

THESIS

IMPROVING PHYSICAL ACTIVITY MAINTENANCE FOLLOWING AN EXERCISE  
PROGRAM FOR CANCER SURVIVORS: A PRAGMATIC HYBRID RANDOMIZED  
CONTROLLED TRIAL

Submitted by

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In partial fulfillment of the requirements

For the Degree of Master of Science

Colorado State University

Fort Collins, Colorado

Summer 2020

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## ABSTRACT

### IMPROVING PHYSICAL ACTIVITY MAINTENANCE FOLLOWING AN EXERCISE PROGRAM FOR CANCER SURVIVORS: A PRAGMATIC HYBRID RANDOMIZED CONTROLLED TRIAL

**Purpose:** Supervised exercise programs can help cancer survivors increase physical activity (PA), but maintaining PA following program completion is challenging. Randomized controlled trials have shown that adding behavior change counseling to supervised exercise can improve PA maintenance in cancer survivors, however, translating this work to real-world settings remains a challenge. This study examined (1) the feasibility and acceptability of implementing six, evidence-based PA behavior change counseling (PABCC) sessions into BfitBwell, an existing exercise program for cancer survivors, and (2) the effects of PABCC on post-program self-efficacy and outcome expectations, and on PA, 3-months following program completion. **Methods:** Cancer survivors enrolled in BfitBwell were randomized to receive (1) the current BfitBwell program, or (2) BfitBwell plus six PABCC sessions. Feasibility was assessed by participant representativeness, process fidelity, time and cost to adapt and deliver the PABCC sessions, and a focus group with BfitBwell staff. Acceptability was based on reasons for declining participation, adherence, and participant satisfaction. Barriers self-efficacy, exercise self-efficacy, outcome expectations, and PA were assessed via validated questionnaires at baseline, post-program, and 3-month follow-up (PA only). Quantitative feasibility and acceptability data were summarized using descriptive

statistics and qualitative data were analyzed using thematic content analysis. Paired sample t-tests examined within group changes in self-efficacy and outcome expectations. Change in minutes of moderate to vigorous PA (MVPA) was calculated by subtracting MVPA at post-program from 3-month follow up, and the percent of participants meeting PA guidelines was calculated. Results: Out of ( $N=33$ ) who enrolled,  $N=13$  completed the post-program assessment, and  $N=9$  completed the 3-month follow-up exercise questionnaire. Based on the staff focus group and study evaluation questionnaire, PABCC was well accepted and the idea of incorporating a behavior change component into BfitBwell was well supported by program staff. However, due to low enrollment rates (35%), reasons for declining participation such as “unable to make class time”, and the staff time associated with delivering PABCC sessions, implementation of the sessions in their current form may not be feasible. There was no significant change in self-efficacy or outcome expectation measures from baseline to post-program. Minutes of MVPA tended to decline from post-intervention to three-month follow-up in both BfitBwell + PABCC ( $-81.7 \pm 240.6$ ) and control ( $-45.0 \pm 63.7$ ), however PA response was highly variable. Additional research to explore alternative PABCC delivery strategies such as virtual delivery modalities or a condensed PABCC format in the context of existing exercise programs is needed. Further, a study with a larger sample size is needed to confirm the effectiveness of adding PABCC to BfitBwell on PA maintenance.

## ACKNOWLEDGEMENTS

There are many people deserving of the warmest thank you for contributing to my intellectual and personal growth over the past two years, these words are for them. First, thank you to my mentor, Dr. Heather Leach who has played an essential role in my graduate school experience. Thank you for challenging me to step out of my comfort zone in research, pushing me to explore new fields, and believing in my ability to succeed. You have been an incredible example of a strong woman in science, compassionate mentor, and role model. I hope to embody some of your remarkable attributes one day as I grow as a professional. Second, thank you to my committee members Dr. Laura Rogers, Dr. Christine Fruhauf, and Dr. Catherine Jankowski. I am grateful for your eagerness to provide advice and incredible guidance through conducting an intervention and focus group for the first time. Thank you to Andrea Swan, my qualitative research assistant. It was an absolute joy working with you and I am overwhelmed with gratitude by your willingness to support my research efforts. Next, thank you to the HES graduate students and PATP lab. Life is truly about the people, and I couldn't imagine a better family to have been a part of over the past two years. Thank you for the laughter, adventure, and far too many Mary's mountain cookies. Each of you inspire me and I wish you nothing but success in the bright futures ahead of you. Next, I thank craigslist, for proving some of the biggest blessings come from the most unexpected place, never would I have anticipated random roommates turning into my closest friends. Roommates- I thank you for walking through this season with me and making Fort Collins home, I am incredibly thankful for the laughter that has filled our walls over the past few years and look forward to the years of laughter that is to come. I

owe the biggest thank you to my family and friends for the constant love and support throughout my academic endeavors, and for the many memories over the past two years, including conquering a 178-mile ultramarathon as a family team. Lastly, thank you from the bottom of my heart to my research participants, I learned more from you personally than I will ever learn from you academically. Thank you for sharing your cancer journey with me and allowing me to walk with you through it. I wish nothing but health and happiness for each of you. Collectively, each of you have played a vital role in supporting me through this challenging experience and the woman I have grown into through it. Cheers, I owe this achievement to each of you.

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## 1. INTRODUCTION

It is estimated that 1.9 million new cancer cases will be diagnosed in the year 2020 [1]. Advancements in screening and treatment have contributed to improved survival rates, but many cancer survivors live with detrimental side effects from treatment [2]. There is strong evidence that suggests physical activity (PA) can attenuate the adverse effects of cancer and its treatments including cancer related fatigue, depressive symptoms, anxiety, declines in physical function, health-related quality of life, and lymphedema [3]. Furthermore, cancer survivors who engage in high levels of PA have significant reductions in cancer related mortality [4].

Supervised exercise interventions are effective for improving physical function and quality of life in cancer survivors [3, 5-7]. Extensive research has demonstrated that such interventions are also effective for increasing PA [8], but few have addressed PA following program completion [9, 10]. Habitual PA, or long-term PA maintenance is critical to achieve the positive impacts of PA on cancer-specific health outcomes [11].

### *Enhancing PA maintenance among cancer survivors*

Behavioral strategies that may be effective for promoting PA maintenance among cancer survivors include goal setting, action planning, social support, and self-monitoring of behavior [11]. These strategies are based on Social Cognitive Theory, a framework consisting of an individual's knowledge, perceived self-efficacy to control health behavior, outcome expectations associated with engaging in a behavior, short and long term goals of a behavior, and perceived facilitators and barriers to behavior change [12-14]. Social Cognitive Theory has demonstrated promise in promoting PA in

healthy adults and cancer survivors [13, 15], with self-efficacy as the primary hypothesized mediator of behavior change (i.e., self-efficacy is thought to have a direct influence on PA)[13, 16]. A systematic review and meta-analysis examined social cognitive theory-based physical activity and nutrition behavior change interventions for cancer survivors and concluded social cognitive theory based interventions are effective for improving physical activity in cancer survivors [13]. Therefore, research efforts to improve physical activity behavior change in cancer survivors should utilize the social cognitive theory in the design of study interventions.

#### *Better Exercise Adherence after Treatment for Cancer*

A previous randomized controlled trial, The Better Exercise Adherence after Treatment for Cancer (BEAT Cancer) [9, 17] tested the effects of implementing behavioral strategies such as goal setting, action planning, social support, and self-monitoring of behavior to increase, and maintain PA in a sample of breast cancer survivors. Participants in the intervention group received supervised exercise sessions, individual, and group-based PA behavior change counseling sessions (PABCC). PABCC was based on the social cognitive theory [9, 12, 14, 17], and included group discussion sessions led by a facilitator on behavior change strategies such as goal setting, self-monitoring, behavioral modification, time management, cognitive reframing, relapse prevention, and role models [9, 17]. Weekly minutes of moderate to vigorous PA was measured at baseline, 3-months, 6-months, and 12-months post intervention. Participants randomized to the BEAT Cancer intervention significantly increased weekly minutes of moderate to vigorous intensity PA, improved aerobic fitness, and physical well-being compared to those who received usual care at post intervention. More

importantly, participants from the BEAT Cancer intervention significantly *maintained* these results 3-months following intervention completion compared to those who received usual care. [18-20] [9]. Furthermore, constructs of the social cognitive theory including self-efficacy, perceived barriers, and outcome expectations were measured at baseline and 3-months. Participants who received the BEAT Cancer intervention reported greater improvement in barriers self-efficacy, the confidence to overcome a barrier, task-self efficacy, perceived barriers, and negative outcome expectations [21, 22].

#### *Maintaining PA among cancer survivors in real world settings*

BEAT Cancer provides an example of a successfully implemented randomized controlled trial to increase and maintain PA in cancer survivors. However, outside of the context of laboratory or research-based settings, there is limited evidence for how to successfully maintain PA following an exercise program conducted in real world settings (i.e., community or clinic) among cancer survivors. In the most recent review on the maintenance of physical activity behavior change in cancer survivors, none of the studies were conducted in community or clinic-based settings, highlighting the lack of research on PA maintenance in pragmatic settings [11]. Several community, and clinic-based PA programs for cancer survivors have demonstrated success in improving physical function or fitness [23-25], QOL [23, 25-27], and increasing PA [23, 25] from pre to post- program. However, of these programs few have conducted follow-up assessments on PA to examine sustained effects on PA [10, 11, 27]. Furthermore, there is limited guidance on how to implement evidence-based PA behavior change strategies as part of existing community or clinic-based exercise programs for cancer survivors.

This translation of successful PA behavior change strategies into community or clinic-based exercise programs to enhance PA maintenance among cancer survivors is a vital gap to be addressed. Utilizing strategies from the field of Dissemination and Implementation (D & I) science can aid in closing this gap. D&I science aims to enhance the translation and implementation of evidence-based findings into practice through various frameworks, such as RE-AIM (Reach, Efficacy/effectiveness, Adoption, Implementation, and Maintenance) [28-32]. RE-AIM is an evaluative model that addresses the reach and representativeness of a target population and setting, effectiveness of an intervention, intention of a settings such as community or clinic-based programs to adopt a given policy or program, the extent to which a program was delivered as intended, and the ability to maintain a sustainable change at the individual and organization level [31, 32] . This evaluative framework assists with the recognition of barriers to dissemination and implementation to aid the translation of public health research to real world settings. [30]. Thus, research addressing *both* the implementation and effectiveness of behavior change strategies on PA maintenance in “real world settings” is needed. The simultaneous study of implementation and effectiveness in real world settings can help answer the questions “would it work?” and “did it work?” This information will contribute to the goal of translating evidence-based PA behavior change strategies into practice, which can help determine whether including behavior change strategies is feasible, and effective for helping cancer survivors maintain PA after a community or clinic-based exercise program ends.

### *Study Purpose*

The aims of this study were to:

- 1) Examine the feasibility and acceptability of adding six, evidence based PABCC sessions to a clinically implemented exercise program for cancer survivors
- 2) Examine changes in barriers self-efficacy, exercise self-efficacy and outcome expectations from pre- to post-exercise program, among participants who did vs. did not receive PABCC sessions.
- 3) Examine changes in PA from immediately post, to 3-months following the completion of the exercise program, among participants who did vs. did not receive PABCC sessions.

