Physical activity behavior change interventions in cancer survivors:

What's cancer got to do with it?

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Overview of the Talk

- summary of cancer statistics and survivorship.
- conceptual basis using a simple framework.
- review of evidence supporting “exercise oncology”.
- examples of “cancer-specific” interventions.
- summary, conclusions, and recommendations.

CAD Cancer Statistics 2017

- 45% of men and 42% of women.
- 200,000 new cancers and 80,000 deaths.
- over 100 types of cancer.
- lung, prostate, breast, colorectal (>50%).
- 75% ≥ 60 years of age.
- 63% 5 year relative survival rate.
- over 1.5 million CAD cancer survivors.

Cancer Survivorship Issues

- treatments are complex and difficult.
- surgery, chemotherapy, radiation therapy, hormone therapy, biologic therapy.
- acute effects include nausea and vomiting, diarrhea, fatigue, neuropathy, pain, menopausal symptoms, insomnia, depression.
- chronic/late effects include cancer recurrence, second cancers, heart problems, osteoporosis.

PA and Cancer Survivorship

- what is the role of PA in cancer survivorship? (from the time of diagnosis until end of life).
- “cancer variables” (CV) make the field of “exercise oncology” unique.
- how CVs are related to PA variables is a conceptual and empirical matter.

TABLE 1. Common cancer variables that may be outcomes, determinants, and/or moderators in physical activity research.

Cancer Variables	Brief Definition, Description, or Example
Disease variables	Variables that describe the nature, biology, extent, or recurrence of disease
Type of cancer	Major cancer sites such as breast, lung, colorectal, and lymphoma
Subtype of cancer	Lymphoma subtypes include diffuse large B cell, follicular, and mantle cell
Disease stage	Extent and spread of the cancer, usually ranging from stage I to stage IV
Tumor grade	Indicator of the abnormality and aggressiveness of the cancer
Tumor biomarkers	Estrogen receptor status, progesterone receptor status, HER2 status
Time since diagnosis	Common cut points are 2, 5, and 10 years
Treatment response	Disease can progress, stabilize, or show a partial or complete response
Disease outcomes	Recurrence-free survival, progression-free survival, second primary cancers, deaths from treatment toxicity, cancer-specific survival, and overall survival
Treatment variables	Variables that describe the nature, extent, or sequencing of treatments
Surgery	Type, location, and extent (*e.g.*, partial vs radical nephrectomy)
Radiation therapy	Ionizing radiation of varying types, field locations, dosing, and schedules
Chemotherapy	Cytotoxic drugs of various types, administration, and scheduling
Endocrine therapy (hormone therapy)	Hormone treatments (*e.g.*, aromatase inhibitors)
Biologic therapy (immunotherapy)	Uses the body's immune system to fight cancer (*e.g.*, Herceptin)
Stem cell transplant (bone marrow transplant)	Used to restore the stem cells when the bone marrow has been destroyed by disease, chemotherapy, or radiation
Multimodal therapy	Combination and sequencing of different treatments
Average relative dose intensity	Percentage of the planned chemotherapy dose received

(Courneya *Exer Sport Sci Rev* 2014;42: 102-109)

ARTICLE

Physical Activity and Cancer Survivorship: A Simple Framework for a Complex Field

Kerry S. Courneya

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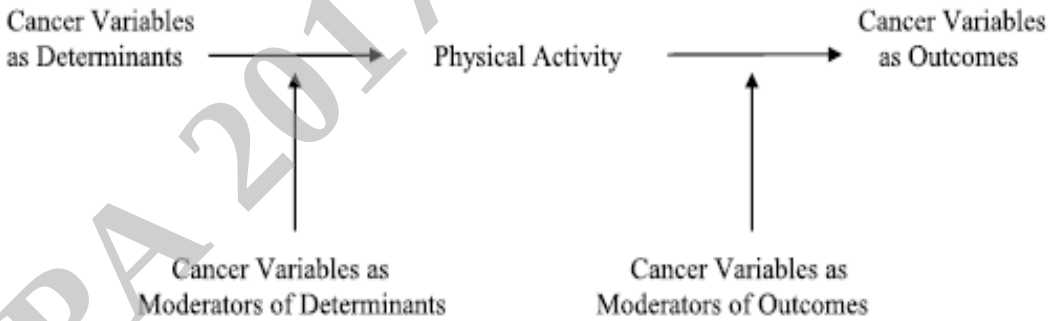


Figure 2. A framework for physical activity and cancer survivorship research.

(Courneya *Exer Sport Sci Rev* 2014;42:102-109)

Cancer variables may be outcomes of PA

- treatment decisions, completion, and response; disease progression, recurrence, and survival.
- cancer outcomes become the "unique" motives/ benefits in PA behavior change interventions.
- most compelling outcomes for cancer patients.
- "fear of cancer recurrence" a major issue.

Cancer variables may be moderators of PA outcomes

- may alter the typical observed exercise response.
- health-related fitness, psychosocial outcomes, QoL outcomes, cancer outcomes, and mechanisms.
- may negate or amplify "standard" effects.
- any CV may moderate any exercise outcome.
- may also influence what PA motives are promoted.

Cancer variables may be determinants of PA

- may influence patients' ability/willingness to EX.
- addresses the issues of feasibility and motivation.
- CVs may impact any aspect of PA (type, volume, intensity, progression, pattern, context).
- may also influence any social cognitive mediators of PA (attitude, control, support, intention).

