


Beyond Stages of Change:

- Modifiable indicators of readiness for follow-up care in long-term childhood cancer survivors

– A Report from the Childhood Cancer Survivor Study

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137th APHA Annual Meeting
November 9, 2009
Philadelphia, PA



Presenter Disclosures

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Grant Support:
(RO3 NR009203 (CL Cox, PI)
U24 CA55727 (LL Robison, PI)
Robert Wood Johnson Generalist Physician
Faculty Scholar (Oeffinger KC, PI)
American Lebanese Syrian Associated Charities
(ALSAC)

Background

- Survival rates approaching 80-90%
- Focus on modification of late treatment-related morbidities
 - Osteoporosis
 - Cardiomyopathy
 - Secondary neoplasms
- Survivors' participation in medical screening and follow-up sub-optimal

Follow-up Screening Recommendations

- Echocardiography
- Bone densitometry
- Mammography
- Pap

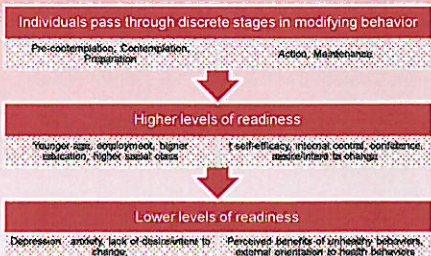
– Baseline (start of long-term follow-up); intervals based on: age at treatment, chemotherapy and/or radiation exposures, clinical indications

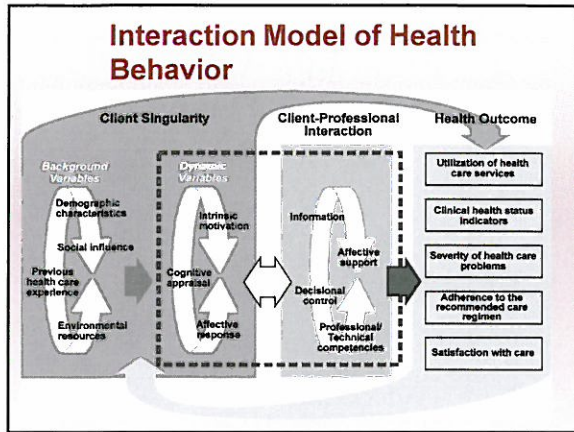
Risks and adherence to screening recommendations

- CRT ↑ breast cancer risk before age 40 (Sheen, 2008)
– 47.3% @ ↑ risk (<40 years) – NEVER had mammogram (Oeffinger, 2009)
- Anthracyclines/CRT ↑ cardiotoxicity (Lipshultz, 2004; Simbre, 2006)
– 72% @ ↑ CV risk – NO echocardiogram ~ last 24 months (Nathan, 2007)
- Corticosteroids ↑ osteonecrosis (ON) (Karimova et al., 2007)
– 74.3% @ ↑ ON risk – NO bone densitometry EVER or not ~ 5 YEARS (Gox, 2008)

Stages of Change (Transtheoretical Model)

(Prochaska & DiClemente, 1983-1986)







Could we better inform intervention studies by:

- Characterizing survivor subgroups based on readiness for follow up care and potentially modifiable affective, cognitive, and motivational indicators?
- Characterizing the relationship that exists between dynamic IMCHB variables and stages of change?

Methods

- **Data Source**
 - Childhood Cancer Survivors Study (CCSS) (Robison et al., 2002)
- **Sample**
 - Survived pediatric malignancy ≥ 5 years after treatment, diagnosed between 1970 and 1986
 - Responded to Health Care Needs and Follow-up 2 Surveys
- **Analytic approach**
 - Latent class analysis

M Feel uncertain about own health
E Worry that cancer will come back
 Worry that health problem will be discovered at routine checkup
 Feel different from others because you had cancer
 Feel like you want to forget that you had cancer

A **COGNITIVE**

How interested in going to doctor for routine medical checkups
 How important to have routine checkups to find problems caused by previous cancer
 How likely you might develop health problem related to cancer treatments

