

An Investigation of Self-Determined Work Motivation Among Young Adult Survivors of Central Nervous System Cancer



With the increase in survivor rates of children diagnosed with cancer, an emerging area of research has focused on understanding the ongoing and lasting impact of cancer on adulthood roles, like employment.^{1,2} In addition to providing an income, meaningful employment is an important predictor of one's quality of life and a catalyst in providing independence, improved self-esteem, and increased self-determination.³ Survivors of childhood cancers face higher rates of unemployment.⁴ In fact, children who have been diagnosed and treated for central nervous system (CNS) tumors experience more drastic unemployment rates.⁵ A meta-analysis conducted by de Boer et al. found that cancer survivors were twice as likely to be unemployed compared to controls. More specifically, survivors of pediatric brain tumors were found to have a five-fold risk compared to other childhood cancer survivor groups.⁵

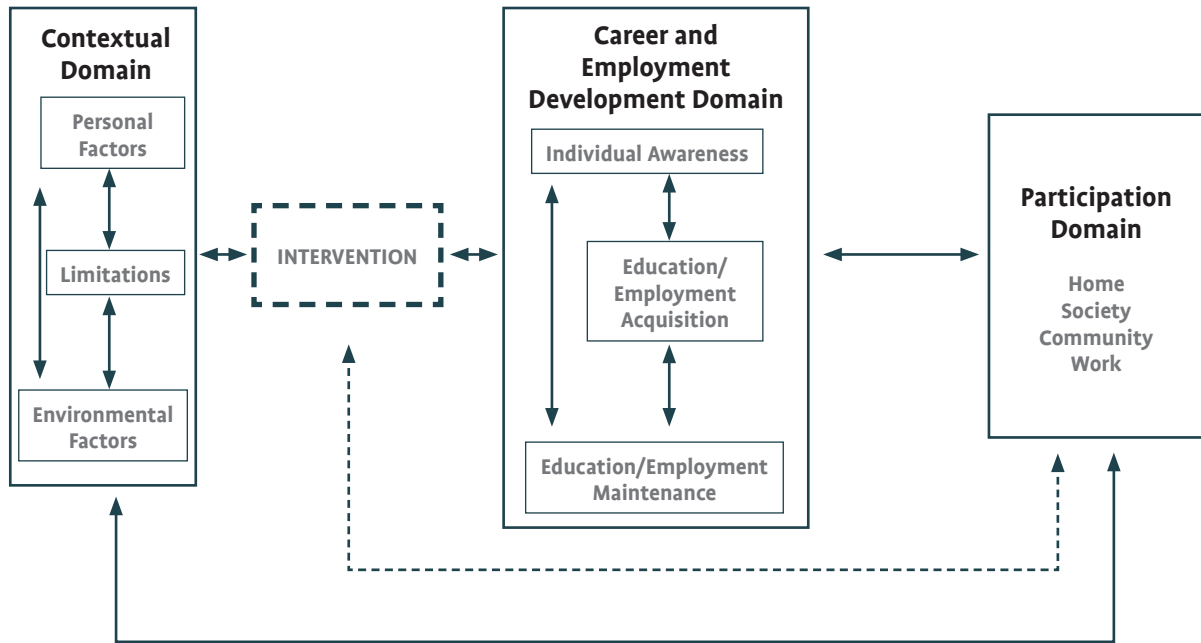
The Illinois Work and Well-Being Model is one model that has been used to understand the factors that relate to career development of young adult survivors of cancer.⁶ The International Classification of Functioning model, a theory based on research regarding the employment of individuals with chronic health conditions, informed the conceptual framework of the model.⁷ The Illinois Work and Well-Being Model is comprised of three major domains—Contextual, Career and Employment Development, and Participation—which have bidirectional relationships that inform outcomes and potential interventions. This model provides a structured framework to conceptualize personal, environmental, and psychological factors that impact the career development of young adult survivors of pediatric CNS tumors and can potentially guide career development and employment research among the cancer population, which can be seen in

Research on chronic health conditions has consistently found that higher levels of career readiness are related to making smarter career and employment decisions with lower levels of psychological distress.²¹

Figure 1, page 54. Using the Illinois Work and Well-Being Model, researchers have begun to identify the relationships among individuals' functional limitations in the context of their personal and environmental factors and the impact on specific areas of career and employment development, such as personal motivation and core self-evaluation.

