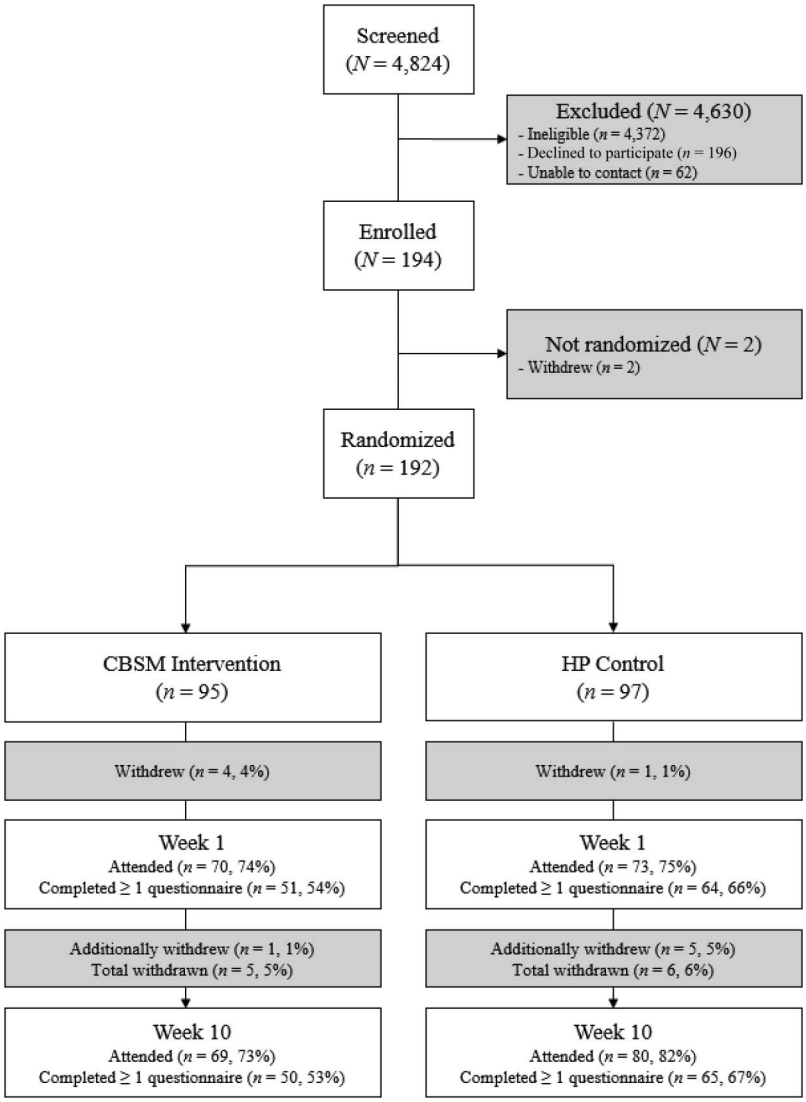

Figure 1. CONSORT diagram.

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Table 2
Proportion of Participants Who Completed Sufficient Items on PROMIS CAT Assessments to Enable Scoring, by Domain

	Anxiety		Depression		Fatigue		Pain interference		Physical function		Completed all CATs	
Wk	CBSM	HP	CBSM	HP	CBSM	HP	CBSM	HP	CBSM	HP	CBSM	HP
1	45 (47.4)	56 (57.7)	51 (53.7)	63 (64.9)	51 (53.7)	64 (66.0)	51 (53.7)	63 (64.9)	51 (53.7)	64 (66.0)	45 (47.4)	56 (57.7)
2	50 (52.6)	56 (57.7)	54 (56.8)	60 (61.9)	55 (57.9)	61 (62.9)	54 (56.8)	60 (61.9)	55 (57.9)	61 (62.9)	50 (52.6)	56 (57.7)
3	57 (60.0)	71 (73.2)	60 (63.2)	74 (76.3)	61 (64.2)	74 (76.3)	61 (64.2)	74 (76.3)	61 (64.2)	74 (76.3)	57 (60.0)	71 (73.2)
4	56 (58.9)	61 (62.9)	60 (63.2)	67 (69.1)	60 (63.2)	68 (70.1)	60 (63.2)	67 (69.1)	60 (63.2)	68 (70.1)	56 (58.9)	61 (62.9)
5	62 (65.3)	66 (68.0)	64 (67.4)	71 (73.2)	65 (68.4)	71 (73.2)	64 (67.4)	71 (73.2)	64 (67.4)	71 (73.2)	62 (65.3)	66 (68.0)
6	51 (53.7)	60 (61.9)	55 (57.9)	63 (64.9)	55 (57.9)	63 (64.9)	55 (57.9)	63 (64.9)	55 (57.9)	63 (64.9)	51 (53.7)	60 (61.9)
7	55 (57.9)	61 (62.9)	55 (57.9)	64 (66.0)	55 (57.9)	66 (68.0)	55 (57.9)	64 (66.0)	55 (57.9)	64 (66.0)	55 (57.9)	61 (62.9)
8	56 (58.9)	63 (64.9)	60 (63.2)	67 (69.1)	59 (62.1)	67 (69.1)	60 (63.2)	67 (69.1)	60 (63.2)	67 (69.1)	55 (57.9)	62 (63.9)
9	56 (58.9)	65 (67.0)	60 (63.2)	67 (69.1)	60 (63.2)	69 (71.1)	60 (63.2)	69 (71.1)	60 (63.2)	69 (71.1)	56 (58.9)	64 (66.0)
10	47 (49.5)	60 (61.9)	50 (52.6)	64 (66.0)	50 (52.6)	65 (67.0)	50 (52.6)	64 (66.0)	50 (52.6)	65 (67.0)	47 (49.5)	60 (61.9)

