

**Virtual Dissemination of Mindful Eating Strategies:  
Improved Food Attitudes and Behaviors Among Cancer Survivors**

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Major Project/ Report submitted to the faculty of the Virginia Polytechnic Institute and State  
University in partial fulfillment of the requirements for the degree of

Online Master of Agricultural and Life Sciences

In

Applied Nutrition and Physical Activity

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July 17<sup>th</sup>, 2025

Keywords: Cancer Survivor, Mindful Eating

## **Acknowledgements**

I would first like to thank my parents for their unwavering support, guidance, and love throughout this entire journey. My mother's experience with breast cancer was one of the key inspirations behind this project, and I am deeply grateful for her strength and influence.

A heartfelt thank you to Emily Myers for her constant support and valuable insight during both the dietetic internship and the Project and Report process. I would also like to thank Amy LaFalce for her encouragement and support along the way.

I am especially grateful to Julie Lanford for her incredible support throughout the design and implementation process—I truly would not have been able to figure it out without her guidance and expertise.

Finally, thank you to my friends for their continued support and kindness throughout this entire process.

## Abstract

Cancer treatments such as radiation and chemotherapy place immense stress on the body, leading to metabolic, physical, and psychological changes that can impact dietary habits long after treatment ends. Throughout the treatment journey these changes, both psychological and emotional, can contribute to periods of emotional eating. Stress, anxiety, and concerns related to body composition shifts during treatment often play a key role in these challenges and may contribute to declined quality of life and mental health status in survivors. Few accessible nutrition education programs currently exist to support cancer survivors in transitioning from a rigid interpretation of dietary guidelines to a more flexible approach that emphasizes food freedom while still prioritizing nutrient-dense choices. The purpose of the *Nourish & Thrive: A Mindful Eating Journey for Cancer Survivors* email series is to provide cancer survivors who have already completed a nutritional education program titled *Nutrition After Cancer: What to Eat and What to Avoid*, the tools necessary to transition to a more flexible approach to fueling their bodies.

A marketing email was sent to all participants who had subscribed to the previous program, with information relating to the mindful eating program. Once the link was clicked, participants were taken to a web page containing the *Mindful Eating Kickstart* pre-survey. Following the completion of this survey, participants received a total of five emails. Each email covered one of five mindful eating concepts: understanding hunger and fullness, fueling with nutrient-dense foods, practicing gentle nutrition, slowing down while eating, and developing a non-judgmental relationship with food. Following the final email, participants completed a self-growth survey. An increased awareness of mindful eating and a more positive relationship with food was observed based on participant responses to open-ended questions. In addition to these

findings, the quantitative data outlined below further demonstrate that the program was effective in achieving its intended objectives. Mean changes in each subdomain were positive, indicating that a majority of participants responded to corresponding questions with an answer choice that was further aligned with mindful eating tendencies. Additionally, a statistically significant change of  $P=0.014$  was calculated for Total Mindful Eating Scores, as well as for Emotional and Stress Eating.

## **Introduction**

### ***Background & Setting***

Cancer treatments, particularly radiation and chemotherapy, impose significant stress on the body, resulting in metabolic, physical, and psychological changes that can affect dietary habits long after treatment has concluded. One prominent dietary alteration during treatment is the decline or complete disappearance of appetite, commonly referred to as cancer treatment induced anorexia. While the exact etiology of this condition remains incompletely understood, systemic inflammation, psychological stress, and hormonal and neurological dysregulation are well-documented contributing factors that impair hunger signaling.<sup>1</sup> This condition is especially problematic, as cancer patients often have elevated nutritional requirements. Anorexia in this context frequently leads to severe muscle wasting.<sup>1</sup> Furthermore, both during and after treatment, the body's regulation of hunger and satiety signals can become dysregulated, resulting in persistent appetite-related issues. In addition to these physical changes, cancer treatment is frequently accompanied by psychological and emotional fluctuations. Stress, anxiety, and concerns about body composition changes during treatment are often central to these challenges. Conversely, many cancer survivors may develop restrictive eating behaviors due to fears that certain foods could increase the risk of cancer recurrence. Both emotional and restrictive eating patterns can foster food-related anxiety, thereby reducing the overall quality of life for many survivors.