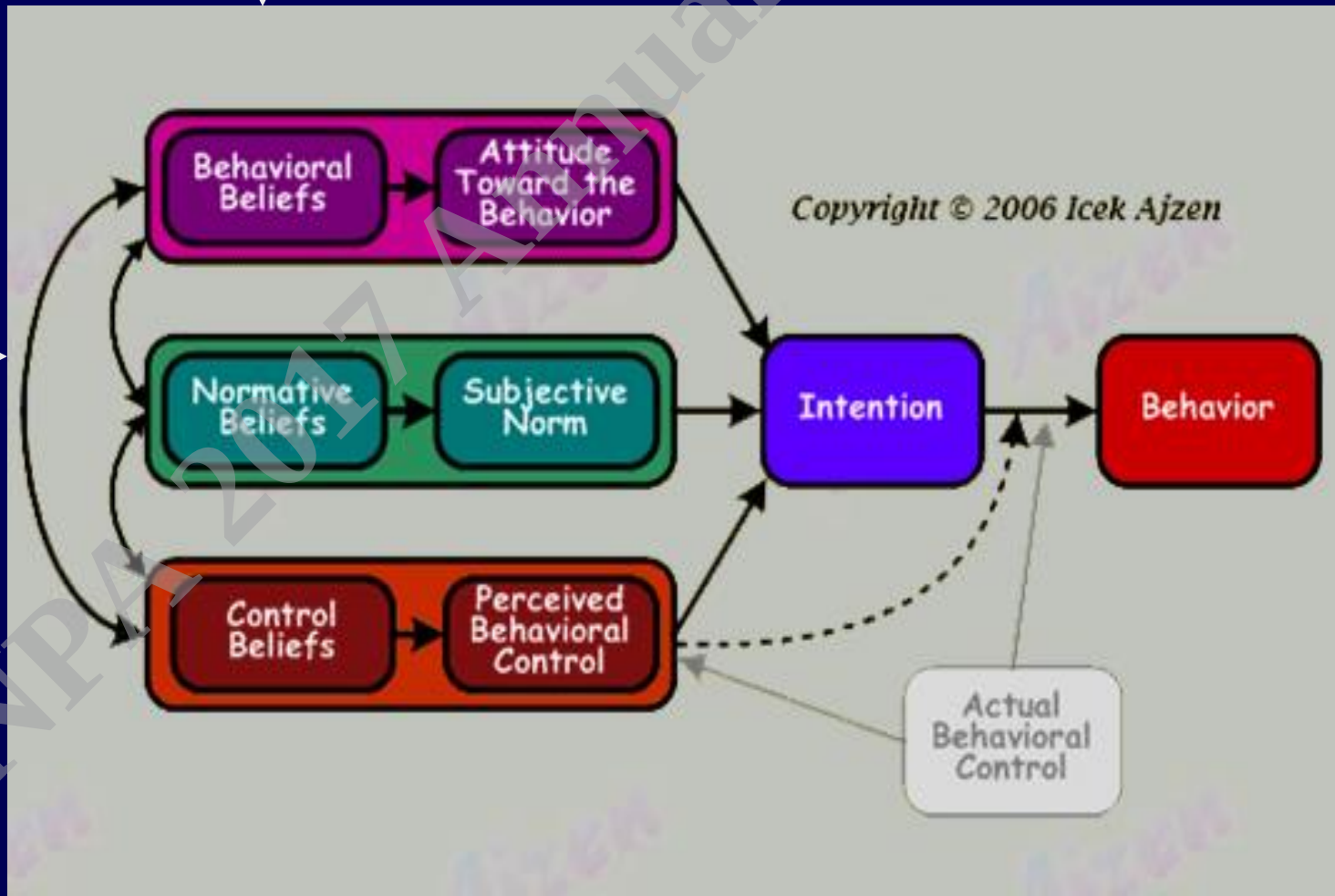
Cancer variables may be moderators of PA determinants

- may alter the typical associations of PA correlates.
- demographic, medical, environmental, social cognitive.
- any CV may moderate any PA correlate.
- may influence which determinants are targeted.
- may alter the effectiveness of PA behavior change interventions (e.g., who, what, when, where).

Theory of Planned Behavior

Cancer-specific beliefs

Cancer Variables
-Type
-Stage
-Treatments
- Recurrence



Cancer-specific Behavioral Beliefs

- prepare for treatments (“prehabilitation”).
- complete treatments.
- respond to treatments.
- manage treatment side effects.
- recover after treatments.
- reduce risk of recurrence/death from cancer.

Cancer-specific Normative Beliefs

- oncologists (medical, radiation, surgical).
- oncology care providers (nurse, pharmacist, PT, SW).
- cancer centers.
- cancer societies/support groups (CCS, Macmillan).
- other cancer survivors.

Cancer-specific Control Beliefs

- side effects/toxicities from treatment.
- fatigue, nausea, diarrhea, peripheral neuropathy, lymphedema, pain, hand-foot syndrome, urinary incontinence, skin problems, dyspnea, mouth problems, anxiety, depression.
- medical appointments, work-related issues.

Journal of Physical Activity and Health, 2009, 6, 339-346

A Population-Based Study of the Determinants of Physical Activity in Ovarian Cancer Survivors

Clare Stevinson, Katia Tonkin, Valerie Capstick, Alexandra Schepansky, Aliya B. Ladha, Jeffrey K. Vallance, Wylam Faught, Helen Steed, and Kerry S. Courneya

(Stevinson et al. *JPAH* 2009;6:339-46)

Table 1 Percentage of Ovarian Cancer Survivors Meeting Physical Activity Guidelines Based on Demographic and Medical Variables (N = 359)

Variable	Meeting guidelines, n = 112 (31.2%)	χ^2	*P*
Time since diagnosis		5.9	.010
<60 months (n = 172)	43 (25.0%)		
≥60 months (n = 187)	69 (36.9%)		
Disease status		7.9	.005
disease-free (n = 297)	102 (34.3%)		
current disease (n = 62)	10 (16.1%)		
Borderline vs invasive disease		0.1	.722
borderline (n = 41)	17 (33.3%)		
invasive (n = 308)	95 (30.8%)		
Disease stage		4.9	.027
stage I or II (n = 163)	62 (38.0%)		
stage III or IV (n = 138)	36 (26.1%)		
missing data (n = 58)[a]	14 (24.1%)		
Received chemotherapy		1.0	.326
yes (n = 253)	75 (29.6%)		
no (n = 106)	37 (34.9%)		

(Stevinson et al. *JPAH* 2009;6:339-46)

Psycho-Oncology
Psycho-Oncology **21**: 1124–1131 (2012)
Published online 18 July 2011 in Wiley Online Library (wileyonlinelibrary.com). **DOI**: 10.1002/pon.2010

Predictors of follow-up exercise behavior 6 months after a randomized trial of supervised exercise training in lymphoma patients

Kerry S. Courneya[1]*, Clare Stevinson[2], Margaret L. McNeely[1], Christopher M. Sellar[1], Christine M. Friedenreich[3], Carolyn J. Peddle-McIntyre[1], Neil Chua[1,3,4] and Tony Reiman[5]

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[2]*University of Loughborough, Loughborough, UK*
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[5]*Saint John Regional Hospital and Dalhousie University, Halifax, Nova Scotia, Canada*

(Courneya et al. *Psycho-Onc* 2012;21:1124-31)

Table 2. Associations between cancer/medical variables and exercise behavior at 6-month follow-up