Note. All values are presented as *n* (%). CBSM = Cognitive-Behavioral Stress Management group; HP = Health Promotion group.

months prior to participation reported significantly higher PROMIS fatigue ($b = 7.25$, $SE = 1.92$, $p < .001$) and pain interference ($b = 5.13$, $SE = 1.89$, $p = .008$) scores than did patients who had not received radiation therapy within that time frame. Finally, pain interference increased with each additional medical comorbidity reported ($b = 2.20$, $SE = 0.60$, $p < .001$). There were no significant relationships between sociodemographic variables and psychosocial functioning across time points.

Discussion

The present study provides moderate support for the feasibility of implementing PROMIS CATs using a web-based method to evaluate the impact of a 10-week, group, web-based adaptation of CBSM on multiple domains of psychosocial functioning among men with APC on HT. PROMIS CAT completion rates were >50%, which is notably higher than the 37% observed in a past web-based application of PROMIS CAT assessments with cancer patients (Wagner et al., 2015). In this prior investigation, PROMIS CATs were disseminated remotely in a clinical setting to women receiving ambulatory gynecologic oncology care. Conversely, the current study involved individuals engaging weekly in research-related activities, which likely contributed to the higher completion rates. The completion rates observed in the present study are similar to those observed in a research study implementing web-based PROMIS pain assessment among individuals with sickle cell disease (Gary et al., 2016). Completion rates approximating 50% are somewhat low, particularly given that clinical trials evaluating health related quality of life have shown that approximately 70% of eligible patients complete baseline assessments, though it is important to note that this number is known to decrease with subsequent assessments (Jones, Snyder, & Wu, 2007). Future research would benefit from additional features to improve assessment completion rates, such as pop-up reminder alerts directly on the iPad home screen to minimize forgetting or enhanced education on the importance of completing assessments to increase intrinsic motivation. An extrinsic motivator was included in the present study in the form of a $5 compensation per weekly assessment completed; however, additional extrinsic motivation such as increased monetary or nonmonetary reward (e.g., badges) may also serve to further improve assessment completion rates. Of note, the stability of the completion rates from week 1 to week 10 observed in the present study did provide additional support for moderate feasibility of repeated PROMIS CAT administration using a web-based method. Additionally the observed tendency to complete either all included CATs or none of the included CATs suggests that the five that were selected did not pose excessive burden, even in the presence of other items (e.g., participant confidence using session-related information), and

Table 3
Number of PROMIS CAT Assessments Completed by Participants at Each Week, Possible Range 0 to 5

	0		1		2		3		4		5	
Wk	CBSM	HP	CBSM	HP	CBSM	HP	CBSM	HP	CBSM	HP	CBSM	HP
1	44 (46.3)	33 (34.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.0)	0 (0.0)	0 (0.0)	6 (6.3)	7 (7.2)	45 (47.4)	56 (57.7)
2	40 (42.1)	36 (37.1)	0 (0.0)	0 (0.0)	1 (1.1)	1 (1.0)	0 (0.0)	0 (0.0)	4 (4.2)	4 (4.1)	50 (52.6)	56 (57.7)
3	34 (35.8)	23 (23.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.1)	0 (0.0)	3 (3.2)	3 (3.1)	57 (60.0)	71 (73.2)
4	35 (36.8)	29 (29.9)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.0)	0 (0.0)	0 (0.0)	4 (4.2)	6 (6.2)	56 (58.9)	61 (62.9)
5	30 (31.6)	26 (26.8)	1 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.1)	5 (5.2)	62 (65.3)	66 (68.0)
6	40 (42.1)	34 (35.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (4.2)	3 (3.1)	51 (53.7)	60 (61.9)
7	40 (42.1)	31 (32.0)	0 (0.0)	2 (2.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (3.1)	55 (57.9)	61 (62.9)
8	35 (36.8)	30 (30.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (5.3)	5 (5.2)	55 (57.9)	62 (63.9)
9	35 (36.8)	28 (28.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.0)	4 (4.2)	4 (4.1)	56 (58.9)	64 (66.0)
10	45 (47.4)	32 (33.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.0)	0 (0.0)	0 (0.0)	3 (3.2)	4 (4.1)	47 (49.5)	60 (51.9)

