THESIS

EFFECT OF A VIDEOCONFERENCE-DELIVERED PHYSICAL ACTIVITY INTERVENTION ON QUALITY OF LIFE IN COLORECTAL CANCER SURVIVORS.

Submitted by

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ABSTRACT

EFFECT OF A VIDEOCONFERENCE-DELIVERED PHYSICAL ACTIVITY INTERVENTION ON QUALITY OF LIFE IN COLORECTAL CANCER SURVIVORS.

INTRODUCTION: Colorectal cancer is the fourth most common cancer diagnosed in both men and women in the United States. For every 100 people diagnosed with colon cancer, 64 are expected to live five or more years after diagnosis. With this growing number of colorectal cancer survivors, quality of life (QOL) becomes an important patient reported outcome within this population. QOL is multidimensional and includes various dimensions of wellbeing (e.g., physical, emotional, social) that can be improved with physical activity.

Previous research has established that face-to-face supervised physical activity (PA) interventions can improve QOL among colorectal cancer survivors (CRC) (Mishra et al., 2012). However, these interventions require a lot of resources, and may be difficult to access. Thus, researchers have turned to distance-based physical activity (PA) interventions (digital health tools, text messaging, prerecorded home-based workouts etc.) to increase access and scalability of PA interventions for CRC survivors. Previous studies that have examined the effect of distance-based PA interventions for improving QOL in CRC survivors did not find improvements in QOL. For example, Kim et al. (2019) found no significant improvements in QOL following an unsupervised, homebased, DVD exercise program, and Chan et al. (2022) found no significant changes in QOL, following a text messaging intervention. These finding suggest that distance-based PA interventions may not be as effective as face-to-face for improving QOL in CRC survivors and may be due to a lack of contact with other survivors and/or diminished PA adherence/compliance due to lack of supervision and instruction from an exercise professional.

Since the COVID-19 pandemic, videoconference PA interventions have grown in popularity, and may be able to overcome some of the limitations of both face-to-face and distance-based PA interventions for improving QOL in CRC survivors. However, to date there are no previous studies that have examined the effect of a videoconference intervention on QOL in CRC survivors. This study will examine changes in QOL in colorectal cancer survivors following a 12-week, videoconference, PA intervention. This study will be a secondary data analysis of participants enrolled in Testing Group Activity CorrelaTes In Colorectal Cancer Survivors (TACTICS), a pilot randomized controlled trial with the primary aims of determining feasibility, and preliminary effects on physical activity.

METHODS: TACTICS is a 12-week pilot randomized controlled trial where the intervention group received group-based exercise sessions 2x/week, and five behavior change discussion sessions delivered via Zoom. The control group received standard physical activity recommendations. QOL was measured at baseline and 12-weeks using the Functional Assessment of Cancer Therapy–Colorectal (FACT-C). Mean change, standard deviation, and effect size were reported to measure improvements in QOL. Established minimal clinically important differences (MCID) are a Δ5 points for total and a Δ2 points for QOL subscales. The proportion achieving MCID's in intervention vs. control were compared using Fisher's Exact tests, and independent t-tests or chi square tests explored differences in participant characteristics between those did vs. did not achieve MCID.

RESULTS: Participants (n= 13 intervention, n=12 control) were mostly 56% female and M=61.2±11.7 years old. Among intervention participants, proportion who achieved MCID was 23.1% total, 15.4% physical, 38.5% functional, 23.1% social, and 15.4 % emotional, compared to 41.7% total, 33.3% physical, 25.0% functional, 41.7% social wellbeing, and 16.7% emotional among control. None of these proportions differed between groups (p>.05). For the physical QOL subscale, BMI was higher [t(11)=2.92, p=.014] and baseline scores were lower [t(7)=-2.34, p=.052] among those who achieved MCID.

CONCLUSION: We observed small improvements in QOL within CRC survivors. There were no statistically significant differences in achieving clinically relevant improvements in QOL between intervention and control group participants. Larger randomized studies are needed to definitively determine if a videoconference exercise intervention can elicit clinically relevant improvements in QOL compared to a control group.

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CHAPTER 1

1.1 INTRODUCTION

Colorectal cancer (CRC) is the third leading cause of cancer related deaths in both men and women and is the second most common cause of cancer deaths when numbers for men and women are combined (American Cancer Society, 2023). With advances in medical treatment of the disease, five-year survival rates for cancers of the colon and rectum have steadily increased to approximately 63%, and 68%, respectively (American Cancer Society, 2023). Improved survival rates, accompanied by population aging and growth, has resulted in more than 1.4 million CRC survivors in the United States living with a previous colorectal cancer diagnosis (Miller et al., 2022).

Although survival rates are improving, CRC survivors often experience a decline in their quality of life (QOL) due to the physical and emotional tolls of the disease and its treatment (Ferrer et al., 2011). QOL encompasses the effect of an illness on a patient's physical, psychological, and social well-being as perceived by that patient (Ferrer et al., 2011). For CRC survivors, a first line treatment for CRC often includes surgical resection of the colon or rectum, which can result in pain, fatigue, fecal incontinence, GI issues, bleeding, infection, injury to nearby organs or anastomotic leak. Such symptoms can significantly reduce QOL and are associated with higher levels of depression and anxiety, lower levels of physical activity, and can extend beyond the patient to negatively impact the QOL of the spouse/partner or family (Choy et al., 2022; Aylaz et al., 2021; Gao et al., 2020). In addition, systemic CRC therapies such as chemotherapy often incur side-effects like low blood platelet counts, increased chance of infections, weight loss, hair loss and nausea or vomiting (Martínez-Vizcaíno et al., 2023), which further impact daily life tasks (i.e.. walking, climbing stairs, and carrying groceries), and hobbies, and interfere with family and social life (Marventano et al., 2013).

QOL is multidimensional and refers to an individual's overall sense of well-being, including their physical health status, social and emotional support, and functional wellbeing (Tortosa-Martínez et al., 2023). For example, the physical dimension of QOL may encompass pain and energy levels, and time spent in bed. The social dimension of QOL often focuses on support from friends, family, or their partner, and the emotional dimension often encompasses feelings of sadness or anxiety. Finally, the functional dimension of QOL is centered around an individual's ability to work and engage in activities of daily living. QOL is most commonly measured by self-report, using validated questionnaires that assess the domains or subscales of QOL [Cohen et al., 2019; CDC, 2000, WHO, 2012, RAND, 1992,]. Specifically for CRC survivors, the most commonly used measure of QOL is the Functional Assessment of Cancer Therapy – Colorectal (FACT-C) questionnaire (Chandramohan et al., 2012). This questionnaire includes physical, social, emotional and functional subscales, and also includes a subscale specific to CRC symptoms and side effects from treatment(s). Given that a QOL score represents a patient's personal reflection of their overall well-being in the face of CRC, the FACT-C is often considered an important outcome measure in research and clinical care (Ward et al., n.d.).

When examining changes or improvements in QOL over time, in addition to magnitude of change (the extent or size of change) or statistically significant changes, it is also important to understand what represents a meaningful change for the person. When examining patient reported outcomes, like QOL, it is important to note that a statistically significant change does not always translate to a clinically meaningful change (Sedaghat, 2019). This is where the measurement of a minimal clinically important difference (MCID) becomes relevant when assessing patient reported outcomes such as QOL. The MCID is the smallest change in a clinical measurement or outcome that is considered significant from a patient's perspective. These definitions may be different based on the patient's perspective. For example, what may be deemed a meaningful change by the patient may be different from what a doctor or company/third

part payor may deem meaningful (Sedaghat, 2019). When considering the impact of exercise on QOL, it's essential to recognize the value of the MCID in the context of patient reported outcomes.

As current research has shown, QOL following a cancer diagnosis can be improved by engaging in healthy lifestyle behaviors, such as physical activity (PA) or exercise (Misiąg et al., 2022) as shown in systematic reviews including exercise interventions that improve cancer survivors' QOL with medium to large effect sizes (Martínez-Vizcaíno et al., 2023; Choy et al., 2022; Mbous et al., 2020). Physical activity can be defined as movement of the body that requires work of your skeletal muscles, whereas exercise is considered planned, structured, and purposeful physical activity (ACSM's Guidelines for Exercise Testing and Prescription, 11th Edition). There is strong evidence to support that physical activity can improve quality of life if cancer survivors engage in physical activity 3 times a week for 30 minutes of moderate aerobic exercise, plus two times a week of resistance training 2 sets of 12-15 reps for major muscle groups at moderate intensity (American College of Sports Medicine, 2019). Mechanisms by which PA may improve QOL include: (1) improved physical functioning, (i.e., mobility, balance, and coordination) which can in-turn improve daily life tasks, such as walking, climbing stairs, and carrying groceries, (2) reductions in cancer related fatigue, a common and distressing side effect of cancer treatment (Kessels et al., 2018), and (3) enhanced psychological well-being by reducing symptoms of depression, anxiety, and stress (ACSM, 2019) potentially via the effects of PA on mood-regulating neurotransmitters such as serotonin and norepinephrine (Gao et al., 2020).

