Marital status and perceived stress in men with advanced prostate cancer: A randomized-controlled trial of cognitive behavioral stress management

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A R T I C L E   I N F O

A B S T R A C T

Objective: Relationship status predicts numerous outcomes among medical populations. Few interventions evaluate the role of marital status on response to psychosocial treatment, and no such studies exist within advanced prostate cancer (APC). This study examined whether marital status modified the effect of a cognitive behavioral stress management (CBSM) intervention on perceived stress.

Methods: Men with APC ($N = 190$) were randomized to 10-week CBSM or a health promotion (HP) intervention (#NCT03149185). The Perceived Stress Scale assessed perceived stress at baseline and 12-month follow-up. Medical status and sociodemographics were captured at enrollment.

Results: Participants were mostly White (59.5%), non-Hispanic (97.4%), heterosexual (97.4%) men, 66.8% of whom were partnered. Neither condition nor marital status predicted perceived stress change at follow-up. However, a significant interaction was found between condition and marital status ($p = 0.014$; Cohen's f = 0.07), such that partnered men who received CBSM and unpartnered men who received HP reported greater reductions in perceived stress.

Conclusion: This is the first study to assess the impact of marital status on psychosocial intervention effects among men with APC. Partnered men derived greater benefit from a cognitive-behavioral intervention and unpartnered men equally benefitted from a HP intervention. Further research is necessary to understand the mechanisms underlying these relationships.

1. Introduction

Across medical populations, marital status predicts a wide range of outcomes [1–3]. Being married and/or cohabitating with a partner is generally protective. Within cancer populations, such intimate relationships predict more intensive treatment regimens, earlier stage at diagnosis, lower morbidity, and lower cancer-specific and all-cause mortality [1,4–8]. Among men with prostate cancer, the impact of marital status on medical outcomes is well-established and linked with type of treatment received, grade of cancer, and presence of metastasis at diagnosis [9–14]. Spouses of men with prostate cancer are often intricately involved with care management and medical decision making [15], and couples report changes in their relationship because of

prostate cancer aftereffects, such as sexual dysfunction [16]. Marital status has also been linked to psychosocial well-being among men with prostate cancer. Compared to partnered men, unpartnered men with prostate cancer experience greater levels of distress, heightened rates of suicidal ideation, and more bothersome physical symptoms, as well as worse quality of life and perceptions of care [17–21]. Prior research suggests that unmet social support needs, less social role attainment, and fewer interpersonal resources among unpartnered men may underlie these differences [22,23].

Many studies have examined interventions to bolster the marital relationship or assess dyadic processes between partnered patients with cancer and their spouses [24–27]. Few studies, however, have assessed the impact of intimate relationships, or lack thereof, on the effects of

psychosocial interventions for cancer [28]. Interventions that have tested the role of marital status have primarily been comprised of individual exercise training programs for patients with breast cancer [29–31] and lymphoma [32]. Notably, these studies found that unpartnered patients exhibited the greatest improvements in exercise-related outcomes, including volume of aerobic exercise, exercise-related sleep quality, and exercise-related quality of life improvements [29–32]. Authors attributed these differences in partnered versus unpartnered participants to possible greater social support needs of unpartnered participants, who may have benefitted more from formal interactions with trainers and other participants through the program [32]. In contrast, there are two known studies that tested the effects of cognitive-behavioral-based interventions: 1) a nurse-led psychosocial intervention consisting of education, behavioral training, and emotional support for patients with head and neck cancer and 2) a cognitive behavioral stress management (CBSM) intervention for women with early-stage breast cancer [33,34]. Both offer evidence that partnered patients experienced the greatest benefit from such interventions, including a reduction in depressive symptoms and an increase in quality of life [33,34]. Van der Meulen et al. (2015) suggested that patients with head and neck cancer who were partnered benefitted most due to rehearsal and discussion of intervention-related content within their intimate relationships, a resource that unpartnered patients may be lacking [33]. This mixed evidence of protective effects for partnered versus unpartnered patients may also be due to differences in the focus of program content (e.g., exercise training versus behavioral skill building), of which the former may work more to build new social connections while the latter may provide tangible skill practice for existing relationships [29–34]. Additionally, this evidence points to the need for exploration into the role of marital status' impact on response to psychosocial interventions. Lastly, no studies currently exist to explore this impact among men with APC, a group in which marital status plays a documented role in physical and psychosocial outcomes.

