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Medical Screening Participation Among Childhood Cancer Survivors

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Abstract

Purpose—Despite their risk for serious late sequelae, childhood cancer survivors do not adhere to recommended medical screenings. We identified treatment, survivor, physician, and contextual factors that may influence survivors' adherence to recommended echocardiography and bone densitometry screening.

Methods—Structural equation modeling of data from the Childhood Cancer Survivor Study (CCSS); participants (N=838) were diagnosed and treated for pediatric malignancies between 1970 and 1986 .

Results—Survivors (Mean age = 31 years; Mean age @ diagnosis = 10 years; Mean time since diagnosis = 21 years) at risk of cardiac sequelae (N=316) who reported more cancer-related visits ($P = 0.01$), having discussed heart disease with a physician ($P \leq 0.001$), a sedentary lifestyle ($P = 0.05$), and less frequent health fears ($P=0.05$) were most likely to follow the recommended echocardiogram schedule ($R^2 = 23\%$). Survivors (Mean age=30 years; Mean age @ diagnosis = 9 years; Mean time since diagnosis = 21 years) at risk for osteoporosis (N=324) who reported more cancer-related visits ($P = 0.05$), were followed up at an oncology clinic ($P = 0.01$), had discussed osteoporosis with a physician ($P \leq 0.001$), and had a lower BMI ($P = 0.05$) were most likely to adhere to the recommended bone density screening guidelines ($R^2 = 26\%$). Symptoms and motivation influenced screening frequency in both models.

Conclusions—Multiple factors influence survivors' adherence to screening recommendations. It is likely that tailored interventions would be more successful in encouraging recommended screening among childhood cancer survivors than will traditional health education approaches.

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Introduction

Improvement in the rates of childhood cancer survival has prompted greater awareness of late treatment-related morbidity. Among the potential sequelae of therapy are osteoporosis, cardiomyopathy, and secondary neoplasms [1-4]. The Children's Oncology Group (COG) has compiled risk-based, exposure-related clinical practice guidelines for screening and management of late effects resulting from treatment for pediatric malignancies [5]. A baseline echocardiography screening is recommended for survivors at entry into long-term follow-up and then periodically based on age at treatment, radiation dose, and cumulative anthracycline dose (Table 1). Survivors who are at highest risk and therefore should undergo more frequent screening are those who were less than five years old at treatment, and who had any anthracycline or radiation exposure. Baseline DEXA screening for bone densitometry is recommended at entry into long-term follow-up and is repeated as clinically indicated (Table 1). While exposure based guidelines for screening the late effects of pediatric cancer treatment have been established, survivors' medical screening practices are sub-optimal [6-8] .

The medical screening literature limited to childhood cancer survivors is confined to breast and cervical cancer, [8,9] and cardiovascular disease [9]. Females in the CCSS (78.2%) reported undergoing a Papanicolaou smear within the previous 3 years, 62.4% underwent a clinical breast examination within the last year, and 20.9% had gotten a mammogram at least once in their lifetime [8]. Childhood cancer survivors who received chest radiation are at an increased risk for developing breast cancer before the age of 40 [10-12]. A prospective study of Hodgkin Disease survivors found that only 47% (41 of 87) reported having had a mammogram in the previous 24 months; only 417 (49%) of 852 female survivors at increased risk of breast cancer underwent mammography within the previous 24 months [9]. Treatment of childhood cancer with anthracyclines and/or radiation increases risk of late cardiotoxicity [4,13-15]. However, only 503 (28%) of 1798 childhood cancer survivors at increased risk of cardiac disease received the recommended cardiac screening in the previous 24 months [9].

In addition to disease and treatment factors, personal and contextual factors influence health behavior choices [16-21]. To describe the multiple influences on survivors' screening behaviors, we selected the Interaction Model of Client Health Behavior (IMCHB) [22,23] which incorporates both intrapersonal and contextual variables and has been adapted to the study of childhood cancer survivors (Fig. 1). Structural equation modeling (SEM), which combines factor and path analyses into a comprehensive methodology [24], allowed us to test the model's hypotheses simultaneously rather than sequentially. Our goal was to identify treatment, survivor, physician, and contextual factors that could be targeted with behavioral interventions to support recommended screening.

Methods

Data Source

The CCSS is a multi-institutional retrospective cohort study initiated in 1994 to examine the late effects of pediatric cancer diagnosed and treated between 1970 and 1986. Survivors completed a baseline questionnaire at study entry and respond to follow-up questionnaires sent at regular intervals. Questionnaires and sampling methods are detailed by Robison, et al. [25] and are available for review at http://www.stjude.org/ccss. The study was approved by the institutional review board of St. Jude Children's Research Hospital.

Sample

Originally 20,346 survivors were contacted to participate in CCSS. Eligible participants were those who had survived 5 or more years after being treated for a malignant disease diagnosed

(before the age of 21 years) between 1970 and 1986 (approximately 12,423 are alive to date). An ancillary study, the Health Care Needs Survey (HCNS; initiated by KO), randomly sampled 1600 of the survivors. Of the 978 (61%) participants who completed and returned the survey, 838 (86%) returned the Follow-up 2 survey of the CCSS within the same data collection period. Non-respondents to the HCNS were typically male (59%), minorities (37%), or had less than a high school education (56%). Survivors who completed the HCNS but not the Follow-up 2 survey were younger at diagnosis (P=0.019) and diagnosed more recently (P=<0.001). No survivor reported here was younger than 18 years at the time of data collection; data were self-reported (Table 2).