Although physical activity has been suggested for improving QOL, a challenge remains in determining the best ways to engage CRC survivors in recommended levels of PA, in order elicit subsequent, positive effects on QOL. Previous researchers have established that face-to-face or in person, supervised (lead by an instructor) PA interventions are effective for increasing PA (Courneya et al., 2016) and improving QOL(Haas et al., 2012). However, these interventions require many resources, and may be difficult to access due to lack of time and distance (Gonzalo-

Encabo et al., 2022). Thus, many researchers have turned to distance-based (e.g., digital health tools, text messaging, prerecorded home-based workouts etc.) to increase access and scalability of PA interventions for CRC survivors (Pelosi et al., 2023). However, a recent review found no significant effect of distance-based exercise interventions compared to a control group, for increasing PA among CRC survivors (Pelosi et al., 2023)., and similarly, previous studies that have examined the effect of distance-based PA interventions for improving QOL in CRC survivors have found limited success. For example, Kim et al. (2019) found no significant improvements in QOL following an unsupervised, homebased, DVD exercise program, and Chan et al. (2022) found no significant changes in QOL, following a text messaging intervention (daily texts with informational and motivational messages on various exercise activities). In addition, in a meta-analysis of 19 exercise interventions in CRC survivors, larger effects were observed for QOL in supervised vs. unsupervised interventions (Singh et al., 2020). Taken together, these findings suggest that unsupervised and/or distance-based interventions may not elicit substantial increases in PA, leading to lesser effects of these interventions for improving QOL among CRC survivors.

Fortunately, videoconference platforms like Skype, Microsoft Teams and Zoom, have recently become popular alternatives to deliver supervised exercise or PA interventions, with several studies in cancer survivors that have established safety and feasibility (Gonzalo-Encabo et al., 2022). These videoconference PA interventions may be able to overcome some of the barriers of face-to-face delivery while retaining the benefits of supervised interventions such as accountability, and social support. However, to date there are no previous studies that have examined the effect of a videoconference PA intervention on QOL in CRC survivors. To address this knowledge gap, the aims of this study were to examine (1) examine magnitude of change in QOL among 25 CRC survivors following a 12-week supervised videoconference PA intervention; and (2) the proportion of the participants who achieved clinically meaningful levels of improvement

in QOL in the intervention and control groups; and (exploratory aim) compare characteristics of participants who achieved clinically meaningful levels of improvements and those who did not.

1.2 HYPOTHESES

We hypothesize that CRC survivors who participate in Testing Group Activity CorrelaTes In Colorectal Cancer Survivors (TACTICS) who are randomized to the intervention group (receiving the 12-week virtually delivered exercise program) will see a greater magnitude of improvement in QOL compared to those who are in the control group. We hypothesize that more participants in the intervention group will achieve an MCID than participants in the control group. And that participants who have lower levels of baseline physical activity will be more likely to have achieved MCID for QOL, than those with higher baseline activity levels.

CHAPTER 2

2.1 METHODS

This study will be a secondary data analysis of participants survivors who completed a pilot randomized controlled trial (TACTICS), with the primary aims of determining feasibility, and preliminary effects on physical activity.

Study Population

Participants were recruited from the University of Colorado Cancer Center, the UCHealth North Cancer Center, Rocky Mountain Oncology Society and at various cancer care clinics and community locations in the Fort Collins Denver area. To be eligible, participants had to (1) be male or female aged 40 years or older at time of colorectal cancer diagnosis, (2) have histologically confirmed cancer of the colon or rectum (stages II-IV), (3) no current evidence of metastatic disease, (4) have completed resection or other surgery 3-24 months prior to enrollment, and (5) received chemotherapy and/or radiation therapy within the previous year, with at least 1 cycle of intended chemotherapy completed and no additional plans for chemotherapy and radiation (6) have access to a computer or phone with internet and a camera, (7) state willingness to comply with all study procedures and be available for the duration of the study (10 months including on site study visits at Colorado State University or CU Anchutz). Participants were excluded if they: (1) showed current evidence of metastatic disease, (2) indicated current participation in greater than 150 minutes per week of moderate intensity PA, (3) had any known contraindications for exercise, or (4) were currently pregnant.

Study Procedures

Recruitment flyers were posted in the University of Colorado Cancer Center, the UC Health North Cancer Center, Rocky Mountain Oncology Society, and at cancer care clinics, and community locations in the Fort Collins Denver area. Study coordinators and clinic staff (oncologists, mid-level providers, nurse navigators), helped identify potentially eligible patients

(i.e., diagnosed with cancer of the colon or rectum, completed all surgical procedures, and received and completed chemo, and/or radiation therapy). All participants received a verbal explanation of the purpose, procedures, and potential risks of the study and their rights as a research participant. The University of Colorado Institutional Review Board (IRB#18-2436) approved this study. Participants were asked to read the document prior to signing and informed consent was obtained from all individual participants included in this study. Upon enrollment, participants were randomly assigned to either the PA intervention group or to a PA education control group for 12- weeks. Randomization was 1:1 and stratified by sex. Participants completed study questionnaires at baseline and 12-weeks, which included information regarding age, sex, BMI, cancer stage, cancer diagnosis, time since diagnosis, PA, and QOL (*See Figure 1*).

Exercise intervention

Participants in the intervention group received instructor-led group-based exercise sessions delivered in real-time via Zoom. Instructors were certified ACSM exercise physiologists and sessions were held twice a week for approximately one hour. Each session had about 3-5 participants in each cohort and included a five minute warm up, circuit-based aerobic and resistance training and a five minute cool down (See Table 1.1). The intervention also included PA behavior change discussion sessions on weeks 1, 4, 7, 9 and 12. Discussion sessions took place in the same groups, via zoom, and lasted about 30-60 minutes following the exercise sessions. These discussion sessions were planned content based on the Social Cognitive Theory and topics included PA maintenance, benefits of PA specific to CRC survivors, how to identify and overcome barriers to PA, and strategies for independent exercise (i.e., goal setting, self-monitoring) (Leach, 2023). (*See Table 1.1 and Table 1.2*)

Control condition

The control group was asked to continue their current level or program of exercise and were provided with an informational handout from the American Cancer Society describing exercise recommendations for cancer survivors. At the conclusion of the study the control group was offered compensation for participation in a community-based cancer-specific exercise program (i.e., Fit Cancer, Livestrong at the YMCA).

2.2 MEASURES

Quality of Life (QOL)

The primary outcome for this study, QOL, was measured using the Functional Assessment of Cancer Therapy – Colorectal (FACT-C) (Ward et al., 1999). The FACT-C is a widely used questionnaire assessing QOL concerns specific to CRC survivors and has been found to have a high internal consistency, concurrent validity, and reliability (Chandramohan et al., 2012). This self-reported measure consists of 36 items that includes approximately 5-7 questions on all four subscales of QOL (physical well-being, social well-being, emotional well-being, functional well-being) with the addition of nine colorectal specific questions for the Colorectal Cancer Subscale (CCS) (Ward et al., 1999). Each item is rated on a 5-point Likert scale with total scores ranging from 0 to 136, with a higher score for total and individual subscales indicating better QOL, to determine one's overall well-being. There are three composite scores which include: the FACT-C Trial Outcome Index (TOI) score, which only includes the CCS score and physical and functional wellbeing subscales, the FACT-G total score, where all subscales are totaled for a general score, not including the CCS subscale, and the FACT-C total score, which includes all subscales of QOL and the CCS subscale These three composite scores were used in order to determine improvements in QOL.

The FACT-C also has established minimal clinically important difference (MCID) (Webster et al., 2003). An MCID is the smallest change within a score that the patient would identify as important, that could then prompt change within the patient's treatment (Sedaghat, 2019). The MCID has been frequently used in clinical studies to quantify the degree of improvement in many

patient reported outcomes that present clinical significance (Yost et al., 2005). Established MCID's for the FACT-G are an increase of greater than or equal to 5 points for the total FACT-G score and greater than or equal to 2 points for each individual subscale. The recommended MCIDs for the FACT-C ranged from 2 to 3 points for the CCS, 4 to 6 points for the TOI subscale, and 5 to 8 points for the FACT-C total score (Webster et al., 2003).

Participant characteristics

All participant characteristics were measured at baseline and were used to examine differences between participants who achieved vs. did not achieve MCID in QOL. Body Mass Index was calculated using measured height and weight. Age, sex, and time since cancer diagnosis (in months) were self-reported. Exercise was also self-reported using the International Physical Activity Questionnaire (Craig et al., 2003). For participants in the intervention group, exercise session attendance was tracked by study staff.

2.3 STATISTICAL ANALYSIS

Descriptive statistics (mean, standard deviation, median or frequencies) were calculated for baseline QOL and participant characteristics.