We hypothesized that:

- 1) PABCC sessions will be a feasible and acceptable addition to a clinically implemented exercise program for cancer survivors.
- 2) Participants who receive PABCC sessions will report greater improvement in barriers self-efficacy, exercise self-efficacy, and outcome expectancy post exercise program.
- 3) Participants who receive PABCC sessions will report a smaller decline in minutes of moderate to vigorous intensity PA, from post-program to 3-month follow up, compared to participants who do not receive PABCC.

## 2. METHODS

### **2.1 SETTING AND PARTICIPANTS**

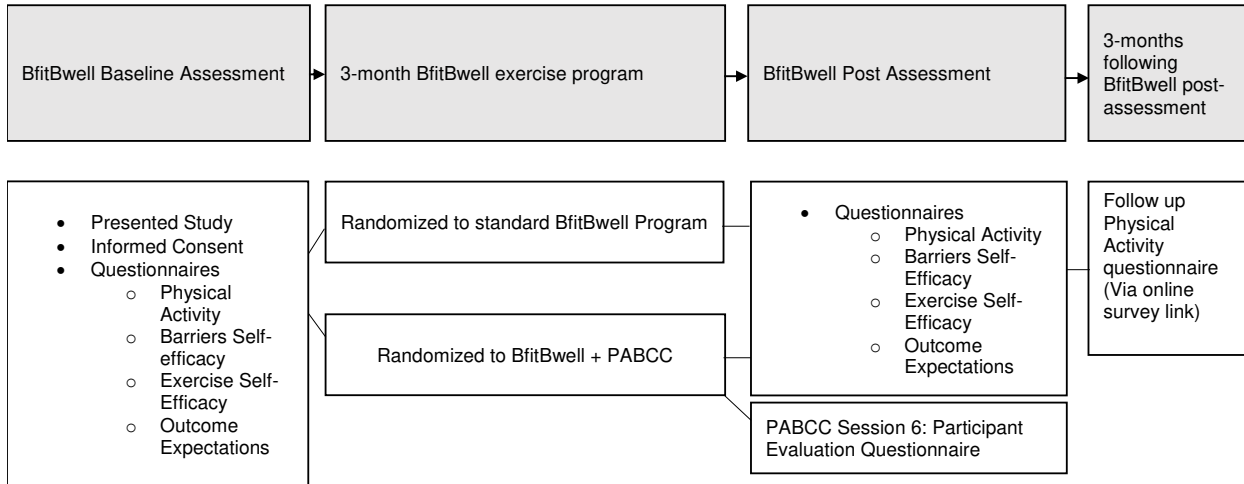
This study was conducted at the University of Colorado Anschutz Medical Campus Health and Wellness Center. Participants were cancer survivors enrolled in the BfitBwell cancer exercise program and BfitBwell program staff. BfitBwell is a 3 month supervised clinical exercise program affiliated with the University of Colorado Cancer Center, and has been in operation for 6 years [23],[33]. This program has demonstrated success for improving physical fitness, fatigue, and depression in a diverse group of cancer survivors [23]. Inclusion criteria for the BfitBwell program includes 1) current patient at the University of Colorado Cancer Center, 2) signed physician clearance to participate in a supervised exercise program, and 3) patient is actively receiving medical cancer treatment (chemotherapy, radiation or surgery) OR within 6 months of receiving medical cancer treatment. Participants were recruited from July 2019 to February 2020. Additional inclusion criteria for participants in this study was a willingness to enroll in the BfitBwell data registry, be randomized to receive six PABCC sessions as part of the BfitBwell program (BfitBwell + PABCC) and commit to attend five out of six of these sessions.

BfitBwell staff includes a program manager, program coordinator, data manager, and exercise specialist. All BfitBwell staff members have a credentialed exercise training certification and B.S. in exercise science or kinesiology.

### **2.2 STUDY PROCEDURES**

#### *2.2.1 Study Design*

This study was a prospective, two arm, randomized controlled trial to examine the implementation and effectiveness of including six PABCC sessions in the BfitBwell Program. The study schema is shown in Figure 1, and an outline of assessments is displayed in Table 1.



**Figure 1. Study Schema**



**Table 1.** Schedule of Assessments

	Type	BfitBwell Baseline Assessment	PABCC Session 6	BfitBwell Post Assessment	Follow up (3-month)
<b>Informed Consent</b>	Written	X			
<b>Physical Activity</b>	Questionnaire	X		X	X
<b>Barriers Self-Efficacy</b>	Questionnaire	X		X	
<b>Exercise Self-Efficacy</b>	Questionnaire	X		X	
<b>Outcome Expectations</b>	Questionnaire	X		X	
<b>Participant Evaluation<sup>a</sup></b>	Questionnaire		X		

PABCC=physical activity behavior change counselling <sup>a</sup>Only participants who are randomized to receive BfitBwell + PABCC

### *2.2.2 Informed consent*

Upon enrollment in the BfitBwell program, cancer survivors were presented information on PABCC and an informed consent for the “Improving Physical Activity Maintenance following an Exercise Program for Cancer Survivors” study. If interested, participants signed the informed consent and additional study questionnaires were added to their standard BfitBwell baseline assessment.

BfitBwell staff were asked if they were willing to participate in an audio-recorded focus group to better understand the feasibility of implementing PABCC as part of the standard BfitBwell program. If interested, BfitBwell staff were presented with an informed consent.

### *2.2.3 Allocation*

The BfitBwell program enrolls cancer survivors on a monthly basis. Every month, BfitBwell provided the study coordinator with a list of individuals who consented to the study for the following month. The study coordinator randomized participants 1:1, in monthly cohorts to receive the standard BfitBwell exercise program (control) or BfitBwell + PABCC (intervention) using a computer generated randomization sequence [34].

#### *2.2.4 BfitBwell Exercise Program (Control)*

The BfitBwell cancer exercise program is delivered at the University of Colorado Anschutz Medical Campus Health and Wellness Center. The BfitBwell program consists of a baseline assessment on functional ability, cardiorespiratory fitness, and muscular strength. Following the baseline assessment, participants receive two exercise sessions per week for 12 weeks led by a Cancer Exercise Specialist or undergraduate intern pursuing a degree in Exercise Science, Kinesiology or Exercise Physiology. Exercise sessions target flexibility, strength, aerobic fitness, and last approximately 50 minutes. Exercise sessions are tailored to each individual's functional ability and modified according to their acute disease or treatment related symptoms. Participants also receive access to the Anschutz Health and Wellness center's fitness facility during off peak hours while enrolled in the program [23]. Exercise sessions are individually supervised during the first month of the BfitBwell program, then during the second two months, participants complete their own individualized workout in the presence of one or two other participants and the exercise specialist. Following completion of the program, participants repeat the assessments conducted at baseline. In addition, BfitBwell offers an optional classroom session where participants learn about how to

design their own exercise session. Classroom sessions are offered once per month and are open to anyone who is currently enrolled or has completed the BfitBwell program.

### *2.2.5 BfitBwell + PA behavior change counseling sessions (Intervention)*

Participants randomized to BfitBwell + PABCC received the same exercise program as participants in the control group. In addition, they received six, 1-1.5-hour PABCCs sessions facilitated by the study coordinator, a graduate research assistant, who was an ACSM Certified Exercise Physiologist, and trained on the study protocol. PABCC sessions were adapted from BEAT Cancer with the permission of the principal investigator [9, 17]. The BEAT Cancer group workbook and intervention presentation slides were altered to reflect the structure and language of the BfitBwell program. Any reference to the BEAT cancer intervention was replaced with BfitBwell content and logos. Breast cancer verbiage was shifted to address all cancer types, and any references to the BEAT cancer staff or intervention were removed.

PABCC sessions were held once per week, every other week at the Anschutz Health and Wellness center. Participants attended the sessions individually or in pairs based on the number of survivors randomized each month and schedule availability. PABCC topics targeted self-efficacy for exercise, barriers to exercise, goal setting, behavior modification strategies, time management, cognitive reframing, and relapse prevention. An outline of session number and content is provided in Table 2. Participants received a group education workbook for note taking and self-reflective journalism throughout the PABCC sessions. During these sessions, information was shared from presentation slides and the group education workbook. The study coordinator presented information from the slides, facilitated discussion on slide topics,

and encouraged participants to answer journaling prompts in the group education workbook throughout the session. Concluding every session, Participants were asked to complete a blueprint of goals that addressed the “what, why, and how” component of goal setting. Five of the six sessions (Sessions 1, 2, 3, 5, 6) followed this format. One session (Session 4) was a role model session where a previous BfitBwell participant was selected by program staff and attended the PABCC session to share their experience with cancer, PA, and the BfitBwell program to survivors in the intervention.

**Table 2.** Physical Activity Behavior Change Counselling (PABCC) session content, and social cognitive theory constructs

	Session Content	Social cognitive theory construct target [17]
Session 1	Program purpose, value of exercise for cancer survivors, blueprint for success, journaling, activity log overview, goal setting	Outcome expectations, barrier self-efficacy, goal setting
Session 2	Self-care and self-knowledge, time management, stress management, journaling, blueprint goal setting	Perceived barriers, barrier self-efficacy, goal setting
Session 3	Stages of change, barriers to changing exercise behavior, solutions to common barriers, issues specific to cancer survivors, healthy boundaries, blueprint goal setting	Barrier self-efficacy, perceived barriers, outcome expectations, social support, goal setting
Session 4	Role Model session: role model discussed experience with exercise, cancer, and the BfitBwell program while motivating cancer participants in the study to maintain their exercise routine	Observational learning, social support, barrier self-efficacy
Session 5	Behavioral elements, the mind-body connection, journaling, goal setting, blueprint goal setting	Barrier self-efficacy, outcome expectations, perceived barriers, goal setting
Session 6	Review important learning from past sessions, progress reflection, closure and farewells, journaling, goal setting	Goal setting, exercise self-efficacy

## **2.3 MEASURES**

### *2.3.1 Aim 1: Feasibility and Acceptability of implementing PABCC in BfitBwell*

Feasibility and acceptability outcomes were based on the RE-AIM framework [31, 35, 36] and summarized in Table 3.

Briefly, feasibility was measured by 1) comparing participant characteristics to those in the BfitBwell database, 2) study coordinator time spent preparing and delivering PABCC, 3) cost of PABCC session materials, 4) time to conduct train BfitBwell staff to administer informed consent, 5) process fidelity (see appendix H), (described below). Acceptability was measured by 1) a study evaluation questionnaire 2) intervention adherence, and 3) reasons for declining study. The study evaluation questionnaire was completed by participants during their final PABCC session and addressed items such as session content, facilitator effectiveness, time burden, and delivery modality. Questions were a combination of open-ended responses, and 7-item Likert scale items ranging from “Definitely No” to “Definitely Yes”. The study evaluation questionnaire is shown in Appendix D. Adherence was measured by participant attendance at PABCC sessions, and upon being presented the study at the BfitBwell baseline assessment, participants provided a reason for declining for participate

Feasibility and acceptability were also assessed based on perceptions of the BfitBwell program staff members via focus group. BfitBwell staff participated in an audio-recorded focus group conducted by the study coordinator and a research assistant during the final month of the study. The study coordinator followed a script addressing the feasibility and acceptability of implementing PABCC as part of the standard BfitBwell program. 8 questions with additional probing questions addressed

the BfitBwell staff's professional opinion towards implementing PABCC as part of BfitBwell, intent to continue PABCC, and barriers to implementation, see appendix E for focus group questions.