Vocational psychology and employment research found that increasing one's motivation to work is linked to increased engagement in the labor market and vocational outcomes.^{8,9} The self-determination theory is a multifaceted psychological conceptualization of work motivation that garners insight into an individual by measuring both intrinsic and extrinsic motivation, as well as strength of said motivation. Given that most individuals engage in work at some capacity, a thorough understanding of work motivation is important.¹⁰ Furthermore, because individuals vary in level and orientation of their motivation, it is worthwhile to

Figure 1. Illinois Work and Well-being Model



gain insight into factors, like vocational-psychological factors, that increase motivation. Having a better understanding of these factors can serve as points of intervention to increase career development and employment among young adult survivors of cancer.

Research in occupational development and vocational behavior has found that personal factors, like work personality and core self-evaluation, and the career factor of career readiness, are robust psychological variables that significantly impact the occupational development, vocational behavior, and work participation of individuals with chronic health conditions.¹¹⁻¹⁴ One’s work personality is a personal developmental construct that has been found to play a critical role in establishing the foundation of effective vocational and career behavior in individuals with disabilities and has been linked to meeting the contextual demands of the work environment.¹⁵⁻¹⁷ Individuals with disabilities who have higher levels of developmental work personality were better able to meet contextual demands, such as interpersonal social demands at work, specific work tasks, and adaptations to workplace changes, therefore increasing overall employment outcomes.¹⁶

Core self-evaluation is a personal factor conceptualized as a higher order construct regarding individuals’ primary perceptions and bottom-line evaluations on how they perceive themselves, the world, and others.¹⁸ It has also been found to be related to job performance and satisfaction.¹⁰ Core self-evaluation is comprised of four psychological constructs—self-esteem, generalized

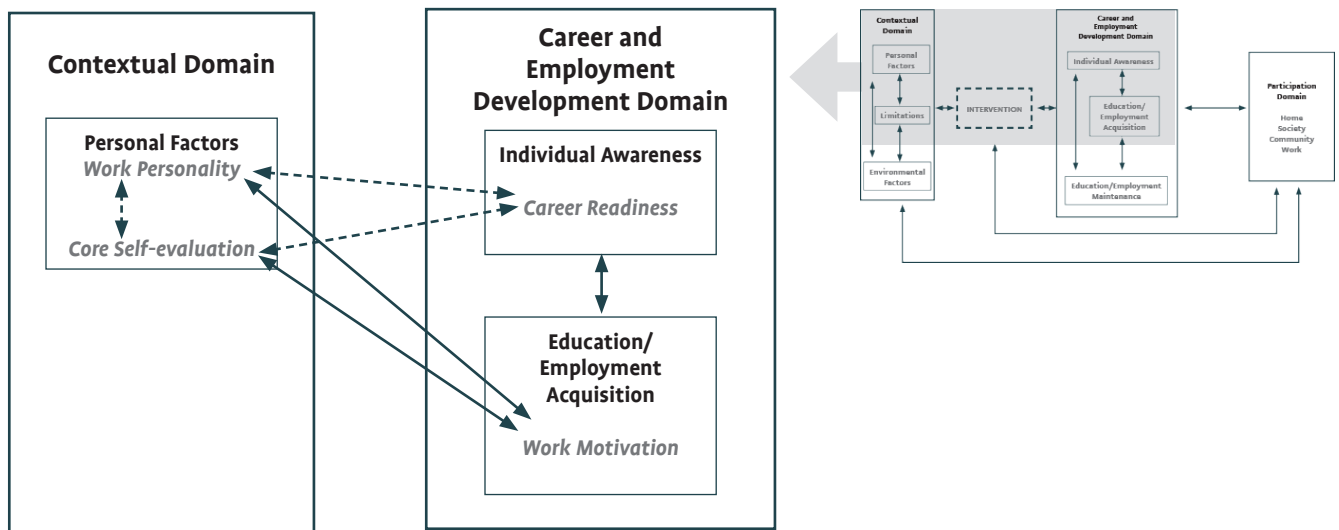
self-efficacy, locus of control, and emotional stability (neuroticism)¹⁹—that act as a higher order factor impacting career and employment outcomes, including, but not limited to, job satisfaction and performance.^{12,14}

Career readiness, which is grounded in the cognitive information processing theory, is a career awareness factor that mediates an individual’s ability to effectively manage cognitive and affective factors related to making impactful career decisions.²⁰ Research on chronic health conditions has consistently found that higher levels of career readiness are related to making smarter career and employment decisions with lower levels of psychological distress.²¹ However, to date, there is limited research conducted on young adult survivors of CNS tumors to examine how these three psychological constructs impact their career development and employment process. No research has examined the relationship of these constructs and work motivation.