S **INTRINSIC MOTIVATION**

If I get sick, it is my own behavior which determines how soon I get well again
 I am in control of my own health
 The main things which affect my health is what I myself do
 If I take care of myself, I can avoid illness
 If I take the right actions, I can stay healthy

U **EXTRINSIC MOTIVATION**

Having regular contact with my physician is the best way for me to avoid illness
 Whenever I don't feel well, I should consult a medically trained professional
 Health professionals control my health
 Regarding my health, I could only do what my doctor tells me to do

R

E

S

Stages of Change Measure

- **Pre-contemplation**
 - Not seen by physician ~ 2 years
 - Not likely to have a CA-related check-up ~ next 2 years
- **Contemplation**
 - Not seen by physician ~ 2 years
 - Likely/very likely to have a CA-related check-up ~ 2 years
- **Action**
 - Seen by physician ~ 2 years
 - Likely/very likely to have CA-related check-up ~ 2 years

Sample Summary (N=920)

	(%)
• Female	53
• White Race	74
• African-American	8
• Hispanic	12
• College-educated	45
• Household income ≤ \$20K/yr	30
• Diagnosis	
– Leukemia	34
– Lymphoma	26
– Brain tumor	9
– Bone tumor	9
– Other	22

Disease and Treatment Summary

	(Mean, SD)
• Age @survey completion	(30.7 yrs, 7.5)
• Age @ diagnosis	(9.2 yrs, 5.9)
• Time since diagnosis	(21.5 yrs, 4.5)
	%
• Received chemotherapy	76
• Chemo + radiation therapy	67
• Cancer-related late effect	27

Latent Class Analysis (LCA)

• Assumption

- Population includes subgroups of individuals; factors differentiating subgroups not defined

• Process

- Each subgroup represented by a latent variable
- Preliminary models determine optimum number of subgroups
- Multivariate logistic regression model determines how affective, cognitive, motivational and stage of change items are related to each subgroup

Final Model

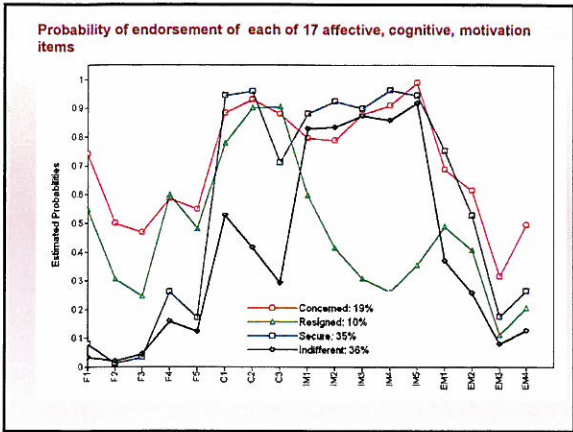
- 4 subgroups = best fit in models (Bayesian Information Criterion = 19,947)
- 9 background variables contributed to the classifications
- Posterior probabilities ranged from 85% to 90%

Sub-group Characteristics

- **Secure (35%)** 😊
 - Most positive toward follow up
 - Externally motivated
 - Appropriately concerned about cancer history
- **Concerned (19%)** 😞
 - Most worried about future health
 - 2nd only to secure group in positive attitude toward follow-up
 - Balance between intrinsic and extrinsic motivation
- **Resigned (10%)** 😞
 - Concerned about cancer history
 - Positive toward follow-up care
 - Least intrinsically motivated, low to moderate extrinsic motivation

The Indifferent Sub-group (36%) 😞

- Least likely to obtain follow-up/screening
- Not concerned about cancer history
- Did not value routine check-ups
- Intrinsically motivated
- Least extrinsically motivated