Aim 1: Examine the magnitude of change in QOL from baseline to 12-weeks in the intervention and control group. A post hoc power calculation revealed that the intervention group (*N*=13), provides only 14% power to detect statistically significant differences within group differences based on alpha 0.05. Within our control group, a post hoc power calculation revealed only 5% power to detect differences and our total sample size (N=25), was only powered 9% to detect statistically significant differences between groups. Therefore, inferential statistics were not used, and instead, for Aim 1, within group magnitude of change (mean, standard deviation, and effect size) was calculated. Magnitude of change in total QOL and all subscales was quantified by mean change from baseline to 12-weeks (12-week minus baseline value). Cohen's d was used to quantify effect size. Cohen's d was determined by calculating the mean difference from pre to post intervention and dividing the result by the standard deviation.

Effect size was considered small if d=0.2-0.49, medium if d=0.5-0.79, or if d=0.8 or greater (Leppink et al., 2016). Only participants who completed the FACT-C at baseline and 12-weeks were included in the analyses.

Aim 2: Compare the proportion of participants who achieved the MCID for total QOL and each subscale between the intervention and control group. First, the change in total and subscale QOL scores were calculated by subtracting baseline from 12-week values. A dichotomous variable was created for total, physical, social, emotional, functional and TOI subscales based on the cut point for achieving the MCID (i.e., an increase of 2 points for subscales, 4 points for TOI, and 5 points for total score). Participants were classified as achieved MCID vs. did not achieve MCID separately for total QOL and each subscale. The proportion who achieved MCID for total QOL and each subscale was calculated using frequencies and compared between the intervention and control group using Fisher's Exact tests. As the proportions of participants who achieved an MCID versus the participants who did not, is a binary response, the test to compare proportions between groups with a small sample size is a fisher's exact test.

Exploratory Aim: Compare characteristics of all participants who achieved MCIDs and those who did not. Seven characteristics were examined and included: (1) age, (2) sex, (3) baseline body mass index (BMI), (4) exercise session attendance (intervention group only), (5) baseline PA (MET minutes/week), (6) times since diagnosis (months), and (7) baseline QOL (total score from FACT-C). For continuous variables (age, exercise session attendance (intervention group only), BMI, baseline QOL, baseline PA, and time since diagnosis) t-tests were run to determine significance, and for categorical variables (sex), chi square tests were run to determine significance.

CHAPTER 3

3.1 RESULTS

Demographics

Participants (*n*= 13 intervention, *n*=12 control) were mostly female (56%) and 61.2±11.7 years old, diagnosed with colon (64%), rectal (20%) or colorectal (16%) cancer. Detailed participant characteristics are shown in *(Table 2.1, 24).*

Aim 1. Magnitude of changes in QOL from baseline to 12-weeks

On average, total QOL increased by 3.22% following the intervention group [*MΔ*=+3.4 (SD=13.2), *d*=0.26] but decreased by 0.31% in the control [*MΔ*= -.33 (SD=11.3), *d*=.03] group. Similarly, TOI tended to increase by 4.16% following the intervention group [*MΔ*=+2.7 (SD=8.8), *d*=.31] but decreased by 0.12% in the control [*MΔ*= -.08 (SD=12.2) *d*=.007]. Within the individual subscales, scores increased by 0.67% in the physical well-being subscale within the control group [*MΔ*=+.16 (SD=2.37), *d*=.07] but decreased by 3.15% in the intervention group [*MΔ*=-.77 (SD=3.96), *d*=.19]. In the functional well-being subscale, scores increased by 14.33% in the intervention group [*MΔ*=+2.69 (SD=4.31), *d*=.63] but decreased by 6.77% in the control [*MΔ*= -1.58 (SD=8.55), *d*=.19]. Within the social well-being subscale, scores increased by 2.29% in the intervention group [*MΔ*=+46 (SD=4.18), *d*=.11] and but decreased by 0.33% in the control [*MΔ*=+.083 (SD=3.42), *d*=.02]. Within the emotional well-being subscale, scores increased by 1.11% in the intervention group [*MΔ*=+.2308 (SD=2.59), *d*=.09] but decreased in the control group by 1.58% [*MΔ*=-.33 (SD=2.15), *d*=.15]. Lastly, for the CRC subscale, scores increased by 3.60% in the intervention group [*MΔ*=+.77 SD=3.47, *d*=.17] and increased by 7.09% in the control group [*MΔ*=+.1.33 SD=7.02, *d*=0.24] (*See Table 3.1 and 3.2*). As for effect size or Cohen's D, within total QOL in the intervention group, Cohen's D was 0.26 indicating a small effect, within the TOI subscale the intervention group reported a Cohen's D of .31 indicating a small effect, within the CRC subcale the control group reported a Cohen's D of .24

indicating another small effect, and lastly, within the functional well-being subscale, the intervention group reported a Cohen's D of .63 indicating a moderate effect *(See Table 3.1).*

Aim 2. Proportion of participants who achieved an MCID.

Established MCID's for the FACT-C are an increase of ≥5 points for total QOL and ≥2 points for subscales and ≥ 4 points for the TOI subscale (Webster et al., 2003). Among intervention participants, proportions who achieved MCID was 23.1% for total QOL, 46.2% for TOI, and 15.4% for the physical, 38.5% functional, 23.1% social, 15.4 % emotional, and 30.8% for CRC subscales. Among control participants, 41.7% achieved the MCID for total QOL, 33.3% for TOI, and 33.3% for the physical, 25.0% functional, 41.7% social wellbeing, 16.7% emotional, and 25.0% for CRC subscales (*See Figures 2.1-2.9*). The fisher's exact test revealed that there were no significant differences between the intervention and control groups in terms of who achieved an MCID and who did not for any measures of QOL: total QOL (p=.411), TOI subscale (p=.688), emotional subscale (p=1.00), social subscale (p=.411), functional subscale (p=.673) or physical subscale (p=.378) (*See Table 4).*

Exploratory Aim: Characteristics of participants who achieved MCIDs and those who did not.

Since there were no differences in proportions of participants who achieved MCID in the intervention versus the control, participants were combined (N=25) to explore differences in characteristics among those who achieved an MCID versus those who did not for total QOL, TOI, and each subscale. There were no significant differences in participant characteristics between those who achieved a MCID in QOL and those who did not, with the exception of body mass index (BMI) and baseline QOL subscale scores for the physical well-being subscale and baseline QOL subscale scores for the emotional well-being subscale. Participants who achieved a MCID in physical well-being subscale had a higher BMI ($\bar{x}$= 33.80 kg/m2) than those who did not ($\bar{x}$= 27.21 kg/m2) (p=.014). Participants who achieved an MCID in the physical well-being subscale had lower baseline physical well-being subscale scores ($\bar{x}$= 20.71) than those who did not achieve an MCID ($\bar{x}$= 25.44) **(**p=.052). Within the emotional well-being subscale, baseline

emotional well-being scores were lower in those who achieved an MCID ($\bar{x}$= 16.00) than those who did not achieve an MCID ($\bar{x}$= 22.00) (p= <.001). This was also shown in the CRC subcale, that those with lower baseline CRC scores ($\bar{x}$=14.33) were more likely to achieve an MCID than those who did not ($\bar{x}$= 21.95) (p= <.001).

Other participant characteristics that showed trends toward differences between those achieving vs. not achieving MCID were age for the TOI, functional and emotional well-being subscales (lower age among those who achieved MCID) (See *Tables 5.1-5.7*). In addition, for those who achieved MCID for TOI and functional well-being tended to have lower baseline scores (See *Tables 5.1-5.7*).

CHAPTER 4

4.1 DISCUSSION

The purpose of this study was to examine the magnitude of change in QOL following a videoconference exercise intervention in CRC survivors, identify the proportion of participants who achieved an MCID in QOL, and explore the characteristics of those who achieved an MCID and those who did not. We observed a small magnitude of improvement in total QOL, the TOI subscale and functional, social, and emotional well-being subscale for the intervention group compared to the control group. Among intervention participants, proportions who achieved MCID was 23.1% for total QOL, 46.2% for TOI, and 15.4% for the physical, 38.5% functional, 23.1% social, and 15.4 % emotional subscales. Among control participants, 41.7% achieved the MCID for total QOL, 33.3% for TOI, and 33.3% for the physical, 25.0% functional, 41.7% social wellbeing, and 16.7% emotional subscales. However, these proportions were not statistically different. Finally, results suggested some potential differences between those who achieved QOL MCID's and those who didn't, including BMI, age and baseline values.