According to previous estimates, approximately 5,500 Americans are diagnosed with cancer each day, resulting in over 2 million new cases annually.<sup>2</sup> These trends are projected to continue rising, underscoring the increasing importance of both cancer prevention and effective

treatment across all forms of the disease. Furthermore, these statistics emphasize the critical need for comprehensive support systems for cancer survivors during and after treatment.

The term cancer survivor refers to any individual who has been diagnosed with cancer, from the time of diagnosis through the remainder of their life.<sup>3</sup> Cancer survivors encounter a range of physical, emotional, and psychological challenges throughout the treatment process. Common cancer treatments such as chemotherapy, radiation, and immunotherapy, can lead to persistent physical side effects, including chronic fatigue, nausea, pain, neuropathy, weight fluctuations, hormonal imbalances, and digestive issues. These side effects may persist for months or even years following the completion of treatment.<sup>4</sup> Beyond physical complications, emotional and psychological disturbances are also prevalent among cancer survivors. Feelings of fear, stress, anxiety, and depression are particularly common in the first few years after treatment.<sup>4</sup> Collectively, these physical and psychological burdens highlight the unique and enduring challenges faced by cancer survivors, which often extend well beyond the active treatment phase and significantly impact their quality of life.

Mindful eating is an intake pattern that is focused on an individual's sensual awareness of the food they are eating, and the experience that the food creates. Mindful eating offers an approach to addressing previously discussed issues by promoting a balanced, yet compassionate relationship with food. Mindful eating focuses on increasing one's awareness of hunger and fullness cues, promotes understanding relating to emotional triggers that may lead to excess intake, can aid individuals in reducing periods of restriction, and reduce food-related anxiety contributing to improved quality of life.

Cancer Services Inc., located in Winston-Salem, North Carolina, is a nonprofit organization committed to supporting individuals affected by cancer. Established in 1955, the

organization's mission is to enhance health, improve quality of life, and promote survivorship for those navigating a cancer diagnosis within the community.<sup>5</sup> Serving the Triad region (Winston-Salem, Greensboro, High Point), Cancer Services provides comprehensive resources to cancer patients and their families throughout their cancer journey. The organization offers a wide range of support services, including medical supplies, medication, and financial assistance.

Additionally, they provide appearance-related resources such as wigs to help patients manage the physical side effects of treatments, as well as mastectomy and lumpectomy supplies and transportation assistance. It should be noted, however, financial assistance is available only to clients whose household income falls below 200% of the federal poverty guidelines (FPG). In 2023 alone, this organization supported approximately 2,496 survivors, provided over \$1.4 million in medical and financial assistance, facilitated 1,298 transportation trips for treatment, and had around 2,904 clients participate in Cancer Services' Survivor Wellness Programs.<sup>5</sup>

Regarding this mindful eating program, the following breakdown represents the cancer related demographics of participants: 40% were breast cancer survivors, 10% had myeloma, 8.75% had leukemia, 5% reported endometrial cancer, and another 5% either reported no cancer or chose to not specify their cancer type. Additionally, 1.25% had AL amyloidosis, and 1.25% provided unclear responses related to cancer type.

A registered dietitian on staff at Cancer Services has developed multiple nutrition education programs specifically designed for cancer survivors in the region. One of these programs, titled "*Nutrition After Cancer: What to Eat, What to Avoid,*" is an eight-week email series providing evidence-based nutrition recommendations for individuals post-treatment. Following a needs assessment, it was identified that cancer survivors would benefit from an additional mindful eating educational series. This proposed program aims to equip survivors with

the practical tools necessary to apply evidence-based nutrition guidance while fostering a mindful and flexible approach to eating.

An email program was chosen over an alternative program method for numerous reasons, the first being that this is one of the most commonly used avenues used by Julie Landford, the registered dietitian on staff for Cancer Services. Additionally, the flexibility and accessibility of an email series make it a valuable format. As a form of self-paced learning, participants can engage with the content on their own schedule, allowing them time to reflect and apply what they have learned. This format also eliminates the need for transportation, making it accessible to individuals facing mobility challenges, fatigue, or those living in rural areas. Furthermore, an email series can reach a large number of individuals in a cost-effective, non-invasive, and low-pressure manner.