The current study tested the effects of a 10-week group-based CBSM intervention for men with advanced prostate cancer (APC). As found in the study of a behavioral intervention for patients with head and neck cancers [33], we hypothesized that partnered men would exhibit greater reductions in perceived stress related to the intervention versus unpartnered men who received CBSM and men who received a health promotion (HP) comparison intervention. Among covariates included in the present study, we additionally expected years since diagnosis to positively predict perceived stress, as prior work has found stress to increase among men with prostate cancer further from diagnosis [20]. As in previous studies, we conceptualized marital status as a dichotomous variable, grouping together married and those cohabitating to represent partnered individuals versus those unpartnered (e.g., unmarried, separated, divorced, widowed, single/never married) [29,35].

2. Methods

2.1. Study procedure & design

The current study is a secondary analysis of a randomized-controlled clinical trial. Study procedures were approved by the Institutional Review Board at Northwestern University and pre-registered as a clinical trial (#NCT03149185). Men with APC were recruited (1/2013–11/2016) through urology clinics at six Chicago-area academic hospitals and outpatient centers and enrolled between January 2013 and November 2016. Study staff screened for initial eligibility over the phone before full eligibility was assessed in-person. Eligible patients provided informed consent and were enrolled and randomized (1,1, parallel allocation) to either the CBSM or a HP intervention. Trained study staff securely stored and administered randomization assignments and thus were not blinded to participant condition. Sample size was determined via power analysis based on large effect sizes found within existing trials of internet-based cognitive behavioral interventions for

perceived stress (Cohen's d = 0.78) [36]. Using an alpha level of 0.05, to reach power of at least 0.95, and for the intended analysis of moderation of two binary predictors, a sample size of at least 118 was the determined benchmark for this study. Both the CBSM and HP groups were stratified by disease status (advanced vs. metastatic disease) to address heterogeneity of disease characteristics.

Participation in the study consisted of in-person assessment visits and a 10-session, remotely delivered, weekly intervention. At baseline and 12 months post-baseline, participants completed a battery of psychosocial assessments via Assessment Center^{SM}, a secure, HIPAA-compliant, online tool for study-specific data capture. The 12-month timepoint was selected to capture short-term follow-up effects of CBSM. Sociodemographic information was reported at baseline and clinical information was obtained from participants' medical records at each timepoint. Participants were compensated $100 for each visit and provided with travel reimbursement for completed in-person assessments.

2.2. Study conditions

Both CBSM and HP were group-based, manualized interventions delivered weekly and remotely using a web-based video-conferencing platform on study-provided tablet devices. Both conditions met in groups of 5–10 participants weekly for one- to two-hour sessions that were facilitated by a master's- or doctoral-level therapist. Participants also had access to study-related content such as expert videos and skill-based didactic material that could be referenced during and in between the weekly group sessions via the study-provided tablet device.

CBSM is a manualized skills-based intervention with a stress management component (e.g., cognitive restructuring) and relaxation training component (e.g., deep breathing exercises) in each session [37]. The original intervention was previously tested in samples with localized prostate cancer and was adapted to address advanced-stage disease concerns such as symptoms associated with androgen deprivation therapy (ADT), existential issues, and life review [38–40]. The HP group received relevant educational material, including general health and APC-relevant health information, delivered in a lecture format with no supportive or therapeutic component. Content by session of each condition is outlined in Table 1.

Table 1
Condition components by week.