CCSS respondents self-identified their racial category based on structured response categories used in the baseline questionnaire (white, black, American Indian or Alaskan Native, Asian or Pacific Islander, Hispanic, and other). The analyses in this article were restricted to survivors classified as white, black, Hispanic, and other because there were too few respondents in the other categories to permit meaningful analyses.

We selected and modeled two at-risk subsamples based on treatment exposures (Table 1) who had responded to the baseline, HCNS and Follow-up 2 surveys: A cardiac risk group (anthracycline, radiation exposure, or both) and a bone density risk group (cranial radiotherapy, glucocorticoids, methotrexate, and prolonged corticosteroid exposure).

Outcome Measures

Single items addressed the recency of the last echocardiogram or bone densitometry evaluation (1 = Never; 2 = 5 or more years ago; 3 = More than 2 years but less than 5 years; 4 = 1-2 years ago; 5 = Less than 1 year ago) (Table 3). Survivors who answered “don't know” for any of the screening exams were excluded from the analysis.

Independent Measures

Two types of variables are modeled in SEM: Observed and latent. In contrast to observed variables that can be directly measured (e.g., test scores), latent variables (e.g., depression) are measured indirectly by a set of observed variables [26]. Our final models have 10 directly observed measures (represented in Figs. 2-3 as rectangles) and 4 latent measures (represented in Figs. 2-3 as ovals) that contributed directly, indirectly, or both to the explained variance in frequency of echocardiography or bone densitometry.

Directly observed independent variables—Although all variables corresponding to the conceptual model were examined as potential covariates, the following directly observed independent variables were statistically significant in the final models: (1) survivors' pain resulting from cancer or its treatment (1 = No pain; 5 = Excruciating pain); (2) number of cancer-related visits last 2 years (1 = None; 7 = More than 20); (3) survivors' perceptions of the severity of their late effects (1 = moderate, severe, life-threatening; 2 = mild or no chronic problems); (4) physician/survivor discussion of osteoporosis (1=Yes; 2 = No); (5) physician/survivor discussion of heart disease (1 = Yes ; 2 = No); (6) follow-up at an oncology clinic in the past 2 years (1 = Yes; 2 = No); (7) receipt of a print media intervention detailing exposure risks and recommended follow-up for cardiac or bone density sequelae (1 = Yes; 0 = No); (8) baseline aerobic exercise frequency (sweat or breathe hard for 20 min) (0-7 days); (9) physically active leisure-time lifestyle during the past month (1=Yes; 2=No); (10) level of readiness for medical follow-up (1=Precontemplation; 2=Contemplation; 3=Action).

Latent independent variables—The following latent measures were significant in the final models.

- **Fear/Worry:** Three observed variables: Survivors' worry about their future health, the recurrence of their cancer, and their fear that a problem would be discovered in a check-up (1 = Moderate, quite a bit, or extremely concerned; 2 = Not at all or a little concerned) ($\alpha = 0.76$)
- **Health Concerns:** Three observed variables: Survivors' general concerns about their health, their concerns about chances of getting sick, and their perceptions about the importance of a check-up (1 = Moderate, quite a bit, or extremely concerned; 2 = Not at all or a little concerned) ($\alpha = 0.79$).
- **Intrinsic Motivation:** Five observed items from the Multidimensional Health Locus of Control Scale (MHLC) [27] ("I am in control of my health") (1 = Strongly disagree; 6 = Strongly agree) ($\alpha = 0.79$).
- **Extrinsic Motivation:** Five MHLC [27] items (e.g., "Health professionals control my health") (1= Strongly disagree; 6 = Strongly agree) ($\alpha = 0.80$).

Statistical Analyses

SEM has two components: (1) the measurement model evaluates whether observed measures (scales, self-reports, etc.) adequately represent the latent variables and (2) model hypotheses (see Fig. 1) are then tested with respect to the interrelation of the latent variables and covariates [28]. SEM was performed with Mplus 4.2 [26]. The models are based on subjects with complete data; sample sizes for each model were more than adequate [29].

Multiple indicators assess how the SEM fit the data [30-33] (see Fig. 2-3). Factor loading values for the latent variables were less than or equal to $P = 0.01$ across both models and factor score determinacy values were ≥ 0.80, suggesting that measures of the latent constructs were strong. The final models have significant parameter estimates (Appendix 1) corresponding to the hypothesized relationships, meet the established SEM fit criteria (See Figs. 2-3), and offer the highest percentage of explained variance for the outcome.

