

Physical Activities and Distress among Participants of a Cancer Wellness Centre: A Community-Based Pilot Study

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Abstract

Background: Severe distress in patients has been negatively correlated with treatment compliance and treatment outcomes. Cancer survivors who have been diagnosed and undergone treatment may be subject to increased distress, anxiety and depression. Little research has been conducted using physical activities as a means of mediating distress among cancer survivors in a community setting.

Objective: This study explored the relationship between physical activities and distress among participants of a cancer wellness centre in Montreal, Quebec.

Methods: Using a longitudinal design and data from participants (N=44), a distress assessment was administered at Time 1, and three months later at Time 2. The Distress Thermometer (DT), and the Hospital Anxiety and Depression Scale (HADS) were used to assess an individual's psychological distress. Physical activities were measured using the Metabolic Equivalent of Tasks (METs) from the Compendium of Physical Activities classification system.

Results: T-tests and regression analysis indicated that at Time 1 participation in physical activities had a significant inverse relationship with distress, in that as participation increased, distress decreased. At Time 2, three months later participation in physical activities was also associated with decreased distress especially as measured by the HADS. Participation in physical activities almost reached significance with the DT as well.

Conclusions: The results suggest that distress may be reduced by participation in physical activities such as gym, yoga and/or Qi Gong among cancer survivors at a cancer wellness centre. Clinical implications include promoting the benefits of physical activities and exercise among cancer survivors as they relate to distress and other major health outcomes during the treatment and post-treatment phase. Implications for future research include the need to corroborate results using a larger sample assessing other supportive activities as they also relate to the outcome of distress.

Keywords: Physical activities; Distress; Cancer survivors; Wellness centre

of promoting physical activities and programs in the community, as to the benefits they provide to distressed individuals.

Introduction

Cancer survivors who have been diagnosed and undergone treatment (chemotherapy, radiation) are known to experience an increase in their distress levels [1,2]. Research in this area has examined distress in certain cancer populations namely lung and breast cancer primarily in hospital settings [3,4]. The purpose of this study was to explore the relationship between physical activities and distress among cancer survivors in community or home based physical activity programs. Any body movement that increases energy expenditure above resting level, can be converted to Metabolic Equivalent of Tasks (METs) by type and intensity [5]. For example at the wellness centre in Montreal, Quebec, activities such as stretch and balance, yoga, resistance training, Qi Gong, and Tai Chi can be converted to METs. The results of this pilot study should provide healthcare practitioners with valuable information as to the necessity

Distress and Emotional Health

Distress following a cancer diagnosis can occur when an individual has difficulty in adapting to the changes in his/her life. Reactions can include a wide range of depressive and anxious symptoms, intrusive thoughts and thoughts of avoidance [6]. The way in which an individual adjusts to a cancer diagnosis may be mediated by a host of pre-existing psychosocial factors that can influence the cancer experience. Such factors include, but are not limited to, social support, past history, and various key demographic factors such as education and marital status [7]. Furthermore, individuals may in fact experience their initial cancer diagnosis in combination with a preexisting level of distress, as described by Zabora et al. (1997). Levels of distress can be high from pre-diagnosis, through diagnosis, into the recovery phase (as high as 30% of individuals) and to the time of recurrence [8].

Distress and Cancer

Distress has been coined the sixth vital sign for those with cancer, after blood pressure, pulse, temperature, respiration and pain [9,10]. The phenomenon of distress in cancer patients has been studied since the 1970's, and was defined by the National Comprehensive Cancer Network (NCCN) as: "...a multi-factorial unpleasant emotional experience...that may interfere with the ability to cope effectively with cancer...feelings of vulnerability, sadness and fears...such as depression, anxiety" [11]. Severe distress in patients has been negatively correlated with treatment compliance [12-14] and treatment outcomes such as survival time [15,16]. In addition to distress being elevated at the time of diagnosis and shortly thereafter, results by the Carlson group demonstrated that distress may linger for over a year and even longer after diagnosis [17]. In a sampling of nearly 900 patients from a large tertiary cancer center, who were followed for up to one year (12 months), distress levels (with scores of ≥ 4) continued to persist from 51 % at baseline (N = 877), to 29 % at 12 months (n = 505). However, any change over time implies that distress levels may gradually be reduced in some patients, and yet in others distress may linger for longer periods of time (> 12mths). It is during this time that patients may greatly benefit from additional complementary supports in their communities, such as various types of physical activities (yoga, Qi Gong). It is also known that besides physical activities, survivors may be engaged in activities such as arts and crafts, cooking classes, choir, which is also offered at the wellness centre [18,19]. Yet more recently physical activities have reached greater importance for the ongoing emotional and physical survival of cancer patients.