The purpose of our study was to apply the Illinois Work and Well-Being Model to an investigation on the impact of career readiness, core self-evaluation, and work personality in individuals’ work motivation (Figure 2, page 55).

An individual’s work personality and overall core self-evaluation can be understood as personal factors in the contextual domain. Career readiness is a measure of one’s awareness within the Career and Employment Development domain. In the context of this study, work motivation is conceptualized as a job acquisition factor within the Career and Employment domain. Given the theoretical framework of the Illinois Work and Well-Being

Figure 2. Hypothesized Relationship of Personal and Career Factors by Domain



Note. The shaded area of the IW2M represents the focus of this study and has been expanded for ease of readability. Solid lines represent the tested pathway regarding the relationship between the psychological variables of interest. Dotted lines represent theoretical and indirect effects between the personal, psychological, and career independent variables.

Model, our study examines the directional relationships among individuals' personal factors, career identity, and work motivation. The following research question guided our study: "Is there a relationship between career readiness, work personality, and core self-evaluation and the work motivation of young adult cancer survivors?"

Defining the Parameters

After obtaining institutional review board approval, we recruited study participants from the Pediatric Brain Tumor Clinic at Dana Farber Cancer Institute, Boston, Mass., where survivors of childhood cancer receive long-term follow-up care. Once we had permission from the respective medical teams to contact patients, we screened potential participants eligibility. To participate in our study, participants must be 18 to 30 years old and have been diagnosed with cancer prior to the age of 18. Additional eligibility criteria included: 1) that participants had not received any cancer therapy within the last two years, 2) that patients were not active patients at a clinic, and 3) that patients spoke English as a primary language. Participants who agreed to participate in the study were then asked to fill out an assessment packet, which included these study instruments:

- A Behavioral Regulation in Work Questionnaire
- A Career Thoughts Inventory Form
- A Revised Development of Work Personality Scale
- A Core Self-Evaluation Scale

- A demographic intake form, which asked participants to provide self-reported data on demographic information, including age, work history, education level, and ethnicity.

We determined that a cross-sectional sample of young adult cancer survivors was best for the study.

Behavioral Regulation in Work Questionnaire

This 19-item measure was developed to assess one's motivation to work based on the self-determination theory. For the purposes of our study, we adapted David Markland and Vanessa Tobin's Behavioral Regulation in Exercise Questionnaire-2 by adjusting the focus from exercise to work.²² Each item is rated on a five-point Likert-style scale that ranges from 1 (*not true for me*) to 5 (*very true for me*). Previously reported reliability estimates for Behavioral Regulation in Work Questionnaire subscales ranged from 0.73 to 0.89, and we found it to be 0.861 for our study.⁹

Career Thoughts Inventory

This 48-item measure has been commonly used in the vocational counseling field to assess individuals' career readiness.²³ Using a four-point rating scale, participants were asked to respond on a scale from 0 (*strongly disagree*) to 3 (*strongly agree*). This standardized measure produces a total score and individual scores on three critical areas of career readiness: decision-making confusion, commitment anxiety, and external conflict. James P. Sampson reported the following ranges of internal consistency

reliability coefficients (Cronbach's alphas) for inventory measures:²³

- Career Thoughts Inventory total between 0.93 and 0.97
- Career Thoughts Inventory-Decision Making Confusion between 0.90 and 0.94
- Career Thoughts Inventory-Commitment Anxiety between 0.79 and 0.91
- Career Thoughts Inventory-External Conflicts between 0.74 and 0.81.

In our study, internal consistency reliability coefficients for Career Thoughts Inventory measures were 0.98 for the total score, 0.97 for Clear Thoughts Inventory-Decision Making Confusion, 0.94 for Clear Thoughts Inventory-Commitment Anxiety, and 0.85 for Clear Thoughts Inventory-External Conflicts. Values of internal consistency were all greater than 0.7, like those found in the original study, providing evidence that the Career Thoughts Inventory is consistent across groups.

Revised Development of Work Personality Scale

This 14-item measure was developed in accordance with Erik Erickson's psychological developmental stage of "Industry vs. Inferiority" and assesses individual behaviors and beliefs. Participants were asked to rate each item using a Likert scale that ranged from 0 (*not at all like me*) to 5 (*very much like me*). The scale has been found to significantly correlate with other measures of work personality and prior studies have provided internal reliability coefficients (Cronbach's alphas) ranging from 0.71 to 0.81.¹⁷ For the purposes of our study, investigators used the Work Tasks subscale of the Revised Development of Work Personality Scale, which had internal reliability of 0.74.