### **Significance of Problem**

Cancer treatments such as radiation and chemotherapy place immense stress on the body, leading to metabolic, physical, and psychological changes that can impact dietary habits long after treatment ends. Throughout the treatment journey these changes, both psychological and emotional, can contribute to periods of emotional eating. Stress, anxiety, and concerns related to body composition shifts during treatment often play a key role in these challenges. Conversely many cancer survivors adopt restrictive eating habits out of fear that certain foods may increase the risk for recurrence. Both emotional and restrictive eating can contribute to food-related anxiety, diminishing overall quality of life for many cancer survivors.

Mindful eating is an intake pattern that is focused on an individual's sensual awareness of the food they are eating, and the experience that the food creates.<sup>6</sup> Mindful eating offers an approach to addressing these issues experienced by cancer survivors through the promotion of a

balanced, yet compassionate relationship with food. Mindful eating focuses on increasing one's awareness of hunger and fullness cues, promotes understanding relating to emotional triggers that may lead to excess intake, can aid individuals in reducing periods of restriction, and reduce food-related anxiety contributing to improved quality of life.

While a substantial body of research exists outlining nutrition-related recommendations for cancer survivors, these guidelines predominantly emphasize the consumption of nutrient-dense foods to support cancer survivors during treatment and recovery. Although these recommendations aim to promote overall health by ensuring adequate intake of essential nutrients, they often rely on prescriptive language, such as “limit” or “avoid,” which may inadvertently contribute to confusion or distress, particularly among individuals with varying levels of health literacy. This restrictive framing may neglect the cultural and emotional significance of food, including its role in celebration, connection, and joy. As a result, survivors may develop heightened anxiety or fear around eating certain foods, compounding the challenges they already face rebuilding a positive relationship with food, body image, and nutrition in the post-treatment phase.

### **Purpose of the Project**

Few accessible nutrition education programs currently exist to support cancer survivors in transitioning from a rigid interpretation of dietary guidelines to a more flexible approach that emphasizes food freedom while still prioritizing nutrient-dense choices. The purpose of the *Nourish & Thrive: A Mindful Eating Journey for Cancer Survivors* email series is to provide cancer survivors who have already completed a nutritional education program titled *Nutrition After Cancer: What to Eat and What to Avoid*, the tools necessary to transition to a more flexible approach to fueling their bodies. The previously mentioned education program provided

information about specific dietary guidelines for cancer survivors. By introducing mindful eating practices through the *Nourish & Thrive: A Mindful Eating Journey for Cancer Survivors* email series, cancer survivors can feel supported in moving from fear-based or overly restrictive eating patterns, towards a more balanced, compassionate approach to nourishing their bodies.

### **Research Questions**

- How do cancer survivors perceive the impact of treatment on their relationship with food and their body? How does a five-week mindful eating program alter this perception?
- How does a five-week mindful eating program influence emotional well-being and food-related anxiety in cancer survivors?

### **Project Objectives**

The following objectives were developed prior to the implementation of this program:

- Develop and implement a five-week mindful eating email series aimed at cancer survivors who have completed the *Nutrition After Cancer: What to Eat and What to Avoid* email series.
- Determine participants' satisfaction with the program through the use of specific questions in the post survey, such as "this email series was interesting."
- By the end of the five-week email series, participants will reflect a statistically significant change ( $P < 0.05$ ) in mindful eating score subdomains.

### **Definition of Key Terms**

- Cancer Survivor: Any individual who has been diagnosed with cancer, from the time of diagnosis through the remainder of their life.<sup>3</sup>

- Mindful Eating: An eating approach that helps individuals develop a nonjudgemental, compassionate relationship with food by focusing on the experience of eating through the recognition of both internal cues and sensory components.<sup>6</sup>

## **Review of Literature**

### ***Treatment Complications: Metabolic and Body Composition Alterations***

Cancer treatments today have become increasingly sophisticated, offering a range of options tailored to the needs of each patient based on the type and stage of their cancer. While traditional methods such as chemotherapy and radiation continue to remain effective, newer treatment techniques are still evolving with the goal of eliminating cancer cells with minimal damage to healthy cells. Despite these advancements, cancer treatments remain associated with considerable physiological strain on the body, with each modality carrying a range of adverse side effects, including fatigue, nausea and vomiting, hair loss, skin irritation, and other related complications associated with changes in body composition. The pathophysiological mechanisms underlying changes in body composition during and after treatment are multifactorial, involving disruptions in metabolism, hormonal imbalances, inflammatory responses, and overall energy-balance.