Variable	Not meeting exercise guidelines (*n*=49; 44.5%)	Meeting exercise guidelines (*n*=61; 55.5%)	χ^2	*p* value
Major cancer type			5.1	0.023
Non-Hodgkin lymphoma (*n*=91)	49.5	50.5		
Hodgkin lymphoma (*n*=19)	21.1	78.9		
Specific disease type			3.3	0.189
Diffuse large B cell (*n*=39)	46.2	53.8		
Follicular (*n*=26)	57.7	42.3		
Other (*n*=45)	35.6	64.4		
Disease stage at study entry			2.3	0.323
No evidence of disease (*n*=32)	37.5	62.5		
Stages I–II (*n*=37)	40.5	59.5		
Stages III–IV (*n*=41)	53.7	46.3		
Time since diagnosis			1.6	0.207
<12 months (*n*=51)	51.0	49.0		
≥12 months (*n*=59)	39.0	61.0		
Previous cancer treatments			0.4	0.800
None (*n*=55)	47.3	52.7		
CT alone (*n*=32)	43.8	56.3		
Radiation ± CT (*n*=23)	39.1	60.9		
Treatment status on trial			1.0	0.311
No treatment (*n*=62)	40.3	59.7		
Receiving chemotherapy (*n*=48)	50.0	50.0		
CT protocol on trial (CT group only)			0.2	0.656
RCHOP/CHOP (*n*=27)	51.9	48.1		
ABVD/RCVP/Other (*n*=22)	45.5	54.5		
% of planned cycles completed (CT only)			2.2	0.136
<85% (*n*=10)	70.0	30.0		
>85% (*n*=39)	43.6	56.4		
Response to CT (CT only)			0.3	0.855
Stable (*n*=9)	55.6	44.4		
Partial (*n*=22)	50.0	50.0		
Complete (*n*=18)	44.4	55.6		
Recurrence/progression during follow-up			3.2	0.072
No (*n*=102)	42.2	57.8		
Yes (*n*=8)	75.0	25.0		

(Courneya et al. *Psycho-Onc* 2012;21:1124-31)

Courneya et al. International Journal of Behavioral Nutrition and Physical Activity 2014, 11:85
http://www.ijbnpa.org/content/1/1/85

INTERNATIONAL JOURNAL OF BEHAVIORAL NUTRITION AND PHYSICAL ACTIVITY

RESEARCH Open Access

Predictors of adherence to different types and doses of supervised exercise during breast cancer chemotherapy

Kerry S Courneya[1*], Roanne J Segal[2,3], Karen Gelmon[4,5], John R Mackey[1,6], Christine M Friedenreich[7], Yutaka Yasui[1], Robert D Reid[8], Carolyn Proulx[2], Linda Trinh[1], Lianne B Dolan[4], Evyanne Wooding[2,3], James R Vallerand[1] and Donald C McKenzie[4]

(Courneya et al. *IJBNPA* 2014;11:85)

Table 1 Significant demographic, medical, and behavioral predictors of adherence to supervised exercise in the CARE Trial, 2008–2011, Canada

Variable	M ± SD (%)	Correlation[1] r; p value	ANOVA[2] F; p value
Group assignment		-.13; 0.025	3.1; 0.048
Standard aerobic (n = 96)	78% ± 24%		
Combined (n = 104)	71% ± 23%		
High aerobic (n = 101)	70% ± 25%		
Location/Center		.42; <0.001	37.8; <0.001
Ottawa (n = 84)	63% ± 27%		
Edmonton (n = 117)	68% ± 23%		
Vancouver (n = 100)	88% ± 13%		
Baseline Aerobic Exercise		.14; 0.015	5.1; 0.024
Not meeting guidelines (n = 210)	71% ± 25%		
Meeting guidelines (n = 91)	78% ± 21%		
Exercise limitations		-.10; 0.098	5.8; 0.017
Not at all/a little (n = 150)	76% ± 22%		
Somewhat/a lot/completely (n = 151)	70% ± 26%		
Comorbidities		-.04; 0.54	4.0; 0.047
0 (n = 135)	76% ± 23%		
≥1 (n = 166)	70% ± 24%		
Length of chemotherapy protocol		-.13; 0.031	4.7; 0.031
12 weeks (n = 89)	78% ± 21%		
≥18 weeks (n = 212)	71% ± 25%		
FEC-D[3]		-.14; 0.013	6.2; 0.013
No (n = 200)	75% ± 22%		
Yes (n = 101)	68% ± 27%		

Note. [1]Tested the association as a continuous variable. [2]Tested the association as a predefined categorical variable. [3]FEC-D = 5-fluorouracil, epirubicin, cyclophosphamide, docetaxel.

(Courneya et al. *IJBNPA* 2014;11:85)

Support Care Cancer (2009) 17:171–179
DOI 10.1007/s00520-008-0471-8

ORIGINAL ARTICLE

A prospective study of the determinants of exercise in bladder cancer survivors using the Theory of Planned Behavior

Kristina H. Karvinen · Kerry S. Courneya · Ronald C. Plotnikoff · John C. Spence · Peter M. Venner · Scott North

(Karvinen et al. *Sup Car Canc* 2009;17:171-9)

Bladder Cancer Survivors

- cancer variables associated with exercise:
  - adjuvant therapy (p=.039)
  - invasiveness (p=.051)
- none were significantly associated with exercise after controlling for the TPB.
- mediated by instrumental/affective attitudes.

(Karvinen et al. *Sup Car Canc* 2009;17:171-9)

Table 1 • Descriptive Statistics for the Salient Physical Activity Beliefs of Colorectal Cancer Survivors in Alberta, Canada, 2008

	n	Mean (SD)	%[a]
Behavioral beliefs			
Feel better and improve well being	577	5.7 (1.4)	66.0
Reduce the risk of cancer returning	560	4.8 (1.8)	40.7
Relieve stress	576	5.3 (1.6)	53.7
Improve energy level	579	5.6 (1.4)	60.7
Get mind off cancer	561	4.8 (1.9)	43.7
Live longer	570	5.4 (1.6)	57.5
Improve fitness	577	5.8 (1.4)	69.5
Lose weight	577	5.2 (1.7)	52.3
Improve immune system	570	5.5 (1.5)	59.2
Normative beliefs			
Spouse/partner (if applicable)	464	5.9 (1.4)	58.2
Other family members	555	5.8 (1.4)	67.3
Best friend	555	5.7 (1.4)	60.5
Oncologist (cancer doctor)	531	5.9 (6.0)	67.0
Control beliefs			
Bad weather	585	3.9 (1.9)	24.8
Felt tired/fatigued	584	3.6 (1.7)	13.7
Medical/health problems	577	3.2 (1.7)	8.8
Busy/limited time	580	3.6 (1.8)	15.2
Cancer recurrence	559	3.4 (1.8)	13.2
Pain or soreness	575	3.2 (1.8)	10.8
Additional family responsibilities	567	3.7 (1.8)	15.2
Boring activity	573	3.8 (1.8)	16.2
Went back on cancer treatment	529	3.0 (1.8)	9.0