Results

The typical respondent was a white, unmarried female college graduate with a personal income of $19,999-39,999; she had health insurance and had not been seen at an oncology clinic in the past 2 years (Table 2). Participants in the risk groups were more recently diagnosed (not significant with Bonferroni adjustment for multiple comparisons), had slightly more education, and were more likely to have been followed recently in an oncology clinic compared to the total sample. The cardiac risk group was slightly older than the bone density risk group at diagnosis (Table 2). In the cardiac risk group, 42.1% of participants had never or not within the last 5 years had an echocardiogram; however, those at cardiac risk were more likely to have had an echocardiogram more recently (2-4 years) than either the total sample or the bone density risk group. Nearly 75% of those in the bone density group had never or not within the last 5 years had a bone densitometry evaluation, and they were no more likely than the cardiac risk group to have had bone densitometry at the recommended intervals (Table 3).

Survivors at cardiac risk were more likely than the total sample and those in the bone density risk group to have discussed heart disease and to be at least 40 years of age. Predictably, survivors in the total sample were more likely to have received a print media intervention detailing their treatment risks; however, a greater proportion of those in the bone density risk group received the intervention than did those in the cardiac risk group (Table 3).

Echocardiogram Frequency

A strong model ($N = 316$; $X^2 = 110.07$, df = 102, $P = 0.28$; CFI = 0.990, TLI = 0.987; RMSEA = 0.016; 90% CI = 0.00-0.034; Probability RMSEA ≤ 0.05 = 1.000 explained 23% of the variance in echocardiogram recency in survivors most at risk for cardiac sequelae (Figure 2a). Survivors who were most likely to follow a more frequent echocardiogram schedule reported more cancer-related visits, discussion of heart disease with a physician, a sedentary lifestyle, and less frequent health fears. The number of cancer-related visits was predicted by reports of increased pain, lower levels of aerobic exercise at baseline, increased readiness for medical follow-up, and perceptions of more severe late effects. Less frequent health fears predicted an active lifestyle. More cancer pain, higher levels of extrinsic motivation, and perceptions of more severe late effects predicted more frequent health fears. Increased readiness to seek medical follow-up was predicted by increased extrinsic motivation, frequent health fears, and more severe late effects. Significant positive indirect effects on echocardiogram recency included cancer-related pain ($P = 0.01$) and an increased readiness for medical follow-up ($P = 0.05$) through cancer-related visits.

Bone Densitometry Frequency

A well-fitting bone densitometry model ($N = 324$; $X^2 = 236.83$, df = 229, $P = 0.35$; CFI = 0.995, TLI = 0.993; RMSEA = 0.010; 90% CI = 0.00-0.026; Probability RMSEA ≤ .05 = 1.000), described participants who were adherent to the bone density screening guidelines ($R^2 = 26\%$) as having made more cancer-related visits, received follow-up at an oncology clinic, were more extrinsically motivated, had discussed osteoporosis with a physician, and had a lower BMI. More health concerns, more cancer-related visits, and having received a print media intervention detailing the individualized risk of sequelae predicted recent oncology clinic follow-up (Fig. 2). Health concerns were predicted by more frequent health fears and reported higher extrinsic motivation. Greater health concerns, decreased intrinsic motivation, more cancer-related pain, perceptions of more severe late effects, and more frequent fatigue predicted increased fear about future health. More cancer-related visits predicted having discussed osteoporosis with the physician. More cancer-related visits and increased concerns about health indirectly predicted bone densitometry frequency through follow-up at an oncology clinic.

Discussion

High-risk adult survivors of childhood cancer frequently do not adhere to recommended medical screening guidelines. Most survivors reported having never discussed heart disease or osteoporosis with their physician. Survivors were most likely to adhere to recommended echocardiogram and bone densitometry screening schedules if they reported more frequent cancer-related visits or were followed up at an oncology clinic, or both. The extent to which our findings reflect the increase in sequelae of treatment, increase in confidence in the knowledge of the specialty provider, familiarity with the facility and its staff in case the treatment was more recent, or more targeted delivery of care, as compared with that available in a non-specialty facility needs further study. Only 7% of the study sample were followed by a cancer specialist; only 4% were followed at a cancer center. Since most survivors are not followed in specialty clinics, this finding is particularly relevant for primary care providers who often lack knowledge about the unique health risks inherent in the treatment for childhood cancer [7,34-37]. Chronic health conditions in childhood cancer survivors become more prevalent with increasing intervals from cancer treatment and are exacerbated by comorbid illnesses associated with aging and maladaptive health behaviors [38]. Since specific treatment and survivor factors are linked to adverse health outcomes in childhood cancer survivors, informed provider intervention based on risk-stratified medical surveillance represents an important opportunity to reduce cancer-related morbidity.

Pain, fatigue, and perceptions of severity of late effects were strong exogenous variables (unaffected by other variables) in both models. They were antecedent to increased health concerns, more frequent health fears, and a negative affect, which in turn directly and/or indirectly impacted screening frequency. Pain is a frequently reported late effect [39,40]; 22.3% of 9034 childhood cancer survivors reported having moderate to very severe pain and 14.3% reported pain sufficient to interfere with daily activities [41]. Nineteen percent of 2645 [42], and 30% of 161 adult childhood cancer survivors reported fatigue [43]. Fatigue and pain negatively impact quality of life [43] and health behaviors that have the potential to modify late effects [44,45].