**Table 3.** Feasibility and acceptability of implementing six physical activity behavior change counseling (PABCC) sessions in BfitBwell

	Who	What	Specific Measure or Question	How	Mapped onto RE-AIM
Feasibility	Participants	Representativeness	Participant characteristics compared to BfitBwell database	BfitBwell database - Sex/age/diagnosis/BMI/current treatment status	Reach
Feasibility	Study Staff	Intervention preparation and delivery	Adaptation of intervention from BEAT cancer, PABCC materials, Study coordinator time, BfitBwell staff time	Spreadsheet Tracking - Hours adapting intervention from BEAT Cancer - Hours delivering intervention - Hours managing study logistics - Cost to print workbooks - Hours training BfitBwell staff/time on informed consent delivery	Implementation
Feasibility	Study Staff	Process Fidelity	Was the program delivered as intended	Fidelity Questionnaire completed by study coordinator after cohort intervention completion (appendix H)	Implementation
Feasibility/ Acceptability	BfitBwell Staff	Adaptation of current intervention moving forward in BfitBwell, appropriateness of perceived fit with BfitBwell, intent to continue	Session content, deliver modality, staff training/time, barriers to implementation	Focus Group (appendix E)	Adoption & Maintenance
Acceptability	Participants	Participant viewpoint on delivery, facilitator, content, and effectiveness	Cost and Time/Session content/ Delivery modality, Perceived effectiveness	Study Evaluation Questionnaire (appendix D)	Effectiveness
Acceptability	Participants	Number of sessions missed and reschedule requests	Intervention adherence, ability to deliver intended intervention to this population	Spreadsheet tracking - Attendance Rescheduled sessions	Implementation
Acceptability	Participants	Number who enrolled in study out of number offered	Factors influencing study participation	BfitBwell database - Reason for declining study	Reach



### *2.3.2 Aim 2: Self-efficacy and outcome expectations*

To measure changes in barrier self-efficacy, exercise self-efficacy, and outcome expectations, participants completed validated questionnaires during the BfitBwell baseline and post assessments. Measures were selected to mirror those used in BEAT Cancer, with the addition of one exercise-self efficacy questionnaire [9, 17, 37].

Self-efficacy refers to the perceived control an individual has over their physical activity and has both a direct and indirect effect on behavior via outcome expectations and perceived barriers [9, 12]. For the purpose of this study, exercise self-efficacy, or the confidence to complete consistent exercise, was measured via an 8-item confidence interval questionnaire assessing confidence in exercising three times per week without quitting at various time points (see Appendix B). For example, “I am able to continue to exercise three times per week at moderate intensity, for 40+ minutes without quitting for the NEXT WEEK”. The exercise self-efficacy questionnaire is scored in 10% increments from 0% (not at all confident) to 100% (highly confident). An overall exercise self-efficacy score (range 0-100) was calculated by summing all questionnaire items and dividing by 8.

Barriers self-efficacy, defined as confidence to overcome barriers to behavior change [16], was measured via a 9-item questionnaire assessing confidence in exercising when faced with varying circumstances (See Appendix A). For example, rate how confident you are that you could exercise “when I lack the discipline to exercise”. The Barriers self-efficacy questionnaire is scored in 10% increments from 0% (not at all confident) to 100% (extremely confident). An overall barriers self-efficacy score (range 0-100) was calculated by summing all questionnaire items and dividing by 9.

Outcome expectations addresses the expected cost and benefit of health behaviors and has demonstrated associations with PA among several populations [12, 17]. For the purpose of this study, outcome expectations were assessed by asking participants to list their level of agreement on a five-point scale, ranging from 0 (strongly disagree) to 5 (strongly agree) on 17 items which may or may not change with exercise during cancer treatment such as “I will improve my self-esteem and feel better about myself if I exercise”, see appendix C. 14 items addressing positive outcome expectations (e.g., “I will feel less depressed if I exercise”) were scored separately from 3 items addressing negative outcome expectations (e.g., “I will hurt myself if I exercise),. Positive and negative outcome expectations items were summed and divided by for the total number of questions answered.

### *2.3.3 Aim 3: Physical Activity*

PA was self-reported using an adapted version of the Godin Leisure time physical activity questionnaire [9, 17]. This questionnaire was administered in person by BfitBwell staff to participants on an electronic device at the BfitBwell baseline assessment, post assessment, and emailed via an online survey at the 3-month follow up. The Godin Leisure time physical activity questionnaire is a widely used self-report measure of PA that has been shown to be valid and reliable [19, 20, 38-40]. The 8-item questionnaire asked about the frequency (days per week) and duration (minutes per session) of mild, moderate and strenuous aerobic exercise, and resistance exercise in a typical week over the past month (see Appendix G).

## **2.4 ANALYSIS**

### *2.4.1 Aim 1: Feasibility and Acceptability of implementing PABCC in BfitBwell*

Quantitative data were collected from the study evaluation questionnaire and BfitBwell database. Descriptive summary statistics are reported via means and standard deviations. Ordinal variables from the study evaluation questionnaire are reported via percentage of participants who answered, “possibly yes”, “likely yes”, or “definitely yes”. Independent T-tests compared characteristics between participants who consented to the study and BfitBwell participants who had enrolled from September 2016 to April 2020.

Qualitative data collected from the focus group with BfitBwell staff was transcribed verbatim by the study coordinator. The transcript was reviewed by the study coordinator and a research assistant pursuing a master’s degree in public health to re-familiarize each party with the information. The transcript content was coded openly and independently by both parties prior to being compared. Discrepancies, defined as sections of text coded inconsistently between parties, were settled via discussion between researchers. Five coding discrepancies occurred, consensus was reached on all discrepancies after discussion between coders, and no third-party examination was required. Codes were then categorized by similarities and organized into overarching themes and subthemes depicting important responses or meaning from the data. Quotations were extracted and synthesized to corresponding to themes and subthemes to bring out the main ideas that emerged from the focus group.

Last, open-ended responses from the study evaluation questionnaire were transcribed and thematically coded following the same content analysis as the BfitBwell program staff focus group. The open responses were reviewed independently by the

research coordinator and research assistant. Responses were coded openly and independently by each party and then reviewed for discrepancies in coding. No discrepancies occurred. Codes were then categorized into themes and subthemes based on similarities and quotes corresponding to themes and subthemes were extracted to represent the data. Quotes representative of the themes that emerged from the focus group and study evaluation questionnaire are presented in the results and participants are cited via randomly assigned numbers.

#### *2.4.2 Aim 2: Changes in self-efficacy and outcome expectations*

Means and standard deviations were calculated to describe baseline and post-program values for barriers self-efficacy, exercise self-efficacy, and outcome expectations. Paired sample t-tests were used to examine change in these outcomes from baseline to post-program within the BfitBwell + PABCC and control group.

#### *2.4.3 Aim 3: Physical Activity*

The primary outcome, weekly minutes of moderate to vigorous PA (MVPA) were calculated based on duration of activity multiplied by frequency in each of the activity levels, vigorous minutes were multiplied by two before adding to moderate minutes for total MVPA.

$$\text{Total MVPA} = [\text{Minutes of moderate PA} \times \text{Days of moderate PA}] + ((\text{Minutes of vigorous PA} \times 2) \times \text{Days of vigorous PA})$$

Weekly minutes of MVPA at baseline, post-program, and three month follow up are presented via means and standard deviation. Average change in weekly minutes of MVPA was calculated by subtracting weekly minutes of MVPA at post-program from 3-month follow up. Secondary outcomes include the percent of participants meeting

aerobic physical activity guidelines and strength physical activity guidelines, defined as achieving  $\geq 150$  minutes/week of MVPA and  $\geq 2$  days of resistance training. Participants were categorized as meeting MVPA guidelines, strength guidelines, and meeting both guidelines. Percent meeting guidelines are reported at baseline, post-program, and 3-month follow up, separately for the BfitBwell + PABCC and control group. Sample size was estimated based on results from BEAT cancer [9]. Based on a conjectured difference between means of 74 minutes of PA with a standard deviation of 95, a sample size of  $n=30$  per group was needed to achieve 84% power. Since we did not achieve the necessary sample size, hypothesis testing was not conducted for between group differences in PA. Data were analyzed using the Statistical Package for the Social Sciences, version 26.

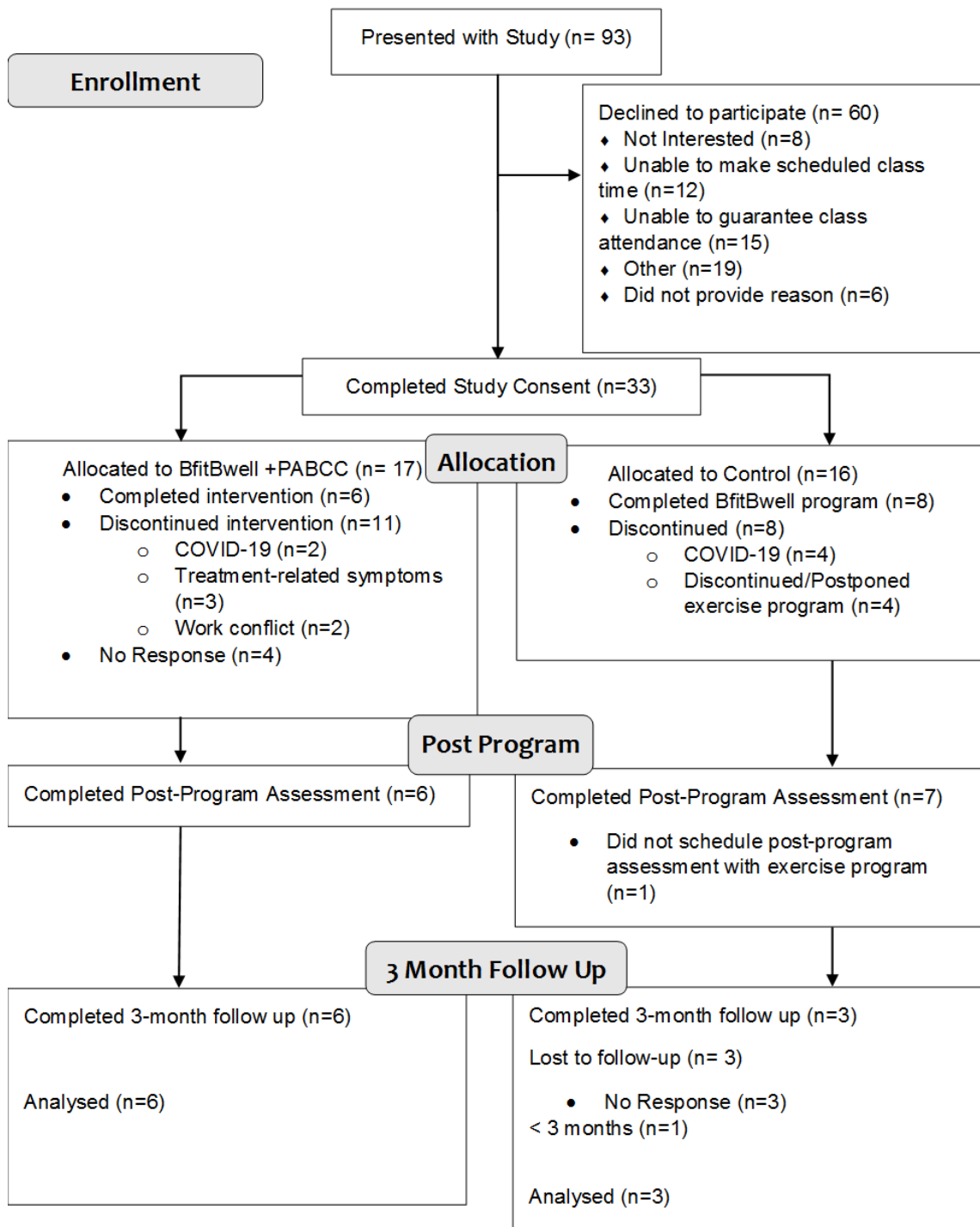
### 3. RESULTS

A total of n=33 participants were recruited from July 2019 to February 2020. Flow of participants through the study is provided in Figure 2. Participants were enrolled in cohorts, starting at the beginning of each month. There was a total of 7 cohorts with sample sizes ranging from 1-2 participants.

