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Mechanisms of navigating goals after testicular cancer: meaning and emotion regulation

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Abstract

***Objective*: The navigation of major life goals can be challenging to cancer survivors, particularly during young adulthood. This study examined the relationships of goal navigation skills (e.g., goal identification, goal clarification, and goal adjustment) with having a sense of life meaning, emotion regulation coping processes, and physical and psychological health indicators in young adult survivors of testicular cancer.**

***Methods*: Men ages 18 to 29 years ($N = 171$; M age = 25.2, $SD = 3.32$) with a history of testicular cancer were recruited via the California State Cancer Registry and completed questionnaire measures including assessments of goal navigation, sense of meaning, emotional approach coping, and indicators of physical and psychological well-being.**

***Results*: Goal navigation skills were negatively related to depressive symptoms ($r = -0.41$, $p < 0.01$) and positively related to physical functioning ($r = 0.28$, $p < 0.01$). Controlling for participant age and months since diagnosis, mediation models revealed significant indirect effects of sense of meaning on depressive symptoms (-0.50, $p < 0.05$) and physical functioning (0.34, $p < 0.05$). Similarly, emotion-regulating coping had significant indirect effects on depressive symptoms (-0.08, $p < 0.05$) and physical functioning (0.11, $p < 0.05$)**

***Conclusions*: Consistent with a self-regulation framework, goal navigation skill is related to physical and psychological well-being via its association with maintenance of a sense of meaning as well as successful attempts at regulation of emotions. The study provides preliminary evidence that these skill-based processes relate to adjustment to cancer in young adults.**

Background

Cancer diagnosis and treatment present circumstances that can challenge the achievement and pursuit of meaningful life goals [1,2]. These can include such things as the pursuit and maintenance of dating and sexual relationships, identification of values-driven occupational pursuits, and the achievement of independence from parents. Goals represent an individual's key priorities or most valued aspirations [3]. Facility (or deficit) in navigating the pursuit of goals during and after cancer might have unique relationships with one's maintenance of a sense of life meaning, as well as engagement in the regulation of difficult emotional responses to the demands and uncertainty of cancer diagnosis and treatment. Goal-related processes are particularly relevant to young adult cancer survivors whose developmental life position is marked by active identification and pursuit of critical goals across life domains [4]. Accordingly, this study's primary purpose was to investigate the relationships of goal navigation skills (e.g., goal identification, goal clarification, and goal adjustment) with having a sense of meaning, emotion regulation coping processes, and physical and psychological health indicators in young adult survivors of testicular cancer.

Effective self-management of goal pursuits requires facility with critical goal navigation skills including the ability to clarify valued life directions, identify meaningful achievements, appraise the attainability of desired goals, and disengage from the unobtainable [5]. Such goal navigation skills develop across the lifespan and often center on fostering a sense of autonomy (e.g., obtaining financial independence), self-efficacy (e.g., belief that one can lead others), and connectedness in young adulthood (e.g., initiating new relationships) [4]. Young adults who encounter unexpected obstacles to goal pursuits might be particularly vulnerable to poor self-regulation and, consequently, negative psychological and physical health outcomes [6]. Young adults who are better able to navigate the goals

related to age-appropriate developmental tasks report enhanced well-being and greater likelihood of goal achievement [6].

One way in which effectively navigating life goals might be related to well-being is through fostering a sense of life purpose and meaning. In fact, associations of post-cancer goals (and not pre-cancer goals) with sense of meaning have been documented [7]. In turn, a bolstered sense of meaning and the degree to which an individual experiences life as coherent is associated with better adjustment to cancer across studies [8]. For some young men, diagnosis of testicular cancer might be viewed as inconsistent with a sense of life meaning, which is intimately connected to perceptions of a robust self, health, and life direction.