More frequent health fears were a deterrent to obtaining echocardiograms; however, more frequent fear also increased health concerns, which predicted more recent follow-up at an oncology clinic. Fear, worry, and anxiety exert both positive and negative influence on health-related behaviors [18,46]. Even though early detection through medical screening may positively modify a disease course, the prospect of learning that one has a serious health condition can be profoundly frightening [47,48]. Survivors may resort to avoidance behavior [46] (e.g., not going for routine screens) to reduce fear, anxiety, and a negative affect, or, in contrast, use screening as a means (e.g., negative screening exam) to reduce the discomfort of fear and anxiety [30].

Lack of specific information on risk factors and misconceptions can exacerbate fear or contribute to the denial of the existence of significant health problems [49-51]. Discussing late effects (heart disease, osteoporosis) with physicians predicted more recent screening in both models. In the general population, specific physician recommendation is associated with a higher rate of screening for cervical [52], breast [53,54], prostate [54], colorectal [55-57], and skin cancers [58]. More recent oncology clinic follow-up was predicted by survivors' receipt of an individualized print media intervention that detailed treatment exposure risks for bone density-related late effects and recommendations for follow-up. The impact of the print media intervention on the bone density risk group may reflect the fact that a larger proportion of this group received the intervention; additionally this group may have had greater sensitivity or receptivity because of discernible symptoms (e.g, pain, physical dysfunction).

Motivation played a prominent role in all the models. Extrinsically motivated individuals are more worried and fearful about their health, think they are less able to exert control over health matters, and are more likely to rely on health professionals for direction [17,23,59]; intrinsically motivated individuals are more self-reliant and self-directed instead of being physician-directed [17,60] in their health care choices. Because they may not have accurate health and risk information and have infrequent contact with a physician, intrinsically motivated survivors may be at greater risk for not adhering to screening guidelines. The complex interactions among fear, the patient-physician relationship, affect, and intrinsic motivation should be further explored.

The unique contributions of baseline exercise frequency and sedentary lifestyle to the echocardiogram model may reflect survivors who have early symptoms of treatment-related cardiac sequelae [45]; similarly, survivors with a low BMI were more likely to adhere to bone densitometry recommendations.

Limitations

The study sample reflects a subset of the overall CCSS population - those who responded to the Health Care Needs and CCSS Follow-up 2 Surveys; therefore, survivors included in the current analysis may not be fully representative of the population from which they were derived. The information utilized to classify the health screening outcomes, as well as the independent measures, was based upon self-reported data. Lastly, while the CCSS population

represents a large and heterogeneous cohort of five year survivors, results may not be generalizable to all childhood cancer survivors. As a group, CCSS participants may be more informed regarding risks and health promotion because of newsletters received as part of participation in the study.

Clinical Implications

Primary care physicians are encouraged to specifically inquire about treatment-related symptoms, particularly pain, fatigue, and anxiety [1,43,61]. These symptoms may share common biological mechanisms [62-64] and, until addressed, obstruct positive health behaviors. Physicians should elicit survivors' concerns and address any misconceptions that may contribute to survivors' lack of understanding about the significance of their late effects risks. Therapeutically increasing or decreasing fear arousal [65,66] by providing personalized information on late effects risks and the benefits of medical screening may enhance screening behavior. Focused interactions with survivors are important to reduce anxiety, support motivation, and contribute to a more positive affect, which in turn support adherence to screening.

Conclusions

Multiple factors can influence survivors' adherence to screening recommendations, including already established sequelae (e.g., pain, fatigue, functional decline). Early interventions (before completion of therapy, early post-therapy follow-up) that consider the multiple influences on survivors' medical screening behaviors may be instrumental in modifying sequelae and supporting earlier screening. Providing the childhood cancer survivor with written summaries of pediatric cancer therapy together with recommendations for screening and follow-up that can be shared with the primary care physician may be a useful adjunct for targeting increased medical screening.