#### **3.1 AIM 1: FEASIBILITY AND ACCEPTABILITY OF IMPLEMENTING PABCC IN BFITBWELL**

Of the 93 BfitBwell participants who were presented the study, 33 consented to the study (35.5%). Of the 60 who did not consent to enroll in the study, 54 provided reasons, with the most common being “unable to guarantee class time” and “other” (See Figure 2). There were no differences in sex, age, race, cancer diagnosis, treatment status, or BMI between those who consented to the study, and cancer survivors in the BfitBwell database (Table 4).

Of the participants that completed the BfitBwell+ PABCC intervention (n=6), there was an 89% adherence rate, with average attendance of  $5.33 \pm 0.52$  out of the six PABCC sessions offered. Four out of 24 PABCC sessions were rescheduled and one was canceled after efforts to reschedule were attempted. Reasons for rescheduling sessions included weather, no-show, work conflict, and cancer-treatment related symptoms. The single cancelled session was not made up due to conflict between the cancer survivor and study coordinator’s schedules.



**Figure 2:** Flow of Participants through the study

**Table 4.** Comparison of Participant Characteristics between study participants and participants in the BfitBwell database

	<b>Study Participants N=33</b>	<b>BfitBwell Registry N=524*</b>
	<i>N (%)</i>	
<b>Sex</b>		
Female	21 (63.6%)	308 (63.6%)
Male	12 (36.4%)	176 (36.4%)
<b>Race</b>		
Asian	1 (3.1%)	19 (4.3%)
Black/African American	1 (3.1%)	21 (4.7%)
White	30 (93.8%)	373 (84.2%)
<b>Cancer Diagnosis</b>		
Breast	11 (39.3%)	141 (30.6%)
Blood/Heme	5 (17.9%)	38 (8.2%)
Ovarian	2 (7.1%)	15 (3.3%)
Prostate	2 (7.1%)	37 (8%)
Other	8 (28.6%)	230 (49.9%)
<b>On Treatment</b>		
Yes	21 (63.6%)	316 (64.2%)
No	12 (36.4%)	175 (35.6%)
	<i>Mean ± SD</i>	
<b>Age (years)</b>	54.3 ± 12.37	55.62± .64
<b>Body Mass Index (kg/m<sup>2</sup>)</b>	28.19±7.15	26.93 ±6.2

\*n's don't add up to 534 for all measures due to missing data

In terms of time and costs, this included time spent adapting BEAT cancer materials (12 hours), training BfitBwell staff on informed consent procedures (2 hours), preparing for PABCC (e.g., email correspondence with participants, randomization, and preparing for sessions; 52 hours), and delivering PABCC to participants (39 hours). Monetary costs included study workbooks which served to provide guidelines through discussion and written activities (15 books @ \$21.75 per book = \$326.25).



Of the 26 applicable fidelity measures (appendix H), all items were marked as “some of the time” or “most of the time” by the study coordinator following the completion of each intervention cohort.

All participants who completed the BfitBwell+PABCC intervention also completed the study evaluation questionnaire. Responses to the Likert scale-based questions of the study evaluation questionnaire are described in table 5.

**Table 5.** Study Evaluation Questionnaire Quantitative Results (N=6)

<b>ITEM</b>	<b>Answered probably yes, yes, or definitely yes N (%)</b>
Did you enjoy Behavior Change counseling?	6 (100%)
Was attending the behavior change counseling sessions an added time burden to you?	5 (83.3%)
Do you think attending behavior change counseling sessions improved your ability to continue exercising after the end of the BfitBwell program?	5 (83.3%)
Did the facilitator and group environment of the behavior change counseling sessions provide you with a sense of community and support that you found beneficial?	6 (100%)
Did the facilitator effectively deliver information and generate open discussion?	6 (100%)
After completing discussion sessions, do you feel confident that you have the knowledge and skills to exercise safely and effectively without professional guidance in another setting (e.g., home, fitness center, etc.)?	6 (100%)

The Study evaluation questionnaire also included 6 open ended responses for participants to provide feedback on their experience with PABCC (see appendix D). Thematic content analysis revealed three themes and six subthemes regarding participant's experience with PABCC.

*Theme 1: Beneficial attributes of PABCC*

Based on responses to questions asking (1) what components of PABCC were beneficial, (2) the highlights of participating, and (3) any additional feedback, participants responded that social interaction, barrier identification, role models, and behavioral strategies addressing benefits of long term PA were benefits of participating in PABCC sessions.

“Loved the social interaction with the other participant and group leader (2)”.

“I really liked hearing from [role model]. Testimonials from old participants is inspiring (4)”.

“I thought the sessions were very helpful and reinforced the importance of lifelong exercise...and its benefits on overall happiness (2)”.

“Barriers- identifying and talk about possible solutions. Positive aspects- why exercise is good and helps me feel better (3)”.

“Informal discussion with facilitator and other participant, inspiring visit from [role model], the Bfit alum (5)”.

One participant who went through the intervention individually highlighted the benefit of social interaction through expressing their desire for more interaction with other cancer survivors

“I would have liked a group (6)”.

### *Theme 2: Positive PABCC Facilitator feedback*

When asked to provide additional feedback for the facilitator, cancer survivor’s provided positive responses regarding their experience

“You’re [facilitator] really good at bringing people back to topic in a nice and patient way (1)”.

“Excellent interpersonal skills (2)”.

“I like all the interaction (3)”.

### *Theme 3: PABCC suggestions*

Based on responses to questions asking (1) if they could change one aspect of PABCC to better suit their needs, (2) if any content should be covered in less detail, and (3) for additional feedback, survivors reported PABCC felt redundant at times

“There was a lot of redundancy that made some of the sessions less appealing to me (4)”.

“There were some aspects that seemed formulaic like questions/responses (2)”.

Participants also suggested offering a remote PABCC delivery modality to ameliorate the scheduling and location barrier.

“Be closer to my home HA! (1)”.

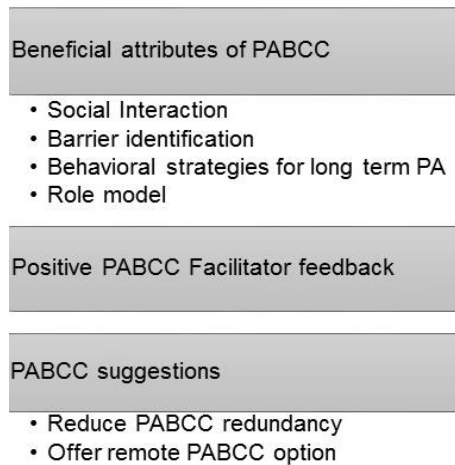
“Have some of the sessions via Skype or Zoom to avoid having to drive to Anschutz (5)”.

“Schedule it so that it could be done remotely so it wouldn’t complicate my schedule (3)”.

A summary of evaluation questionnaire themes and subthemes is provided in table 6. A few other items from the open-ended questionnaires that did not fit a theme or subtheme due to infrequent responses but provided unique feedback included:

“Change the assumption that all participants have a cancer diagnosis that will be ‘cured’ (4).

“It would be great to have follow-up so that we keep exercise top of mind and in our lives regularly. The program makes you hopeful! (3)”.



**Figure 3.** Summary of study evaluation questionnaire themes and subthemes

The focus group with four BfitBwell staff members revealed four themes and thirteen subthemes regarding their perceptions of the feasibility and acceptability of implementing PABCC in the BfitBwell program.

*Theme 1: Positive Cancer survivor feedback on PABCC*

When asked to provide general feedback towards the implementation of PABCC via the study, staff described the positive feedback they’ve received from participants when the study was presented during the BfitBwell baseline assessment, and during exercise training sessions.

“Everyone loves it and when I present it to them in the assessment with the consent, everyone’s like it’s a need and they’re very excited about it (F2).”

“In fact they [participants] almost don’t want to be randomized to the [control] group (F1)”.

“From everyone I heard who was in it, it was positive and they got a lot out of it...I still see some of the people that [at] least I know were in your classes still working out (M2)”.

“I’ve heard nothing but good things about people attending (F2)”.

The value participants placed on PABCC due to content and social interaction was evident to staff via observation

“We’ve even had some individuals who maybe aren’t feeling well due to their treatment that will cancel their exercise session but yet will still come here the same day for your group (F1)”.

When discussing staff perspective on PABCC, they were supportive of the benefit PABCC would have on both the program and participants. There was agreement among all of program staff regarding an eagerness to implement a behavioral component to the BfitBwell exercise program.

“We’d love to have it [PABCC]. There’s no doubt about that (M1)”

“I mean selfishly I wish this were a standard of care for us already (F1)”.

The benefit of PABCC for participants was mentioned in regard to both exercise and social interaction

“it connects them to something other than just their exercise routine...The social community component that came out of it I think they looked forward to equally as much as the content that they were learning... (F1)”.

Staff speculated the addition of PABCC may even improve exercise program participation

“I do think if people were to start taking classes, I think we would see better adherence to the program. I think there would be a huge benefit just because I think they could start writing down benefits they are going to be seeing and start paying attention to it more (M1)”.

Staff members added that outside of the study they have been brainstorming and implementing small additions to promote independent exercise including their classroom session and follow up with participants on their post-program plans. At the end of the focus group, staff members were provided time to share any remaining thoughts towards PABCC

“I think if we had the resources, we would do this no matter what the data says. We would start right now (M1)”, “yeah absolutely” –unanimous agreement.

Staff mentioned the addition of PABCC to the BfitBwell program would align well with the current mission and direction of the Anschutz Health and Wellness Center.

“The whole push for the center as a whole, is to incorporate into every program components of physical activity, mindfulness and nutrition. So it kind of aligns with where the center is going (F1)”.

Another added the similarity to an existing program housed in the center regarding alignment with the center and potential resource utilization

“It’s... a lot like state of slim, just in a different [population], working with cancer patients instead of weight loss...they have a behavior change component (F2)”.

Ultimately, staff emphasized that PABCC would be a beneficial addition at the survivor, program, and organizational level.

*Theme 2: Barriers to implementing PABCC in the BfitBwell program*

When asked about barriers to implementing PABCC in the BfitBwell program, there was distinct agreement that “staffing” was the largest barrier due to lack of time and flexibility. When asked if PABCC could be implemented as a standard part of BfitBwell, two participants described

“I think the short answer is Yes (M1), long answer is how we allocate time (M2)”.

Another participant described the lack of flexibility the staff would have compared to an external facilitator

“yeah like if you [study coordinator] could come down and always teach it, it would be great because you have the flexibility, but that flexibility piece would totally go away if we were doing [it]... we are flexible with their workouts and... we run out of time there (F2)”.