	Cognitive Behavioral Stress Management		Health Promotion
	Relaxation	Stress Management	Topic
Week 1	Deep breathing	Health review & stress education	Living with advanced prostate cancer
Week 2	Deep breathing	Stress education & awareness	Healthy lifestyle
Week 3	Progressive muscle relaxation	Cognitive distortions & automatic thoughts	Physical changes
Week 4	Progressive muscle relaxation	Cognitive restructuring	Activity & social engagement
Week 5	Deep breathing & brief progressive muscle relaxation	Coping effectiveness	Health eating & nutrition
Week 6	Deep breathing & brief progressive muscle relaxation	Sexuality & intimacy	Cognition & memory
Week 7	Special place imagery	Social support	Family relations & intimacy
Week 8	Special place imagery	Anger management	Quality of life & life satisfaction
Week 9	Mindfulness meditation	Assertiveness	Managing information
Week 10	Mindfulness meditation	Acceptance & program review	Review & summary

2.3. Participants

Eligible participants were fluent in English, 50 years of age or older, had a diagnosis of stage III or IV prostate cancer, and had undergone ADT within the 12 months prior to study enrollment. Consistent with current staging literature, advanced disease in this sample was defined as patients with disease that has grown outside of the prostate at diagnosis (e.g., extra-capsular extension, into seminal vesicles) while metastatic disease was determined as patients with disease that has spread beyond the prostate and/or seminal vesicles (e.g., into rectum, bladder, pelvic wall, or elsewhere in the body) [41]. Exclusion criteria included treatment for cancer other than prostate or non-melanoma skin cancer within the past five years, active psychopathology or an inpatient psychiatric treatment in the prior six months, active substance dependence, diagnosis of an autoimmune condition, a life expectancy of <12 months, or a score of <20 on the Mini Mental State Examination at the time of screening [42]. Medical criteria were included to ensure participants were post-diagnosis and completed initial treatment but not at end of life. The study consort diagram can be found in the Supplemental File.

2.4. Measures

Sociodemographic and Medical Information. Sociodemographics were collected at the baseline visit and included marital status, age, race/ethnicity, years of education, individual annual income, and sexual orientation. Medical variables, such as disease stage at diagnosis and date of diagnosis, were extracted from participants' medical records. Prior research has linked these participant characteristics with psychosocial intervention outcomes, and thus they were included in the tested models to control for such effects [40,43–45].

Perceived Stress. The Perceived Stress Scale (PSS) is a 14-item measure that was used to assess the degree to which participants appraised their lives as stressful during the past month [46]. The PSS has been widely used and validated to assess stress perceptions in many medical populations [47–50]. Questions include items such as, "in the last month, how often have you felt that you were unable to control the important things in your life?" Participants answer on a five-point Likert scale ranging from *never* to *very often* [46]. Mean imputation handled missing data for participants missing <20% of full responses. Participants completed the PSS at baseline and at the 12-month post-baseline follow-up assessment. In this sample, the PSS demonstrated strong internal consistency (α = 0.82).

2.5. Statistical plan

Predictors were evaluated for normality and outliers. All participants' data were retained and included in intention-to-treat analyses. MPlus Software tested main effects (condition and marital status) and a moderation model (condition by marital status), each with covariates (age, stage of disease, annual income, years of education, baseline perceived stress, race/ethnicity). Dummy coded covariates included race/ethnicity (0: non-Hispanic White; 1: non-White and/or Hispanic) and stage of disease (0: stage 3; 1: stage 4). Marital status was also dummy coded (0: unpartnered; 1: partnered). Age, annual income (brackets described in Table 2), education level (as described in Table 2), and baseline perceived stress were included as continuous variables in each model.

Structural equation modeling estimated each model and used full maximum information likelihood estimation to handle missingness. The outcome of interest, perceived stress at 12 months post-baseline, was operationalized as a change score from baseline to 12 months post-baseline because baseline perceived stress was included as a covariate in the model. Interaction effect size was calculated using Cohen's f with the existing benchmarks 0.10 (small), 0.25 (medium), and 0.40 (large) [51]. No differences between condition groups existed at baseline; however, as previously reported, later stage of disease and receipt of

Table 2
Participant characteristics.