Cancer treatment induced metabolic syndrome (CTIMetS) is an overarching term to describe the metabolic changes that occur in result of cancer treatment forms such as chemotherapy, radiation, hormone therapy, and additional targeted therapies. Similar to metabolic syndrome (MetS) experienced in the average population, CTIMetS is characterized by central obesity, insulin resistance, dyslipidemia, and hypertension. These conditions are further associated with the promotion of cardiovascular disease and type 2 diabetes. The mechanisms that lead to the development of MetS and its related conditions, are thought to be associated with

the release of adipokines (pro-inflammatory factors) and free fatty acids (FFAs) from adipose tissue, in addition to the increased production of very low density lipoprotein triglycerides (VLDL) by the liver<sup>7</sup>. Both insulin resistance and the increased release of FFAs into circulation reduce production of nitric oxide by endothelial cells. Nitric oxide is directly involved in the vasodilation process; a decrease in production results in decreased vasodilation and increased blood pressure, further promoting the development of hypertension.<sup>7</sup>

The review article Westerink et al., focused on the etiology of CTIMetS, along with a variety of different cancer types, their associated treatments, and how each may contribute to the development of this condition. Surgery is a common intervention for multiple forms of cancer such as brain, breast, testicular, and ovarian cancer. Surgical interventions are often considered one of the most effective treatment options, as they offer a potential cure by physically removing the entire tumor, thereby preventing cancer progression and spread. Surgeries involving hormone-producing organs such as the adrenal glands, testes, thyroid, or pituitary glands can disrupt hormone production. As discussed in Westerink et al., surgery requiring the removal of a tumor around or on the pituitary gland and hypothalamus region can result in damage. Damage to this region of the brain can may induce a deficiency in growth hormone, thyrotropin, gonadotropin, and adrenocorticotropin.<sup>7</sup> The reduction in hormone production is linked to obesity, particularly central obesity due to alterations in fat distribution. This shift in body composition is a key factor in the development of CTIMetS, which is commonly observed in cancer survivors post treatment.

Radiation can contribute to CTIMetS through the disruption of multiple metabolic processes, altering hormone levels, and inducing inflammation. Radiation causes both oxidative stress and inflammation, which leads to impaired insulin signaling and sensitivity. Oxidative

stress, such as reactive oxygen species (ROS), can suppress insulin response and contribute to the development of insulin resistance, a key characteristic of CTIMetS.<sup>8</sup> Radiation to the thyroid region is linked to lower basal metabolic rate, which is associated with the development of obesity. Hypothyroidism is a common complication observed in cancer patients who have received radiation to the thyroid area. Bölling et al., a study discussed in the previously mentioned review, found that 24% of patients who received radiotherapy experienced elevated thyroid-stimulating hormone (TSH) levels. Elevated levels of TSH are a potential clinical indication of declined thyroid functioning.<sup>9</sup>

Chemotherapy has proven to be a highly effective form of cancer treatment for many years. While the effectiveness of this treatment is undisputed, its cytotoxic effect on healthy, functioning cells are a subject for concern. Adjuvant chemotherapy is a form of chemotherapy that is provided after primary treatment, such as after surgery or radiation. This form of chemotherapy has been linked to an increased chance of developing metabolic syndrome when compared to other chemotherapy regimens. One study in particular found that patients undergoing adjuvant chemotherapy had a 35% higher risk for developing metabolic syndrome when compared to those not undergoing this form of treatment.<sup>10,11</sup> In relation to body composition alterations that occur secondary to chemotherapy, these changes can include weight gain, muscle loss, and increased fat accumulation. In comparison to adjuvant chemotherapy, neoadjuvant treatment is provided prior to primary treatment. Jang et al., aimed to examine sarcopenia prevalence as well as elevated body composition changes in breast cancer patients prior to and following neoadjuvant chemotherapy.<sup>12</sup> Findings of this study demonstrated an increase in both body surface area (BSA), BMI, and visceral fat index (VFI) following neoadjuvant chemotherapy.<sup>12</sup> These finding highlight the significant impact of neoadjuvant and

adjuvant chemotherapy on body composition, underscoring the need for targeted interventions to manage these changes and mitigate potential long term health risks in cancer patients.