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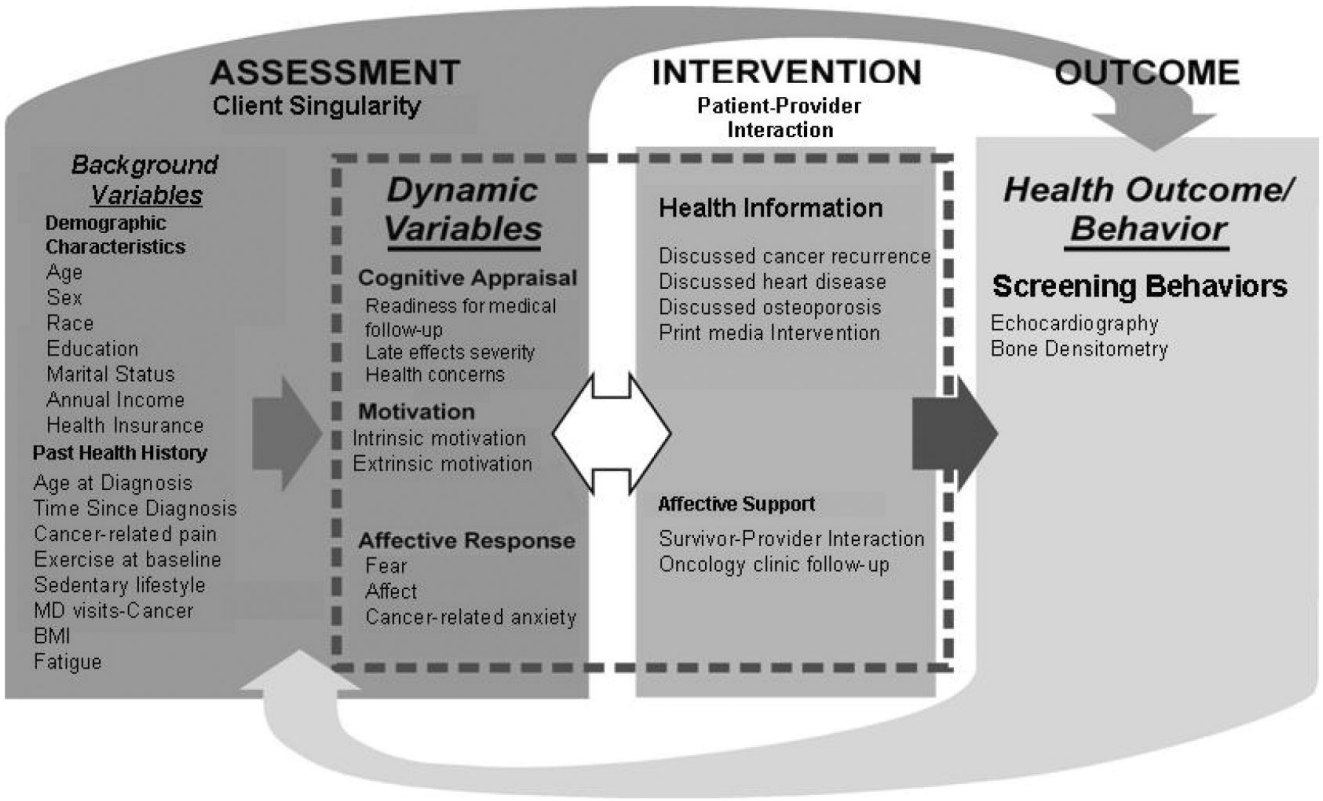
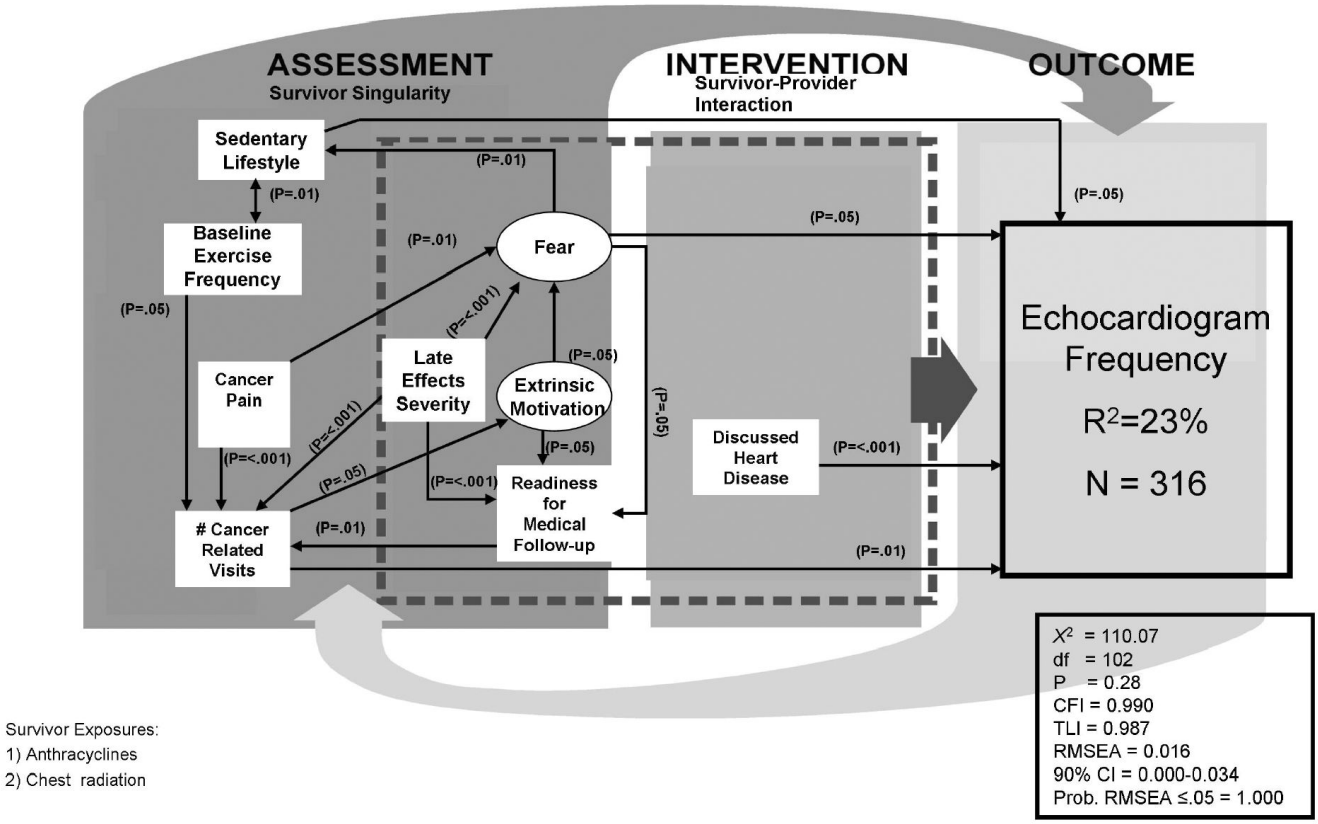


Fig. 1.
Correspondence of the Interaction Model of Client Health Behavior (IMCHB) with Study Variables



A non-significant $X2$ test statistic measures the absolute fit of the model to the data but is sensitive to sample size [30].

