

FEASIBILITY OF COGNITIVELY-BASED COMPASSION TRAINING TO IMPROVE HEALTH
RELATED QUALITY OF LIFE IN SOLID TUMOR CANCER SURVIVORS AND THEIR
INFORMAL CAREGIVERS

By

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Abstract

While survival rates of solid tumor cancers have increased, the health-related quality of life (HRQOL) of cancer survivor's post-treatment remains problematic. HRQOL in survivors is significantly lower compared to the general population. Relevant for this problem is that survivors' HRQOL is interconnected with the HRQOL of their informal caregivers. Caregivers provide support, and their health is important for the well-being of survivors. Most wellness interventions focus on survivors, and few studies focus on both parties. This study investigated the feasibility of a meditation-based intervention for survivors and caregivers. Cognitively-Based Compassion Training (CBCT®) is an eight-week intervention that teaches compassion and empathy towards self and others. Sixteen solid tumor cancer survivor-informal caregiver dyads were randomly assigned to undergo CBCT or a control. Participants completed HRQOL questionnaires before and after the intervention. We predicted that CBCT would improve HRQOL in survivors and caregivers. Besides being feasible, CBCT improved several domains of HRQOL including anxiety, global HRQOL, health/function, and psychological/spiritual well-being (reflected by effect sizes). Similar effects were not found for caregivers. These findings suggest CBCT may improve HRQOL for survivors, although a larger trial is needed. The extent to which caregivers are required for this effect also remains to be determined.

Introduction

Modern health care has made it possible to increase the 5-year survival rates for many different cancers that, until several decades ago, were seen as a death sentence. While survival rates of many solid tumor cancers have increased by significant percentages, the health-related quality of life (HRQOL) of the survivors remains of great concern. For example, research has shown that many survivors of solid tumor cancers show an increase in depressive symptoms and anxiety compared to the normal population: Bleiker et al. (2000) showed that 25% of breast cancer survivors have increased anxiety and intrusive thoughts about breast cancer. Further, Bleiker et al. (2000) also found that 16% show symptoms of posttraumatic stress disorder (PTSD), compared to 1% for PTSD in the United States population respectively. Prostate cancer survivors show a rate of anxiety between 13.81% and 24.31%, and a similar rate is found for depression between 15.18% to 22.22% (Watts et al., 2014). Besides impairments in physical HRQOL such as pain, lung cancer survivors show psychological HRQOL, i.e. 21.9% of survivors reported anxiety and 8.2% reported depression (Lowery et al., 2014). Another study found a rate of depression of 31% in lung cancer survivors (Sullivan et al., 2016)

Survivors are not the only individuals who experience HRQOL impairments around the time of diagnosis, during treatments, and after treatments are over. Indeed, informal caregivers also have to carry the weight of cancer. An informal caregiver can be a family member, close friend, neighbor, or anybody who provides unpaid care towards for cancer survivor. They support the survivor emotionally, financially, help them to function around the house, as well as provide support to receive medical care (Litzelman et al., 2016). Previous studies have shown that informal caregiver HRQOL and survivor HRQOL are strongly interconnected. For example, when informal caregivers showed higher levels of depressive features, this causally predicted

that survivors of breast or prostate cancer would also report increased depressive features (Litzelman et al., 2016; Segrin and Badger, 2014; Segrin, Badger, and Harrington, 2012).

Related, when informal caregivers rated their own health poorly, survivors also tend to rate their health lower as well (Litzelman et al., 2016).

When looking at the overall HRQOL of cancer survivors, which goes beyond the medical services provided by a professional caregiver and therefore exceeds the medical definition of well-being, the health of the informal caregiver is a crucial piece. If an informal caregiver reports fair to poor health, cancer survivors were three times more likely to report fair to poor health (Litzelman et al., 2016). This strongly suggests that HRQOL of cancer survivors and their informal caregivers is interconnected. To improve the successful long-term healing process and well-being of the cancer survivor new ways are needed that also support the informal caregiver and improve their overall well-being. Ideal interventions to address the needs of both survivors and caregivers would likely increase the chances of promoting HRQOL of cancer survivors.