Theories of meaning making have centered on global meaning systems, which are composed of global beliefs and goals [9]. Global beliefs (e.g., justice, luck, and personal vulnerability) map onto core schemas that individuals use to understand their experiences of the world, whereas global goals are more motivational in nature and include ideals, states, or objects that provide purpose in life and contribute to self-esteem [10]. Meaning making and purpose in life generate from the global beliefs and goals of an individual [9]. A significant stressor, such as a cancer diagnosis, can fragment global beliefs and goals and result in a re-examination or questioning of goals and priorities. Such cancer-induced goal stress must be navigated alongside more expected goal challenges that are inherent across young adulthood [4]. It is important to distinguish the search for meaning (meaning making) from one's sense of meaning (meaning made). The latter is more consistently related to better adjustment [9].

Theories of goal navigation include skills in disengaging from unattainable goals by moving away from efforts and commitments toward them and engaging in alternative goals, which involves identifying, committing to, and devoting effort toward achievement of the alternative goals [11]. Such processes might be an important precursor to meaning making. The extent to which young adults have facility in clarifying values and identifying achievable life directions, appraising attainability of goals, and disengaging and re-engaging in goal pursuits will likely be associated with their sense of meaning.

Important life goals are inherently linked to emotions and can reflect desired emotional states (e.g., to decrease feelings of sadness). The identification and management of goal pursuits are then inherently linked to emotion regulation [12]. In fact, Mauss and Tamir put forth a conceptual framework in which goals directly influence efforts at emotion regulation and ultimately downstream thoughts and emotions [13]. Consistent with a self-regulatory perspective, difficulty in navigating goals after cancer likely influence attempts to regulate emotional and behavioral responses. Schroevers, Kraail, and Garnefski documented negative correlations of goal navigation processes with rumination and catastrophizing, and positive correlations with positive refocusing in cancer patients [14]. Failed or weak attempts at reappraisal of goals and priorities affected by cancer-related demands might yield disrupted, confused, or incomplete regulation of emotions. Thus, coping responses aimed at regulating cancer-related emotions, such as coping by expressing and processing emotions, might be shaped by goal navigating skills.

Coping through emotional approach involves interrelated strategies of acknowledging, exploring, and understanding emotional experiences (emotional processing), as well as expressing and communicating emotions (emotional expression) [15]. Research with breast cancer survivors has revealed benefits of coping through emotional approach on physical health and psychological adjustment [16,17]. Similarly, research with men with cancer has demonstrated a salutary role for emotional approach coping. Findings include negative associations of cancer-related emotional expression with psychological distress in men with mixed cancer types [18] and positive associations of emotional processing with improved prostate-specific functioning in men following primary treatment for localized prostate cancer [19].

Calling upon empirical and theoretical work on goals and self-regulation [20], meaning making [10], and emotion regulation [12], the current study aimed to examine relationships among goal navigation skills, sense of meaning, emotion-regulating coping, and physical and psychological adjustment by testing a hypothesized model in which meaning and emotion-regulating coping mediate the relationship of goal navigation on health in young adult survivors of testicular cancer. We hypothesize that goal navigation skill will be associated with higher meaning and purpose, greater use of emotion-regulating coping, and, in turn, with better physical functioning and lower depressive symptoms.

Methods

Participants and procedures

Participants were recruited through a state cancer registry and invited to participate in a study on the cancer experiences of young adult men. Men between the ages of 18 and 29 years at study enrollment with a history of testicular cancer were eligible to participate. Those with physician-confirmed or self-reported severe psychiatric disorder or cognitive impairment were excluded ($n = 1$). After providing informed consent, participants completed questionnaires by mail or in person, for which they were compensated $50. The study was approved by the university human subjects' protection review board. The sample included 171 men who ranged in age from 18 to 29 years

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($M = 25.2$, $SD = 3.32$) (Table 1). This reflects a 59% response rate of invited survivors. Responders did not differ significantly from non-responders on clinical or demographic variables.

Measures

Goal navigation

Goal navigation, which includes elements of goal setting, goal clarification, goal adjustment, and goal initiation, was measured by the Goal Navigation subscale of the Cancer Assessment for Young Adults –Testicular [21]. The scale is composed of five items (e.g., "I am able to identify goals in my life", "I know what steps to take to make progress toward my goals", and "I am able to redirect my energy when I feel my life isn't going in the right direction"). Participants indicate how often each item is true of them over the past 7 days on a 3-point response scale ranging from 0 (None of the time) to 2 (Much or most of the time). Criterion, construct, and procedural validity have been established with this sample [21]. The internal consistency reliability of the subscale was high ($\alpha = 0.85$).