Core Self-Evaluation Scale

This 12-item-scale measures four specific traits—self-esteem, generalized self-efficacy, neuroticism, and locus of control.²⁴ This tool is considered to be a measure of personality traits that can remain stable over time and have been shown to correlate with job satisfaction, job performance, and life satisfaction. Using a five-point Likert scale, participants were asked to respond between 1 (*strongly disagree*) and 5 (*strongly agree*) to show how much each statement represents their experience. A prior study of the Core Self-Evaluation Scale found internal consistency values ranging from 0.81 to 0.87.²⁴ The calculated internal consistency coefficient for our study was 0.94, demonstrating that the scale items are related and performing appropriately among this sample.

Gathering Study Participants

We collected the data set in Table 1, page 57, from the Pediatric Brain Tumor Outcomes Clinic at Dana Farber Cancer Institute where survivors of pediatric brain tumors receive long-term follow-up care. Study participants consisted of 128 young adult survivors of pediatric CNS tumors aged between 18 and 30 years old (the mean age was 23.27 with a standard deviation of 3.39). The age of participants at diagnosis was between newborn and 20 years old (the mean age was 9.50 with a standard deviation

of 4.86). Sixty-six (51.6 percent) of the total 128 participants identified as women. Most participants identified themselves as Caucasian (88.9 percent), with the remaining participants identifying as Hispanic (3.2 percent), Asian or other Pacific Islander (4.0 percent), and African American (3.2 percent). Regarding educational attainment, 23.6 percent of participants had a high school diploma, 5.5 percent had training after high school other than college, 35.4 percent had some college, 30.7 percent had a college degree, and 4.7 percent had a post-graduate degree. In terms of employment status, 35.7 percent of participants were working full time, 23.8 percent were working part time, 11.9 percent were unemployed or currently looking for work, 16.7 percent were unemployed and not currently looking for work, and 6.3 percent were disabled and unable to work.

Among the sample of survivors of brain tumors, the following treatment modalities were performed:

- 40 percent underwent surgery only
- 28 percent underwent surgery, radiation, and chemotherapy
- 15.2 percent underwent surgery and radiation
- 6.4 percent underwent surgery and chemotherapy
- 2.4 percent underwent radiation and chemotherapy
- 3.2 percent only had radiation
- 2.4 percent only had chemotherapy
- 1.6 percent underwent surgery, radiation, chemotherapy, and stem cell transplant
- 0.8 percent received no treatment.

Post-treatment symptoms experienced by participants include vision loss (23.4 percent), hearing loss (17.2 percent), seizures (9.4 percent), endocrine problems (25 percent), growth problems (12.5 percent), headaches (17.2 percent), chronic pain (6.3 percent), depression (22.7 percent), anxiety (45.3 percent), social problems (28.9 percent), learning problems (27.3 percent), stroke (0.8 percent), and diabetes (3.1 percent).

Analyzing the Data

We entered the data from participants' completed questionnaires into the statistical software Statistical Package for Social Science.²⁵ We checked accuracy of data by random selection and all checked data were 100 percent accurate. Prior to analysis, there was a small amount of missing data found on several variables. The mean percentage of missing data across variables in the data set was less than 1 percent. Therefore, missing data were excluded from the complete data analysis.

We summarized demographic data provided by participants using descriptive statistics (i.e., frequencies and percentages). To assess the relationships among variables, we analyzed data with a Pearson correlation. Prior to regression analyses, the results of Pearson correlations provide the significance and strength of the relationships among the variables. Strong and significant relationships among the variables of interest justify further investigation using multiple regression. To investigate which variables best predicted participants' work motivation, we conducted multiple regression analyses. To control the impact of demographic variables (i.e., age, sex, and ethnicity) in the multiple regression

(Continued on page 58)

Table 1. Demographic Characteristics of the Participants (n = 128)