For Aim 1, there may be several possible reasons for the overall small improvements in QOL following the intervention, similar to (Chan et al., 2022). One explanation is the relatively high scores of QOL at baseline. Within the intervention group, the maximum score one can acheieve on total QOL is 136 and baseline total QOL scores were 105. In the TOI subscale, the maximum score one can achieve is an 84 and baseline scores within the participants in the intervention group was 64.69. The highest score one can achieve on individual subscales is a 28 and average scores amoung intervention participants were: 24.46 for physical, 18.85 for functional, 19.62 for social, 20.69 for emotional and 21.38 for the CRC subscale. The control group participants had higher baseline total QOL and TOI subscale scores than the intervention group, which could be reasoning as to why there was no improvement in total QOL or TOI subscale scores at all. The average baseline score within the control group participants for total QOL was 110.42 and in the TOI subscale the average score was 65.83. Subscale scores for

control group included: 23.75 for physical, 23.33 for functional, 23.67 for social, 20.92 for emotional and 18.75 for CRC subscale. Similar results were shown in other studies like (Chan et al., 2022) where small improvements in QOL were observed in the intervention group, but little to no change was observed in the control group. Baseline QOL scores within (Chan et al., 2022) study were similar to participants in our intervention. With a small sample size and high baseline QOL scores, participants may already have achieved near maximum benefits in QOL from physical activity prior to enrollment, which would minimize any observed effect of our TACTICS intervention on QOL. This would be considered a ceiling effect, as a large percentage of participants score near the upper limit, or the "ceiling" of a survey or questionnaire which causes the measurement to lose value (Liu & Wang, 2021).

Another notable point to discuss would be the reason as to why the intervention group saw a decrease in the mean change of scores from pre to post (*See Table 3.1*). As the intervention group received the full 12-week exercise intervention, this decrease in physical well-being scores was not something we expected to see. When taking a look at the FACT-C QOL physical well-being subscale questions, these questions ask participants about their fatigue, pain, energy, and time spent in bed. These questions within the physical well-being subscale, and other subscales, are not regarding an exercise intervention. The FACT-C QOL questionnaire was not designed to measure QOL in regards to exercise, the FACT-C is simply a questionnaire made specifically for CRC survivors to measure all four domains of QOL and total QOL. These questions are general, therefore, if participants are feeling fatigued or more pain than usual, we cannot conclude that it is from the exercise intervention. Some other QOL measures that might be more responsive to exercise given the multifaced nature of QOL could include: McGill QOL Questionnaire (Cohen et al., 2019), Health-Related QOL Questionnaire (CDC, 2000), the World Health Organization QOL Instrument (WHO, 2012) and the SF-36 Questionnaire (RAND, 1992).

As for effect size or Cohen's D, the intervention group reported a 0.26 effect size within total QOL, a 0.31 effect size within the TOI subscale and a 0.63 effect size in the functional wellbeing subscale, indicating a moderate effect. This suggests that our 12-week exercise intervention (including both aerobic and resistance training) had a small effect on the intervention group participant's total QOL and TOI subscale and a moderate effect on functional wellbeing. Similar findings were shown within (Martínez-Vizcaíno et al., 2023) systematic review, where in a face-to-face combined aerobic and resistance training exercise intervention, results showed a moderate effect for QOL measured by cancer-specific questionnaires (Cohen's D= 0.57 to 0.67). Therefore, suggesting that individuals living with or beyond colorectal cancer may elicit benefits to their QOL from aerobic and resistance training. Within a distance-based PA intervention amoung cancer survivors, (Groen et al., 2018), study showed a small effect size (Cohen's D= .21) for improving QOL. These findings are similar to our study as both small and moderate effect sizes were found when measuring QOL improvements.

In addition to magnitude of change, we also examined the proportion of participants in the intervention and control groups who achieved a clinically meaningful change (i.e., MCID) in QOL. Within intervention participants, proportions who achieved MCID were 23.1% (total QOL), 46.2% (TOI), 15.4% (physical), 38.5% (functional), 23.1% (social), and 15.4 % (emotional). Among control participants, 41.7% achieved the MCID for total QOL, 33.3% (TOI), and 33.3% (physical), 25.0% (functional), 41.7% (social), and 16.7% (emotional), and these differences were not statistically different. One explanation for the lack of significant differences in proportions between groups in our results (ie. similar proportions achieving MCID in both the intervention and control groups) may be attributed to the fact that most baseline QOL and subscale scores were not statistically significant at baseline. For example, baseline total QOL for the intervention group averaged to 105.0 out of a possible 136 and average baseline total QOL for the control group averaged to 110.42. Another example within subscale scores was social wellbeing, intervention group averaged 20.80 out of a possible 28 and control group was

a 20.69 (*See Table 2.1*). Our results are similar to (Chan et al., 2022) as between-group comparisons were not statistically significant. However, in Table 2.2, we see that functional well-being baseline scores were statistically different between the intervention and control group (p=.046). Baseline functional well-being scores were higher in the control group, compared to the intervention group. These differences may suggest that baseline QOL scores may be more predictive of those who achieved an MCID compared to those who did not, rather than being a result of the intervention itself. Another possible explanation for the lack of significant differences in proportions could be due to the fact that some participants in the control group increased their PA even though they only received PA recommendations. Control participants could have independently devised their own physical activities routines, incorporating activities they enjoyed, which in turn motivated them to maintain these habits, this is also known as intrinsic motivation (Durosini et al., 2021). This could potentially explain why these participants achieved MCIDs within QOL, as they independently developed physical activity routines and acquired self-sustaining exercise habits that are specific and enjoyable to themselves.

This study also explored differences in characteristics between participants who achieved the MCID for QOL and those who did not. One characteristic that reached statistical significance was BMI, which was higher among those who achieved the MCID for the physical well-being subscale (p= .014) (*See table 5.3*). The average BMI for those who achieved the MCID in the physical well-being scale was 33.80 kg/m2 vs. 27.21 kg/m2 for those who did not. Of the seven participants who achieved an MCID in the physical well-being scale, their individual BMIs were all categorized as overweight or obese. It is reasonable to infer that individuals with higher BMIs are achieving an MCID in the physical well-being subscale, because as they engage in physical activity, they experience improvements in metabolic health (Misiąg et al., 2022). For example, this includes better regulation of blood sugar levels, resulting in increased energy and reduced time spent in bed. While previous research has indicated that individuals with lower BMIs have reported higher perceived QOL (Stephenson et al., 2009), it's

important to note that this finding was limited to perceived QOL and did not consider the influence of a physical activity intervention. In the context of our intervention, individuals with higher BMIs might have achieved an MCID in the physical well-being subscale as it could be attributed to their perception of making positive changes to their physical health as a result of the program.

Our results had also found that baseline CRC subscale scores (p=<.001), baseline emotional wellbeing scores (p=<.001), and baseline physical well-being subscale scores (p=.052) were statistically significant. These data show that those who had lower baseline QOL scores in these subscales, were more likely to achieve an MCID than those with higher baseline QOL scores. As previously mentioned, these baseline QOL scores may be indicative of seeing improvements in QOL, rather than a direct effect of the intervention itself. Future studies should look at CRC survivors with lower baseline QOL scores to determine improvements in QOL following an exercise intervention.

There are other characteristics that did not show statistical significance, but showed trends toward differences among those who achieved vs. did not achieve MCID for QOL. For example, those who achieved an MCID for functional well-being, TOI and emotional well-being tended to be younger. Compared to younger adults, older adults are at a higher risk for adverse effects from anticancer therapies, such as chemotherapy and radiation, as well as functional impairments (Nightingale et al., 2021). As also indicated in current research (Patel et al., 2022), patients with early onset disease have more favorable survival rates and reduced recurrence rates, which may lead to a higher perception of quality of life. In addition, baseline TOI and functional well-being scores tended to be lower among those who achieved the MCID for those subscales. These findings are likely attributed to a ceiling effect, where those who have lower scores of QOL at baseline have more room to improve.

4.2 STRENGTHS AND LIMITATIONS

One notable strength of this study is novel examination of the effect of a videoconference delivered exercise intervention to improve QOL among CRC survivors. To our knowledge, there are currently no studies that have examined the effect of a videoconference intervention on QOL in CRC survivors. Through a videoconference exercise intervention, participants received real time feedback on how to safely perform exercises and how to use equipment. This may have positive implications for increasing physical and functional well-being subscales of QOL. The use of videoconference technology allowed for interaction with the instructor, as well as other CRC survivors, increasing group cohesion and highlighting social and emotional well-being dimensions of QOL. Our intervention aimed to target all domains of QOL.

Another strength of our study included the use of a minimal clinically important difference (MCID). Within a meta-analysis of exercise interventions for cancer survivors and QOL outcomes,(Ferrer et al., 2011), not one study included used established MCIDs for the FACT-G (Functional Assessment for Cancer Therapy General). In a systematic review and meta-analysis looking specifically at colorectal cancer survivors and QOL following an exercise intervention, (Gao et al., 2020), studies used the FACT-C to measure QOL, but did not look at the previously established MCID's. As these MCID's are already established within the FACT-C, the MCID can be another way to look at and see clinically meaningful improvements in QOL.