One possible approach for such an intervention is a meditation intervention directed at both survivors and caregivers together, that focuses on cultivating compassion and empathy toward the self and others. Currently such a meditation intervention exists and has been previously tested in several different populations, including breast cancer survivors. Cognitively-Based Compassion Training (CBCT®) is a meditation program created by Lobsang Tenzin Negi, PhD at Emory University (Dodds et al., 2015 et al., 2015). The practice teaches a person to reflect on empathy and compassion towards loved ones, strangers, enemies, and themselves (Reddy et al., 2013). Like other meditation programs, CBCT starts with basic mindfulness

training but then uses this skill to build compassion and understanding, as well as acceptance of self and all people around the self.

This meditation technique has been used in previous studies, including to increase the HRQOL in breast cancer survivors (Dodds et al., 2015). Dodds et al. (2015) showed that CBCT is feasible and also improves depressive symptoms, fatigue/vitality, and enhances the mindful presence of breast cancer survivors after 8 weeks of CBCT. Similar results were found in a study by Gonzalez et al. in which breast cancer survivors showed reduced depressive and general distress symptoms, as well as a higher score on a self-kindness scale (Gonzalez et al., 2018 et al., 2018).

Based on the positive results of CBCT with breast cancer survivors, we wanted to test if this intervention could have the same positive benefits for solid tumor cancer survivors and their informal caregivers. The purpose of the current study was to find evidence of feasibility and acceptability as well as evidence of preliminary efficacy of CBCT when comparing it with an active attention control group (Cancer Health Education [CHE]) on different domains of HRQOL. Research for this honors project was focused on distress-depression, anxiety, and global HRQOL over the 8-week program that included survivors of solid tumor cancer and their informal caregivers. We hypothesize that the CBCT would show feasibility, acceptability, and efficacy to improve different aspects of HRQOL in survivors and their informal caregivers.

Methods

Participants

Sixteen dyads of solid cancer survivors and informal caregivers were recruited as part of this honors project. To be eligible for participation, cancer survivors had to be at least 21 years

old, had to have a solid cancer diagnosis, completed treatment at least three months and a maximum of 10 years before the start of the CBCT or CHE intervention start that included surgery, chemotherapy, and radiation, but excluded hormone therapy. The informal caregivers were named by survivors, and had to be at least 18 years of age. Both survivors and caregivers had to be cognitively oriented in time, place, and person. Both parties had to be able to speak and understand English and able to travel to the meetings on the University of Arizona campus. Participants were excluded if they had an on-going compassion meditation practice. Further exclusion criteria for cancers survivors was a diagnosis of mental illness, or if they were residents of a nursing home.

Additional requirements were at least mild anxiety on the PROMIS anxiety 4-item scale with a raw score greater than 6, and/or mild depressive symptoms on the same scale with a score greater than 6, for either the cancer survivor or their informal caregiver. Sixteen dyads (32 participants) were randomly assigned to either the CBCT (n = 8 dyads) group or CHE (n = 8 dyads) attention control group.

Study Design and Interventions

This honors thesis focused on how certain HRQOL domains (see below) changed as a result of CBCT and CHE interventions. Participants completed assessments before and again after the 8-week interventions. In the intervention phase, both groups met once a week, for eight weeks. Once the meeting started, the CBCT group learned eight modules that built upon each other. The CHE control group learned different aspects of health and cancer. The following topics were taught in the CBCT meditation sessions: 1) Resting in a Moment of Nurturance and Developing Attentional Stability and Clarity (Module I), 2) Insight into the Nature of Mental Experience (Module II), 3) Self-Compassion (Module III), 4) Developing Equanimity and

Impartiality (Module IV), 5) Appreciation and Gratitude for Others (Module V), 6) Affection (Module V), 7) Empathetic Concern and Engaged Compassion (Module VI), and 8) Empathic Concern and Engaged Compassion (Module VI). Participants of the CBCT group were encouraged to meditate at least two times a week at home with guided audio recordings. Those in the CBCT were also asked to fill out a short description about their experience that was collected every meeting.