The Comparative Fit Index (CFI) and TLI (Tucker Lewis Index) test the proportionate improvement in fit by comparing the target model to an independent base model; a value of 0.90 is minimally acceptable [31], values approximating 0.95 indicate a good fit, and values at or close to 1.000 indicate an excellent fit [32].

The root mean square of approximation (RMSEA) represents closeness of fit, and values approximating 0.06 and 0.00 demonstrate close and exact fit of the model, respectively [32, 33].

Fig. 2.
Predictors of Echocardiograpic Screening

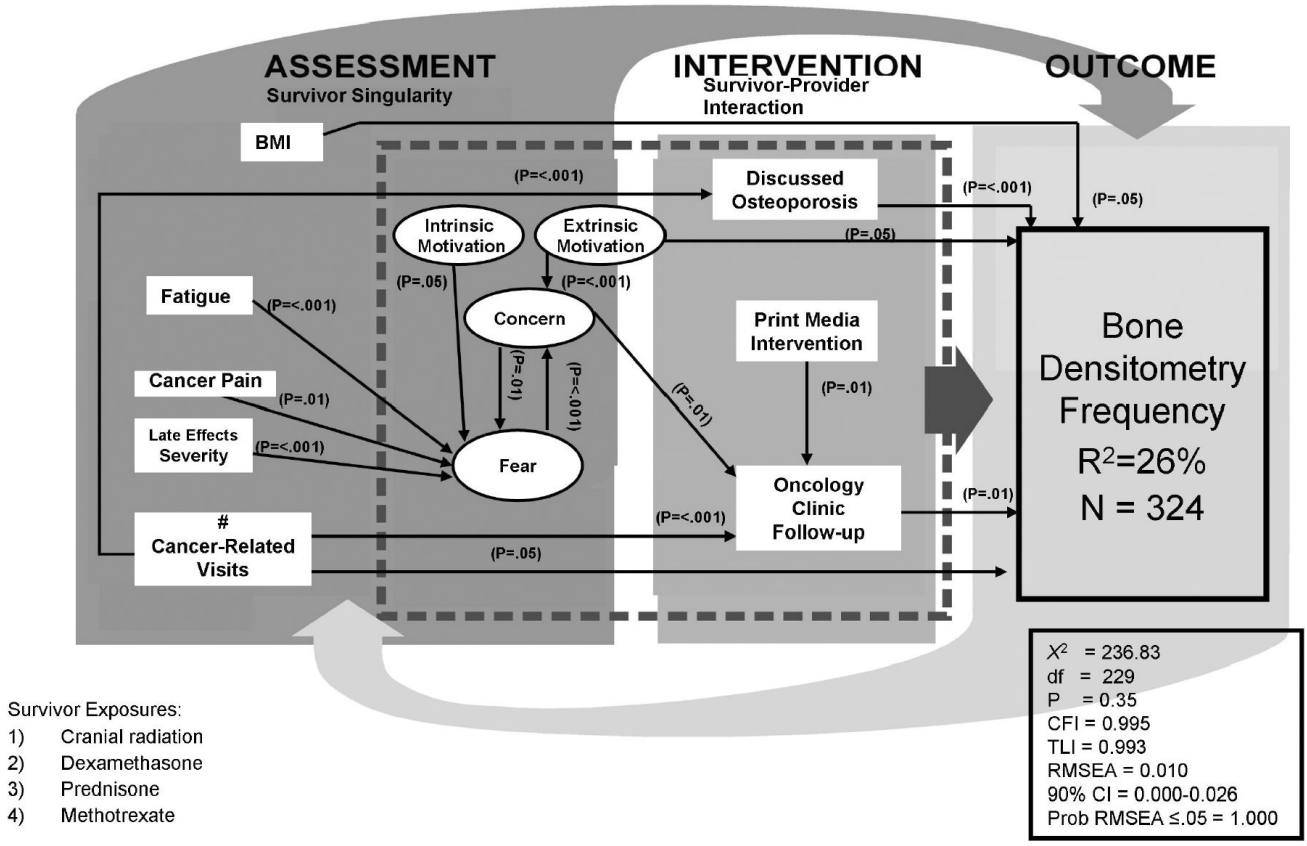


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Fig. 3.
Predictors of Bone Densitometry Screening

Table 1

Treatment Exposure and Screening Guidelines[a]