Hormonal treatment forms such as hormone blockers can lead to changes in body weight, composition, and metabolism. Among these various hormonal treatments are selective estrogen receptor modulators (SERMs), which are particularly known for their effects on estrogen levels, leading to notable changes in body composition. SERMs are a type of drug class that acts by binding to estrogen receptors, preventing estrogen from binding. Tamoxifen is a type of SERM blocks estrogen from binding to estrogen receptors in breast tissue. Through preventing estrogen from binding to these receptors, estrogen is unable to stimulate the growth of cancer cells, slowing or completely stopping tumor growth. Tavares et al., explored how tamoxifen and chemotherapy impact nutritional status and risk of obesity in breast cancer patients. This study utilized transversal study design, in which participants were receiving tamoxifen along with chemotherapy or tamoxifen alone.<sup>13</sup> The results of this study indicated that women who underwent chemotherapy three to four years prior to taking tamoxifen had an increase in body fat, as well as BMI.<sup>13</sup>

In conclusion, cancer treatments, while advancing in sophistication, continue to present significant challenges related to their impact on the body's metabolism and overall health. Chemotherapy, radiation, and hormonal therapies, often lead to changes in body composition, including weight gain, muscle loss, and increased fat accumulation, all of which can contribute to the development of CTIMetS. The underlying mechanisms are multifactorial, involving hormonal imbalances, oxidative stress, insulin resistance, and altered fat distribution. These metabolic changes not only affect the immediate quality of life of cancer patients but also increase the risk of long-term health conditions such as cardiovascular disease and type 2

diabetes. As cancer therapies continue to evolve, understanding the complexities of their effects on body composition is crucial.

### ***Treatment Complications: Dietary Alterations***

Side effects of cancer treatments vary among patients depending on their specific treatment regimen. However, common side effects include nausea, vomiting, fatigue, changes in weight, loss of appetite, dry mouth, alterations in bowel movements, and changes in taste. These side effects can significantly disrupt hunger signals, fullness cues, and overall eating patterns.

A cross-sectional study conducted by Coa et al., involved 1,199 cancer patients undergoing outpatient treatment and aimed to examine the dietary changes experienced during treatment. The study also assessed the relationship between these dietary changes and selected health outcomes such as fluctuations in energy levels and weight, while exploring food preferences and aversions.<sup>14</sup> Participants completed a self-administered survey to identify the prevalence of dietary changes and associated health impacts. Approximately 40% of respondents reported a decreased appetite since beginning treatment, while 67.2% experienced at least one chemosensory change, such as altered sense of taste.<sup>14</sup> The study also highlighted a range of food preferences and aversions among patients. Notably, the five most commonly avoided foods were greasy or fried foods, spicy foods, citrus or acidic foods, Indian cuisine, and Mexican cuisine.<sup>14</sup> Furthermore, the findings indicated that patients who reported increased weight loss since starting treatment were more likely to experience dietary changes than those who did not.<sup>14</sup> This research underscores the profound impact of cancer treatment on eating behaviors and the need for personalized nutrition support to mitigate these side effects and maintain patients' quality of life.

As demonstrated by the research conducted by Coa et al. and colleagues, decreased appetite is a common and significant complication among cancer patients and survivors. The etiology of cancer-related anorexia is multifactorial and not yet fully understood by health professionals. However, several well-established contributing factors include increased inflammatory cytokine production, neurotransmitter dysregulation, hormonal imbalances, and psychological factors such as anxiety and depression.

The hypothalamus plays a central role in regulating energy homeostasis using neurotransmitters to coordinate food intake and control energy expenditure.<sup>1</sup> Within this system, appetite regulation involves two key groups of neurons: appetite-stimulating neurons including neuropeptide Y (NPY) and agouti gene-related protein (AgRP) and appetite-suppressing neurons, such as proopiomelanocortin (POMC) and cocaine and amphetamine-regulated transcript (CART). In cancer patients, particularly those who develop cachexia, there is a marked decrease in the activity of NPY and AgRP neurons, combined with hyperactivity of POMC and CART neurons. This imbalance contributes to a persistent reduction in appetite.<sup>1</sup> Moreover, cancer and its associated treatments often trigger chronic inflammation leading to excessive cytokine production. This overproduction of cytokines increases the expression of corticotropin-releasing factor (CRF), an appetite suppressant that further inhibits NPY activity and exacerbates anorexia.<sup>1</sup> Chronic inflammation also slows gastric emptying, which prolongs feelings of fullness even when nutritional intake is inadequate. Hormonal dysregulation is another critical factor in cancer-induced anorexia. For example, elevated levels of parathyroid hormone-related protein (PTHrP) reduce hunger by sending inhibitory signals through pathways in the digestive system, further suppressing appetite.<sup>1</sup> Additionally, psychological conditions commonly observed in individuals with cancer, such as anxiety and depression, further suppress

appetite. Together, these complex interactions between the hypothalamic regulatory system, inflammatory processes, and hormonal alterations contribute to the development of anorexia and cancer-induced cachexia, highlighting the multifaceted nature of appetite dysregulation in cancer patients.