Sense of meaning

The 4-item meaning subscale of the Function Assessment of Chronic Illness Therapy Spiritual Well-Being Scale [22,23] measures the extent to which an individual possesses a sense of meaning in life (e.g., "My life lacks meaning and purpose") on a 5-point response scale ranging from 0 (Not at All) to 4 (Very Much). Cronbach's α in the present study was 0.91.

Emotion-regulating coping

Emotion-regulating coping processes were measured using Stanton and colleague's Emotional Approach Coping scales [24], which consist of the 4-item Emotional Processing (e.g., "I take time to figure out what I'm really feeling" and "I delve into my feelings to get a thorough understanding of them") and 4-item Emotional Expression (e.g., "I feel free to express my emotions" and "I let my feelings come out freely") scales. Participants were instructed to complete items specifically with reference to responses to testicular cancer problems and experiences on a 4-point response scale ranging from 1 (I don't do this at all) to 4 (I do this a lot). The emotional approach coping scales have been shown to demonstrate sound internal consistency and predictive validity [15]. A mean score was computed using an average of all items. In the current study, Cronbach's α was 0.90.[1]

Physical functioning

Physical functioning was measured using the 7-item Physical Well-Being subscale of the Functional Assessment of Cancer Therapy General [25]. The subscale measures the experience of symptoms and subjective physical well-being over the past 7 days (e.g., "I have a lack of energy" and "I feel ill") on a response scale from 0 (not at all) to 4 (very much). Subscale scores were summed in accordance with established scoring procedures [25] in which higher scores reflect better physical functioning. The subscale demonstrated good internal consistency reliability in our sample ($\alpha = 0.86$).

Depressive symptoms

Depressive symptoms were measured using the 20-item Center for Epidemiologic Studies Depression Scale [26], which is a widely used questionnaire measure of depressive symptoms that is commonly used in samples of cancer survivors and young adults. The scale has a

Table 1. Participant characteristics ($N = 171$)

Characteristic		Characteristic	
Ethnicity		Income	
White (non-Hispanic)	46%	$15,000 or less	24%
Hispanic/Latino	38%	$15,001–$30,000	20%
Asian	10%	$30,001–$45,000	12%
Native American/Alaskan Native	3%	$45,001–$60,000	15%
African American/Black	1%	$60,001–$75,000	11%
Other	2%	$75,001 or more	18%
Education		Treatment type	
Less than high school	5%	Radical inguinal orchiectomy	73%
High School/GED	15%	Bilateral orchiectomy[a]	7%
Some college	32%	RPLND	24%
2-year college degree	11%	Chemotherapy	53%
4-Year college degree	27%	Radiation therapy	15%
Graduate degree	10%	Other	8%
In a committed relationship	44%	Months since treatment	30.1 (SD = 14.4)
Live with parents	49%		
Has at least 1 child	19%		

RPLND, retroperitoneal lymph node dissection.
[a]Six cases reported subsequent contralateral tumor.

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4-point response scale from 0 to 3 and demonstrated good reliability in our sample ($\alpha = 0.94$). Total scores are summed across items and can range from 0 to 60 [26].

Health status and demographics

Participants self-reported their age, level of education, income, employment status, ethnicity, and other sociodemographic variables. They also confirmed registry-acquired information regarding health history, diagnosis, and treatment factors.

Data analyses

Descriptive statistics and zero-order correlations were computed for key variables. To determine whether meaning making and emotional approach coping were separate mediators of the relationship between goal navigation and adjustment indicators, bootstrapping analyses were conducted using methods described by Preacher and Hayes [27] for estimating total, direct, and indirect effects [27]. Four models were tested using bootstrapping with 10,000 resamples via Process procedure for SPSS to test effects as determined by bias-corrected 95% confidence intervals [28]. This statistical method allows for mediation without evidence that X affects Y (total effect), because it is possible for X to have an indirect effect on Y through M the mediator. In addition, completely standardized indirect effects were computed as a measure of effect size of indirect effects as described by Preacher and Kelley [29]. Effect sizes of 0.01 were interpreted as a small effect, 0.09 as a medium effect, and 0.25 as a large effect [30].