(Speed-Andrews et al. *Cancer Nursing* 2014;37: 14-22)

Support Care Cancer (2014) 22:891–903
DOI 10.1007/s00520-013-2045-7

ORIGINAL ARTICLE

A comparison of physical activity correlates across breast, prostate and colorectal cancer survivors in Nova Scotia, Canada

Cynthia C. Forbes · Chris M. Blanchard · W. Kerry Mummery · Kerry S. Courneya

(Forbes et al. *Sup Car Canc* 2014;22:891-903)

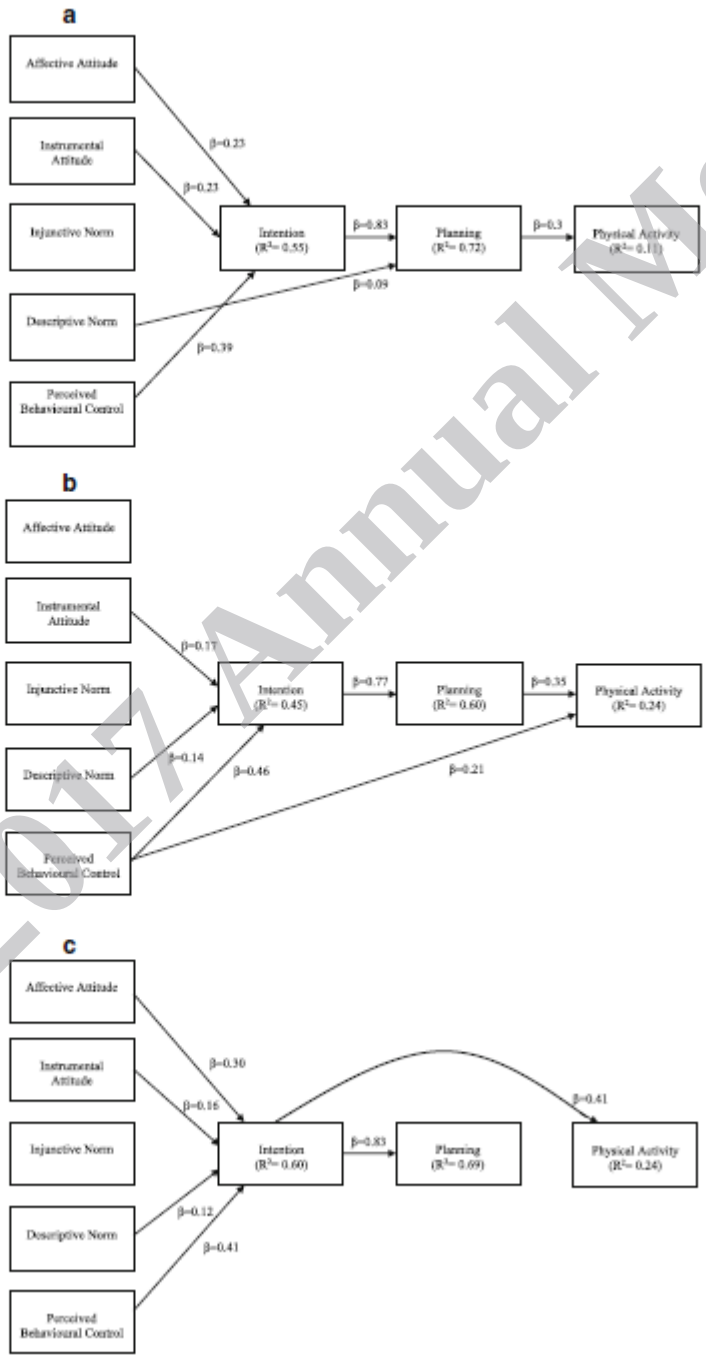


Fig. 2 a Path analysis of the theory of planned behavior and physical activity in 248 breast cancer survivors in Nova Scotia, Canada, October 2011 to February 2012. b Path analysis of the theory of planned behavior and physical activity in 253 prostate cancer survivors in Nova Scotia, Canada, October 2011 to February 2012. c Path analysis of the theory of planned behavior and physical activity in 240 colorectal cancer survivors in Nova Scotia, Canada, October 2011 to February 2012

Cancer-specific Interventions

ONCORE Trial

(Ann Behav Med 2004, *28*(2):105–113)

Effects of an Oncologist's Recommendation to Exercise on Self-Reported Exercise Behavior in Newly Diagnosed Breast Cancer Survivors: A Single-Blind, Randomized Controlled Trial

Lee W. Jones, Ph.D., Kerry S. Courneya, Ph.D., Adrian S. Fairey, M.S., and John R. Mackey, M.D.
University of Alberta

Health Psychology
2005, Vol. 24, No. 2, 189–197

0278-6133/05/$12.00 DOI: 10.1037/0278-6133.24.2.189

Does the Theory of Planned Behavior Mediate the Effects of an Oncologist's Recommendation to Exercise in Newly Diagnosed Breast Cancer Survivors? Results From a Randomized Controlled Trial

Lee W. Jones, Kerry S. Courneya, Adrian S. Fairey, and John R. Mackey
University of Alberta