Physical Activities, Distress and Cancer

Physical activity is defined as any body movement that exerts one's muscles and requires more energy than resting, and can be categorized as occupational, leisure, various sports, household [20], and or physical exercise, which is a more structured subset of physical activity [21]. Several studies have examined the effects of physical activity interventions for cancer patients, and found that improvements were made in general wellbeing including decreases in anxiety and depression, noted by greater modulations in rates of physical activity during treatment [22-27]. Studies have also explored the effects of exercising before the commencement of chemotherapy treatment, and how adapting interventions to patients' existing pre-treatment regimen can improve quality of life post-treatment and in the longer term [28].

In addition to conventional physical activities, the social aspects of dance therapy as a physical activity may improve physical health, as well as help with patients' body image and enhance self-expression. Additionally, these activities address feelings of isolation, anger, depression and fear [29,30], plus benefit an individual's quality of life [31]. Yet evidence suggests that individuals undergoing chemotherapy treatment have loss of muscle strength, fatigue, and or reduced cardiovascular capacity [26]. In combination with physical activities, psychological interventions are also beneficial such as psychotherapy and support groups. These activities have been compared to physical activity interventions and have demonstrated that psychological interventions plus physical activity provide a combination of beneficial results [32-34].

The length of time between diagnosis and death has greatly increased [35]. Exploring the relationship between physical activities

and distress gains importance, as evidence suggests that even minimal physical activity can make significant improvements in cardiovascular health and symptoms during treatment [36]. Relaxation-based interventions such as mindfulness-based stress reduction (MBSR), and relaxation in yoga have been found to significantly reduce levels of distress (as measured by stress and anxiety) in cancer patients [37-41]. The benefits of relaxation have been captured in as brief as a 15-minute, one-time guided relaxation program [42]. Although not looking at distress directly, physiotherapists are currently investigating the benefits of customized exercise in a community setting, and demonstrating positive preliminary outcomes [43,44].

However, current investigations have lacked standardized measures of physical activities, reported inadequate sample sizes, and have not reflected the reality of a cancer wellness community, but rather have taken place in a hospital [45]. Therefore, it is timely to explore this area in a small population of cancer survivors who were participating in physical activities both at the cancer wellness centre along with those performed at home or in other community settings.

Rationale and Hypothesis

Similar to other studies, whereby physical activities are measured along with several indicators of distress, anxiety and depression, it is important to build on this existing body of work to address the needs of cancer survivors attending community wellness centers [46,47]. Physical activity levels (using self-reported METs hrs) were seen as useful to test physical activities as interventions among cancer survivors either during or post-chemotherapy treatment. Based on the literature which supports the use and importance of physical activity in the lives of cancer survivors [22-25], we tested the following hypothesis: 1) Participating in physical activities at a cancer wellness centre will have a positive relationship to distress among a population of cancer survivors (either undergoing chemotherapy, or post-treatment) at 3 months follow-up (Time 2), and 2) As physical activities increase, distress will decrease over a 3 month period of time.

Methodology

Design

A longitudinal design was used to assess distress among registered participants of a cancer wellness centre in Montreal, Quebec, specifically cancer survivors who have completed or are currently on treatment. Along with physical activities (total METs) all participants were measured for their distress using the Distress Thermometer and the Hospital Anxiety and Depression Scale (HADS) at Time 1 and three months later (T2) (see Table 1 for schedule).

The Site

The data were collected at the Hope & Cope Cancer Wellness Centre, which is a freestanding centre for people and their families in the Montreal community where attendees are cancer survivors. The attendees may attend psychosocial, educational, leisure, physical activities and supportive services. The centre offers programs with various physical activities such as gym, yoga, dancing, and also art classes, choir, and supportive groups. The Wellness Centre is an extension of Hope & Cope's already existing services at the Jewish General Hospital (JGH) in Montreal, Quebec.