The CHE control group learned different aspects of health and cancer. Topics taught in the CHE group included: 1) Cancer Advocacy, 2) Health Through the Lifespan, 3) Nutrition, 4) Physical Activity, 5) Sleep, 6) Stress, and 7) Mental Health and Social Support. The CHE intervention used here was similar to that used previously by Dr. Pace and colleagues in a prior study on compassion meditation with healthy community dwelling adults (Desbordes et al., 2014). Additional details of sessions of CBCT and CHE (provided by Dr. Pace) can be found in Appendix 1 and Appendix 2.

Within a week after the last class, self-report assessments performed at baseline were again administered to survivors and caregivers.

Outcomes and analytic plan

To measure depression and anxiety the PROMIS short form 8a distress-depression and PROMIS short form 8a distress-anxiety were used to document depressive symptoms and anxiety, respectively, before and after the intervention. Fatigue was assessed using the PROMIS short form 7a fatigue. Global HRQOL was measured using the Quality of Life Index (QLI) (developed by Ferrans and Powers) that captures satisfaction and importance of various aspects of life, including functioning, social and economic well-being, psychological and spiritual well-being, and family (Wilson & Cleary, 1995). The change of these outcomes from before to after

CBCT or CHE were reflected as effect sizes. Outcomes were entered into a linear mixed effects model with the following covariates: outcome measure at baseline, study group, and group X time interaction. The least square (LS) means according to the levels of the interaction term was outputted from the model, and effect sizes were estimated as differences between the LS means, divided by the adjusted standard deviation. Separate models were fit for each survivor outcome and each caregiver outcome.

Results

Table 1 shows depressive symptoms, anxiety, and fatigue assessed in survivors and informal caregivers at baseline and before CBCT or CHE. Table 2 presents the demographic characteristics of the participants. Participants of both groups were similar in age: 61.5 and 60.9 for survivors, 78.0 and 75.0 for informal caregivers in CBCT versus CHE, respectively. Other measures such as education and income were similar in both groups. Slight differences were detected in the gender distribution amongst participants, a greater number of female survivors were present in the CBCT group (100%) compared to the CHE group (75%). Income on the other hand showed that overall, survivor-informal caregiver dyads in the CBCT group had relatively higher income compared to those in the CHE group. The attendance rate in both groups was relatively high compared to previous studies, with 75% in the CBCT group and 87.5% in the CHE group.

The results in Table 3 show effect sizes comparing survivors and caregivers randomized to CBCT or health education. Anxiety showed an effect size of 0.81, meaning there was a moderate difference on the anxiety scale in survivors after attending CBCT compared to CHE. When looking at the results of the subgroups of the QLI scale, an improvement versus CHE in all

areas can be found. Health and function QLI was higher in CBCT after the 8 weeks with an effect size of 1.147, followed by psychological and spiritual QLI (1.075), and social and economic QLI (0.712). For the informal caregivers, effect sizes were smaller.

Discussion

This study worked to determine the effect of CBCT on HRQOL, i.e. depressive symptoms, anxiety, and global HRQOL, in solid tumor cancer survivors and their informal caregivers. Specifically, the study tested the effectiveness of an intervention delivered to both parties simultaneously. Methods used to test the hypothesis were self-reported questionnaires for HRQOL that were administered before and after 8 weeks of CBCT or CHE (an active attention control group). The data collected after the interventions was compared to the baseline data collected prior to the interventions, and changes were reflected by effect sizes.