The most significant limitation to our study was the relatively high levels of QOL among participants at enrollment. This limitation is similar to findings in current literature (Chan et al., 2022; Courneya et al., 2016). Future studies should look at targeting CRC survivors with lower QOL scores at baseline, however, future studies should also look at other measures of QOL. As the FACT-C is for CRC survivors specifically and has been found to have a high internal consistency concurrent validity and reliability, the questions are not designed in regard to exercise. Therefore, results from the FACT-C QOL measure may reflect experiences outside

and separate from the exercise intervention itself. There may be other QOL measures that might be more responsive to exercise given the multifaced nature of QOL.

4.3 FUTURE DIRECTIONS

It is widely recognized that exercise can improve QOL within CRC survivors (Choy et al., 2022; Kim et al., 2019; Lynch et al., 2016). However, future studies examining the impact of a videoconference exercise intervention should target a larger sample size of CRC survivors who have low QOL scores at enrollment. As many participants came into the program with high scores of QOL at baseline, there was only little room for improvement. Pre-program screening should include the FACT-C QOL questionnaire to target CRC survivors with low QOL at enrollment.

4.4 CONCLUSION

In this pilot randomized control trial, we observed small improvements in QOL within CRC survivors. There were no statistically significant differences in achieving clinically relevant improvements in QOL between intervention and control group participants. There were also no significant differences in participant characteristics between those who achieved a MCID in QOL and those who did not, with the exception of body mass index (BMI) and baseline QOL subscale scores for the physical emotional and CRC subscale. Larger randomized studies are needed to definitively determine if a videoconference exercise intervention can elicit clinically relevant improvements in QOL compared to a control group.

TABLES AND FIGURES

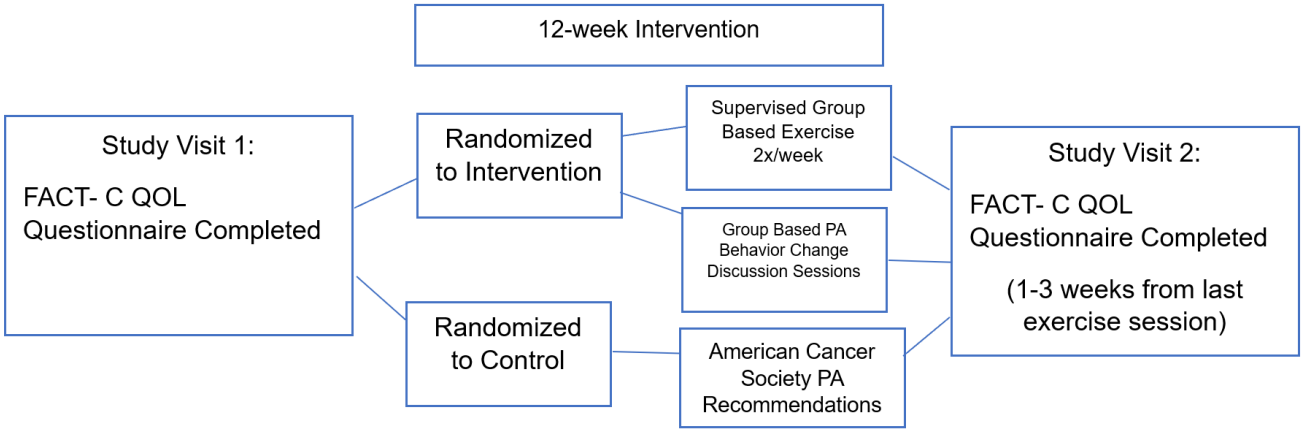


Figure 1.

Table 1. 1 Exercise Session Example

Activity	Example Exercises	Time
Warm Up	• Aerobic full body movements • Dynamic stretching	• 5 minutes
Circuit 1: Aerobic Exercise	• Marching • Shuffle • Hamstring Curl • Jumping/step Jacks	• 45 seconds per exercise • 15 seconds rest between exercises • Repeat 3 times
Circuit 2: Upper Body Resistance Exercise	• Bicep Curls • Upright Banded Rows	• 1 minute per exercise • 15 seconds rest between exercises • Repeat 3 times
Circuit 3: Lower Body Resistance Exercise	• Calf Raises • Lateral Band Walk	• 45 seconds per exercise • 15 seconds rest between exercises • Repeat 3 times
Circuit 4: Aerobic Exercise	• Marching • Shuffle • Hamstring Curl • Jumping/step Jacks	• 1 minute per exercise • 15 seconds rest between exercises • Repeat 3 times
Cool Down	• Balance • Core strengthening • Static stretching	• 5-minutes

Table 1. 2 Discussion Session Example

	Behavior Change Techniques	Discussion Topics/Strategies
Session 1 (Week 1)	- Goal setting (behavior) - Social Support - Action Planning - Self-Monitoring of behavior - Generalization of target behavior	- Introductions and motivation for joining exercise program. - Group identity (create "Team" name). - Identify short (i.e., during intervention) and long-term PA goals. - Specify the frequency, duration, intensity, type and location/context of PA to reach goals. - Instructions on how to track activity and provide written logs for activity tracking
Session 2 (Week 4)	- Credible source - Instruction on how to perform behavior	- Information about aerobic and resistance exercise, and appropriate Frequency, Intensity, Time and Type.
Session 3 (Week 7)	- Credible source - Social support	- Information about the benefits of exercise for colorectal cancer survivors, with references to peer-reviewed literature - Group identity (custom apparel with Team name)
Session 4 (Week 9)	- Problem Solving	- Identify barriers to exercise. - Identify and discuss strategies for overcoming barriers. - Discuss additional strategies for independent exercise
Session 5 (Week 12)	- Review Behavior Goals - Feedback on behavior - Generalization of target behavior - Social support	- Review PA goals with instructor, update/revise. - Community resources for exercise - Ideas for maintaining social connections (e.g., Facebook, signing up for a virtual event together, other ways to stay in touch with group members).

[a]Behavior Change Technique(s) derived from Michie S, Richardson M, Johnston M, Abraham C, Francis J, Hardeman W, Eccles MP, Cane J, Wood CE. The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behavior change interventions. *Ann Behav Med*. 2013 Aug;46(1):81-95.

Table 2. 2 Baseline Participant Characteristics

	Total Sample (N=25)	**Intervention (n= 13)**	**Control (n= 12)**	**p-value**
		Mean ± Standard Deviation		
Age	61.16±11.67	58.85±10.92	63.67±12.43	.334
BMI	29.05±5.80 (18.93-41.59)	28.48±5.16	29.67±6.61	.624
Time since completing treatment (months)				
Chemotherapy	18.26±15.95	15.22±12.62	21.59± 19.01	.362
Radiation	27.3±15.44	25.17±15.88	30.81± 17.33	.670
Sex		***N (%)***		.581
Female	11 (44%)	8 (61.5%)	6 (50%)	
Male	14 (56%)	5 (38.5%)	6 (50%)	
Cancer Type				
Colon	16 (64%)	8 (61%)	8 (67%)	.800
Rectal	5 (20%)	4 (31%)	1 (8%)	.169
Colorectal	4 (16%)	1 (8%)	3 (25%)	.268
Stage		***N (%)***		.306
II	8 (32%)	6 (46%)	2 (17%)	
III	16 (64%)	7 (54%)	9 (75%)	
Unsure	1 (4%)	0 (0%)	1 (8%)	
Baseline Physical Activity (MET mins/week)	2,247.80±2,309.37	1490.23±1769.42	3,068.50± 2,609.13	.095
Exercise Session Attendance (Intervention Only)		20.62±3.96		
QOL Measures:		***Mean ± Standard Deviation***		
Total QOL	107.60±19.01	105.0±21.70	110.42±16.07	.483

TOI Subscale	67.28±14.07	64.69±13.02	65.83±10.93	.814
Physical Well-Being	24.12±3.91	24.46±2.90	23.75±4.88	.667
Functional Well-Being	21.00±5.72	18.85±6.71	23.33 ±3.28	**.046**
Social Well-Being	21.56±5.69	19.62 ±6.51	23.67±3.90	.071
Emotional Well-Being	20.80±3.23	20.69±3.52	20.92±3.03	.866
CRC Subscale	20.12±4.99	21.38±4.44	18.75±5.36	.197