A probing question asked if program interns would be a suitable alternative to delivering PABCC, the staff responded with skepticism towards an exercise intern’s ability to deliver such content due to their lack of expertise and experience working with



cancer survivors; the statement “I don’t know that an intern could do it (M2)” was supported by multiple staff members.

“The biggest factor with [interns delivering PABCC] is that so many of them are coming in with absolutely no knowledge of cancer, and that’s ok. But to then have someone like really green like that administer a class on ya know time management, and barriers to exercise, and then answering all of the cancer specific [questions]. I think that would be a big undertaking for a green individual in the industry (F1)”.

It was implied that the four staff members would be the optimal personnel to deliver PABCC, however a member shared skepticism towards their ability to do so

“I think it would have to be...one of the four of us...I don’t know how we could make it work (F2)”.

When asked about cost as a barrier, staff shared implementation materials would be a “minimal minimal obstacle (M1)” and “very feasible (F1)”. The cost associated with hiring a new staff to deliver PABCC however was discussed and perceived as a potential barrier. The staff were uncertain of the cost or feasibility of hiring a new staff member for PABCC delivery

“and the cost of if we had to hire a staff... then we couldn’t afford that (F2)”.

Staff concluded they don’t feel this would be an entry level position and more research would need to be done on what the number of hours and wage to hire someone would entail. One staff member suggested a hypothetical situation

“20ish hours, so like 400 dollars at 20 dollars an hour. I mean it’s something we couldn’t just be like yeah, but it’s doable-ish (M1)”.

Another staff member mentioned uncertainty of the feasibility to hiring a new staff member due to unknown participation in PABCC

“also how many patients would be going, if they are getting one or two, is it worth it for us to pay that person that rate if only 1 or 2 patients are going verses every group of 20 wants to attend (F2)”.

Staff members were asked what factors would motivate the University of Colorado Cancer Center to distribute additional resources to PABCC, staff concluded “money (M2/F2)”, “research (F1)” and provider support (discussed in theme 4) were the biggest influencing factors. Staff shared that the further away from the patient the more decisions are centered on money and research.

“I mean it is [program champion’s] biggest push for us is to focus on the research rather than the number of patients that pass through, so I know that long term they care about the data we are collecting and that it’s quality data (F1)”

There was overlap between theme 2 (Barriers to implementing PABCC in BfitBwell) and theme 4 (Collaboration between Health Professionals) regarding provider’s lack of support towards exercise treatment as a potential barrier, provider support is discussed further under theme 4.

Last, staff suggested that another barrier to PABCC implementation is cancer survivor accessibility due to fluctuating treatment and work schedules, which they cited as barriers the BfitBwell program already face.

“In fact that’s been...the biggest barrier to someone not joining [the study] is the conflict of the dates or times when the sessions are offered (F1)”.

“I think again it’s like the timing, cause some people are like I can only come at 8 because I work I can only come at 3 because I work, I can only come at lunch cause of this (M2)”.

Staff highlighted the need to offer alternative delivery options (discussed in Theme 3) to accommodate cancer survivors and enhance accessibility.

### *Theme 3: Alternative PABCC implementation suggestions*

Staff members were asked if it would be possible to continue delivering PABCC as part of the program and/or what factors would make it possible. All staff agreed that it would be possible “I think we could (M2)”, however changes would need to be made to the PABCC delivery structure for implementation feasibility. Staff members were eager to brainstorm alternative PABCC implementation solutions and suggestions.

Staff brainstormed a plethora of alternative delivery modalities to overcome the barriers associated with staffing and cancer survivor accessibility. A few ideas they shared to increase implementation feasibility using existing staff were to condense and combine PABCC with the existing BfitBwell classroom session, add it as an additional

classroom session, to offer sessions at multiple times throughout the BfitBwell program, and to allow participants who have completed BfitBwell to still attend PABCC sessions.

“Like a version 2.0 of our classroom session...maybe it’s a 3-part series and they come to a, b, and c (F1)”.

“We could even do it like as a weekly you always rotate through but it’s a weekly class so if someone can’t make session 2 (M2)” ... “well then you can come in 3 weeks when it’s offered again (F1)”.

“We’ve had some just come to our classroom session that have graduated and I think maybe for them, their mindset is in a different place and they’re more likely to sit down and be like I no longer have trainers, I need to figure this out...I think for some it’s ok they come after they’re done versus when they’re enrolled in the [program] (F1)”.

Another delivery modality that was discussed was creating a PABCC video platform to provide participants the opportunity to complete at home

“if we’re not offering it at multiple various times throughout the week and day you know for some it’s like they can never come on Tuesdays that’s their chemo day, others they work they can only come at 3pm so we would have to... and maybe we can think of um sort of a virtual platform for them (F1)”.

Staff suggested either live recording PABCC to maintain cancer survivor interaction or pre-filming six PABCC sessions and providing a link to pre-recorded sessions

“Like you’re recording a lecture or a live, yeah (F2)”.

“Here’s a link to a YouTube and keep it private with that same link (M2)”.

While staff concluded exercise program interns would not be a feasible alternative to delivering PABCC, they considered the option of hiring an intern from a different field such as psychology or public health as a more suitable fit for delivering PABCC

“the idea of an intern that saves us a lot of costs like we’ve had interns that come to us that are...psychology majors...that could be something we like broaden our intern take from...we’ve turned them away mostly because they don’t fit any of our criteria but if that was their project, their whole internship is like developing this, working on this class, offering it more (F2)”.

“Or like a mph student...might take this on for like a master’s program (M1)”.

A benefit of hiring a public health or psychology intern was the ability to schedule PABCC based on BfitBwell’s intern hiring schedule

“Then it would help establish the [PABCC] schedule knowing that we only take interns like spring, summer, fall, semester and we could set up our six weeks (F1)”.

Staff mentioned that a public health student group on campus previously reached out to contribute to BfitBwell, while they did not have work for them at the time, implementing PABCC may be a potential future project.

Finally, staff agreed that adding a fee for service component to PABCC would potentially increase attendance and offset costs associated with hiring new staff or supporting current staff.

“The only other thing that I would be interested in doing like a fee for service even if was nominal. Like if we roll it into their membership costs so it doesn’t feel like they are paying for something extra, but just a way for us to pull a little bit of revenue so that we could support an additional staff person (F1)”.

“That [fee for service] would get solid members too, if they pay they are more likely to come to this. We are not wasting the hour and only one person shows up (F2)”.

One staff member mentioned the benefit of adding a fee for service component to PABCC and suggested a potential cost

“we are adding a ton more value, when you look at the content of something like this [PABCC]. I think we all struggle sometimes with being so giving and we know that cost is a huge barrier for many patients just in general with medication and treatment, etc. So we don’t want that to prohibit somebody from joining, but we have found those that actually sign up and pay for a membership here... are more likely to come... There is just a perceived value, so that would be something that I would be really interested [in] incorporating. Even it were ten dollars extra a month... that ten extra dollars can be fueled toward development of a person’s time, data entry, etc (F1)”.

#### *Theme 4: Collaboration between health-care professionals*

While reviewing what would motivate the University of Colorado Cancer Center to distribute additional resources towards PABCC as part of the BfitBwell program, the lack of perceived value provider's exhibit towards exercise treatment became an item of discussion. It became evident that there is a lack of collaboration between health-care professionals both amongst each other and with cancer survivors. The staff implied that the lack of support from providers towards exercise as cancer treatment may influence their perspective towards PABCC implementation. Staff highlighted the lack of provider support

“But from our experience, do providers all believe this? No. Like the referees need to get on board (F1)”.

“I don't feel like everyone is even sold on the fact that cancer patients have to exercise long term, or anything like that, so it's like a two part, yes exercise improves quality of life for your cancer patients, and this is why they need to continue long term (F2)”.

Staff also shared that exercise treatment is not at the forefront of provider's minds due to their trained duties

“And they are like clinically trained, like as an oncologist, look at the pathology how do we treat that cancer, so it's like very linear for them I'm sure to just go through and be like, 'you have esophageal cancer, this is the preferred regimen that you are

going to be on, plug them in.’ So the thought of these holistic or alternative add-ons isn’t always a forefront thought for a lot of them I think (F1)”.

Staff members shared that the mid-level clinical providers or those with greater patient contact are more inclined to refer cancer survivors to the BfitBwell program and place greater value on exercise treatment, overlapping with the provider support barrier from theme 2.

“we get more referrals from mid-levels, nurse schedulers, ‘PA’s (M2)’, PA’s and self-referrals than we do from [oncologists]. And if they don’t hear about it from their oncologist, then what we do hear is why didn’t my doctor tell me about this (F1)”.

“My perception of it is, I mean we are all in the middle of it every single day and we know this makes a difference for people whether we can prove it or not, I think every one of us believe that, we can see it all the time, every day, and I think that’s what some of the mid-levels are seeing and they are interacting with these people on a regular basis and having conversations, they are watching improvements, but as you get further and further up, they become more disconnected from the everyday of the patient and it becomes more about like data and money...so for us it’s really easy to say yes of course exercise makes a difference, of course this is going to make difference because we see the effects (M1)”.

Staff shared that they’ve received frustration from participants when exercise is not recommended to them by their provider



“and then it’s a little bit of frustration from their [cancer survivors] end, like if this is supposed to help me get through treatment, why isn’t my doctor prescribing this (F1)”.

While the staff emphasized the lack of general support from providers, they highlighted anticipated support and collaboration from program advocates and leadership within the Anschutz Health and Wellness Center. Staff members described having an advocate may influence resource distribution towards PABCC implementation.

“Yeah, or an advocate like [program champion]. That’s why this program exists. There’s someone at the top who is like do this and waving that flag (M1)”.

“I also think someone like [cancer researcher]. Obviously she’s seeing patients for what they are going through trauma wise with their diagnosis and everything like that...this kind of like a new avenue...but someone like her could be a really big champion for us if [current program champion] couldn’t necessarily be, I mean he would be all in, but she could potentially give more resource to that I think (F2)”.

When asked if the current program champion would be sold on implementing PABCC in BfitBwell, staff responded “100% absolutely (F1)”.

A summary of focus group themes and subthemes is depicted in figure 4.

#### Positive cancer survivor feedback on PABCC

- Staff believe PABCC is beneficial to program and participants
- PABCC aligns with direction and mission of Anschutz Health and Wellness Center

#### Barriers to implementing PABCC in the BfitBwell program

- Staff Capacity
- Exercise program interns not suitable for delivering PABCC
- Cost to hire new staff
- Contribution of additional resources from University of Colorado Cancer Center
- Cancer survivor accessibility

#### Alternative PABCC implementation suggestions

- Alternative delivery modality
- Current staff are optimal intervention delivery personnel for implementation
- Fee for service
- Hire intern in alternative field to deliver PABCC

#### Collaboration between health-care professionals

- Lack of perceived value towards cancer exercise treatment by physicians
- Anticipated support towards PABCC implementation from BfitBwell program advocates and leadership

**Figure 4.** Summary of themes and subthemes from focus group with BfitBwell program staff

### 3.2 AIM 2: CHANGES IN SELF-EFFICACY AND OUTCOME EXPECTATIONS

From baseline to post program, participants in both the control and the PABCC (intervention) group reported an increase in overall barriers self-efficacy scores following program completion, but these changes were not statistically significant (Table 8). Participants who received the PABCC sessions reported a 21.5% increase in barriers self-efficacy compared to a 4.2% increase in the control group.