Sample

Patients are usually referred by their physicians from the Jewish General Hospital (JGH), who are either undergoing chemotherapy or post-treatment and who were registered at the Wellness Centre between January 1st, 2011, and February 28th, 2012 (N = 44). Additionally, criteria included those who were over the age of 18 years, and had recently attended at least one physical activity at the wellness centre (participants had to be registered and active at the wellness centre). The most highly attended activities were gym (which includes various types of exercise, i.e. stationary bicycle, resistance training), with yoga as the second highest. However, participants may or may not be participating in other forms of physical activities like dancing or walking in their community, at home or at the centre. Forty-four participants were recruited with a retention rate of 98 % (43/44). One individual was un-able to complete the study requirements at follow-up due to serious medical complications. Over a six-month period twenty-seven participants in the study attended the gym 346 times, 11 participants attended 87 yoga classes, along with Qi Gong nine attended 37 classes, and 7 participants attended 64 dancing classes. Along with physical activities, some participants were also involved in art classes, and nutrition classes, along with relaxation, laughter therapy and choir.

Registration	T1	T2
DT: CPC	METs ^a HADS ^b DT: CPC ^d	METs HADS DT: CPC

Table 1: Time Table for Measurement of Variables

^aMETs: Metabolic Equivalent Tasks

^bHADS: Hospital Anxiety and Depression Scale

^cDT: Distress Thermometer

^dCPC: Canadian Problem Checklist is administered at the same time as the DT

Data Collection

Data were collected after receiving approval from the hospital research ethics department, under the specifications of a low-risk, expedited review (Protocol: #11-146, Nov, 2011). Patients that had agreed to participate in research projects at registration were contacted by phone and/or e-mail to determine interest in study participation. Those who agreed were required to sign consent forms, after receiving medical authorization from their oncologist before commencing physical activities. The researchers arranged for a convenient time and place at the Hope & Cope Wellness Centre for the interviews. Self-report questionnaires were distributed to the participants, which contained questions relating to their level of distress and their level of physical activity at the centre, at home and/or in the community. The entire questionnaire was also translated into French. The METs hours per week [5], were collected for Time 1 and Time 2. At Time 1, a follow-up meeting was scheduled for the repeat measure at Time 2, which was 3 months later. The questionnaires were completed in approximately 30 minutes. If a participant became distressed during the questionnaire period a referral could be made to a social worker at the hospital for further evaluation.

Measurement

Dependent variable

The dependent variable of distress was measured at both Time 1, and Time 2. To measure the dependent variable the Distress Thermometer (DT) and the Hospital Anxiety and Depression Scale (HADS) were used [48-50], both of which are commonly used to measure psychological distress [51,52]. The Distress Thermometer (DT) is a brief, rapid, visual analogue to capture distress levels, and is widely employed across North America. The DT measures distress from 0 to 10, and the distress level is scored either low (0-3), medium (4-7), or high (7-10). Patients rate their distress level and then identify causes by checking from a list (the Canadian Problem Checklist), a 21-item checklist to determine how their distress is contributed to by various factors of psychosocial, practical and physical concerns, financial and other [53]. The Hospital Anxiety and Depression Scale (HADS) is a widely used 14-item measure that assesses symptom severity of anxiety and depression, has been used in cancer patient populations [54], with its validity and reliability well established. Scores range from 0 to 21 with higher scores indicating higher levels of anxiety/depression. A subscale, which consists of two 7-item subscales, can also measure anxiety and depression.

Independent variable

The independent variable of physical activities was assessed using the Metabolic Equivalent Tasks (METs) based on the Compendium of Physical Activities questionnaire [5]. Values to measure the independent variable were captured in a table format (check all that apply), and from this the total METs hours were calculated (using the METs conversion table). It was necessary to report and measure in the total METs score and physical activities performed outside the wellness centre such as at home or in the community, which also contributed to their total physical activities. This was added to activities performed at the wellness centre for a total METs score.