The study found that CBCT improved depression, anxiety, as well as general quality of life, reflected by effect sizes versus the health education control. There was improvement of HRQOL in survivors from before to after CBCT versus CHE. The improved areas included depression, anxiety, and total quality of life. Effect sizes comparing CBCT and CHE in caregivers were much smaller. These findings suggest that CBCT may increase HRQOL of survivors. Survivors in CBCT showed higher improvements of HRQOL than the control group, measured by comparing scores before and after the intervention.

Caregiver influence on a survivor's HRQOL improvement by CBCT remains to be determined. It is important to determine how caregivers affects HRQOL of survivors in the context of CBCT. If they are important to the process, it is necessary to find a therapeutic approach that evolves around that concept. Informal caregivers may be a fundamental part of the

approach. Approaches to teach and support informal caregivers should also be created, along with increasing the participation in the healing process of survivors.

A major limitation of the study was the small sample size. Having a small sample size made it possible to find effect sizes, but did not allow us to determine statistical significance. The pilot study shows a general trend for an improvement of HRQOL in solid tumor cancer survivors with CBCT. To test its significance, a further study with a larger sample size must be performed.

Future studies require greater sample sizes if findings are to hold for wider populations. Studies could also look at if there is an increased effect on HRQOL if a caregiver had cancer before, because they might be able to support the survivors differently and show greater understanding for their situation. Looking into study designs that allow to test for long-term effects of CBCT will be crucial to understand if CBCT has a long-lasting effect on the HRQOL of survivors and will be beneficial in the long-run.

Future studies may support a connection between survivor and informal caregiver HRQOL. Although moderate or strong effect sizes were not found in informal caregivers' HRQOL, their presence could still be a crucial factor for the success of the survivors. A study designed to test the impact of informal caregiver presence on survivor HRQOL is imperative. These studies may also find this relationship can improve the HRQOL over a longer term, which may be the most important factor.

In conclusion, CBCT showed feasibility, acceptability, and efficacy to improve HRQOL in solid tumor cancer survivors. To understand if there is a positive outcome for the survivors after undergoing an intervention with their informal caregiver, larger sample sizes are needed. An approach to study the effects of informal caregiver presence is also needed.

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Table 1. PROMIS scale scores at baseline for survivors and caregivers.

| PROMIS | <u>Survivors</u> (n=16) | <u>Caregivers</u> (n=16) |
|---|--|---|
| Emotional distress – Depression 8a | 53.3 (7.5) | 52.6 (5.2) |
| Emotional distress – Anxiety 8a | 58.2 (5.4) | 53.6 (7.4) |
| Fatigue 7a | 55.8 (4.9) | 55.0 (5.9) |

Table 2. Demographics of CBCT and CHE participants.

| Demographics | <u>CBCT</u> (<i>n</i>_{dyads} = 8) | <u>CHE</u> (<i>n</i>_{dyads} = 8) |
|---|---|--|
| Age survivor / partner (SD) | 61.5 (15.7) / 78.0 (4.2) | 60.9 (8.4) / 75.5 (2.1) |
| Women (%) survivor / partner | 100 / 38 | 75 / 75 |
| Breast cancer (%) | 57 | 33 |
| Colorectal (%) | 14 | - |
| Prostate (%) | - | - |
| Other (%) | 29 | 67 |
| High school (%) | 12 / 50 | 12 / 38 |
| Vocational (%) | 12 / - | 25 / - |
| Bachelors (%) | 63 / 38 | 25 / 37 |
| Graduate (%) | 13 / 12 | 38 / 25 |
| Employed (%) survivor / partner | 13 / 25 | 63 / 50 |
| < \$49k (%) survivor / partner | 38 / 25 | 50 / 50 |
| Retention (%) | 94 | 100 |
| Class attendance (% total classes) | 75 | 87.5 |
| CBCT at home practice sessions / week (SD) | 4.90 (1.9) | |
| CBCT practice minutes / session (SD) | 18.4 (2.0) | |