**Table 8.** Changes in barriers self-efficacy (BSE) from baseline to post-program

	<b>Baseline</b>	<b>Post-Program</b>	<b>Average Change</b>	<b><i>p</i></b>	<b><i>t</i></b>
<i>Mean (SD)</i>					
BfitBwell + PABCC (n=6)	46.5 (20.4)	56.5 (18.6)	10.0	.18	2.1
Control (n=7)	56.2 (25.8)	58.6 (26.6)	2.4	.58	.46

For exercise self-efficacy, participants in both the control and PABCC (intervention) group reported a decrease from baseline to post-program, but this change was not statistically significant (Table 9). Participants who received PABCC reported a 18.4% decrease in exercise self-efficacy compared to a 4.3% decrease in the control group.

**Table 9.** Changes in exercise self-efficacy (ESE) from baseline to post-program

	<b>Baseline</b>	<b>Post-Program</b>	<b>Average Change</b>	<b><i>p</i></b>	<b><i>t</i></b>
<i>Mean (SD)</i>					
BfitBwell + PABCC (n=6)	79.2 (27.4)	64.6 (28.7)	-14.6	.29	1.2
Control (n=7)	88.2 (12.6)	88.5 (14.7)	-3.8	.58	.58

For positive outcome expectations, participants in the PABCC (intervention) group reported an increase from baseline to post-program, but this change was not statistically significant (Table 10). Participants who received PABCC reported a 2.8% increase in positive outcome expectations compared to 0% in the control group. For negative outcome expectations, participants in both the control and PABCC (intervention) group reported a decrease from baseline to post-program, but this change was not statistically significant (Table 10). Participants who received PABCC reported a

5.1% decrease in negative outcome expectations compared to a 19.6% decrease in the control group.

**Table 10.** Changes in outcome expectations from baseline to post-program

	Baseline	Post-program	Average Change	<i>p</i>	<i>t</i>
	<i>Mean(SD)</i>				
<b>Positive Outcome Expectations</b>					
BfitBwell+PABCC	64.5 (4.1)	66.3 (2.2)	1.8	.32	-1.1
Control	64.0 (4.4)	64.0 (4.5)	0	1.0	.00
<b>Negative Outcome Expectations</b>					
BfitBwell+PABCC	9.8 (1.9)	9.3 (2.5)	-.50	.42	.89
Control	7.3 (3.2)	5.9 (3.0)	-1.4	.20	1.4

### 3.3 AIM 3: PHYSICAL ACTIVITY

At baseline, the majority of participants in both the PABCC intervention and the control group were not meeting PA guidelines (Table 11). At post-program, the majority of participants in both BfitBwell + PABCC and control group were doing >150 minutes per week of MVPA and meeting aerobic and strength PA guidelines. From post-program to three-months following program completion, participants in BfitBwell + PABCC decreased MVPA by an average of -81.7 minutes per week, compared to -45.0 minutes per week in the control group. Means and standard deviations for all PA outcomes at post-program and three-month follow up are shown in Table 12. Individual participant data for weekly minutes of MVPA at all three time points (baseline, post-program, three-month follow-up) is shown in figure 5.

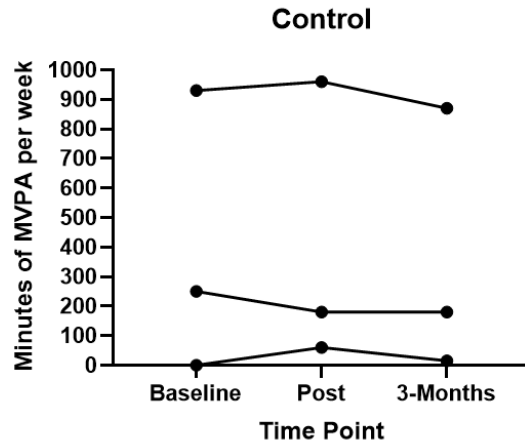
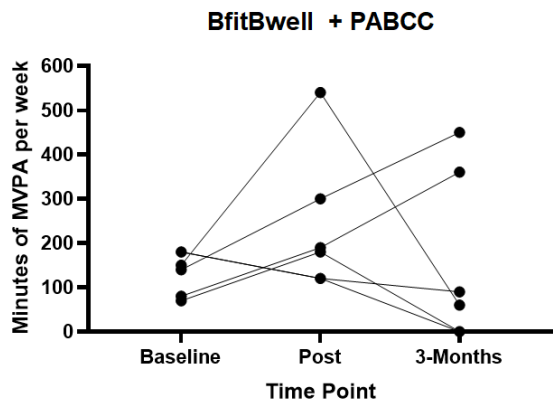
**Table 11. Baseline Physical Activity**

	BfitBwell + PABCC (N=6)	Control (N=7)
	<i>Mean (SD)</i>	
Minutes of MVPA per week	133.3 (48.0)	232.9 (317.9)
Strength Days per week	1 (1.3)	1 (1.3)
	<i>N (%)</i>	
Meeting aerobic PA guidelines	2 (33.3%)	3 (42.9%)
Meeting strength guidelines	2 (33.3%)	3 (42.9%)
Meeting both PA guidelines	1 (16.7%)	2 (28.6%)

**Table 12: Physical activity from Post-Program to 3-Month follow up**

	BfitBwell + PABCC (Post-program)	BfitBwell + PABCC (3-Month)	Control (Post-program)	Control (3-month)
	<i>Mean (SD)</i>			
Minutes of MVPA per week	241.7 (160.3)	160.0 (195.0)	400.0 (488.7)	355.0 (453.6)
Strength Days per week	2.0 (.89)	1.3 (1.2)	2.3 (.58)	2.7 (.58)
	<i>N (%)</i>			
Meeting aerobic PA guidelines	4 (66.7%)	2 (33.3%)	2 (66.7%)	2 (66.7%)
Meeting strength guidelines	4 (66.7%)	3 (50%)	3 (100%)	3 (100%)
Meeting both PA guidelines	3 (50%)	2 (33.3%)	2 (66.7%)	2 (66.7%)

\*BfitBwell+PABCC (N=6), Control (N=3)



**Figure 5:** Minutes of MVPA per week in the BfitBwell+PABCC Intervention and control group at baseline, post-program, and 3-month follow up

## 4. DISCUSSION

This study examined the feasibility and acceptability of implementing six, evidence-based PABCC sessions in an existing exercise program for cancer survivors, and the effects of these PABCC sessions on barriers self-efficacy, exercise self-efficacy, and outcome expectations at post-program, and PA 3-months following program completion. Overall, we found that based on staff and participant feedback PABC was well accepted and the idea of incorporating a behavior change component in BfitBwell was well supported by program staff. However, due to our low enrollment rates (35%), reasons for declining participation such as “unable to make class time”, and staff capacity and time barriers as discussed in the focus group, implementation of PABCC sessions in their current form may not be feasible. There was no statistically significant change in self-efficacy or outcome expectation measures from baseline to post-program. Minutes of MVPA tended to decline from post-intervention to three-month follow-up in both BfitBwell + PABCC ( $-81.7 \pm 240.6$ ) and control ( $-45.0 \pm 63.7$ ), however PA response was highly variable.

### *Aim 1: Feasibility and Acceptability of implementing PABCC in BfitBwell*

Findings for the feasibility and acceptability of implementing six, PABCC sessions in BfitBwell were mixed; with some measures indicating the sessions were feasible and acceptable, and others not. Measures indicating PABCC as feasible and acceptable included our study sample representativeness, participant study evaluation feedback, staff support from the focus group, monetary cost, and maintenance at the individual level. The participants who enrolled in the current study were representative

of BfitBwell participants, as we found no differences in sex, race, cancer diagnosis, treatment status, BMI, or age. Acceptability of the PABCC sessions was supported by positive participant responses on the study evaluation questionnaire. 100% of participants enjoyed PABCC and indicated confidence in ability to engage in independent exercise following completion. Furthermore, participants highlighted positive attributes of PABCC including social support and barrier identification.

Qualitative findings from the focus group with BfitBwell staff also supported acceptability of including PABCC sessions in BfitBwell; with emerging themes and subthemes such as “Positive cancer survivor feedback on PABCC”, “Staff believe PABCC is a beneficial addition to BfitBwell program”, and “PABCC aligns with direction and mission of Anschutz Health and Wellness center”. The minimal monetary cost associated with materials also supports feasibility of implementing PABCC sessions in BfitBwell. Finally, participant adherence to the PABCC sessions was (89%), suggesting attendance at the sessions were feasible once participants enrolled. Conversely, some of our findings suggest that some aspects of implementing PABCC sessions in their current form, would not be feasible or acceptable for the BfitBwell program. This was based on our enrollment rate, attrition, participant reported time burden, and staffing needs to deliver the PABCC sessions. Enrollment in the study was much lower than anticipated, we expected that approximately 70-80%% of participants enrolled in BfitBwell would participate in the study but had 35%. Common reasons for not agreeing to participate in the study such as “unable to guarantee attendance”, “unable to make class time” indicated that our sessions were not easily accessible to all participants of BfitBwell. 83.3% of participants on the study evaluation questionnaire indicated that



attending PABCC was an added time burden, and the location was inconvenient.

Finally, the focus group with BfitBwell staff revealed the primary barrier to implementing the PABCC sessions in BfitBwell was staff capacity and time. Staff also provided suggestions for implementation such as [subthemes], illustrating reservations in continuing to implement the PABCC sessions in their current form. Thus, based on these findings, we conclude that PABCC session delivery would need to be adapted in order to be implemented in BfitBwell. These adaptations could include incorporating PABCC session content into the existing BfitBwell classroom session, adding more classroom sessions, virtual delivery, and finding creative ways to fund a person to deliver PABCC sessions, such as a fee for service model to hire a staff member, or hiring an intern in a psychology or public health field to deliver PABCC. In conclusion, similar to previous studies, our findings confirm the significant staff time and resources required to deliver six PABCC sessions, contrasted by positive participant feedback [41]. We recommend further research on alternative implementation strategies to enhance the translation of evidence based PABCC into existing clinic-based cancer exercise programs, such as BfitBwell.

*Aim 2: Changes in self-efficacy and outcome expectations*

There were no changes in barriers self-efficacy or exercise self-efficacy ( $p < .05$ ), on average participants had a 21.5% increase in barriers self-efficacy and 18.4% decrease in exercise self-efficacy, but these results were not statistically significant ( $p < .05$ ). On average there was a 2.8% increase in positive outcome expectations and 5.1% decrease in negative outcome expectations, but these results were not statistically significant. Ultimately, we found there were no changes in BfitBwell + PABCC

participants in these measures. These results were not congruent with our hypothesis, which was participants who received PABCC would report greater improvement in self-efficacy and outcome expectations than those who did not, and differed from the findings from the efficacy study which PABCC sessions were adapted from [21]. Our findings were surprising given success in the use of the social cognitive theory framework in improving these outcomes in other studies. Our findings raise the question of if there is a necessary dosage or intensity of strategies mobilizing the social cognitive theory to improve self-efficacy and outcome expectations in this population. Factors contributing to our results may include intervention intensity, small sample size, group cohesion, and treatment status of participants.