Variable	n (%)
Sex	
Male	62 (48.4%)
Female	66 (51.6%)
Race/ethnicity	
African American	4 (3.2%)
Asian or Pacific Islander	5 (4.0%)
Caucasian	112 (88.9%)
Hispanic	4 (3.2%)
Other	1 (0.8%)
Education level	
Completed high school or equivalent	30 (23.6%)
Training after high school, other than college	7 (5.5%)
Some college	45 (35.4%)
College graduate	39 (30.7%)
Postgraduate	6 (4.7%)
Employment	
Working full time	45 (35.7%)
Working part time	30 (23.8%)
Unemployed looking for work	15 (11.9%)
Unemployed not looking for work	21 (16.7%)
Disabled and unable to work	8 (6.3%)
Other	7 (5.6%)
Treatment	
Surgery	50 (40.0%)
Surgery, radiation, and chemotherapy	35 (28.0%)
Surgery and radiation	19 (15.2%)
Surgery and chemotherapy	8 (6.4%)
Radiation and chemotherapy	3 (3.2%)
Only radiation	4 (5.6%)
Only chemotherapy	3 (2.4%)
Surgery, radiation, chemotherapy, and stem cell transplant	2 (1.6%)
Received no treatment	1 (0.8%)

Percentages may not add up to exactly 100 due to rounding.

(Continued from page 56)

analysis, we performed hierarchical regression. In the first step, age, sex, and ethnicity were entered into the regression to be controlled and then predictors of interest that were to be evaluated were all entered together. As articulated in the research question, work motivation (Behavioral Regulation in Work Questionnaire) was measured as the dependent variable with career readiness (Clear Thoughts Inventory-Commitment Anxiety, Clear Thoughts Inventory-Decision Making Confusion, Clear Thoughts Inventory-External Conflicts), work personality (Revised Development of Work Personality Scale-Work Tasks), and core self-evaluation (Core Self-Evaluation Scale) as the three predictor variables.

The Pearson correlation and multiple regression analyses that we conducted to examine the relationship between work motivation and various potential predictors are summarized in Table 2, below. The Behavioral Regulation in Work Questionnaire significantly correlated in a positive manner with the Core Self-Evaluation Scale. On the other hand, the Behavioral Regulation in Work Questionnaire significantly correlated in a negative manner with the Clear Thoughts Inventory scores on the three critical areas of career readiness: decision-making confusion, commitment anxiety, and external conflict. Finally, the Behavioral Regulation in Work Questionnaire only slightly correlated and not in a significant manner with the Revised Development of Work Personality Scale (Work Tasks subscale).

We calculated a hierarchical multiple linear regression to predict work motivation (Behavioral Regulation in Work Ques-

tionnaire) based on the Clear Thoughts Inventory scores on commitment anxiety, decision-making confusion, and external conflict; the Revised Development of Work Personality Scale; and the Core Self-Evaluation Scale. Table 3, page 59, displays the standardized regression coefficients (β), R^2 , and adjusted R^2 values. The R^2 value accounted for 19 percent of the variance, indicating that the regression was significantly different from zero, $F(3, 118) = 1.444, p < 0.001$. That is, the combination of predictors used in the regression analyses had a significant linear relationship to participants' work motivation. In addition, for young adult survivors of CNS tumors who participated in the study, the Core Self-Evaluation Scale is a significant positive predictor of work motivation. For every 1.00 increase in core self-evaluation, participants' work motivation had an increase of 0.443. However, the other four factors did not uniquely contribute to the prediction of participants' work motivation.

It is important to note that there are potential limitations to our study that might inform potential future research with young adult survivors of cancer. The data we collected were based on self-reported information from study participants and could be subject to biases. Our study was also designed using cross-sectional data of a small sample that lacks racial diversity. Due to this small sample, there is a risk that the answers provided by this subset of cancer survivors may not be indicative of the entire young adult survivor community.

Table 2. Correlations Between Variables

Variables	1	2	3	4	5	6	7	8	9
1. Age	—								
2. Sex	0.00	—							
3. Ethnicity	-0.10	0.12	—						
4. BRWQ total	0.19*	-0.02	-0.04	—					
5. CTI-CA	-0.08	0.09	0.10	-0.33***	—				
6. CTI-DMC	0.04	0.12	0.02	-0.29**	-0.91***	—			
7. CTI-EC	-0.07	0.04	0.18*	-0.22*	0.74***	0.71***	—		
8. RDWPS- Work Tasks	-0.13	-0.16	0.00	0.15	-0.28***	-0.32***	-0.39***	—	
9. CSES Total	0.01	-0.00	-0.08	0.43***	-0.73***	-0.73***	-0.64***	0.28***	—
Mean (M)	23.27	0.48	1.12	53.58	18.08	22.83	7.56	27.21	46.34
Standard error (S)	0.30	0.04	0.06	1.25	0.79	0.93	0.28	0.39	0.92
Standard deviations (SD)	3.39	0.50	0.64	13.94	7.85	10.44	3.18	4.36	10.33

BRWQ = Behavioral Regulation in Work Questionnaire; CTI = Career Thoughts Inventory; CA = Commitment Anxiety subscale; DMC = Decision Making Confusion subscale; EC = External Conflict subscale; RDWPS-Work Tasks = Revised Developmental Work Personality Scale-Work Tasks subscale; CSES = Core Self-evaluation Scale total score.