Characteristic; M (SD); N (%)	CBSM Intervention (*n* = 94)	HP Control (*n* = 96)	Total (N = 190)
Age	68.8 (8.5)	68.7 (9.1)	68.7 (8.8)
Stage:			
3	43 (45.7)	37 (38.5)	80 (42.1)
4	48 (51.1)	58 (60.4)	106 (55.8)
Unknown	3 (3.2)	1 (1.1)	4 (2.1)
Years since diagnosis	4.4 (5.2)	5.0 (5.4)	4.7 (5.3)
Years of education:			
<12 years	3 (3.2)	5 (5.2)	8 (4.2)
High school diploma or GED	25 (26.6)	26 (27.1)	51 (26.8)
2-year technical degree	13 (13.8)	18 (18.8)	31 (16.3)
4-year bachelor's degree	23 (24.5)	21 (21.9)	44 (23.2)
Masters or doctoral degree	28 (29.8)	25 (26.0)	53 (27.9)
Unsure	2 (2.1)	1 (1.0)	3 (1.6)
Race/ethnicity:			
Non-Hispanic White	54 (57.5)	54 (56.3)	108 (56.9)
African American/Black	35 (37.2)	34 (35.4)	69 (36.3)
Hispanic White	2 (2.1)	3 (3.1)	5 (2.6)
Multiracial	2 (2.1)	3 (3.1)	5 (2.6)
Asian	1 (1.1)	2 (2.1)	3 (1.6)
Income:			
Less than $5 k	7 (7.4)	5 (5.2)	12 (6.3)
$5 k-$11,999	2 (2.1)	6 (6.3)	8 (4.2)
$12 k-15,999	7 (7.4)	4 (4.2)	11 (5.8)
$16 k-24,999	7 (7.4)	6 (6.3)	13 (6.8)
$25 K-34,999	10 (10.6)	13 (13.5)	23 (12.1)
$35 K-49,999	10 (10.6)	10 (10.4)	20 (10.5)
$50 K-74,999	9 (9.6)	14 (14.6)	23 (12.1)
$75 K-99,999	10 (10.6)	8 (8.3)	18 (9.5)
$100 K and greater	25 (26.6)	21 (21.9)	46 (24.2)
Unsure/prefer not to answer	7 (7.4)	9 (9.4)	16 (8.4)
Baseline perceived stress	16.39 (7.29)	17.31 (7.32)	16.84 (7.30)
12-month post-baseline perceived stress	15.78 (7.40)	15.11 (6.36)	15.44 (6.88)
Marital status:			
Partnered	66 (70.2)	61 (63.5)	127 (66.8)
Unpartnered	28 (29.8)	35 (36.5)	63 (33.2)
Sexual orientation: Heterosexual	91 (96.8)	94 (97.9)	185 (97.4)

Note: CBSM = Cognitive behavioral stress management; HP = health promotion control. No significant differences between groups existed at baseline.

cancer treatment within the prior 6 months predicted missingness at the 12-month follow-up [52]. Notably, as stated within the eligibility criteria, participants were required to have undergone ADT within the prior year. Responses to ADT have been shown to vary within the year after receipt [53,54] thus time since ADT (i.e., within prior 6 months versus prior to 6 months before enrollment) was considered for inclusion as a covariate. However, due to the high correlation of time since ADT with time since diagnosis (r(180) = 0.415, $p < 0.001$), this variable was excluded. For transparency, additional moderators, including baseline interpersonal disruption, fatigue, sexual functioning, and perceived stress, related to treatment response (i.e., health-related quality of life, symptom burden, perceived stress management skills) have been tested in this sample and reported elsewhere [52]. Within the current study, age was an additional moderator tested for treatment response effects, which were null and are not reported. No other tests of moderation in this sample are planned at the time of publication. Study data and statistical code available from authors upon reasonable request.

3. Results

A total of 194 participants were consented and enrolled, of which two withdrew and two provided incomplete baseline data and were therefore excluded from this analysis (Supplemental File). Participants

were primarily partnered (66.8%; CBSM: 70.2%, HP: 63.5%), White (59.5%), non-Hispanic men (97.4%) with stage IV prostate cancer (55.8%; CBSM: 51.1%, HP: 60.4%). Men were enrolled on average 4.7 years after diagnosis ($SD = 5.30$) and were approximately 68.7 years old ($SD = 8.8$ years). Nearly a third of participants had a master's or doctoral degree (27.9%; CBSM: 29.8%, HP: 26.0%), while 66.3% received either a high school diploma ($n = 51$) or had completed some college ($n = 75$). While no prior PSS cut-off has been established, previous work among patients with genitourinary cancer has defined a score of >16 as clinically high perceived stress [55] As such, 54.6% ($n = 102$) of the current sample presented with high stress at baseline. Of participants who completed the 12-month assessment ($n = 147$), approximately 50.3% ($n = 74$) reported a score of 16 or above on the PSS. Differences at baseline across groups were not significant. Table 2 describes characteristics of the full sample.