Table 3. Post-intervention outcome effect sizes for survivors and caregivers controlling for baseline of the same measures.

| | Survivors | | | Caregivers | | |
|--|------------------------------|---|-------------|------------------------------|---|-------------|
| | Intervention LS Mean (SE) | Attention control LS Mean (SE) | Effect size | Intervention LS Mean (SE) | Attention control LS Mean (SE) | Effect size |
| Depression | 53.02 (1.03) | 54.83 (1.11) | -0.6329 | 50.34 (1.65) | 51.36 (1.65) | -0.2440 |
| Anxiety | 53.18 (2.20) | 58.23 (2.36) | -0.8106 | 50.72 (2.52) | 53.06 (2.52) | -0.3744 |
| Fatigue | 50.62 (1.56) | 51.85 (1.69) | -0.3067 | 50.71 (1.02) | 50.91 (1.02) | -0.0741 |
| QLI total | 22.16 (0.92) | 19.92 (0.99) | 0.9739 | 21.23 (1.21) | 21.73 (1.21) | -0.1582 |
| QLI subscale 1, Health and functioning | 21.05 (0.95) | 18.32 (1.04) | 1.1471 | 21.07 (1.17) | 21.08 (.1.17) | -0.0032 |
| QLI subscale 2, Social and economic | 22.69 (1.06) | 20.79 (1.15) | 0.7116 | 20.80 (1.56) | 22.00 (1.56) | -0.2963 |
| QLI subscale 3, Psychological/spiritual | 22.33 (1.16) | 18.90 (1.24) | 1.0752 | 22.10 (1.51) | 23.32 (1.51) | -0.3073 |
| QLI subscale 4, family | 24.66 (1.33) | 24.15 (1.42) | 0.1386 | 20.64 (2.25) | 21.17 (2.25) | -0.0965 |

Appendix 1. Description of Cognitively-Based Compassion Training as published in Pace et al 2019 (reproduced here with permission).

Week 1: Resting in a Moment of Nurturance and Developing Attentional Stability and Clarity (Module I). Physical relaxation and focused attention training aid in mental stability and attention regulation and lead to concentration and later clarity of mental contents, states, and processes. Week 1 reviews confidentiality, defines compassion and its benefits, provides instruction in correct meditation posture, diaphragmatic breathing, and relaxation of muscle tension. This is followed by visualizing a remembered moment of nurturance that recalls the experience of compassion by a caregiver or caring other to prime the practitioner in feelings of safety and security. Last, the first mindfulness meditation practice (*shamatha*) is introduced and uses the breath as an object to focus attention for increasingly longer periods of time. These opening practices are the starting point of all subsequent CBCT meditation practice

Week 2: Insight into the Nature of Mental Experience (Module II). The felt experience of compassion is one of kindness, connection, and unconditional positive regard. Cognitions, often with a negative emotional charge, are impermanent and transient, change rapidly, and can be observed as such. Week 2 reiterates the opening practices of the first week, and introduces the second mindfulness meditation practice (*vipassana*) to develop open awareness of subjective experience through non-judgmental, non-reactive observation of the fluctuating (and impermanent) nature of thought, sensory experience, and emotion. This practice aids the participant in distinguishing internal mental experiences and external reality and creates a greater gap between an experience and the reaction to that experience, thus allowing for more deliberate choice in response or behavior. The technique is included in all subsequent CBCT meditation practice.

Week 3: Self-compassion (Module III). Before compassion can be expressed to others, CBCT holds that one must first understand and reduce causes of distress in oneself, as well as attune to a sustained attitude of kindness toward the self. The assumption that all people share the common human desires for happiness, well-being, and freedom from distress is discussed, yet both external and internal conditions can interfere. Thus, causes of both external and internal interference need to be identified, along with learned perceptions and cognitive appraisals that accompany them. Concordant attitudes (e.g., narrow self-centeredness and self-preoccupation) and behaviors (e.g., [egoic] attachment and aversion, rumination, addiction, and avoidance) that can sustain faulty appraisals and that are potentially harmful require insight, reappraisal, and corrective emotional experience. Introspection, resolve, and commitment are then required for ongoing improvement. Week 3 introduces analytic meditation practice (as opposed to mindfulness practice) to identify and assess conditioned and habitual patterns of cognitions and appraisals contributing to distress to promote a resolution to correct these habits as they are identified.