ONCORE Trial

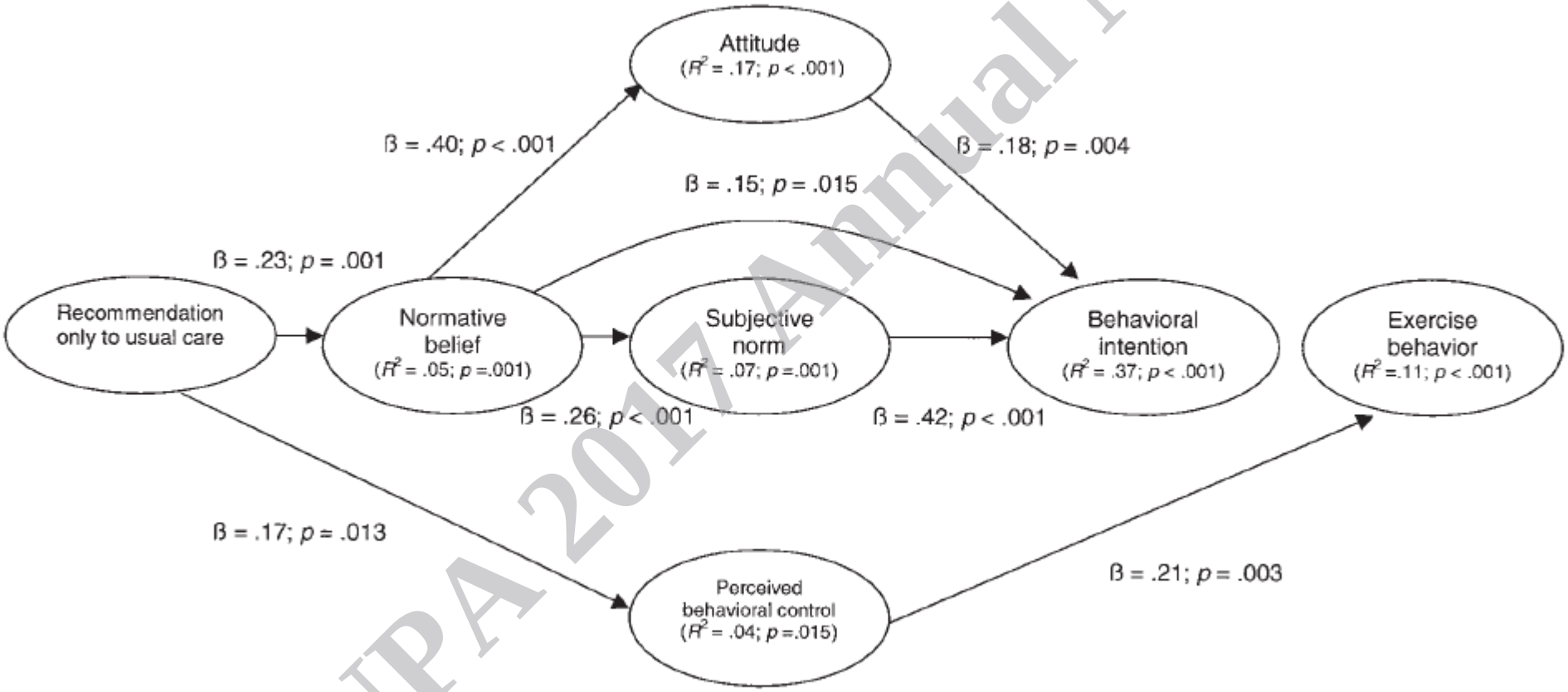


Figure 2. Path analysis of the relationships between group assignment, theory of planned behavior constructs, and exercise for the recommendation-only intervention.

ACTION Trial

VOLUME 25 · NUMBER 17 · JUNE 10 2007

JOURNAL OF CLINICAL ONCOLOGY

ORIGINAL REPORT

Randomized Controlled Trial of the Effects of Print Materials and Step Pedometers on Physical Activity and Quality of Life in Breast Cancer Survivors

Jeffrey K.H. Vallance, Kerry S. Courneya, Ronald C. Plotnikoff, Yutaka Yasui, and John R. Mackey

ann. behav. med. (2008) 35:150–158
DOI 10.1007/s12160-008-9019-x

ORIGINAL ARTICLE

Analyzing Theoretical Mechanisms of Physical Activity Behavior Change in Breast Cancer Survivors: Results from the Activity Promotion (ACTION) Trial

Jeffrey K. H. Vallance, Ph.D. •
Kerry S. Courneya, Ph.D. •
Ronald C. Plotnikoff, Ph.D. •
John R. Mackey, M.D.

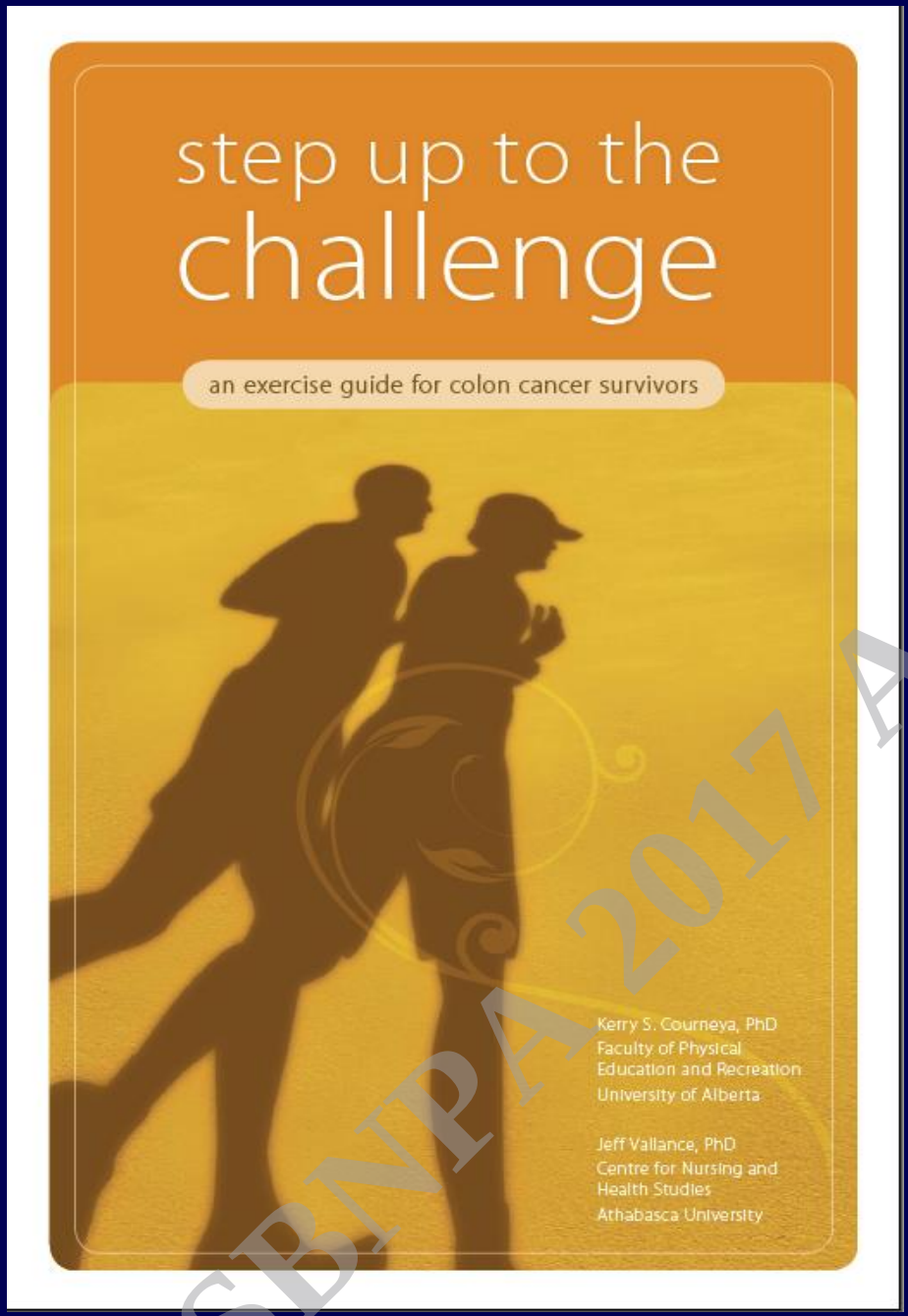
CHALLENGE Trial (CO.21)