Main Effects Model of Condition and Marital Status. Neither condition ($b = 0.40$, $SE = 0.99$, $p = 0.686$, 95% CI [−1.53, 2.33]) nor marital status ($b = −0.51$, $SE = 1.15$, $p = 0.655$, 95% CI [−2.76, 1.74]) exhibited significant effects on perceived stress. Significant covariates included years since diagnosis and baseline perceived stress levels. Full model results may be found in Table 3. Prior results of this study relating to perceived stress, exclusive of marital status, have been published elsewhere and mirror the results found here [56].

Interaction Model of Condition and Marital Status. In this model, a significant condition by marital status interaction was found ($b = −5.36$, $SE = 2.17$, $p = 0.014$, 95% CI [−9.62, −1.10]), such that partnered men who received CBSM and unpartnered men who received HP reported greater decreases in perceived stress at 12-month follow-up versus others (Fig. 1). The interaction had an effect size, Cohen's f, of 0.07, indicating a small effect was found. Men further from diagnosis and with greater levels of perceived stress upon enrolling in the study reported greater increases in perceived stress at 12 months post-baseline relative to those for whom less time had passed since diagnosis and who had less perceived stress at baseline (Table 3). All other covariates exhibited no significant effects.

4. Discussion

This study presented the results of a 10-week, virtual, group-based

cognitive behavioral stress management (CBSM) intervention for men with advanced prostate cancer (APC). Notably, no main effects of condition or marital status were found, but a significant interaction between these two variables emerged. Specifically, partnered men who received the CBSM intervention and unpartnered men who received the health promotion (HP) intervention exhibited statistically significant reductions in perceived stress between baseline and the 12-month follow-up relative to others. These results point to opposing effects of CBSM versus the HP group on perceived stress based on relationship status of the recipients. Additionally, years since diagnosis was a significant covariate across all analyses, suggesting that as men got further from the time of their diagnosis, perceived stress increased from baseline to one year later regardless of psychosocial intervention. This finding is consistent with prior research, which has shown that negative psychosocial sequalae increase over time among survivors with APC [20]. Klaassen and colleagues (2018) suggested that this may be the result of physical aftereffects of cancer treatment (e.g., erectile dysfunction). Therefore, future research ought to consider the role of physical symptoms and side effects in the association between relationship status and stress outcomes after psychosocial intervention. Lastly, consistent with prior studies, baseline perceived stress was a strong predictor of perceived stress one year later [56].

These findings are similar to those from a behavioral trial of survivors of head and neck cancer led by van der Meulen and colleagues. These authors found that partnered individuals benefitted more from a psychosocial intervention than unpartnered individuals and hypothesized that the opportunity to practice and rehearse skills with an intimate social contact may have driven this result. Importantly, this mechanism has yet to be tested fully but may point to the underlying components of CBSM that drove greater reductions in perceived stress among partnered, but not unpartnered men [33]. Notably, sexual relationship functioning has been previously examined within this sample while controlling for marital status [56]. Among men who received CBSM, those experiencing poorer sexual functioning within a romantic relationship at baseline experienced the greatest intervention-related social benefit. These findings may be the result of CBSM modules which focus on cognitive restructuring, soliciting social support, and assertiveness training. Men who presented with poorer sexual functioning may have had greater opportunity to integrate these skills into their existing relationships to alter their perceptions of sexual functioning or facilitate different support or sexual activities with their partner. These results offer additional evidence for how CBSM, and not the HP intervention, enhances social improvement among men in intimate relationships, potentially providing additional opportunity for the practice of such skills. Furthermore, prior work on exercise-related interventions have found that unpartnered individuals benefit most from these programs, which may be the result of primarily educational and informational content, versus skills like those of CBSM [29–31]. Compared to partnered men who may receive disease- and treatment-related information from intimate partners throughout the disease course, men who are unpartnered may need to expend additional resources to gather this information, which in the HP group they received readily. This may be why unpartnered men in HP demonstrated reductions in perceived stress comparable to those observed among partnered men who received CBSM.