Control variables

We included several control variables to further clarify the relationship between the major variables in the study such as age, gender, education, marital status, chemotherapy, radiation, and date of diagnosis. These variables were included in the self-reported questionnaire. They have been shown to be associated with distress levels especially factors of age and gender [17]. Age was measured as a continuous variable. Dummy variables were used to measure marital status such as; 1=married (including common law); 0=other (including widowed, divorced, single). Education was measured as; 1=university; 0=other (college equivalent or less), chemotherapy was measured as 1=on chemotherapy; 0=not on chemotherapy, radiotherapy was measured as 1=currently undergoing radiation therapy; 0=not undergoing radiation therapy.

Data analysis plan

The SPSS (IBM Corporation, NY, USA), a statistical software program was used to analyze the data. Descriptive statistics were employed followed by paired t-tests, Wilcoxon matched-pairs signed-ranks test was used. Regression analyses was also used to assess the relationship between the independent variable of physical activities (measured by METs hours), and the dependent variable of distress as

measured by the Distress Thermometer, and the HADS at Time 1 and Time 2.

Results

Demographics for the total sample are presented in Table 2. Of the total sample (N=44), there were 13 men and 31 females. Their ages ranged from 25-76 with a mean age of 58 (SD; 12.3) years. Thirty-nine percent of the population was married, and 70% were university educated. The highest percent of cancer type was breast cancer (48%). The Canadian Problem Checklist as administered with the DT, revealed that concerns remained high for the majority of participants at Time 1 in the areas of physical (n=32; 55%), and emotional problems (n=35; 73%) and information needs (n=21; 48%). At Time 2 physical (n=32; 74%) and emotional problems (n=32; 74%) remained high for cancer survivors contributing to persistent distress levels for some participants.

	(n)	% ^a	mean	[95 % CI]	SD
Age					
25-76			57.9	54.2 - 61.7	12.3
Gender					
Male	13	30			
Female	31	70			
Education					
University +	30	69			
College or equivalent	6	14			
High School or less	7	16			
Marital Status					
Married/Common Law	29	66			
Divorced/Widowed	10	23			
Never married/Single	4	9			
Type of Cancer					
Brain	1	2.2			
Gynecological	2	4.5			
Head and Neck	1	2.2			
Urological	1	2.2			
Hematological	6	13.6			
Lung	3	6.8			
Gastrointestinal	5	11.4			
Breast	21	47.7			
Skin Cancer	1	2.2			
Unknown	3	6.8			
Total recurrence	10	22.7			
Date of Diagnosis					
<1 year	22	50			
1-3years	13	30			
>3years	9	20			
Treatment					

Surgery	29	66.0		
Chemotherapy	36	81.8		
In treatment	13	29.5		
Radiation	19	43.2		
Hormone	6	13.6		
Other	5	11.4		

Table 2: Demographics for Total Sample of Participants (N=44) at Time 1

Note: ^aPercentages may not add up to 100% due to missing data.

Results of Paired t-tests

We did a paired t-test analysis for both the DT and the HADS to explore changes over time. The results revealed as shown in Table 3, that although no significant differences were observed between the DT scores at Time 1 and Time 2 (Time 1 3.148-Time 2 3.024; Mean difference of 0.083; SE 0.36; p = 0.82), significant differences were found between total HADS scores (Time 1 13.625 - Time 2 11.795; Mean difference of 1.83; SE 0.75; p = 0.019). No significant differences were found between METs scores from Time 1 to Time 2 (Time 1 31.021-Time 2 32.961; Mean difference -2.03; SE 4.34; p = 0.65), suggesting that participants remained equally active with only a slight increase after the three month time period.

Sample t-tests with Equal Variances								
Pair	Mean †	Std. Err.	Std. Dev.	[95% Conf. Interval]	t	df	Sig. (2-tailed)	
Time1 DT & Time2 DT	0.083	0.357	2.314	-0.638-0.804	0.233	41	0.817	
Time1 HADS & Time2 HADS	1.830	0.750	4.978	0.316- 3.343	2.438	43	0.019*	
Time1 METs & Time2 METs	-2.026	4.389	28.778	-10.833- 6.830	-0.462	42	0.647	