Although this study restricted participant age upon entry, it is still possible that systematic developmental differences exist across the range of 18 to 29 years. Thus, participant age was included as a covariate in all model testing. Likewise, for many, adjustment to cancer is thought to change over time as a patient progresses along the disease and treatment trajectory. Consequently, time (in months) from cancer diagnosis was also included as a covariate in statistical models. Covariate by predictor interactions will also be examined.

Results

Descriptive statistics and correlations

Descriptive statistics and bivariate correlations among study variables are presented in Table 2. Neither age nor time since diagnosis was significantly associated with adjustment indicators; however, they were included in models as potentially covarying processes, as described previously. Notably, no significant covariate by goal navigation interactions was observed. On average, men were not depressed, although nearly 34% of the participants reported depressive symptoms at levels clinically significant for risk of depression (≥16) and average score on the physical functioning subscale was 23.89 ($SD = 4.92$), which was lower than general population norms for young adults ($M = 25.1$; $SD = 3.6$) [31]. Mean values of emotional approach coping ($M = 3.90$, $SD = 1.11$) were notably higher than those documented by Hoyt, Stanton, Irwin, & Thomas in men with prostate cancer (emotional expression: 2.52, $SD = 0.84$; emotional processing: 2.66, $SD = 0.89$) [19]. Finally, meaning ($M = 12.57$, $SD = 3.95$) was lower than scores documented in a validation sample of long-term female cancer survivors (e.g., $M = 14.30$, $SD = 2.50$) [23].

Notably, goal navigation was negatively correlated with depressive symptoms ($r = -0.41$, $p < 0.01$) and positively with physical functioning ($r = 0.48$, $p < 0.01$), suggesting that greater goal navigation skill is associated with better physical and psychological health. Relationships between goal navigation and the mediators (i.e., meaning and emotional approach coping) were examined. Goal navigation skill was positively associated with both meaning ($r = 0.44$, $p < 0.01$) and emotional approach coping

Table 2. Descriptive and correlations coefficients

Variable	M	SD	1	2	3	4	5	6
Predictor								
Goal navigation	1.79	0.32						
Mediators								
Sense of meaning	12.57	3.95	0.40**					
Emotional approach coping	3.90	1.11	0.27**	0.46**				
Outcomes								
Depressive symptoms	13.00	12.01	−0.41**	−0.67**	−0.25**			
Physical functioning	23.89	4.92	0.28**	0.42**	0.24**	−0.60**		
Covariates								
Age (in years)	25.22	3.32	−0.03	0.10	0.09	0.04	−0.03	
Months since diagnosis	32.34	19.3	−0.11	0.01	0.02	0.03	0.07	−0.01

**Correlation is significant at the 0.01 level (two-tailed).

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($r = 0.27$, $p < 0.01$). Meaning and emotional approach coping were significantly correlated ($r = 0.50$, $p < 0.01$).

Model testing

Four models were tested to evaluate the two potential mediators with each dependent variable. Results are organized by mediating process and displayed in Tables 3 and 4. Notably, the sample size was sufficient to detect mediated effects at 0.80 power [32].

Sense of meaning

Models testing the indirect effects of meaning on depressive symptoms and physical functioning (models 1 and 2, respectively) are reported in Table 3. In both instances, the indirect effect reached statistical significance (depressive symptoms: indirect effect = −0.50, 95% CI: −0.78, −0.30; physical functioning: indirect effect = 0.34, 95% CI: 0.18, 0.58]. Notably, the direct effect of goal navigation was significant for depressive symptoms but only approached significance for physical functioning. In each case, higher goal navigation was associated with better adjustment. These results suggest that the relationships of goal navigation with depressive symptoms and physical functioning can be partially explained by greater meaning.