Treatment Exposure	Recommended Screening	Frequency
Anthracyclines	ECHO	Baseline at entry to follow-up, then periodically based on age at tx, history of chest radiation, and cumulative anthracycline
<1 yr old at tx + chest radiation + any dose anthracycline	ECHO	Every year
<1 yr old at tx + no radiation + <200 mg/m^2 anthracycline	ECHO	Every 2 years
<1 yr old at tx + no radiation + ≥200 mg/m^2 anthracycline	ECHO	Every year
1-4 yrs old at tx+ chest radiation + any anthracycline	ECHO	Every year
1-4 yrs old at tx + no radiation + <100 mg/m^2 anthracycline	ECHO	Every 5 years
1-4 yrs old at tx + no radiation + ≥100 to <300mg/m^2 anthracycline	ECHO	Every 2 years
1-4 yrs old at tx + no radiation + ≥300 mg/m^2 anthracycline	ECHO	Every year
≥5 yrs old at tx + chest radiation + <300 mg/m^2 anthracycline	ECHO	Every 2 years
≥5 yrs old at tx + chest radiation + ≥300 mg/m^2 anthracycline	ECHO	Every year
≥5 yrs old at tx + no radiation + <200 mg/m^2 anthracycline	ECHO	Every 5 years
≥5 yrs old at tx + no radiation + ≥200 to <300mg/m^2 anthracycline	ECHO	Every 2 years
≥5 yrs old at tx + no radiation + ≥300 mg/m^2 anthracycline	ECHO	Every year
Any age with decrease in serial function	ECHO	Every year
Radiation (Mantle, Spine, Abdomen)	ECHO	Baseline at entry to follow-up, then periodically based on age at tx, radiation dose, and cumulative anthracycline dose
<5 yr old at tx + no anthracycline + any dose radiation	ECHO	Every 2 years
<5 yr old at tx + any anthracycline + any dose radiation	ECHO	Every year
≥5 yr old at tx + no anthracycline + <30 Gy radiation	ECHO	Every 5 years
≥5 yr old at tx + no anthracycline + ≥30 Gy radiation	ECHO	Every 2 years
≥5 yr old at tx + <300 mg/m^2 anthracycline + any radiation	ECHO	Every 2 years
≥5 yr old at tx + ≥300 mg/m^2 anthracycline + any radiation	ECHO	Every year
Any age with serial decrease in function	ECHO	Every year
Corticosteroids	DEXA	Baseline at entry into long-term follow-up. Repeat clinically as indicated.

Abbreviations: tx, treatment; ECHO, echocardiogram; DEXA: dual-energy X-ray absorptiometry

[a] Table created from information obtained from the Children's Oncology Group Survivorship Guidelines available at http://www.survivorshipguidelines.org/pdf/HR/LTFUGuidelines_HR.pdf

Table 2

Descriptive Summary of the Total Sample (N = 838) and Sample Completing Barriers Survey Only (N =121)[a]

Variables	Total Sample [N (%)]	Bone Density Risk Group [N (%)]	Cardiac Risk Group [N (%)]	*P*-Value Between Total & Risk Groups
				(X^2)
Sex				0.156
Male	385 (45.9)	280 (47.4)	197 (41.6)	
Female	453 (54.1)	311 (52.6)	276 (58.2)	
Race				0.863
White	599 (71.5)	437 (73.9)	359 (75.7)	
Black	64 (7.6)	42 (7.1)	39 (8.2)	
Hispanic	96 (11.5)	70 (11.8)	52 (11)	
Other	46 (5.5)	41 (6.9)	24(5.1)_	
Personal Annual Income ($US)				0.901
None	94 (11.5)	64 (11.7)	51 (11.5)	
<19,999 - 39,999	490 (60.3)	340 (62.2)	265 (59.5)	
40,000 - 59,999	123 (15.1)	80 (14.6)	76 (17.1)	
≥ 60,000	107 (13.1)	63 (11.5)	53 (11.9)	
Marital Status				0.183
Ever Married	329 (39.4)	209 (35.5)	192 (40.7)	
Never Married	506 (60.6)	379 (64.5)	280 (59.3)	
Health Insurance				0.438
Yes	732 (88.1)	513 (86.8)	428 (90.3)	
No	99 (11.9)	73 (12.5)	44 (9.3)	
Education				0.002
1-12 Years	20 (2.4)	41 (6.1)	19 (4.0)	
Completed High School/GED	106 (12.8)	82 (14.1)	55 (11.7)	
Post High School Training/Some College	305 (36.9)	204 (35.2)	165 (35.2)	
College Graduate/Post-graduate work	397 (48.0)	253 (43.6)	230 (49.1)	
Seen at Oncology Clinic Within Past 2 Yrs				0.008
Yes	76 (9.9%)	76 (12.9)	70 (14.8)	
No	690 (90.1%)	474 (80.2)	376 (79.3)	

Variables	Total Sample [N (%)]		Bone Density Risk Group [N (%)]		Cardiac Risk Group [N (%)]		*P*-Value Between Total & Risk Groups	
	Mean	SD	Mean	SD	Mean	SD	P-Value Between Risk Groups (F-ratio)	Post-hoc P-Value (Bonferroni Adj)
Age (years)	30.98	7.50	30.20	7.09	31.01	7.40	0.094	
Age at Diagnosis (years)	9.25	5.87	9.01	5.51	9.88	5.88	0.036	BD/C[b]=0.012
Time Since Diagnosis (years)	21.74	4.54	21.20	4.27	21.14	4.37	0.021	T/BD=0.023 T/C=0.018

[a] *N* varies because of missing data.