### ***Nutrition Recommendations for Cancer Survivors***

Cancer survivors face a heightened risk of developing chronic conditions such as cardiovascular disease, obesity, diabetes, cancer recurrence, and the development of secondary forms of cancer. The American Cancer Society (ACS) plays a leading role in cancer research, offering the latest evidence-based lifestyle recommendations to help survivors enhance and maintain their overall health. The most recent comprehensive guidelines, published in 2020, highlight four key recommendations: adopting a healthy eating pattern, reducing processed meat consumption, maintaining a healthy body weight, and engaging in regular physical activity. While this section of the literature review is focused on dietary recommendations for cancer survivors, it is important to briefly discuss the ACS guidelines relating to body weight, as this factor is directly correlated with an individual's intake patterns. As discussed in the quinquennial update released by the ACS in 2020, excess body weight occurs as a result of excess energy intake and declined energy expenditure. As commonly described in literature, dietary factors typically associated with excess body fat include sugar-sweetened beverages, fast food, and following a "Western" type diet that is traditionally high in added sugar, processed meats, and fat.<sup>15</sup> In contrast to this, studies show that dietary intake patterns similar to Mediterranean diet may reduce cancer risk. This may be contributed to the high antioxidant and anti-inflammatory nutrients found in the foods apart of this dietary intake patterns such as legumes, fresh fruits, vegetables, fish, and olive oil. Polyphenols found in these foods may reduce the proliferation of

cancer cells and protect cell membranes from metastasis. Additionally, the high concentration of fruits and vegetables found in this diet can aid in the prevention of DNA damage as they are high in nutrients such as carotenoids, vitamin C and E, folates and flavonoids.<sup>16</sup>

Overall, the ACS recommends that cancer survivors follow a healthy eating pattern at all ages. A healthy eating pattern consists of nutrient-dense foods in portions that support achieving and maintaining a healthy body weight. It includes a variety of vegetables, such as dark green, red, and orange vegetables, as well as fiber rich legumes like beans and peas. Whole fruits in a range of colors, and whole grains are also essential components of a balanced diet. In contrast, a healthy eating pattern limits or excludes red and processed meats, sugar-sweetened beverages, and highly process foods, including refined grain products.<sup>15</sup> It is recommended that individuals consume at least three servings of whole grains per day, along with five servings of a variety of different fruits and vegetables per day.<sup>17</sup> Additionally, the consumption of alcohol should be limited to no more than one drink a day for women, and two drinks a day for men.<sup>15</sup>

### ***Health Behavior Changes Post-Treatment and Potential Implications***

The experience of undergoing cancer treatment is often profoundly transformative, inspiring many individuals to adopt lifestyle changes after recovery. These changes may be driven by various factors including a heightened desire for control, the need to manage lingering symptoms, guidance from health care providers, and most commonly the fear of recurrence. Health behavior changes encompass various actions, including the previously discussed dietary adjustments, increased physical activity, reduced sedentary time, smoking cessation, stress management, and prioritizing sleep.

While these changes are generally beneficial after cancer treatment, taking them to the extreme can negatively impact the overall well-being and health of survivors. Hall et al., aimed

to examine the extent to which fear of recurrence related to emotional distress and self-reported behavior changes in 258 cancer survivors.<sup>18</sup> This study found that higher fear of cancer recurrence was associated with greater emotional distress ( $P < 0.05$ ). It was reported that 56% of respondents participated in 75 minutes or greater of vigorous exercise, and 37% of respondents participated in 150 minutes of moderate exercise. Additionally, 35% of those sampled indicated consuming five or more servings of fruits and vegetables per day.<sup>18</sup> The results of this study indicate that the emotional stress resulting from fear of recurrence may be contributing to declined health related alterations in cancer survivors. While these findings stem from a single study, they highlight the need for further exploration into the opposite end of the spectrum, engaging in excessive exercise. It is reasonable to assume that some individuals may overexercise in an effort to regain control and reduce their risk of recurrence, potentially leading to physical exhaustion, increased risk of injury, mental strain, and the increased risk for the development of conditions such as orthorexia, presenting an opportunity for future studies to examine the potential consequences of extreme exercise behaviors in cancer survivors.