Note. All values are presented as *n* (%). CBSM = Cognitive-Behavioral Stress Management group; HP = Health Promotion group.

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Table 4
Means at Each Time Point for the CBSM and HP Groups on All PROMIS CAT Scores

Measure	CBSM		HP	
	Week 1	Week 10	Week 1	Week 10
Anxiety	50.70 (8.52)[a]	48.05 (9.13)[b]	49.95 (8.10)[e]	47.32 (8.65)[f]
Depression	49.03 (7.29)[d]	46.55 (9.16)[c]	48.48 (7.43)[g]	46.64 (8.07)[h]
Fatigue	49.77 (8.57)[d]	47.82 (11.44)[c]	50.38 (9.79)[h]	48.58 (9.71)[j]
Pain interference	49.60 (9.24)[d]	49.95 (11.31)[c]	50.79 (9.48)[g]	50.16 (9.57)[h]
Physical function	46.51 (9.87)[d]	45.30 (10.30)[c]	45.33 (7.98)[h]	44.66 (8.61)[j]

Note. Unadjusted means are presented for all PROMIS CAT scores. Significant mean differences for the multilevel models are based on adjusted models. CBSM = Cognitive-Behavioral Stress Management; HP = Health Promotion.
Different cells have slightly different sample sizes because of missing data: [a] $n = 44$. [b] $n = 47$. [c] $n = 50$. [d] $n = 51$. [e] $n = 56$. [f] $n = 60$. [g] $n = 63$. [h] $n = 64$. [j] $n = 65$.

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therefore can be used in combination for research and/or clinical investigations.

To highlight the utility of assessing a web-based intervention with PROMIS CATs, simple effect analyses demonstrated significant changes in psychosocial functioning over the 10-week intervention. Men in both the CBSM and HP groups demonstrated decreases in anxiety symptoms over 10 weeks, highlighting the ability of the PROMIS CATs to identify change over time in psychosocial functioning. One explanation for the change over time across both groups is that interacting weekly with peers may be sufficient to yield psychological benefit. Furthermore, the HP group sessions consisted primarily of information dissemination, which can contribute to improved psychosocial functioning in oncologic populations (Husson, Mols, & van de Poll-Franse, 2011). Thus, an ideal intervention targeting psychosocial functioning among men with APC would include both CBT-based therapeutic components and health-promoting didactic components.

History of prostatectomy was associated with better physical function across time points. This may be because patients who are older and more medically complicated, and as such may have worse physical function, are often poor candidates for surgery. Additionally, recent radiation therapy was associated with increased fatigue and pain interference, consistent with the broader literature (Hofman, Ryan, Figueroa-Moseley, Jean-Pierre, & Morrow, 2007; Potosky et al., 2004). Medical comorbidity was also related to increased pain interference, further highlighting the complex nature of chronic illnesses, and the burden of medical comorbidities in the context of APC.

The present findings must be interpreted within the context of relevant limitations. All participants were provided with tablets and a data plan, limiting the generalizability of these findings. Additionally, although the sample was racially diverse, there were few Latino men in the sample. Furthermore, scores on the PROMIS CATs approximated the U.S. population average at week 1, likely limiting the intervention effects. As such, future research may benefit from screening men for distress at baseline to ensure inclusion of individuals most in need of intervention due to heightened baseline distress. Additionally, although the present study did utilize repeated assessments, future studies should evaluate lasting intervention effects at longer postintervention intervals.

In addition to these limitations, this study is characterized by notable strengths. One primary strength of this study was its web-adapted assessment and intervention protocol. By providing a group-based psychotherapy web-enabled intervention, patients could benefit from participation without the limiting effects of disease burden and travel. Additionally, by using the PROMIS CATs, psychosocial functioning could be assessed weekly while minimizing participant burden. In sum, the present findings highlight the feasibility and benefits of using PROMIS CATs to repeatedly assess psychosocial functioning using a web-based method, and indicate that web-based intervention may be an effective strategy to decrease psychosocial distress among men with APC undergoing HT.

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