The Colon Health and Life-Long Exercise Change trial: a randomized trial of the National Cancer Institute of Canada Clinical Trials Group

K.S. Courneya PhD, C.M. Booth MD,† S. Gill MD,‡ P. O'Brien MSc,† J. Vardy MD PhD,§ C.M. Friedenreich PhD,|| H.J. Au MD,# M.D. Brundage MD,† D. Tu PhD,† H. Dhillon MA,§ and R.M. Meyer MD†*

Update on the Colon Health and Life-Long Exercise Change Trial: A Phase III Study of the Impact of an Exercise Program on Disease-Free Survival in Colon Cancer Survivors

Kerry S. Courneya · Janette Vardy · Sharlene Gill · Derek Jonker · Patti O'Brien · Christine M. Friedenreich · Haryana Dhillon · Rebecca K. S. Wong · Ralph M. Meyer · Jennifer J. Crawford · Kristin L. Campbell · Harry Prapavessis · Christopher O'Callaghan · Jane Turner · Lissa M. Spencer · Hidde P. van der Ploeg · Dongsheng Tu · Christopher M. Booth



Behavioral Sessions

1. Overview of Trial
2. Overview Exercise Program
3. Goal Setting/Planning
4. Pedometers
5. Fitness Appraisal Test
6. Benefits of Physical Activity
7. Barriers to Physical Activity
8. Environmental Scan
9. Social Support
10. Having Fun with PA
11. Stimulus Control
12. Decision Balance Sheet
13. Self-monitoring
14. Time management

(Vallance et al *J Phys Act Health* 2010;7:794-801)

Exercise helps you feel good about yourself

Several research studies tell us that exercise helps colon cancer survivors feel better about themselves.

Survivors in these studies reported that exercise helped them:

- Improve their quality of life.
- Feel more able to perform daily routines and activities.
- Feel satisfied and happy with their body weight, shape, and appearance.
- Increase their self-esteem.
- Reduce their depression.
- Reduce their anxiety.

Exercise helps you do things to improve your health, and this will help you feel more positive about yourself.

† *Lynch B. et al. (2007). Associations of leisure-time physical activity with quality of life in a large, population-based sample of colorectal cancer survivors. Cancer Causes and Control, 18, 735-742.*

†† *Courneya, K., et al. (2003). A randomized trial of exercise and quality of life in colorectal cancer survivors. European Journal of Cancer Care, 12, 347-357.*

††† *Courneya KS, Friedenreich CM. (1997). Relationship between exercise pattern across the cancer experience and current quality of life in colorectal cancer survivors. J Alt Compl Med, 3, 215-226.*

Exercise helps you get your mind off cancer

Do you ever find yourself worrying about whether your cancer will come back? Exercise is a great way to distract yourself from every day life stressors including those related to cancer.

Choose an exercise setting that stimulates you. For example, you may feel more motivated to walk outside than on a treadmill.

Some excellent areas to walk include the local park or even a shopping mall. Some of the local running stores may even provide you with maps of local walking trails around your neighborhood. They may also have walking programs that will help you to find walking partners. Your physical activity consultant in the CHALLENGE trial can also help you with these ideas.

Exercise helps you relieve stress

Exercise is also a great way to relieve any stress you have. Exercise can distract you from the challenges that you might face during the day.

Other colon cancer survivors agree that exercise relieves stress. A recent survey told us the majority of colon cancer survivors believe exercise helped them to cope with the stress of cancer and cancer treatment†.

Also, research studies have found that regular exercise may actually reduce stress and anxiety††.

† *Courneya KS, Friedenreich CM. (1997). Determinants of exercise during colorectal cancer treatment: An application of the theory of planned behavior. Oncol Nurs Forum, 24,1715-1723.*

†† *Petruzzello, S.J., et al. (1991). A meta-analysis on the anxiety-reducing effects of acute and chronic exercise: Outcomes and mechanisms. Sports Medicine, 11, 143-82.*

Exercise improves your energy level

Surviving colon cancer and enduring treatments can cause survivors to experience fatigue and a lack of energy. This lack of energy may limit your ability to do the daily activities that you found easy to do prior to your treatments. In other cancer survivor groups, we have found exercise to be one of the most effective ways to improve your energy level. To notice an increase in your energy level, you don't have to do very hard exercise all the time. It is as simple as walking on a regular basis.

Exercise helps reduce feelings of tiredness in many ways. Exercise helps your red blood cells work better. Exercise improves the function of red blood cells. When you are not active, oxygen is not used very well in the body. When you exercise, you are increasing the ability of the body to use oxygen in the blood. This helps your body use oxygen more effectively, and helps you feel more energized.