Waterman et al., aimed to examine the presence of orthorexia symptoms and disordered eating behaviors in young women with cancer, the factors associated with the development of these conditions, and the type and frequency of eating behaviors changes following the diagnosis of cancer.<sup>19</sup> In this study, a total of 93 women between 19–39 years of age completed the Düsseldorf Orthorexia Scale, as well as the Eating Habits Questionnaire to measure both extent of orthorexia symptoms and disordered eating behaviors. The results of this study indicated that 58% of participants exhibited orthorexia symptoms, and 36.7% of participants scored range that is indicative of probable presence of orthorexia.<sup>19</sup> Additionally, a positive correlation between fear of cancer recurrence and associated eating patterns was observed, suggesting that

participants placed high significance on dietary patterns and influence over cancer-related outcomes. A total of 44.1% of women who completed the survey, indicated that they had changed their eating habits following their cancer diagnosis.<sup>19</sup> This finding in addition to the positive correlation observed between fear of recurrence and perceived dietary patterns can potentially indicate that individuals who participated in this study who were more fearful of cancer recurrence, were more likely to engage in specific eating behaviors that can be more restrictive, or anxiety driven.

After cancer treatment, many survivors restrict or eliminate certain food groups out of fear of recurrence. Although this is often done with good intentions, it can inadvertently lead to malnutrition, nutrient deficiencies, and the development of disordered eating patterns. As discussed in Prat et al., restrictive diets can contribute to weight loss, potentially promoting the development of malnutrition and the prolonged avoidance of specific food groups.<sup>20</sup> Prolonged avoidance can contribute to macro and micronutrient deficiencies as well. A restrictive dietary intake pattern places further emphasis and focuses on food, which can increase anxiety about food choices, becoming a constant source of stress for cancer survivors. Additionally, a declined ability to enjoy food is observed, and may lead to limited social interactions as well.<sup>20</sup>

### ***Mindful Eating vs Intuitive Eating***

Mindfulness is the act of focusing one's attention on the present moment or action; it involves utilizing both a non-judgmental and accepting attitude towards oneself and others. The connection between mindfulness and enhanced emotional well-being has been extensively studied. Studies consistently demonstrate that mindfulness practices are correlated with improved indicators of psychological health including higher levels of positive affect, life satisfaction, emotional regulation, and lower levels of negative affects<sup>21</sup>. One important

application of mindfulness is in eating behaviors. Mindful eating, as previously discussed, is an intake pattern that is focused on an individual's sensual awareness of the food they are eating, and the experience that the food creates.<sup>6</sup> This style emphasizes the enjoyment of food, the experience it creates when utilizing all senses, the use of internal body cues to avoid overconsumption, and external cues to help aid in bringing awareness to the process of eating such as portion sizes or eating environment.<sup>22</sup>

The idea of intuitive eating was first introduced by registered dietitians Evelyn Tribole and Elyse Resch in their book *Intuitive Eating: A Revolutionary Program That Works*. Intuitive eating is closely related to mindful eating, but is more deeply rooted in responding to physiological cues, such as hunger and fullness, rather than the situational or emotional awareness emphasized in mindful eating.<sup>22</sup> Additionally, intuitive eating is based around ten key principles such as rejecting diet mentality, honoring hunger and fullness, making peace with food, and respecting one's body. Overall, this process is more comprehensive and structured than mindful eating and encompasses broader lifestyle practices such as exercise and body image.<sup>23</sup>

### ***Mindful Eating and Psychological Well-being***

After cancer treatment, many survivors experience changes in their relationship with food and their body. Many studies have been conducted to evaluate the prevalence of body image concerns amongst breast, head, and neck cancer survivors due to the significant visible and physical changes that result from the associated treatments. Study findings suggest that body image concerns are significantly correlated to instances of declined mental health and lower quality of life<sup>24</sup>. In one study specifically, it was found that 49.7% of the studies' 210 participants with cancer, exhibited eating disorders.<sup>25</sup>