[b] T=Total Group;BD=Bone Density Risk Group; C=Cardiac Risk Group

Table 3

Descriptive Summary of Study Measures

Medical Screening Behaviors	**Total Sample [N (%)]**	**Bone Density Risk Group [N (%)]**	**Cardiac Risk Group [N (%)]**	***P*-Value Between Total & Risk Groups**	***P*-Value Between Risk Groups**
				(X^2)	**(X^2)**
Recency of Echocardiogram (*N* = 836)[a]				<0.001	0.003
Never	354 (36.2)	194 (38.9)	105 (25.4)		
5 or more years ago	134 (13.7)	54 (10.8)	69 (16.7)		
More than 2 years but less than 5 years	87 (8.9)	55 (11.0)	53 (12.8)		
1-2 years ago	82 (8.4)	55 (11.0)	57 (13.8)		
Less than a year ago	95 (9.7)	85 (17.0)	89 (21.5)		
Don't know	84 (8.6)	56 (11.2)	40 (9.7)		
Recency of DEXA Scan (Bone Density) (*N* + 839)				0.531	0.932
Never	589 (60.2)	343 (68.5)	271 (65.3)		
5 or more years ago	61 (6.2)	29 (5.8)	26 (6.3)		
More than 2 years but less than 5 years	31 (3.2)	20 (4.0)	21 (5.1)		
1-2 years ago	34 (3.5)	20 (4.0)	17 (4.1)		
Less than a year ago	44 (4.5)	39 (7.8)	34 (8.2)		
Don't know	80 (8.2)	50 (10.0)	46 (11.1)		
INDEPENDENT VARIABLES				**P-Value Between Total Sample & Risk Groups**	**P-Value Between Risk Groups**
				(X^2)	**(X^2)**
Physician Discussed Risk of Developing Cancer				0.128	0.064
Yes	183 (23.9)	106 (23.0)	111 (28.6)		
No	583 (76.1)	354 (77.0)	277 (71.4)		
Physician Discussed Risk of Developing Osteoporosis				0.328	0.317
Yes	75 (7.7)	48 (10.4)	49 (12.6)		
No	692 (70.8)	412 (89.6)	339 (87.4)		

Medical Screening Behaviors	Total Sample [N (%)]	Bone Density Risk Group [N (%)]	Cardiac Risk Group [N (%)]	*P*-Value Between Total & Risk Groups	*P*-Value Between Risk Groups
Physician Discussed Risk of Developing Heart Disease				0.017	0.012
Yes	131 (13.4)	75 (16.3)	90 (23.2)		
No	636 (65.0)	385 (83.7)	298 (76.8)		
Survivors' Severity of Late Effects				0.487	0.350
Moderate, Severe, Life-threatening	164 (19.7)	117 (20.1)	105 (22.2)		
Mild or No Chronic Problems	667 (80.3)	466 (79.9)	363 (76.6)		
Print Media Intervention				<0.001	0.005
Yes	6166 (73.5)	408 (69.0)	288 (60.8)		
No	222 (26.5)	183 (31.0)	186 (39.2)		
Age 40 Years or More				0.027	0.011
Yes	65 (7.8)	37 (6.3)	50 (10.5)		
No	773 (92.2)	554 (93.7)	424 (89.5)		
Likelihood of Cancer-Related Follow-up				0.488	0.777
Precontemplation	419 (51.7)	276 (48.8)	213 (46.6)		
Contemplation	242 (29.9)	177 (31.3)	147 (32.2)		
Action	149 (18.4)	113 (20.0)	97 (21.2)		

	Mean	SD	Mean	SD	Mean	SD	P-Value Between Total Sample and Risk Groups (ANOVA)
Cancer Pain	1.36	0.749	1.36	0.764	1.40	0.786	0.620
Cancer Anxiety	1.56	0.855	1.59	0.891	1.60	0.860	0.686
Fatigue	3.86	1.253	3.88	1.223	3.89	1.247	0.922
Intrinsic Motivation	18.19	3.636	18.10	3.625	18.06	3.528	0.802
Extrinsic Motivation	7.59	3.291	8.05	3.429	7.79	3.231	0.451
Health Concerns	3.92	0.943	3.89	0.956	3.87	0.948	0.638
Fear/Worry	5.52	0.835	5.51	0.856	5.48	0.866	0.711
Patient-Physician Relationship	13.82	3.696	13.96	3.625	14.01	3.540	0.624
No. of Cancer-related Physician Visits	1.84	1.416	1.88	1.401	1.97	1.497	0.302

Medical Screening Behaviors	Total Sample [N (%)]		Bone Density Risk Group [N (%)]		Cardiac Risk Group [N (%)]		*P*-Value Between Total & Risk Groups	*P*-Value Between Risk Groups
Exercise Frequency at Baseline	2.27	2.185	2.30	2.150	2.20	2.147	0.750	

[a] *N* varies because of missing data.