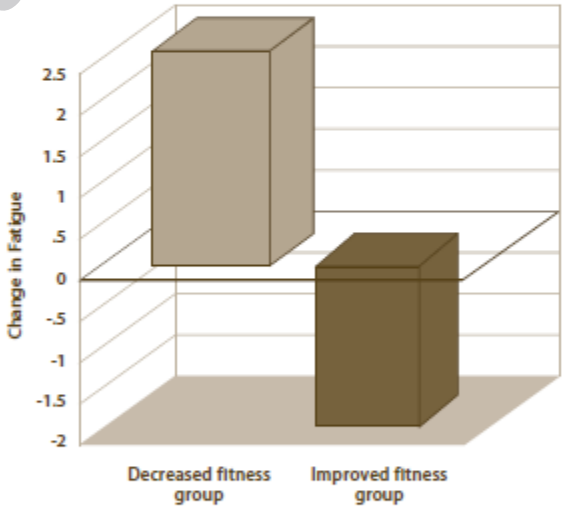
One large experimental study found that colon cancer survivors that increased their cardiovascular fitness also reported decreased fatigue levels. On the other hand, survivors that decreased in their fitness reported more fatigue.

† Courneya, K., et al. (2003). A randomized trial of exercise and quality of life in colorectal cancer survivors. European Journal of Cancer Care, 12, 347-357.

Study: Reducing tiredness

A recent study examined how fitness levels affected fatigue in over 100 colorectal cancer survivors†. This chart shows that survivors who improved their fitness during the exercise intervention reported significantly less fatigue than survivors whose fitness did not improve. Survivors who did not increase their fitness actually reported higher fatigue levels than they did at the beginning of the study.

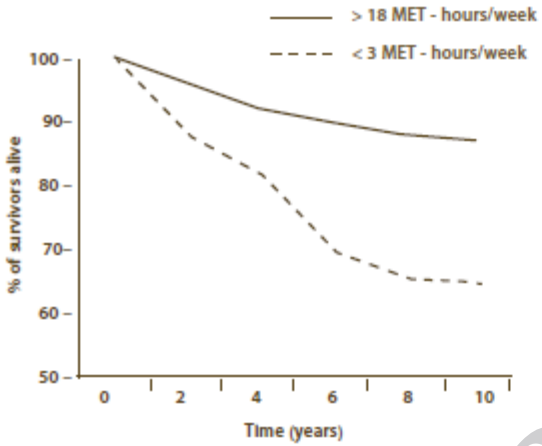
Impact of fitness changes on fatigue



† Courneya, K., et al. (2003). A randomized trial of exercise and quality of life in colorectal cancer survivors. European Journal of Cancer Care, 12, 347-357.

This same study also found that colon cancer survivors that did more than 18 metabolic equivalents of exercise per week (approximately 6 hours of walking per week) lived longer than colon cancer survivors doing little or no activity. Look at the graph, the curves speak for themselves!

Overall survival of colon cancer survivors by level of postdiagnosis physical activity



† *Meyerhardt, J. et al. (2006). Physical activity and survival after colorectal cancer diagnosis. J Clin Onc, 24, 3527-3534.*

Exercise may help prevent your colon cancer from coming back

Researchers have also found that exercise may also reduce the risk of your colon cancer from returning. It was found that survivors who walked as little as 6 hours per week at an average pace had a 47% improvement in disease-free survival time when compared to those colon cancer survivors that did not exercise.†

These studies also found that the amount of exercise you did before you were diagnosed is not nearly as important as the amount of exercise you do after your diagnosis and treatment. Starting exercise after diagnosis is very important. Your timing is perfect!

And remember, eating a healthy diet will also help you achieve a healthy body weight. Exercising regularly combined with eating healthy are the best ways in which you can keep a healthy body weight.

† *Meyerhardt, J. et al. (2006). Impact of physical activity on cancer recurrence and survival in patients with Stage III colon cancer: Findings from CALGB 89803., J Clin Onc, 24, 3535-3541.*

"Sometimes I think a lot about the cancer I had. Sometimes I also don't feel very healthy. But exercise allows me to feel like I am doing something positive for my well being. Also, getting out to do my exercises helps me physically as well as emotionally."

—Joy (Age 59)

getting support

What do colon cancer doctors think about exercise?

Many oncologists now encourage their patients to do regular exercise. Here is what some medical oncologists in Canada who treat colon cancer patients say about exercise.

"I am often asked by my patients with colon cancer what they can do to improve their health and contribute to their own treatment program. Over the past few years there is growing evidence that regular exercise may have substantial benefits for patients. It is well known that regular physical activity reduces many of the side effects associated with treatment from cancer including fatigue and low blood counts. Furthermore, exercise has a multitude of other benefits for all of us including improved heart health and quality of life. Studies that are coming out suggest that regular exercise can be a simple, inexpensive, and healthy component of cancer treatment recovery programs."

—Dr. Christopher Booth, Medical Oncologist, Kingston Regional Cancer Centre

"Exercise is a very powerful and effective way to stay fit and healthy. Especially in cancer survivors, the benefits of exercise are even more evident. And it's not just hard types of exercise like lifting weights or running. We're finding that cancer patients and survivors can get these benefits simply by walking. . .and that is something that everyone can do. I think what is most exciting is the research that is now showing that colon cancer survivors that are active may be more likely to live longer, healthier lives than survivors that are not as active. Because of this research, I now try to encourage all colon cancer survivors to get out and be active. It is as simple as taking the stairs more often, walking to the grocery store, or taking the dog for a longer walk. The benefits are enormous!"

—Dr. Sharlene Gill, Medical Oncologist, British Columbia Cancer Agency

"I regularly encourage my patients to exercise during and after completion of chemotherapy for colon cancer. There is now a lot of research that has been done in the area of exercise and cancer survivorship. We now know that it is both safe and effective to be active both during and after your cancer treatments. This research also shows that survivors that are active can recover quicker from their treatments and live longer and healthier lives. I also inform my patients that "no pain, no gain" is not true. They can see the benefits with simple activities like walking, rollerblading, or even riding a bike. When being active, I encourage my patients to listen to their body. When you need a rest, take a rest. And if something is hurting you should try a different activity. I challenge my patients to take steps to be more active. It is another thing they can do to get back on the road to recovery."

—Dr. Heather-Jane Au, Medical Oncologist, Cross Cancer Institute

"I feel better, I feel less sleepy, and I have more energy after I exercise!"

—Catherine (Age 34)

Can't quite achieve the recommended goal?

Don't forget that you can contact your qualified physical activity consultant at anytime! Either when you visit the exercise centre or via the phone. These physical activity consultants are there for you and they are there to help you reach your exercise goals.

There are several other groups of people that can help you with your exercise program. These include your family physician, your oncologist, and colon cancer support groups.

Never be afraid to ask. Exercising when you have not exercised that much in the past can be a hard step.

Still experiencing some side effects?