The absence of improvements in self-efficacy and negative outcome expectations following BfitBwell + PABCC may be attributed to a lower intervention intensity, as compared to the efficacy study which PABCC sessions were adapted from. Participants in BEAT Cancer received instruction on unsupervised home exercise sessions, and three face-to-face update counseling sessions, in addition to the six group-based PABCC sessions, and 3-months of supervised exercise [17]. These additional components may have contributed to a greater magnitude of change in self-efficacy and outcome expectations because of greater exposure to exercise outside of the supervised setting and strategies addressing social cognitive theory constructs.

Our group size was limited due to our low recruitment rates; therefore, our participants were not exposed to the same level of social support as those in the BEAT Cancer intervention. Furthermore, our intervention was open to all cancer types rather than a homogenous group such as the breast cancer population in the BEAT Cancer

study. The differing cancer diagnoses and treatments associated with different cancer types raises question to if a homogenous group influences social support and social cognitive theory construct improvements. We recommend research on behavioral strategies in homogenous vs heterogeneous cancer groups.

Our small sample size may have limited our ability to detect statistically significant changes in self-efficacy and outcome expectations. We did see non-statistically significant improvements by our control group in these self-efficacy and outcome expectation measures which may be attributed to our control groups higher levels of pre-program physical activity or that our control participants received the same exercise intervention as BfitBwell+ PABCC participants, differing from BEAT cancer where control participants only received written materials.

### *Aim 3: Physical Activity*

From post-program to three-month follow-up, average change in minutes of MVPA was -81.7 minutes per week in BfitBwell + PABCC, and -45.0 minutes in the control. However, when looking at individual data, PA change from post-to follow-up was variable. In the BfitBwell + PABCC intervention, two participants had an increase in minutes of MVPA from post-program to 3-month follow-up, and four participants showed a decline in minutes of MVPA. Similarly, in terms of meeting PA guidelines at 3-month follow up, the same two participants who increased MVPA were the only two meeting aerobic PA guidelines at 3-month follow up.

One explanation for this variability in PA during the three-month follow-up may be related to the treatment status of participants. We hypothesize treatment status may have influenced some participants ability to engage in physical activity and prioritize

behavior change. Three BfitBwell + PABCC participants who had a decline in minutes of MVPA from post-program to 3-month follow up had additional cancer-related treatment such as surgery or chemotherapy scheduled for after the completion of the BfitBwell program. Thus, surgical recovery and the acute side effects of chemotherapy, may have had a significant impact on these participant's ability to engage in PA following program completion. These findings raise the question of the ideal timing of a PA behavior change intervention for cancer survivors, given our findings of a large decline in participants pursuing further treatment, a behavior change intervention delivered following completion of treatment may be more suitable.

A second explanation for some participant's decline in PA was that our study did not include a tapered exercise intervention or follow-up counseling sessions with the interventionist as offered in BEAT cancer. A tapered exercise design may help promote PA maintenance and the transition out of the BfitBwell program. Participants in our study received personal training in a state-of-the-art exercise facility, leaving an abrupt transition to independent exercise out of this environment after program completion. We recommend future research on the implementation of a tapered design and/or follow up via prescribed home-based exercises to ameliorate the transition to independent exercise.

### *Strengths and limitations*

This study was unique in its focus on both the implementation and effectiveness of PABCC in a clinic-based exercise program for cancer survivors. A strength of our study was that it is the first to disseminate previously tested, evidence-based PABCC

from a randomized controlled trial into a clinic-based exercise program for cancer survivors.

Limitations to this study included our small sample size and inability to conduct between group statistical analyses to detect differences between those who received PABCC and those who did not on behavioral mediators and PA.

### *Future Implications*

Clinic-based exercise programs such as BfitBwell are unique as participants are of all cancer diagnoses, on or within six months of treatment, and program staff are salaried professionals with limited time flexibility. More pragmatic research on implementation strategies to reduce staff barriers and enhance participant accessibility such as virtual delivery modalities or offering multiple sessions for PABCC is recommended to guide clinic-based programs on the implementation of behavioral strategies such as PABCC. We recommend a future focus group conducted with cancer survivors to better understand implementation strategies from a participant perspective as a focus group may provide more in-depth data than what was collected within our study evaluation questionnaire.

Furthermore, previous evidence supports peer facilitated programs effective at promoting MVPA and well-being in cancer survivors [41]. We recommend research to explore the implementation feasibility and effectiveness of utilizing a peer-facilitated model to deliver PABCC. It is vital research efforts are placed on translational science to bridge the gap between hypothesis driven laboratory environments and clinic and community-based settings, like BfitBwell.

This study was underpowered to detect improvement in behavioral mediators and PA maintenance between participants who received PABCC and the control group. Further research with a larger sample size is needed to explore the effects of PABCC and effective intervention strategies for cancer survivors of all diagnosis types on treatment. Furthermore, to determine best timing to deliver PABCC for improved physical activity maintenance in cancer survivors.

### *Conclusion*

In conclusion, this study addresses the gap between the evidence of PABCC for cancer survivors in a hypothesis-driven research environment and translation to a “real-world” setting such as a clinic-based exercise program. Findings from this study highlight considerations for the dissemination and implementation of PABCC in a clinic-based exercise program for cancer survivors. Further pragmatic research on PABCC for cancer survivors undergoing treatment will help improve physical activity maintenance for cancer survivors, and the translation of efficacious behavioral strategies to real-world settings.

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## APPENDICES

### A. EXERCISE SELF-EFFICACY

The items listed below are designed to assess your beliefs in your ability to continue exercising on a three time per week basis at moderate intensities (upper end of your perceived exertion range), for **40+** minutes per session in the future. Using the scales listed below please indicate how confident you are that you will be able to continue to exercise in the future. For example, if you have complete confidence that you could exercise three times per week at moderate intensity for **40+** minutes for the next four weeks without quitting, you would **circle 100%**. However, if you had no confidence at all that you could exercise at your exercise prescription for the next four weeks without quitting, (that is, confident you would not exercise), you would **circle 0%**.

Please remember to answer honestly and accurately. There are no right or wrong answers.

**Mark your answer by circling a %:**

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

NOT AT ALL

MODERATELY

HIGHLY

CONFIDENT

CONFIDENT

CONFIDENT

1. I am able to continue to exercise three times per week at moderate intensity, for 40+ minutes without quitting for the NEXT WEEK

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

2. I am able to continue to exercise three times per week at moderate intensity, for 40+ minutes without quitting for the NEXT TWO WEEKS

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

3. I am able to continue to exercise three times per week at moderate intensity, for 40+ minutes without quitting for the NEXT THREE WEEKS

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

4. I am able to continue to exercise three times per week at moderate intensity, for 40+ minutes without quitting for the NEXT FOUR WEEKS

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

5. I am able to continue to exercise three times per week at moderate intensity, for 40+ minutes without quitting for the NEXT FIVE WEEKS

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

6. I am able to continue to exercise three times per week at moderate intensity, for 40+ minutes without quitting for the NEXT SIX WEEKS

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

7. I am able to continue to exercise three times per week at moderate intensity, for 40+ minutes without quitting for the NEXT SEVEN WEEKS

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

8. I am able to continue to exercise three times per week at moderate intensity, for 40+ minutes without quitting for the NEXT EIGHT WEEKS

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

## **B. BARRIERS SELF-EFFICACY**

Using the numbers to the right, rate how confident you are that you could exercise in each of the following situations. (Circle one number for each statement.)

When I lack the discipline to exercise.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

When I am nauseated.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

When exercise is not a priority.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

When the weather is bad.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

When I am tired.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

When I am not interested in exercising.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

When I lack time.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

When I do not enjoy exercising.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

When I do not have someone to encourage me to exercise.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

### C. OUTCOME EXPECTATIONS

*Below are listed a number of things which may or may not change with exercise during cancer treatment. Please tell me whether you strongly disagree, somewhat disagree, are neutral, somewhat agree or strongly agree with each statement (circle one for each). I will also ask you how important each of these things are to you (check one for each).*

1. *I will feel less depressed if I exercise*                      1      2      3      4      5

a. *How important is feeling less depressed to you?*

- (1) \_\_\_\_\_ *not important at all*
- (2) \_\_\_\_\_ *a little important*
- (3) \_\_\_\_\_ *somewhat important*
- (4) \_\_\_\_\_ *very important*
- (5) \_\_\_\_\_ *extremely important*

2. *I will feel less bored if I exercise*                      1      2      3      4      5

a. *How important is feeling less bored to you?*

- (1) \_\_\_\_\_ *not important at all*
- (2) \_\_\_\_\_ *a little important*
- (3) \_\_\_\_\_ *somewhat important*
- (4) \_\_\_\_\_ *very important*
- (5) \_\_\_\_\_ *extremely important*

3. *I will meet new people if I exercise* 1 2 3 4 5

a. *How important is meeting new people to you?*

(1) \_\_\_\_\_ *not important at all*

(2) \_\_\_\_\_ *a little important*

(3) \_\_\_\_\_ *somewhat important*

(4) \_\_\_\_\_ *very important*

(5) \_\_\_\_\_ *extremely important*

4. *I will improve my self-esteem and feel better about myself if I exercise* 1 2 3 4 5

a. *How important is improving your self-esteem or feeling better about yourself?*

(1) \_\_\_\_\_ *not important at all*

(2) \_\_\_\_\_ *a little important*

(3) \_\_\_\_\_ *somewhat important*

(4) \_\_\_\_\_ *very important*

(5) \_\_\_\_\_ *extremely important*

5. *I will lose weight or improve my shape if I exercise* 1 2 3 4 5

a. *How important is losing weight to you?*

- (1) \_\_\_\_ *not important at all*
- (2) \_\_\_\_ *a little important*
- (3) \_\_\_\_ *somewhat important*
- (4) \_\_\_\_ *very important*
- (5) \_\_\_\_ *extremely important*

6. *I will build up my muscle strength if I exercise*    1    2    3    4    5

a. *How important is building up muscle strength to you?*

- (1) \_\_\_\_ *not important at all*
- (2) \_\_\_\_ *a little important*
- (3) \_\_\_\_ *somewhat important*
- (4) \_\_\_\_ *very important*
- (5) \_\_\_\_ *extremely important*

7. *I will feel less tension and stress if I exercise.....* 1    2    3    4    5

a. *How important is felling less tension to you?*

- (1) \_\_\_\_ *not important at all*
- (2) \_\_\_\_ *a little important*
- (3) \_\_\_\_ *somewhat important*
- (4) \_\_\_\_ *very important*
- (5) \_\_\_\_ *extremely important*

8. *I will improve my health or reduce my risk of disease if I exercise*

1      2      3      4      5

a. *How important is improving your health to you?*

(1) \_\_\_\_\_ *not important at all*

(2) \_\_\_\_\_ *a little important*

(3) \_\_\_\_\_ *somewhat important*

(4) \_\_\_\_\_ *very important*

(5) \_\_\_\_\_ *extremely important*

9. *I will do better on my job if I exercise*                      1      2      3      4      5

a. *How important is doing better on your job to you? (skip if unemployed)*

(1) \_\_\_\_\_ *not important at all*

(2) \_\_\_\_\_ *a little important*

(3) \_\_\_\_\_ *somewhat important*

(4) \_\_\_\_\_ *very important*

(5) \_\_\_\_\_ *extremely important*

10. *I will feel more attractive if I exercise*                      1      2      3      4      5

a. *How important is feeling more attractive to you?*



- (1) \_\_\_\_ *not important at all*
- (2) \_\_\_\_ *a little important*
- (3) \_\_\_\_ *somewhat important*
- (4) \_\_\_\_ *very important*
- (5) \_\_\_\_ *extremely important*