Emotion-regulating coping

Models testing the indirect effects of emotional approach coping on depressive symptoms and physical functioning (models 3 and 4, respectively) are reported in Table 4. Similarly, the indirect effect reached statistical significance for both dependent variables (depressive symptoms:

Table 3. Bootstrap results for total, direct, and indirect effects for goal navigation and meaning[a,b]

				Confidence interval*		
Variable	**Effect**	**SE**	***p***	**Lower**	**Upper**	**Effect size**
Model 1						
Goal navigation ➔sense of meaning ➔depressive symptoms						
Total effect[c]	−0.77*	0.13	<0.001	−1.04	−0.51	
Direct effect	−0.28*	0.12	<0.05	−0.51	−0.05	
Indirect effect[d]	−0.50*	0.12		−0.78	−0.30	−0.013
Model 2						
Goal navigation➔ sense of meaning ➔physical functioning						
Total effect[c]	0.64*	0.17	<0.001	0.31	0.96	
Direct effect	0.29	0.17	0.09	−0.04	0.63	
Indirect effect[d]	0.34*	0.10		0.18	0.58	0.022

[a]Asterisks indicate a significant effect as determined by the 95% bias-corrected and accelerated confidence interval based on 10,000 bootstrap samples. Confidence intervals containing zero are interpreted as not significant.
[b]Covariates were age and months since diagnosis in each model.
[c]The total effects model is a sum of direct and indirect effects.
[d]*p*-values are not calculated for indirect effects with this statistical method.

Table 4. Bootstrap results for total, direct, and indirect effects for goal navigation and emotion-regulating coping[a,b]

				Confidence interval*		
Variable	**Effect**	**SE**	***p***	**Lower**	**Upper**	**Effect size**
Model 3						
Goal navigation➔ EAC➔depressive symptoms						
Total effect[c]	−0.77*	0.13	<0.001	−1.04	−0.51	
Direct effect	−0.69*	0.14	<0.001	0.96	−0.41	
Indirect effect[d]	−0.08*	0.05		−0.24	−0.01	−0.002
Model 4						
Goal navigation➔ EAC➔physical functioning						
Total effect[c]	0.64*	0.17	<0.001	0.31	0.96	
Direct effect	0.53*	0.17	<0.001	0.19	0.86	
Indirect effect[d]	0.11*	0.06		0.02	0.26	0.007

EAC, emotional approach coping.
[a]Asterisks indicate a significant effect as determined by the 95% bias-corrected and accelerated confidence interval based on 10,000 bootstrap samples. Confidence intervals containing zero are interpreted as not significant.
[b]Covariates were age and months since diagnosis in each model.
[c]The total effects model is a sum of direct and indirect effects.
[d]*p*-values are not calculated for indirect effects with this statistical method.

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indirect effect = −0.08, 95% CI: −0.24, −0.01; physical functioning: indirect effect = 0.11, 95% CI: 0.02, 0.26). In models 3 and 4, the direct effect for goal navigation was significant for depressive symptoms (direct effect = −0.69, $p < 0.001$) and physical functioning (direct effect = 0.53, $p < 0.001$). Similarly, these results suggest that the relationships of goal navigation with depressive symptoms and physical functioning can be partially explained by greater emotion-regulating coping.

Post hoc analyses were conducted to consider the possibility that goal navigation acted as a mediator of meaning or emotional approach coping (reverse mediation models). These models either resulted in non-significant or small indirect effects of goal navigation for both meaning (depressive symptoms: indirect effect = −0.04, 95% CI: −0.08, −0.04; physical functioning: indirect effect = 0.04, 95% CI: −0.01, 0.13) and for emotional approach (depressive symptoms: indirect effect = −0.05, 95% CI: −0.08, −0.01; physical functioning: indirect effect = 0.06, 95% CI: 0.01, 0.87). Additionally, models were examined that simultaneously included both mediators (i.e., meaning and emotion approach coping) (multiple mediator model). These models yielded significant indirect effects for both mediators. In each case, the indirect effect for meaning was larger than that of emotional approach coping. These results build confidence in the retained models.