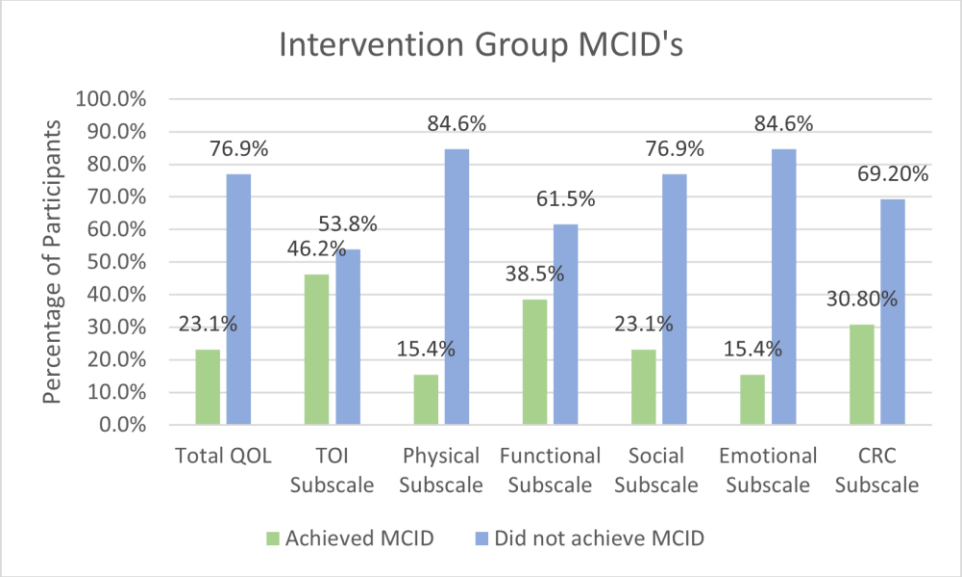


Figure 2. 1

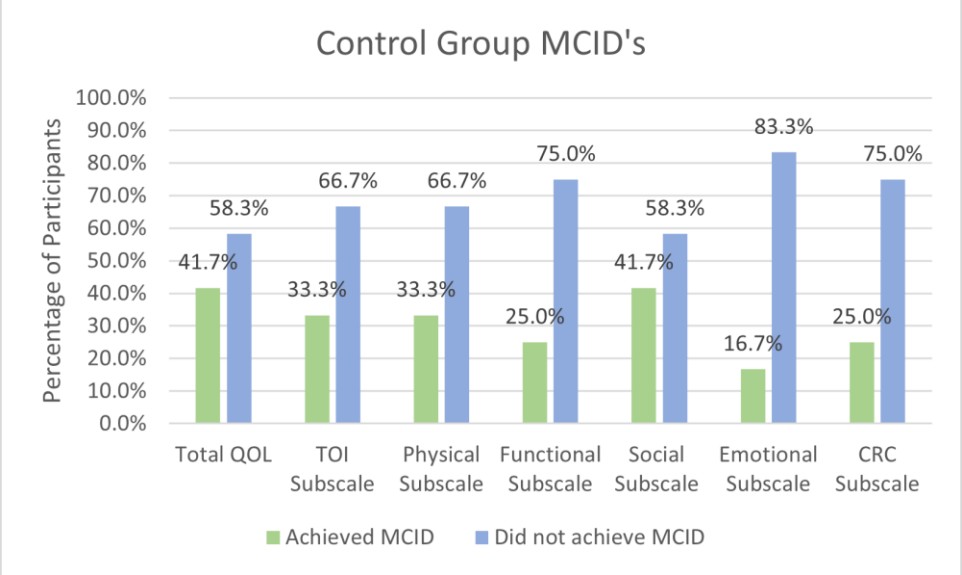
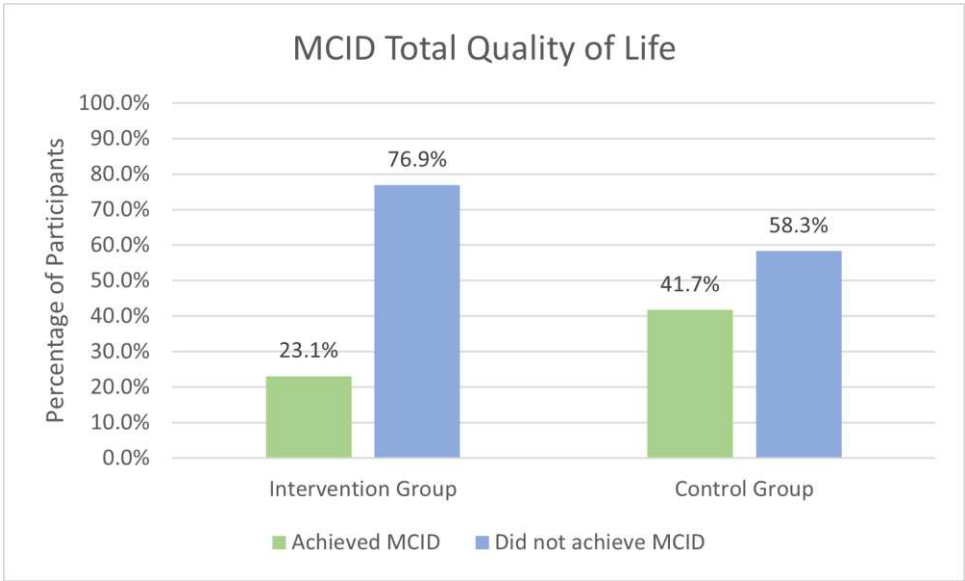


Figure 2. 2



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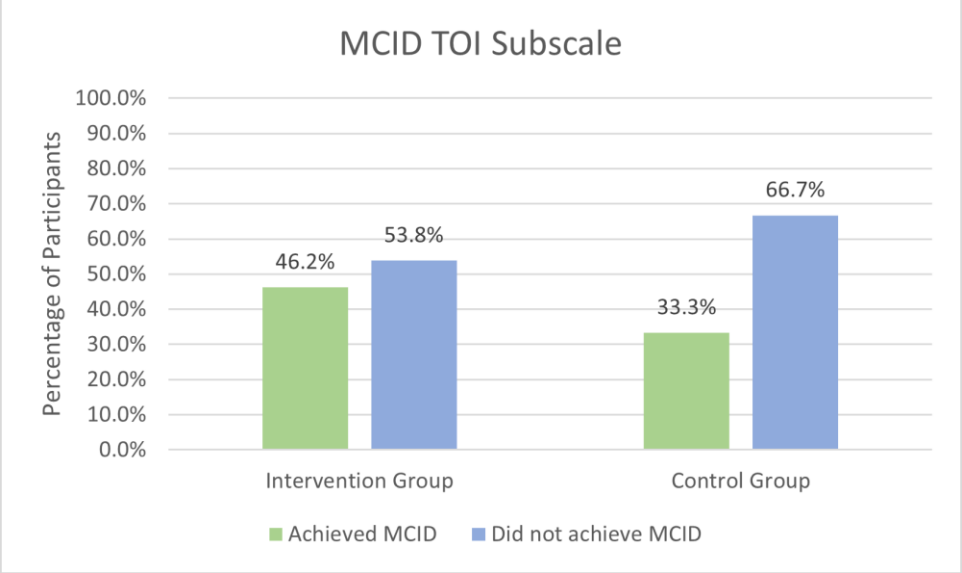

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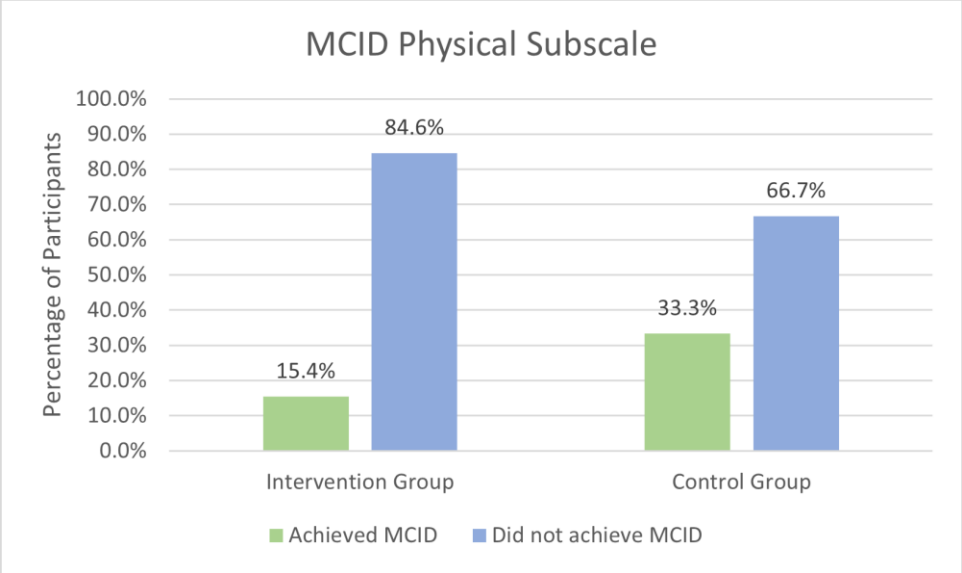