* $p \leq 0.05$. ** $p \leq 0.01$. *** $p \leq 0.001$.

Lessons Learned

The primary aim of our study was to examine the relationship of an individual's core self-evaluation, career readiness, and work personality against their work motivation among a sample of young adult survivors of central nervous system cancer. Our findings provided further support to prior research that core self-evaluation, work personality, and career readiness collectively contribute to young adult cancer survivors' work motivation. Additionally, these results highlight that core self-evaluation—individuals' perceptions of how they see themselves and the world—stood out as the best predictor of increased work motivation. The study results indicated that the vocational psychology constructs of career readiness, core self-evaluation, and work

personality accounted for 19 percent of the variance in work motivation.

Our findings also provide additional support for the relationships conveyed within the Illinois Work and Well-Being Model framework. For young adult survivors of CNS cancer, personal factors, such as core self-evaluation and work personality, are directly related to work motivation within career acquisition. Additionally, within the career development domain, individual awareness factors such as dysfunctional career thinking have a direct relationship with the acquisition factor of work motivation. Furthermore, young adult survivors of central nervous system cancer experience higher rates of unemployment, and work motivation interventions may be able decrease this rate. The

Table 3. Results from Multiple Regression Analyses Predicting Work Motivation Among Young Adult CNS Cancer Survivors (n = 128)

Variables	Model 1			Model 2		
	β	<i>t</i>	<i>p</i>	β	<i>t</i>	<i>p</i>
Age	0.182	2.006	0.047*	0.186	2.166	0.032
Sex	-0.027	-0.291	0.771	0.007	0.078	0.938
Ethnicity	-0.020	-0.215	0.830	-0.005	-0.054	0.957
CTI-CA				-0.221	-1.049	0.296
CTI-DMC				0.087	0.421	0.675
CTI-EC				0.207	1.549	0.124
RDWPS				0.107	1.176	0.242
CSES				0.443	3.471	0.001***
<i>R</i> ²	0.035			0.246		
<i>R</i> ² adj	0.011			0.193		
<i>F</i>	1.444			4.613		
<i>df</i>	(3, 118)			(8, 113)		
<i>p</i>	0.235			<0.001***		
ΔR^2	—			0.211		
<i>F</i> for ΔR^2	—			6.322		
<i>df</i> for ΔR^2	—			(5, 113)		
<i>p</i> for ΔR^2	—			<0.001***		


Beta is the standardized regression coefficient; Model 1 regressed work motivation on all control variables.

CA = Commitment Anxiety subscale; CNS = Central nervous system; CTI = Career Thoughts Inventory; DMC = Decision Making Confusion subscale; EC = External Conflict subscale; RDWPS-Work Tasks = Revised Developmental Work Personality Scale-Work Tasks subscale; CSES = Core Self-evaluation Scale total score.

* $p \leq 0.05$. ** $p \leq 0.01$. *** $p \leq 0.001$.

results suggest that tailoring interventions toward increasing an individual's vocational identity by improving core self-evaluation and work personality and decreasing an individual's dysfunctional career thinking could improve work motivation and employment outcomes for cancer survivors. Specifically, particular attention should be aimed at increasing one's core self-evaluation, given that our findings suggest that the Core Self-evaluation Scale is the strongest predictor of work motivation compared to the other instruments used in our study. The results of our study provide a more complete picture of the vocational psychology factors that impact work motivation among young adult survivors of cancer. Career interventions aimed at increasing core self-evaluation, career readiness, and work personality can improve young adult cancer survivors' work motivation, therefore improving their career and vocational outcomes.

Looking Ahead

Our study provides a springboard for future directions of research among cancer survivors. For example, future research could examine other work outcomes, in addition to motivation, or it could differentiate between influences of either intrinsic or extrinsic motivation. Studies applying multivariate statistical techniques with a larger sample size could provide a more detailed understanding of the cross-domain interactions within the Illinois Work and Well-Being Model and career outcomes. Lastly, the analyses of our study used the total instrument scores of the scales and did not investigate the possible significance among the subscales. Subsequent studies should consider the possibility of explaining more fully the relationships among these variables by utilizing all of the appropriate instrument subscales. 

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