Table 3: Paired Samples Test of Time 1 to Time 2 for DT, HADS, and METs scores

Note: DT: Distress Thermometer; HADS: Hospital Anxiety and Depression Scale; METs: Metabolic Equivalent of Tasks; †Mean difference reported; *p<0.05

Results of linear regression analysis

The results of the regression analyses at Time 1, as shown in Table 4, revealed that gender and physical activity (METs scores) had significant relationships to distress levels. Physical activity (METs score) was negatively correlated with distress as measured by the DT (b= -0.04, p = 0.41) suggesting that as physical activities increased, distress levels decreased (Table 3). R-squared values suggest the regression model accounts for 13 % and 23% variance in the outcome, in the HADS and DT respectively. Additionally, gender was positively

and significantly related to distress ($b = 2.58, p = 0.021$), suggesting that at Time 1, women were more distressed than men.

At Time 2, as shown in Table 5, regression analysis indicated that a significant and negative relationship was found between radiation and physical activities and distress, ($b = -4.11, p = 0.049$); ($b = -0.07, p = 0.037$) respectively, suggesting that for those on radiation who were participating in physical activities, distress was reduced. An increased METs score was negatively correlated with a lower HADS, in that the higher the METs scores the lower the distress (HADS) scores, and reaching near significance with the DT ($b = -0.025, p = 0.074$). R-squared values suggest the regression model accounts for 12 % and 28% variance in the outcome, in the HADS and DT respectively. At Time 2, gender again was significantly related to distress, ($b = 3.45, p = 0.002$) suggesting that woman had higher distress levels than men. Control variables such as chemotherapy treatment, education, age or surgery did not reveal other significant relationships. A correlation analyses revealed supportive data indicating that at Time 1 DT was inversely correlated with the METs ($r = -0.298, p = 0.049$), as more METs hours completed, the lower the DT score. The joint F-statistic is not significant, however individual predictor variables reveal significance, as presented in Tables 4 and 5.

Variables	Time 1 HADS ^b			Time 1 DT ^c		
	b	SE	β	b	SE	β
Age	-2.90	2.98	-0.21	-1.13	1.21	-0.19
MarStat	3.06	2.55	0.24	1.57	1.03	0.28
Gender	3.32	2.64	0.25	2.58*	1.07	0.45
Educ	-1.57	2.41	-0.12	-0.68	0.97	-0.12
Surg	-1.32	2.63	-0.10	-1.27	1.07	-0.23
Radia	-3.68	2.25	-0.29	-0.60	0.91	-0.11
Chemo	-1.50	2.59	-0.11	-1.40	1.01	-0.24
METs ^a	-0.07	0.05	-0.27	-0.04*	0.02	-0.37
R	-.064			.048		
R ²	.13			.23		
F	.675			1.27		
F sig.	.710			.289		

Table 4: Regression Analysis Examining the Effects of Physical Activities (METs^a) and control variables, on Distress at Time 1

Note: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

^aMETs: Metabolic Equivalent Tasks

^bHADS: Hospital Anxiety and Depression Scale

^cDT: Distress Thermometer

Discussion

To our knowledge few studies have investigated physical activities and their relationship to distress in a population of cancer survivors, especially in a community cancer wellness centre. In summary, the results indicate that over time distress as measured by the HADS

decreased as shown in the t-test and regression results, suggesting that participation in physical activities at a cancer wellness centre are beneficial and serve to lessen the negative impact of distress. The brief and rapid DT capturing essentially 1-item using a visual analogue varies from the HADS which uses a 14-item measure to assess symptoms of anxiety and depression, this may contribute to the varying results observed in the t-test analysis. HADS revealed a minimally clinically important difference [55]. The regression results revealed that the more physically active (the higher the METs score) an individual is, the greater the effect is on distress. Additional findings revealed that woman experience more distress than men over time and those individuals on radiation experienced less distress.