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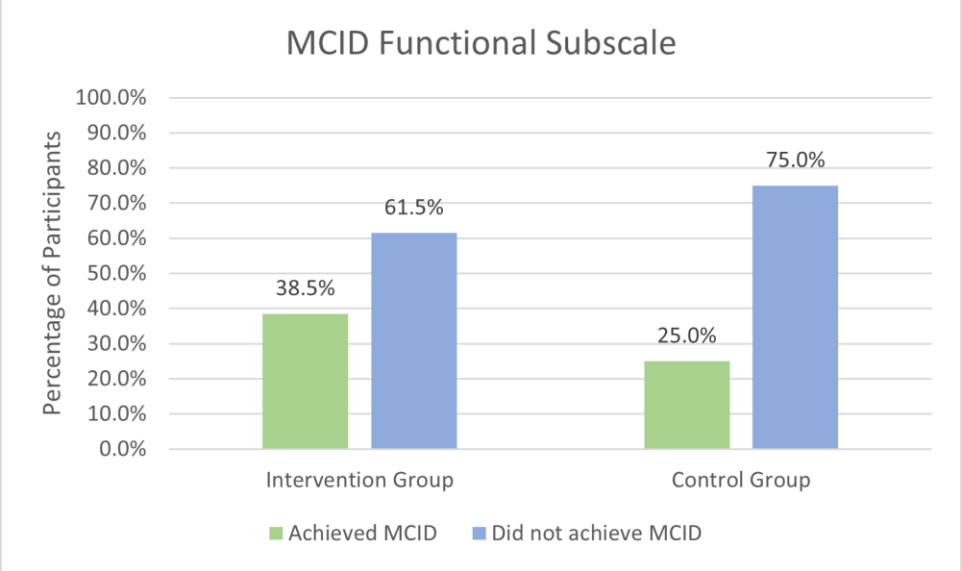

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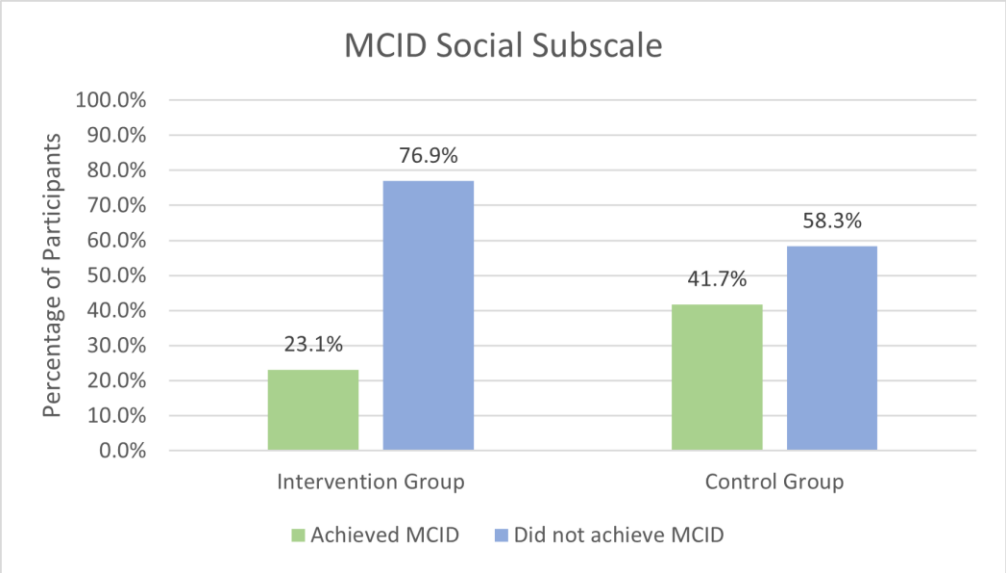

Figure 2. 7

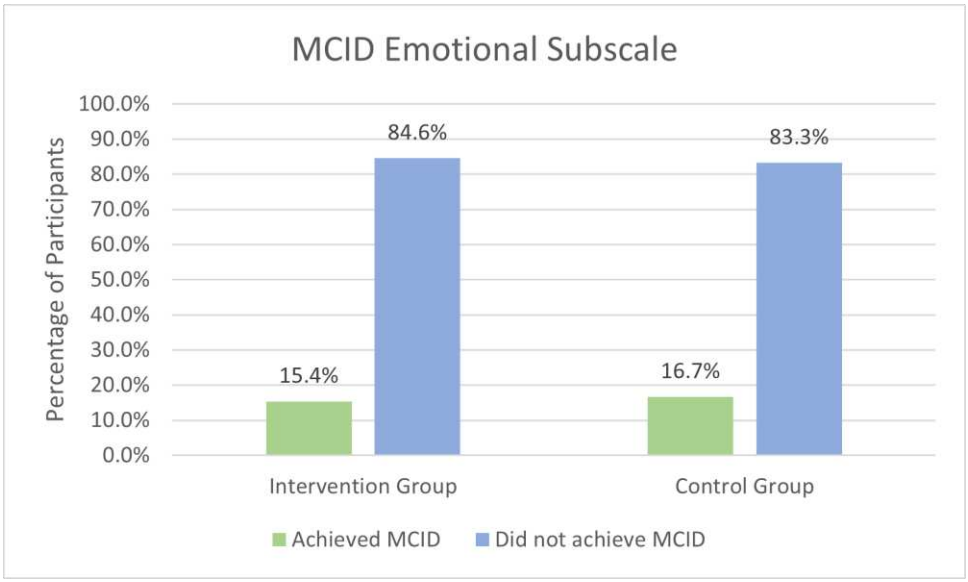

Figure 2. 8

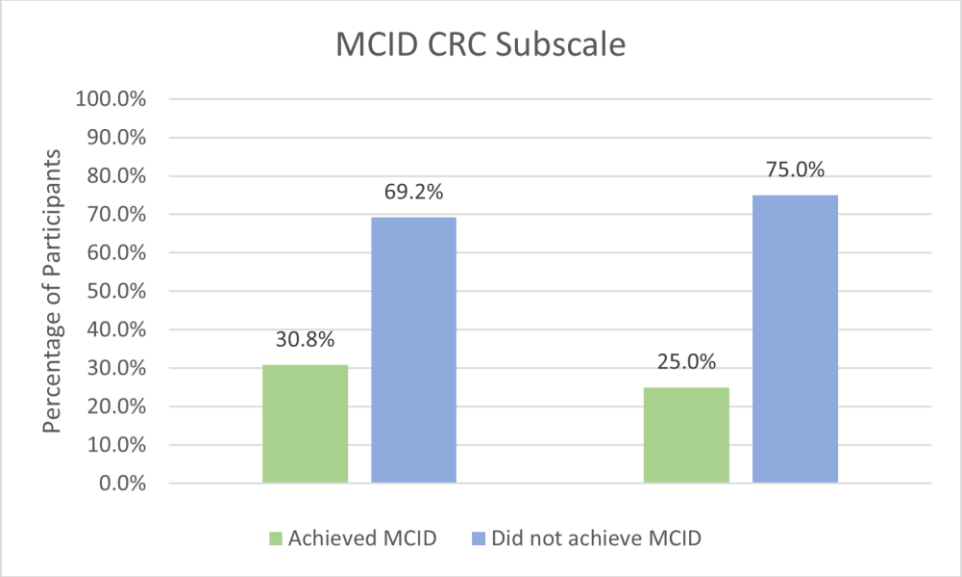
MCID CRC Subscale
Percentage of Participants
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
30.8%
69.2%
25.0%
75.0%
Achieved MCID
Did not achieve MCID

Figure 2. 9

Table 3. 1 Mean Change and Effect Size for Total QOL and Subscales

	***Mean Change* ± Standard Deviation**	***Cohen's D***
Total Quality of Life		
Intervention Group	MΔ=+3.38 ± 13.16	0.26
Control Group	MΔ= -.33 ±11.3	.03
Trial Outcome Index		
Intervention Group	MΔ=+2.7 ± 8.8	.31
Control Group	MΔ= -.08 ± 12.2	.007
Physical Well-Being Subscale		
Intervention Group	MΔ=-.77 ± 3.96	-.19
Control Group	MΔ=.16 ± 2.37	.07
Functional Well-Being Subscale		
Intervention Group	MΔ= +2.69 ± 4.31	.63
Control Group	MΔ=-1.58 ± 8.55	-.19
Social Well-Being Subscale		
Intervention Group	MΔ=+.46 ± 4.18	.11
Control Group	MΔ= .083 ± 3.42	.02
Emotional Well-Being Subscale		
Intervention Group	MΔ=+.2308 ± 2.59	.09
Control Group	MΔ= -.33 ± 2.15	-.155
CRC Subscale		
Intervention Group	MΔ= .7692 ± 3.47	0.17
Control Group	MΔ= 1.33 ± 7.02	0.24