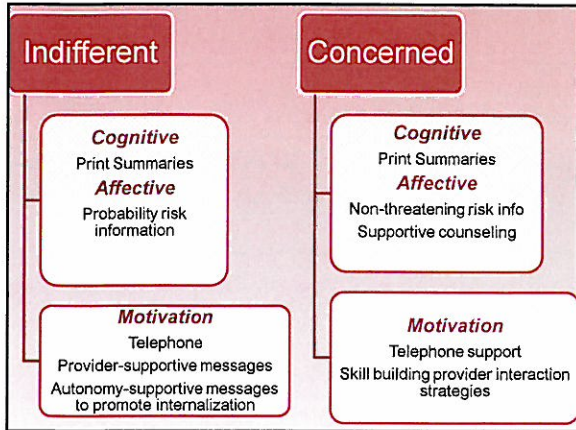


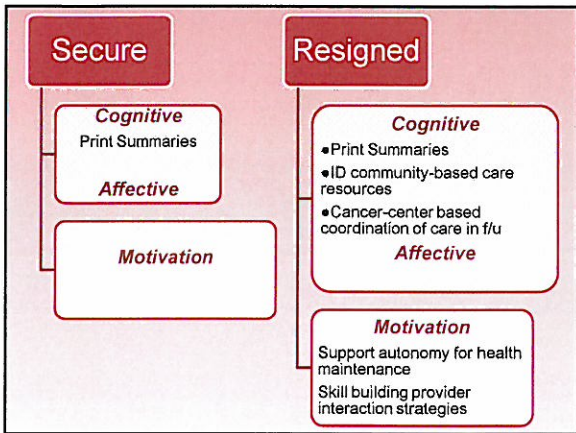
Comparison of the *indifferent* subgroup vs. the *resigned*, *secure*, or *concerned* subgroups on background variable covariates (n=920)

Background variables	Concerned (OR, 95% CI)	Resigned (OR, 95% CI)	Secure (OR, 95% CI)
Demographic			
Female	2.21 (1.07–4.56)*	1.79 (0.62–5.21)	0.96 (0.59–1.66)
Black vs. white	5.81 (1.73–18.19)*	0.82 (0.03–15.33)	3.70 (1.31–10.44)*
Hispanic vs. white	3.83 (1.61–8.17)*	3.65 (1.31–10.15)*	1.17 (0.48–2.86)
Previous/current health			
Presence of late effects	6.82 (3.26–14.55)*	7.40 (2.15–25.46)*	3.35 (1.52–7.36)*
Fair/poor self-rated health	1.65 (0.64–4.27)	5.22 (1.96–13.95)*	0.48 (0.11–2.11)
Medium to extreme anxiety/fears of cancer or cancer treatments	3.48 (1.10–10.50)*	2.27 (0.48–10.68)	1.00 (0.32–3.10)
Limited ability to participate in vigorous activities	1.14 (0.52–2.50)	2.27 (0.96–5.33)	1.99 (1.13–3.49)*
Environmental resources			
Past 2 years read newspaper/article related to childhood cancer long-term problems	2.71 (1.32–5.58)*	2.90 (1.23–6.84)*	3.73 (2.23–6.24)*
Social influence			
Parents worry about survivor's health (almost always/very often)	5.55 (3.01–10.24)*	2.58 (0.94–7.09)	2.18 (1.08–4.32)*
Friends/family tell survivor to be grateful that cancer is cured (almost always/very often)	3.10 (1.50–6.40)*	1.24 (0.54–2.84)	0.81 (0.45–1.46)

Link Between Subgroups and Readiness to Seek Health Care

READINESS TO SEEK HEALTH CARE	Concerned	Resigned	Secure	Indifferent
Pre-contemplation	25	25	35	65
Contemplation	41	36	42	13
Action	34	39	23	2





Conclusions

- Childhood cancer survivors can be profiled on the basis of affective, cognitive, and motivational uniqueness
- Intervention strategies may be better guided by these unique profiles than by stage of readiness for medical follow-up
- Short screens @ end of treatment and throughout survivorship can identify survivors at risk and inform tailored intervention strategies

Future Directions

- Document co-variation between survivor class membership and health outcomes (screening, follow-up)
- Test interventions that are tailored to class profiles (telephone, cancer-center follow-up)

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