Variables	Time 1 HADS ^b			Time 1 DT ^c		
	b	SE	β	b	SE	β
Age	-1.26	2.33	-0.09	0.98	0.99	0.17
MarStat	3.61	2.07	0.29	0.58	0.88	0.12
Gender	3.74	2.49	0.29	3.45**	1.05	0.62
Educ	-3.07	2.21	-0.23	-1.40	0.94	-0.25
Surg	0.25	2.18	0.02	-0.44	0.92	-0.08
Radia	-4.11*	2.01	-0.35	1.07	0.86	-0.21
Chemo	-5.98	2.85	-0.35	-1.36	1.21	-0.19
METs ^a	-0.07*	0.03	-0.32	-0.02	0.01	-0.27
R	.129			.169		
R ²	.12			.28		
F	1.78			2.04		
F sig.	.116			.072		

Table 5: Regression Analysis Examining the Effects of Physical Activities (METs^a) and control variables, on Distress at Time 2

Note: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

^aMETs: (Metabolic Equivalent Tasks)

^bHADS: Hospital Anxiety and Depression Scale

^cDT: Distress Thermometer

A varied group of individuals with a wide range of cancers were included in the study. In spite of the heterogeneity of the sample, the results of this current study suggest that participating in physical activities at the centre, reduced distress over the course of three months. Our results also suggest that as physical activities increased over time, distress as measured by METs decreased. However, average physical activity levels as measured by METs scores remained relatively unchanged throughout the three month time period. The results of our data differ from existing studies, that address distress, as their studies do not specifically examine the benefits of physical activities on distress [29,31,41,56]. Our findings also revealed that woman experienced higher distress than men both at Time 1 and at Time 2. Although there were significantly more woman in the study, several previous studies [2,57], found that woman experience distress over a longer time period up to 12 months [17]. Similarly, the Lebel group (2008) followed woman for 6 years [58], and noted that levels

can remain high, years after treatment and initial diagnosis. Residual distress can serve as a predictor of depressive symptoms and can further be linked to a fear of the future [59], and long-term survival outcomes [60]. These studies however, have all been conducted with breast cancer patients. Gynecological cancer patients reported high distress levels, especially among younger women (under the age of 60 years) [61-64], and in women with advanced disease [65,66].

It is possible, although not measured in this study, that participating in other supportive activities at the wellness centre such as art classes, choir, and bead making may have additional mediating effects on distress among those cancer survivors already participating in physical activities. Supportive activities can be leisure activities [67], such as art-therapy [68,69,47,70], singing in a choir [71], and relaxation and nutrition classes. Future studies with a larger sample should examine the differences and/or combined effects of both types of activities on distress.

Those that were undergoing radiation therapy also had lower anxiety and depression (HADS) at Time 2. This may suggest that distress levels may have been higher at the beginning of the study for these individuals due to the fact that they were receiving treatment, thus a greater effect may be observed on distress following the intervention. However, studies have shown that patients can also experience distress in the absence of treatment [2]. Waiting for treatment can leave patients wondering how long they will wait before their cancer progresses enough to undergo further treatment. Alternatively, post-treatment distress and anxiety may be due to feelings of loss of support, whereby treatment may provide a means of control, a way to cope and a focus for their energy.

Several limitations of the study are warranted. For example, only one cancer wellness centre supplied the study sample, making it difficult to generalize our results to the larger population of community cancer wellness centers. The sample was heterogeneous in the stage of the cancer and disease progression (local vs. metastasized), and 50% were within the first year of diagnosis, with only 9% being over three years since their primary diagnosis. The self-reported questions for physical activity participation (METs) may have resulted in an under- or over-reporting of participants' physical activities. METs values can range from 0.9 (sleeping) to 18 (running speed at 17.5 km/hr), and are dependent on an individual's resting metabolic rate (RMR), which in turn depends on lean body mass (vs. total weight). The values therefore are a reference and indicator of a physiological measure expressing the particular energy cost of physical activities [5]. However, this measure is widely used in studies, when other metabolic indicators are not available [45,72].

Implications for Clinical Practice

Despite these limitations, the results of the pilot study have implications for clinical practice, cancer wellness centre programming, and health care practitioners. Depending on the limitations of the individual, participation in physical activities may be an important therapeutic intervention to help relieve distress among cancer survivors. It is therefore, possible for participants to experience less distress after being diagnosed with cancer. Yet this investigation demonstrates the importance of physical activities as an important intervention in the programming of a community cancer wellness centre and the relationship to distress among cancer survivors. Implications for future research include the need to further explore a broad range of physical activities, include a larger sample size, along

with other supportive activities using a more robust experimental design.

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