Week 4: Developing Equanimity and Impartiality (Module IV). CBCT holds that in the universal desire for happiness, well-being, and freedom from distress, all individuals are alike; there are no differences among them (common humanity). Partiality and bias not only harm those regarded as adversaries or enemies, but also those regarded as loved ones, since bias ultimately distorts interactions with others. Week 4 counters the participants' learned attitudes of prejudice and partiality through continuing reflection on the common human desires for well-being and freedom from distress. Through guided analytical meditation practice, recognition of this commonality is promoted by visualizing people in the categories of friend, adversary, and

stranger with the goal of increasing identification with them (and thus empathic understanding) and of reducing indifference or excessive liking or disliking of some over others.

Week 5. Appreciation and Gratitude for Others (Module V). CBCT holds that all people exist in an interconnected system, a web of interdependence for all needed resources and benefits. Recognition of this interdependence, in particular the high degree of dependence one's well-being has on the efforts others, decreases perceptions of interpersonal distance and social isolation (disconnection) and can lead to a sense of appreciation and gratitude for the beneficence of others, both familiar and unknown, as well as the hidden benefits that are often derived from adversaries. Week 5 explores interconnection and interdependence and the appreciation of others. Analysis and reflection during meditation examine the benefits received from others, even those received from adversaries. Further meditation practice guides the participant in visualizing extending appreciation and gratitude to an ever-widening circle of others.

Week 6. Affection (Module V). The CBCT model contends that experiences of appreciation and gratitude lead to feelings of endearment, or warm affection. Warmth, together with identification (see Module IV) stimulates empathy, or the recognition that others too, experience distress and its causes. Week 6 introduces affection for others based on their beneficence and also their similarity to oneself in wanting well-being yet often experiencing distress. Relating to others with profound affection and endearment then become the preconditions for empathy; in turn, empathy can catalyze compassion. Meditative reflection is guided to recall the kindnesses of others, their similarities to oneself ("just like me"), and to strengthen endearment and affection towards them. Further meditative reflection is guided on the drawbacks of egoistic attitudes to lessen self-centeredness.

Week 7. Empathetic Concern and Engaged Compassion (Module VI). Once insight into the causes of distress (Week 3) is combined with affection toward and empathic understanding of others (Week 6), CBCT holds that compassion naturally ensues. Week 7 focuses on sustaining the spontaneous empathetic concern that naturally arises when these two conditions are present: (1) holding someone with deep affection and warm-heartedness and (2) attuning to their dissatisfaction, distress, and vulnerability. To sustain the emerging motivation to alleviate their distress (while simultaneously acknowledging one's limitations and boundaries via self-compassion), Week 7 provides instruction to attune to this compassionate love as an image of energy or light, radiating outward and including first our family and friends and then increasingly others. Instruction guides the practitioner in wishing compassion as a desirable thought of "How *wonderful* it would be if others were happy and free from dissatisfaction".

Week 8. Empathic Concern and Engaged Compassion (Module VI). When a genuine desire for compassion is deepened and accompanied with a determined motivation to help others when possible, the final step is of CBCT is considered to be activated or engaged compassion. Continued practice helps strengthen all of the prior skills and insights meant to support to an embodied compassionate responsiveness toward others. In Week 8, class exercises promote group closure, and a final comprehensive meditation practice is conducted. The same guided meditation is used as in Week 7, but more emphasis during reflection is placed on phrases that promote a move from simply wishing others happiness and freedom from distress to a motivational readiness to assist whenever possible ("*May* they be happy and free from dissatisfaction").