While men comprise a greater proportion of individuals diagnosed with cancer annually [57], other genders make up most cancer samples in psychosocial intervention clinical trials [58]. Therefore, a greater emphasis to recruit men with cancer, especially men who are not partnered, in mixed cancer samples would benefit representativeness in the literature. Other areas to consider include involvement of non-spousal caregivers in cancer care to support unpartnered patients. Burgeoning care models for patients with cancer and co-occurring serious mental illness demonstrate feasibility and acceptability of the inclusion of non-spousal caregivers or community mental health providers to bridge gaps in psychosocial and cancer care, which may lend itself to more equitable

Table 3
Main effects and interaction models of condition and partnership status on perceived stress.

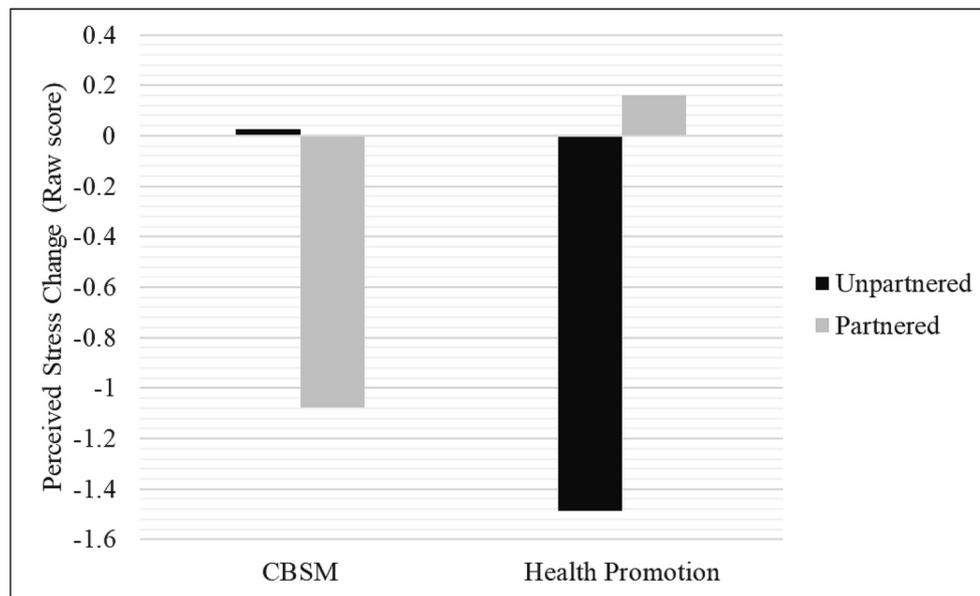| Predictor	Main Effects Model b (SE), [95% CI]	Interaction Model b (SE), [95% CI]
Condition	0.40 (0.99), [−1.53, 2.33]	4.02 (1.76), [0.58, 7.47]*
Partnership Status	−0.51 (1.15), −2.76, 1.74]	1.77 (1.46), [−1.08, 4.63]
Baseline Perceived Stress	0.56 (0.07), [0.41, 0.70]***	0.55 (0.07), [0.41, 0.69]***
Years Since Diagnosis	0.25 (0.11), 0.03, 0.46]*	0.26 (0.11), [0.05, 0.47]*
Income	0.28 (0.25), [−0.20, 0.76]	0.31 (0.24), [−0.16, 2.21]
Stage	−0.07 (0.99), [−2.01, 1.88]	0.29 (0.98), [−1.64, 2.21]
Education	−0.43 (0.47), [−1.36, 0.50]	−0.43 (0.46), [−1.34, 0.48]
Race/Ethnicity	−0.54 (1.24), −2.97, 1.89]	−1.37 (1.26), [−3.83, 1.09]
Age	−0.01 (0.06), −0.12, 0.11]	−0.02 (0.06), [−0.13, 0.09]
Condition*Partnership Status	–	−5.36 (2.17), [−9.62, −1.10]*

Note: Partnership status, stage, and race/ethnicity included dummy coded. Unstandardized betas reported. * < 0.05, ** < 0.01, *** < 0.001. CI = Confidence interval.