Colon cancer survivors often report that many of the side effects from chemotherapy and other treatments stay with them even into their survivorship. You as well might still be having some of these lingering side effects. Common side effects include nausea, fatigue, and fecal incontinence which can prevent you from exercising.

The good news is that exercising may help reduce some of these side effects related to treatment. Are there certain times during the day that your side effects seem to limit you? You can try to exercise when the side effects are not present. So for example, perhaps you only feel fatigue in the evening. If so, try doing your exercise in the morning.

Another strategy is to start off your exercise very slowly. Once you get moving and active, you may find that the side effects you are experiencing may go away the more active you get.

It's cold!

If you live in Canada, you are no stranger to cold weather. This does not mean that you can't still get your daily exercise. Try these tips:

Cold weather survival tips

Ease into it. Start slowly to give your muscles a chance to warm up.

Walk at a moderate or slow pace. Winter roads and paths can be icy. The bigger your walking strides, the higher risk you have of falling.

Bring water. Don't assume you only need water in summertime. Dry winter air is dehydrating, and you do sweat away water in the winter.

Wear three layers of clothing. It's better to overdress. You can always take the clothes off if you get too hot.

Avoid cotton. Try clothes made out of material that will keep sweat away from your skin.

Wear gloves. Wear ski gloves, a hat, and a scarf for your neck to help you keep warm. If your ears, hands or head get really cold, go inside.

Try outdoor walking shoes. Lightweight hiking boots are a good option. Stay away from heavy hiking boots that are for mountaineering.

Check with your physical activity consultant. Remember, your consultant will have many ideas for winter exercise including helping you find a facility where you can exercise at little or no charge.

What if my cancer comes back?

Some people may experience a return of their colon cancer. Sticking to your exercise program may be very hard during this time.

Studies have found that exercise has a positive effect on physical and mental functioning in cancer survivors receiving treatment. These benefits include:

- Increased ability to do regular activities.
- Decreased body fat and more muscle.
- Decreased nausea, vomiting and tiredness.
- Improved immune system.
- Improved mood, happiness and self-esteem.

Be sure to consult your oncologist or physical activity consultant before continuing your exercise program if your cancer comes back and your are scheduled to receive more treatments.

Exercise makes my body sore

Soreness from exercise is very common. Exercising too much may cause a dull, achy feeling in the muscles that may occur 24-48 hours after exercise. To prevent this:

- Start your exercise program slowly.
- Don't exercise too hard in a short period of time.
- Try some gentle stretches before and after you exercise.
- Give your muscles a day to relax by doing some lighter exercises (walking).

Most muscle soreness is a result of resistance training (lifting weights). If you are lifting weights, always lift the weights every other day. Always give you body a day in between each weight lifting session to relax. Believe it or not, the muscles have to repair themselves after a day of "pumping iron".

Make it fun

Exercise does not have to occur in a gym or on a running track. There are other ways to get the health benefits of exercise. Try these tips to make exercise more enjoyable:

- Lower your exercise level but exercise for a longer amount of time. For example, if you don't like walking briskly for 30 minutes, try walking at a slower pace for 45 minutes.
- Start moving more and sitting less. It's as simple as taking the stairs, walking to the store, walking through the mall or even enjoying some work in your garden. All these activities add up to give you health benefits.
- Take up a new hobby that involves exercise. Rollerblading, speed walking, and hiking are all relatively cheap exercises that have a lot to offer. Exercising more can simply be a matter of spending more time on things you already do.

We always seem to forget that fun activities are forms of exercise as well. If you have gone ice skating, played soccer, skied, or swam, you are also exercising.

activity 7

What are two ways you can increase your daily activity? For example:

1. I can walk to get milk instead of driving.

2. I can take the stairs at work.

Now it's your turn:

1. _____

2. _____

CHALLENGE testimonial

[Overall impression of trial]
I think it's helping me get a healthier lifestyle. I feel stronger. After going through the chemo, it's pretty draining. I found my stamina has increased dramatically since I started this thing [the trial].

[What kept you motivated over the past 2 years?]
One, I wanted to get in shape and secondly, if this prevents my cancer coming back, then I'll do anything. You have to get into a routine and it took me a while to get into the routine and I think it's just at the point where it's just part of my life.

[Main barriers during intervention]
My main barrier right now to increasing what I'm doing is one of the side effects of the chemotherapy, which is peripheral neuropathy in my feet. That does impact what I can do and how hard I can work. I can't run right now but I substitute it by walking a lot.
If I have to, I take a 30-40 second break. That's the main thing of how I do it.

[Would you recommend trial to others?]
I'd say most definitely. If you do exercise, it builds up your energy, helps you feel better about yourself. With the CHALLENGE trial, you work with people that understand what you're going through. You can use the other participants as a support group because they're going through the same problems as you are and you can relate with them.

[Advice for people just starting intervention]
My first bit of advice is to hang in there. It's tiring and you're going to be tired. The chemotherapy takes a lot out of you but you'll be amazed that within 6 months, you realize that you are making significant progress and it's a great feeling to be from where I started first to where I am now 2 years later. I'm really impressed with what I am able to do, and surprised too! I'm just glad that I am on this trial.

Ralph, Chief Train Dispatcher, Age 57, Year 2 of intervention

Research Article

Cancer Epidemiology, Biomarkers & Prevention

Effects of a Structured Exercise Program on Physical Activity and Fitness in Colon Cancer Survivors: One Year Feasibility Results from the CHALLENGE Trial

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(Courneya et al. *Cancer Epi Bio Prev* 2016;25:969-77)

Who is Likely to Benefit from a Cancer-Specific PA Intervention?

- newly diagnosed cancer patients starting treatments.
- patients receiving or recovering from treatments.
- cancer patients with poor or modest prognosis.
- patients with advanced or metastatic cancer.
- EXCEPTION: long term survivors of early stage cancers with good prognosis and few morbidities.

Summary and Conclusions

- cancer is a compelling disease for most people.
- most cancer patients want cancer-specific information, not general health information.
- cancer affects all aspects of PA behavior change interventions including motives, barriers, social influences, and delivery (who, what, when, where).

PA Intervention Recommendations in Cancer Survivors

- incorporate cancer-specific outcomes (behavioral beliefs) where supported by the evidence,
- invoke cancer-specific people and groups (normative beliefs) with their approval,
- address cancer-specific barriers (control beliefs) if necessary,
- which may vary by cancer type, stage, and treatments.

Acknowledgements

- Many colleagues, students, staff and study participants have contributed to this research.
- K.S. Courneya is supported by the Canada Research Chairs Program.