Appendix 2. Description of Cancer Health Education as published in Pace et al 2019 (reproduced here with permission).

CHE Intervention Program

Week 1. Cancer Advocacy. This module begins with a discussion on cancer advocacy that includes the definition of cancer advocacy, how to be an advocate for your own cancer care throughout survivorship, how to be an advocate for others with cancer, and how to approach public interest advocacy for cancer. This module also discusses current events related to cancer, trends about cancer diagnoses, and the latest science and research about cancer (e.g. the Cancer Moonshot). At the conclusion of this module participants will have a broad understanding of the major themes of cancer advocacy, the significance of cancer advocacy for promoting the wellness of the self, family, and society, and cancer research.

Week 2. Health Through the Lifespan. This module provides an overview of the biology of cancer, how cancer is defined, how cancer is treated, and side effects of cancer treatments. Also reviewed are topics relevant to maintaining a healthy lifestyle over the lifespan including leading causes of mortality besides cancer, brain and mental health, and health screenings. At the conclusion of this module participants will be familiar with the leading causes of death and avoidable causes of death, the role of general health habits, importance of health screenings, and the relevance of mind-body connections for health and cancer survivorship.

Weeks 3 and 4. Nutrition. The first week of this module focuses on basic components of food such as carbohydrates, proteins, and fat. Whole grains, hydration, and caffeine are also discussed as well as essential nutrients and dietary fiber. The second week provides an overview of healthy diet tips, serving sizes, and factors that contribute to unhealthy eating. Key topics in the second week include nutrition related to obesity, healthy serving sizes, nutritional “trade-offs”, healthy grocery shopping, and tips for maintaining a healthy diet. At the conclusion of this module

participants will have an understanding of food components as well as basic strategies to maintain good nutrition to promote health, including in cancer survivorship.

Week 5. Physical Activity. This module reviews the importance of physical activity in survivorship but also the importance of physical activity for the wellness of non-cancer survivors across the lifespan. This module provides an overview & explanation of the basic components, principles, and health benefits of physical fitness. Information for developing and implementing a personal fitness plan and goals are also presented. The module concludes with practical tips for exercise, e.g., staying fit while traveling. Also addressed are consequences of a lack of exercise (e.g., obesity), health benefits of exercise (e.g., mental wellness, healthy aging, cardiovascular wellness), lactic acid, muscle burning and soreness, planning an exercise schedule, and exercise nutrition. At the conclusion of this module participants will have an understanding of exercise basics, the relationship between exercise and wellness, and how to better incorporate exercise in their own lives.

Week 6. Sleep. This module provides an overview of the sleep cycle, the benefits of sleep, common sleep disorders, and tips for better sleep. Topics considered also include the neuroscience mechanisms of sleep, common sleep disorders, and tips for diet to promote healthy sleep including for survivors. By the end of the module participants will understand the mechanisms of sleep, why sleep is important for good health (including in survivorship), and how to get better sleep.

Week 7. Stress. This module reviews the concept of stress and how stress is known to impact health, including the biological mechanisms involved. Topics discussed include the definition of stress, a review of “America’s most stressed out cities”, types of stress (distress and eustress), negative effects of chronic stress, and basic ways to cope with stress. Of note, this module will

not provide participants with a comprehensive stress management plan. Instead, the coping strategies for stress considered will be limited to general topics such as good sleep, physical activity, and diet (to synergize with earlier CHE modules).

Week 8. Mental Health and Social Support. This module provides a broad overview of mental health disorders (e.g. depression, anxiety disorders, eating disorders), as well as disorders that many survivors and caregivers experience. The health-related consequences of loneliness and benefits of social interaction are also reviewed. This module also introduces the concept of social capital, and also explores the impact of social networking sites. By the end of the module participants will have a general understanding of mental health disorders and how social contact can promote wellness for survivors and caregivers.