Fig. 1. Perceived Stress Change by Partnership Status and Condition.
Note: CBSM = Cognitive behavioral stress management. Raw change score demonstrates the difference between baseline and 12-month follow-up perceived stress scores.

treatment and medical outcomes [59]. Lastly, adequate representation of same-sex and gender diverse relationships versus other-sex relationships is lacking, as studies assessing marital status primarily capture the experiences of other-sex couples or lack this demographic information entirely [29,31,32,34]. Differences in same versus other-sex relationships in cancer have been demonstrated [60] and more research is needed to assess the interactions of sexual orientation, gender identity, and relationship status in the receipt of psychosocial interventions.

Further testing of CBSM for men with APC requires tailoring to better support unpartnered men. Potential areas for intervention development may include individual, versus group, format [28] and targeting those presenting with greater social support needs. While CBSM includes modules for training of social support elicitation [38], partnered individuals may garner greater benefit through practice with their current partner. This discrepancy between partnered versus unpartnered may be related to age-specific social support needs of older cancer populations [34,61]. As individuals age, there is greater risk of loneliness and social isolation, often due to living alone, fewer confiding relationships, and the deaths of loved ones, especially among widowed individuals [61]. A wide range of interventions exist to reduce loneliness among older populations and may be integrated, such as inclusion of engagement in common interests and skill building, a direct focus on socialization and building connections, and community-based activities [62]. Notably, the intervention tested was remotely delivered, which is a modality found to support greater accessibility for patients than in-person programs, while remaining feasible and acceptable [63–66]. Continued use of virtually based interventions may promote participation in psychosocial interventions for unpartnered men with cancer, especially in the presence of public health events, such as the COVID-19 pandemic [67]. Overall, CBSM provides a virtual, group setting that may be refined by incorporating evidence-based techniques to bolster the positive effects of CBSM for unpartnered men experiencing cancer.

Limitations. Several limitations exist within the current study, namely lack of assessment of marital quality or relationship length, change in marital status during study participation, little variation among level of education and annual income within the sample, and representation of primarily non-Hispanic, White, heterosexual men. The high level of education within the current sample (i.e., 27.9% had received a masters or doctoral degree) limits the generalizability of these

results beyond the urban academic medical center in which this study was conducted. Additionally, due to the small sample size within this sample, partnership status (e.g., windowed, divorced, single, etc.) were collapsed and unable to be tested as individual predictors. Overarching categories of partnered versus unpartnered, as tested, may miss unique qualities of some relationship statuses and should be explored further in future research. The small sample size of this study may be a contributing factor of the null findings of the main effects model. Lastly, this study only assessed perceived stress at baseline and the 12-month follow-up, although use of the PSS measure has captured notable fluctuations as often as every six weeks within medical populations [68].

5. Conclusions

In sum, partnered men with APC who received a 10-week CBSM intervention and unpartnered men who received a HP comparison intervention exhibited greater reductions in perceived stress than others. Evidence-based techniques to enhance CBSM for unpartnered men should be considered in future research. Additional research considerations include same-sex relationship representation and increased efforts to capture and measure social support quality.

Declaration of Competing Interest

F. Penedo & B. Yanez: Blue Note Therapeutics consulting.
E. Walsh, C. Boland, P. Popok, P. Pedreira, R. Fox, and P. Moreno: None.
Data Availability.
Deidentified data is available upon reasonable request to the authors.
Authorship Contributions.
E.A. Walsh: Conceptualization, formal analysis, writing – original draft, writing – review & editing.
C. Boland: Project administration, writing – original draft, writing –

review & editing.

P.J. Popok: Writing – review & editing.

P.B. Pedreira: Writing – review & editing.

R.S. Fox: Project administration, writing – review & editing.

P. I. Moreno: Project administration, writing – review & editing.

B. Yanez: Project administration, writing – review & editing.

F. J. Penedo: Conceptualization, funding, project administration, writing – review & editing.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpsychores.2023.111198.

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