Conclusions

This study highlights the importance of goal navigation skills in young adult testicular cancer survivors and points to meaning and emotion regulation as two key processes by which goal navigation is related to physical and psychological adjustment. Our findings support a self-regulation theory perspective in which successful navigation of goals might play a role in establishing meaning after cancer and successful engagement in attempts to regulate cancer-related emotions.

In this study, we used bootstrapping techniques to test for mediation, which has several advantages over more traditional statistical approaches [32–34]. Traditional methods typically only allow for mediation once a significant zero-order effect of X on Y is established; however, the zero-order effect of X on Y is in fact mathematically equivalent to a total effect [33], and both indirect and direct effects should be tested. Most studies using the traditional method only achieve partial mediation. A direct effect is rarely predicted or explained theoretically, which leaves researchers often suggesting that the unexplained direct path can indicate an omitted mediator [34]. Although these analyses demonstrate support for both meaning and emotion-regulating coping, the strength of the effects suggest that having a sense of meaning is potentially a stronger mechanism. Future work designed to distinguish the relative contribution of these mediators is warranted.

The present findings hold potential for understanding survivors' experiences and developing methods for promoting adjustment. However, more research will be needed before such findings can be translated to clinical intervention. In addition to establishing a causal relationship among variables, several questions remain. For instance, is goal navigation amenable to intervention and will enhancement of goal navigation skills provide a pathway to improvements in health and well-being in young cancer survivors? Importantly, would alterations in goal navigation skills outperform more traditional approaches (e.g., psychotherapy and physical exercise)? Interventions that extend beyond basic goal setting and motivation for goal pursuit (e.g., [35]) may be particularly successful in building enduring resilience and fostering positive post-cancer adjustment. Some multi-component behavioral interventions for cancer patients have included training in basic goal formulation and pursuit (e.g., [36,37]), yet none have comprehensively focused on goal navigation nor targeted the young adult context. Hope-based strategies that focus on bolstering agency and identifying pathways to goal achievement [38] may be useful in fostering better regulation of emotion and enhancement of life purpose.

Despite promising findings regarding the role of finding meaning in cancer adjustment, limited research has developed and tested therapeutic interventions. In a randomized controlled trial of advanced cancer patients, Breitbart and colleagues documented significant reductions in hopelessness and depressive symptoms and improvements in quality of life in patients receiving psychotherapy aimed at strengthening a sense of meaning [39]. Cancer adjustment will likely be facilitated through skillful assimilation and accommodation of readjusted beliefs and goals into one's global sense of meaning [10].

Therapeutic interventions have directly or indirectly targeted affective processing and goal-related emotion regulation skill building such as emotion-focused approaches (e.g., [40,41]), acceptance-based interventions (e.g., [42,43]) written expressive disclosure (e.g., [44]), and targeted coping skills training (e.g., [45]). Limited studies have specifically focused on cancer populations, and to our knowledge, none have centered on the management of goal processes after medical illness.

Although these findings hold potential for theory and practice, interpretation of findings warrants caution regarding causal inference. The study employed self-reported variables in a cross-sectional, correlational research design. Hypotheses were carefully grounded in theory; however, alternate patterns of relationships warrant consideration. For instance, the possibility remains that meaning processes and affective experiences might

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themselves influence goal navigation or relationships might be dynamic and reciprocal. Alternatively, unknown factors might better account for the relationships among variables. It is possible that relationships are not longitudinally explained. Future work should examine patterned relationships over time. Men in this study varied widely in terms of elapsed time since primary treatment. The role of physical functioning and its relationship to psychological factors might vary across the treatment trajectory. A strength of this study is the use of a unique sample of young adult male survivors. At the same time, these processes are equally important to understand across genders and across varied cancer diagnoses.

Taken together, our findings provide preliminary evidence that goal navigation, perhaps through meaning making and emotion-regulating coping, relates to physical and psychological health in young adult testicular cancer survivors. With sufficient confirmation, these findings may assist in the development of approaches that are designed to build durable skills related to goal processes, focus on enhancing a sense of meaning after cancer, and foster the expression and processing of emotions to promote adjustment.

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Note

1. The emotional expression and emotional processing did not exhibit different mediation patterns in post hoc testing.

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