Table 3. 2 Percent Change for Total QOL and Subscales

	***Mean* ± Standard Deviation** (Pre)	***Mean* ± Standard Deviation** (Post)	***Percent Change***
Total Quality of Life			
Intervention Group	M= 105.00 ± 21.70	M= 108.38 ± 15.37	+3.22%
Control Group	M= 110.42 ± 16.07	M= 110.08 ± 15.65	- 0.31%
Trial Outcome Index			
Intervention Group	M= 64.69 ± 13.02	M= 67.38 ± 11.85	+4.16%
Control Group	M= 65.83 ± 10.93	M= 65.75 ± 13.73	-0.12%
Physical Well-Being Subscale			
Intervention Group	M= 24.46 ± 2.90	M= 23.69 ± 4.25	-3.15%
Control Group	M= 23.75 ± 4.88	M= 23.91 ± 4.81	+0.67%
Functional Well-Being Subscale			
Intervention Group	M= 18.84 ± 6.71	M= 21.54 ± 4.57	+14.33%
Control Group	M= 23.33 ± 3.28	M= 21.75 ± 7.98	-6.77%
Social Well-Being Subscale			
Intervention Group	M=19.62 ± 6.51	M= 20.07 ± 4.27	+2.29%
Control Group	M= 23.67 ± 3.89	M= 23.75 ± 3.14	-0.33%
Emotional Well-Being Subscale			
Intervention Group	M= 20.69 ± 3.52	M= 20.92 ± 2.32	+1.11%
Control Group	M= 20.91 ± 3.03	M= 20.58 ± 3.12	-1.58%
CRC Subscale			
Intervention Group	M=21.38± 4.44	M= 22.15 ± 4.25	+3.60%
Control Group	M= 18.75 ± 5.36	M= 20.08 ± 5.25	+7.09%

Table 4. 1 Difference of MCID's Between Groups:

		Achieved an MCID (n=), %	***Did Not Achieve MCID (n=), %***	***p-value***
Total QOL	Intervention	3, 23.1%	10, 76.9%	.411
	Control	5, 41.7%	7, 58.3%	
TOI Subscale	Intervention	6, 46.2%	7, 53.8%	.688
	Control	4, 33.3%	8, 66.7%	
Physical Well-Being Subscale	Intervention	2, 15.4%	11, 84.6%	.378
	Control	4, 33.3%	8, 66.7%	
Functional Well-Being Subscale	Intervention	5, 38.5%	8, 61.5%	.673
	Control	3, 25%	9, 75%	
Social Well-Being Subscale	Intervention	3, 23.1%	10, 76.9%	.411
	Control	5, 41.7%	7, 58.3%	
Emotional Well-Being Subscale	Intervention	2, 15.4%	11, 84.6%	1.000
	Control	2, 16.7%	10, 83.3%	
CRC Subscale	Intervention	4, 30.8%	9 69.2%	1.000
	Control	3, 25.0%	9, 75.0%	

*p-values is based off fischer's exact test comparing proportions between intervention and control group. MCID=minimal clincally important difference.

Table 5. 1: Comparing MCID Characterisitics: Total QOL

Total QOL	***Achieved MCID n= 9***	***Did Not Achieve MCID n= 16***	***p-value***
Age (years)	61.33 ± 10.38	61.20 ± 12.78	.976
Sex			
% male	27.3%	72.7%	.677
% female	42.9%	57.1%	
Baseline Body Mass Index (kg/m2)	28.17 ± 6.15	29.56 ± 5.74	.586
Exercise Session Attendance (out of 24 sessions, intervention group only)	(n= 4) 19.75 ± 6.50	(n= 9) 21.00 ± 2.69	.732
Baseline PA (MET mins/week)	1643.00 ± 2050.74	2588.00 ± 2438.69	.315
Time Since Diagnosis (months)	28.31 ± 20.87	18.96 ± 11.14	.239
Baseline QOL (FACT-C)	98.33 ± 21.76	112.81 ± 15.66	.103

Table 5. 2: Comparing MCID Characterisitics: TOI Subscale

TOI Subscale	***Achieved MCID n= 8***	***Did Not Achieve MCID n= 17***	***p-value***
Age (years)	55.75 ± 9.48	63.82 ± 12.06	.087
Sex			
% male	27.3%	72.7%	.695
% female	35.7%	64.3%	
Baseline Body Mass Index (kg/m2)	31.59 ± 7.26	27.86 ± 4.76	.215
Exercise Session Attendance (out of 24 sessions, intervention group only)	(n= 4) 18.75 ± 5.97	(n= 9) 21.44 ± 2.79	.442
Baseline PA (MET mins/week)	1484.75 ± 2056.97	2606.88 ± 2391.77	.245
Time Since Diagnosis (months)	23.40 ± 18.56	21.81 ± 14.63	.836
Baseline QOL (TOI Subscale)	60.50 ± 10.31	70.47 ± 14.72	.065

Table 5. 3: Comparing MCID Characterisitics: Physical Well-Being Subscale

Physical Well-Being	***Achieved MCID n= 7***	***Did Not Achieve MCID n=18***	***p-value***
Age (years)	58.28 ± 11.25	62.39 ± 12.05	.438
Sex			
% male	18.2%	81.8%	.407
% female	35.7%	64.3%	
Baseline Body Mass Index (kg/m2)	33.80 ± 5.06	27.21 ± 5.06	**.014 ***
Exercise Session Attendance (out of 24 sessions, intervention group only)	(n= 3) 18.33 ± 7.23	(n=10) 21.30 ± 2.70	.553
Baseline PA (MET mins/week)	3427.57 ± 2384.78	1789.00 ± 2173.94	.145
Time Since Diagnosis (months)	26.57 ± 14.43	20.67 ± 16.14	.393
Baseline QOL (Physical Well-Being Subscale)	20.71 ± 5.15	25.44 ± 2.36	**.052***

Table 5. 4: Comparing MCID Characterisitics: Functional Well-Being Subscale

Functional Well-Being	***Achieved MCID n= 7***	***Did Not Achieve MCID n= 18***	***p-value***
Age (years)	55.29 ± 7.99	63.56 ± 12.33	.065
Sex			
% male	36.4%	63.6%	.656
% female	21.4%	78.6%	
Baseline Body Mass Index (kg/m2)	29.31 ± 6.65	28.96 ± 5.65	.903
Exercise Session Attendance (out of 24 sessions, intervention group only)	19.00 ± 6.22	21.33 ± 2.69	.516
Baseline PA (MET mins/week)	2287.00 ± 2669.614	2232.56 ± 2238.972	.963
Time Since Diagnosis (months)	22.16 ± 16.76	22.38 ± 15.65	.976
Baseline QOL (Functional Well-Being Subscale)	17.00 ± 6.22	22.56 ± 4.83	.062

Table 5. 5: Comparing MCID Characterisitics: Social Well-Being Subscale

Social Well-Being	***Achieved MCID n= 8***	***Did Not Achieve MCID n= 17***	***p-value***
Age (years)	61.00 ± 15.42	61.35 ± 10.15	.954
Sex			
% male	36.3%	63.6%	1.00
% female	28.6%	71.4%	
Baseline Body Mass Index (kg/m2)	29.98 ± 4.89	28.62 ± 6.27	.563
Exercise Session Attendance (out of 24 sessions, intervention group only)	(n= 3) 16.33 ± 6.51	(n= 10) 21.90 ± 1.91	.275
Baseline PA (MET mins/week)	3518.63 ± 2968.35	1649.76 ± 1719.72	.131
Time Since Diagnosis (months)	20.11 ± 15.38	23.37 ± 16.08	.634
Baseline QOL (Social Well-Being Subscale)	18.63 ± 7.05	22.94 ± 4.53	.145

Table 5. 6: Comparing MCID Characterisitics: Emotional Well-Being Subscale

Emotional Well-Being	***Achieved MCID n= 5***	***Did Not Achieve MCID n= 20***	***p-value***
Age (years)	53.80 ± 8.93	63.10 ± 11.80	.088
Sex			
% male	18.2%	81.8%	1.00
% female	21.4%	78.6%	
Baseline Body Mass Index (kg/m2)	30.97 ± 3.34	28.58 ± 6.24	.264
Exercise Session Attendance (out of 24 sessions, intervention group only)	(n= 3) 16.33 ± 6.51	(n= 10) 21.90 ± 1.91	.275
Baseline PA (MET mins/week)	1558.00 ± 1242.189	2420.25 ± 2501.06	.293
Time Since Diagnosis (months)	24.22 ± 16.57	21.85 ± 15.78	.782
Baseline QOL (Emotional Well-Being Subscale)	16.00 ± 2.74	22.00 ± 2.00	**<.001 ***

Table 5. 7: Comparing MCID Characterisitics: CRC Subscale

CRC Subscale	***Achieved MCID n= 6***	***Did Not Achieve MCID n= 19***	***p-value***
Age (years)	59.00 ± 12.71	61.94 ± 11.70	.628
Sex			
% male	10%	90%	.180
% female	36%	64%	
Baseline Body Mass Index (kg/m2)	30.78 ± 5.48	28.51 ± 5.93	.410
Exercise Session Attendance (out of 24 sessions, intervention group only)	(n=3) 17.67 ± 6.81	(n=10) 21.50 ± 2.64	.433
Baseline PA (MET mins/week)	1361.17 ± 2786.75	2527.79 ± 2146.84	.378
Time Since Diagnosis (months)	28.10 ± 21.15	20.49 ± 13.64	.438
Baseline QOL (CRC Subscale)	14.33 ± 3.32	21.95 ± 3.92	**<.001**

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