11. *I will improve my heart and lungs if I exercise*    1    2    3    4    5

a. *How important is improving your heart and lungs to you?*

- (1) \_\_\_\_ *not important at all*
- (2) \_\_\_\_ *a little important*
- (3) \_\_\_\_ *somewhat important*
- (4) \_\_\_\_ *very important*
- (5) \_\_\_\_ *extremely important*

12. *I will improve my state of mind if I exercise*    1    2    3    4    5

a. *How important is improving your state of mind to you?*

- (1) \_\_\_\_ *not important at all*
- (2) \_\_\_\_ *a little important*
- (3) \_\_\_\_ *somewhat important*
- (4) \_\_\_\_ *very important*
- (5) \_\_\_\_ *extremely important*

13. *I will feel less tired if I exercise*                    1       2       3       4       5

a.     *How important is feeling less tired  
to you?*

- (1) \_\_\_\_\_ *not important at all*
- (2) \_\_\_\_\_ *a little important*
- (3) \_\_\_\_\_ *somewhat important*
- (4) \_\_\_\_\_ *very important*
- (5) \_\_\_\_\_ *extremely important*

14. *I will hurt myself if I exercise*                    1       2       3       4       5

a.     *How important is not hurting  
yourself to you?*

- (1) \_\_\_\_\_ *not important at all*
- (2) \_\_\_\_\_ *a little important*
- (3) \_\_\_\_\_ *somewhat important*
- (4) \_\_\_\_\_ *very important*
- (5) \_\_\_\_\_ *extremely important*

15. *I will feel less nauseated if I exercise*                    1       2       3       4       5

a.     *How important is feeling less  
nauseated to you?*

- (1) \_\_\_\_ *not important at all*
- (2) \_\_\_\_ *a little important*
- (3) \_\_\_\_ *somewhat important*
- (4) \_\_\_\_ *very important*
- (5) \_\_\_\_ *extremely important*

16. *I will have increased joint pain if I exercise*      1      2      3      4      5

a.    *How important is not having increased joint pain to you?*

- (1) \_\_\_\_ *not important at all*
- (2) \_\_\_\_ *a little important*
- (3) \_\_\_\_ *somewhat important*
- (4) \_\_\_\_ *very important*
- (5) \_\_\_\_ *extremely important*

17. *I will have increased muscle aches if I exercise*      1      2      3      4      5

a.    *How important is not having increased muscle aches to you?*

- (1) \_\_\_\_ *not important at all*
- (2) \_\_\_\_ *a little important*
- (3) \_\_\_\_ *somewhat important*
- (4) \_\_\_\_ *very important*
- (5) \_\_\_\_ *extremely important*

## D. STUDY EVALUATION QUESTIONNAIRE

Participant Evaluation Survey: Improving physical activity maintenance following an exercise program for cancer survivors

### 1. Did you enjoy the behavior change counseling sessions?

1	2	3	4	5	6	7
Definitely No	Likely No	Possibly No	Neither Yes or No	Possibly Yes	Likely Yes	Definitely Yes

### 2. Was attending the behavior change counseling sessions an added time burden to you?

1	2	3	4	5	6	7
Definitely No	Likely No	Possibly No	Neither Yes or No	Possibly Yes	Likely Yes	Definitely Yes

### 3. Do you think attending behavior change counseling sessions improved your ability to continue exercising after the end of the BfitBwell program?

1	2	3	4	5	6	7
Definitely No	Likely No	Possibly No	Neither Yes or No	Possibly Yes	Likely Yes	Definitely Yes

### 4. Did the facilitator and group environment of the behavior change counseling sessions provide you with a sense of community and support that you found beneficial?

1	2	3	4	5	6	7
Definitely No	Likely No	Possibly No	Neither Yes or No	Possibly Yes	Likely Yes	Definitely Yes

### 5. Did the facilitator effectively deliver information and generate open discussion

1	2	3	4	5	6	7
Definitely No	Likely No	Possibly No	Neither Yes or No	Possibly Yes	Likely Yes	Definitely Yes

Please provide any additional comments for the facilitator

6. What topics covered during behavior change counseling sessions did you find most beneficial?

7. Are there any topics, content or concepts from discussion or exercise sessions that you believe could have been:

a. Covered in **more** detail:

\_\_\_\_\_

b. Covered in **less** detail:

\_\_\_\_\_

8. After completing discussion sessions, do you feel confident that you have the knowledge and skills to exercise safely and effectively without professional guidance in another setting (e.g., home, fitness center, etc.)?

1	2	3	4	5	6	7
Definitely No	Likely No	Possibly No	Neither Yes or No	Possibly Yes	Likely Yes	Definitely Yes

9. What were the highlights of your participation in the counseling sessions?

10. "If I could change one aspect of the counseling session component of BfitBwell to better suit my needs I would..."

11. Please provide any additional comments/concerns or questions you might have

## E. FOCUS GROUP WITH BFITBWEELL PROGRAM STAFF QUESTIONS

1. Please describe your thoughts about the integration of the IPAM behavior change counseling sessions.
  - Pros/cons of IPAM behavior change counseling
2. Based on your experiences and knowledge of the IPAM behavior change counseling sessions, how is this beneficial to the BfitBwell program?
  - How can this improve someone's experience in BfitBwell/ PA maintenance following BfitBwell
3. Would it be possible for BfitBwell to continue delivering IPAM behavior change counseling sessions as part of the program?
  - What factors would make it possible for BfitBwell to continue delivering IPAM behavior change counseling as part of the program
4. What barriers or other factors would prevent BfitBwell from continuing IPAM behavior change counseling sessions as part of the program?
  - Time, staff, cost, equipment, resources, etc.
5. If BfitBwell were to continue using IPAM behavior change counseling, who would deliver these sessions to cancer survivors?

- Is there someone that could easily move into delivering these sessions? Do you need to hire someone? Train someone new?
6. What could be done to reduce the cost of implementing IPAM behavior change counseling as part of the standard BfitBwell program?
- Less sessions, combine behavior change counseling sessions with exercise sessions, interns lead, etc.
7. What would motivate The University of Colorado Cancer Center to invest additional resources into implementing behavior change counseling into the standard BfitBwell program?
- Research, staff interest/request, etc.
8. This concludes the questions that I have for you during the focus group, but before we end today, is there anything else you would like to share with me about the BfitBwell program or the IPAM behavior change counseling?

## G. ADAPTED GODIN LEISURE TIME ACTIVITY QUESTIONNAIRE

For this question, we would like you to recall your average weekly exercise during the past month. We will ask you separate questions about aerobic or endurance exercise (i.e., exercise that improves the heart and lungs such as walking or swimming) and strength or resistance exercise (i.e., exercise that improves muscular strength such as weight lifting).

When answering these questions please remember:

- Only count exercise sessions that lasted 10 minutes or longer in duration.
- Only count exercise that was done during free time (i.e., not occupation or housework).
- Note that the main difference between the categories 'a,' 'b', and 'c' is the intensity of the aerobic (endurance) exercise and category 'd' is for strength (resistance) exercise.
- Please write the average frequency on the first line and the average duration on the second.
- If you did not do any exercise in one of the categories, please write in "0".

**Considering a typical week (7 days) over the PAST MONTH how many days on average did you do the following kinds of aerobic and strength exercise and what was the average duration (minutes per session)?**

- a. VIGOROUS INTENSITY **AEROBIC** EXERCISE (HEART BEATS RAPIDLY, SWEATING) (e.g., running, aerobics classes, cross country skiing, vigorous swimming, vigorous bicycling).



- b. MODERATE INTENSITY **AEROBIC** EXERCISE (NOT EXHAUSTING, LIGHT PERSPIRATION) (e.g., fast walking, tennis, easy bicycling, easy swimming, popular and folk dancing).
- c. LIGHT INTENSITY **AEROBIC** EXERCISE (MINIMAL EFFORT, NO PERSPIRATION) (e.g., easy walking, yoga, bowling, lawn bowling, shuffleboard).
- d. **STRENGTH/RESISTANCE** EXERCISE (MODERATE TO INTENSE EFFORT) (e.g., weight lifting, resistance bands, sit-ups, push-ups)

## H. FIDELITY QUESTIONNAIRE

Use the numbers to the right of each item to indicate your agreement with the following statements about the IPAM Study. (Circle one number for each item.) \*Mark “not applicable” if you were not responsible for that specific activity (e.g., did not lead the discussion groups).

1= Never 2= some of the time 3= Most of the time 4= All of the time 0= Not applicable

### General Administration

A. Were the following administrative tasks completed for all components (Supervised Exercise, Group Sessions, and Update Sessions)?

a. Staff training requirements met

1      2      3      4      0

b. Attendance documented

1      2      3      4      0

c. Participants program records completed and maintained

1      2      3      4      0

d. Follow up contact for participants who missed a session

1      2      3      4      0

### Discussion Groups

A. Were PowerPoint slides used during the discussion group sessions?

1      2      3      4      0

B. Were the following topics covered in the discussion group sessions?

	1	2	3	4	0
a. Blueprint for Success					
b. Time management					
c. Stress management					
d. Exercise barriers					
e. Exercise benefits					
f. Goal setting					
g. Role models					
h. Behavior change					
i. Relapse					

C. Were group attendees encouraged to use the following items?

a. Group notebook	1	2	3	4	0		
b. Exercise logs	1	2	3	4	0		
c. Blueprint for Success	1	2	3	4	0		
d. Journaling tasks in the notebook			1	2	3	4	0

D. Was group interaction facilitated by the use of discussion questions and notebook tasks?

1 2 3 4 0

E. Were group attendees given written information regarding local physical activity resources?

1 2 3 4 0

**Supervised exercise sessions**

A. Were participants instructed in how to achieve target exercise intensity?

1    2    3    4    0

A. Were clear exercise goals set with each participant at each exercise session?

1    2    3    4    0

B. Were exercise logs and exercise goals reviewed at each exercise session?

1    2    3    4    0

C. Were exercise barriers addressed during exercise sessions?

1    2    3    4    0

D. Was exercise training and prescription individualized with specific feedback and encouragement?

1    2    3    4    0

E. Was the exercise area kept clean and equipment maintained?

1    2    3    4    0

### **Update sessions**

A. Were the following topics discussed at each Update counseling session?

a. Target exercise intensity for home exercise    1    2    3    4    0

b. Review of home exercise logs    1    2    3    4    0

c. Exercise barriers    1    2    3    4    0

d. Exercise benefits    1    2    3    4    0

e. Goal setting    1    2    3    4    0

f. Feedback and encouragement    1    2    3    4    0

g. Individualized exercise prescription for home exercise

1    2    3    4    0

h. Dealing with and overcoming relapse            1       2       3       4       0

**Overall and/or Miscellaneous**

A. Were cancer-specific issues addressed?

1       2       3       4       0

B. Were participants held accountable for attendance, participation, exercising, and exercise logs?

1       2       3       4       0

C. Were program staff responsive to participant needs?

1       2       3       4       0

D. Were opportunities provided for program participant feedback?

1       2       3       4       0

E. Were group participants given regular encouragement regarding their exercise?

1       2       3       4       0

F. Were participants counseled about and/or assisted with identifying social support for exercise?

1       2       3       4       0

G. Were program participants taught ways to improve their motivation?

1       2       3       4       0

H. Was the exercise prescription increased gradually?

1       2       3       4       0