A cancer diagnosis and the treatment process in general can significantly impact an individual's sense of control, creating a feeling of helplessness. Nutrition following treatment offers an opportunity for reclamation of control for many survivors. Following evidence-based nutrition and physical activity guidelines can create routine and a sense of autonomy<sup>26</sup>. While this can be an empowering process, it can easily become a source of stress, anxiety, restriction, and emotional eating patterns may potentially lead to disordered eating practices. Mindful eating practices can be incredibly beneficial in not only improving an individual's relationship with food and their body, but also their psychological health. One study conducted aimed to explore the relationship between mindful eating behavior, self-compassion, weight, disordered eating tendencies, and well-being through the use of a survey questionnaire. Results suggest that survey participants who practiced mindful eating were more likely to practice self-compassion, which is linked to a decreased potential for developing an eating disorder, a more positive eating attitude, and mental health status.<sup>27</sup>

In regard to mindful eating programs developed specifically for cancer survivors, little research has been conducted. However, one study in particular utilizing the Survivors Overcoming and Achieving Resiliency (SOAR) program, shows notable promise in how this dietary approach can be used to enhance survivors' awareness of their eating habits while also fostering the development of sustainable dietary patterns aligned with nutrition recommendations relating to survivorship.<sup>28</sup> SOAR was a multidisciplinary virtual teaching kitchen, nine-week program, where participants completed weekly cooking classes that integrated multiple aspects of mindfulness, including mindful eating techniques and practices. Prior to and following this intervention, participants completed The Mindful Eating Questionnaire (MEQ). This tool is designed to assess dimensions of mindful eating behaviors such as awareness, disinhibition,

external cues, emotional response, and distractions<sup>29</sup>. Following the nine-week intervention the mean change in MEQ scores was 0.12, indicating a small positive shift in mindful eating behaviors among participants.<sup>28</sup> While this increase in MEQ score was modest, this study provides insight into potential future research on mindful eating behaviors and their long-term impact on cancer survivors' health. Additionally, future exploring of similar programs could examine the deep psychological benefits of mindful eating in cancer survivors, specifically focusing on its long-term impact on emotional well-being and mental health.

### ***Mindful Eating: Honoring Hunger and Fullness Cues***

One of the first steps in practicing mindful eating, is honoring one's hunger and fullness cues. When these internal signals are ignored or disrupted due to external factors, the ability to regulate eating based on the body's true needs can become compromised, often leading to patterns of overeating, undereating, or emotional eating.<sup>23</sup> As discussed in *Intuitive Eating: A Revolutionary Program That Works*, the body needs to be consistently given adequate amounts of energy and carbohydrates to function properly. When an individual follows a restrictive diet or fasting pattern, the body attempts to compensate by activating the neurological and physiological pathways responsible for triggering the drive to eat. For example, salivation and the production of neuropeptide Y (NPY) increase. NPY is the neurotransmitter responsible for stimulating appetite, more specifically it promotes the drive to increase carbohydrate intake.<sup>23</sup> While these are just two examples of how the body adapts to encourage eating during periods of deprivation, such as those caused by restriction, fasting, or dieting, these and other physiological mechanisms can contribute to long-term overeating.

Hunger manifests differently in each individual; while many recognize it through a growling stomach, others may experience more subtle or varied cues such as fatigue, irritability,

and preoccupation with food. Stevenson et al., aimed to examine the association between interoceptive hunger and dysregulated eating patterns. Introspective hunger refers to an individual's varying ability to perceive internal hunger signals.<sup>30</sup> In this study, participants completed the Monello and Mayer's hunger questionnaire; this survey was designed to assess an individual's subjective experiences of hunger and satiety. Sensations were categorized into five distinct categories: stomach related cues (e.g., stomach growling or the feeling of emptiness), mood related indicators (such as irritability), head related cues (such as dizziness), and general body sensations (such as fatigue). Participants were asked to rate the intensity of each sensation. In addition to these sensory experiences, the questionnaire assessed contextual factors such as time elapsed since the last meal, current subjective hunger levels, urge to eat, preoccupation with food, and the estimated quantity of food that could be consumed at the time of the survey.<sup>30</sup> Questions to gauge participants' attitudes and eating beliefs were also presented. The results of this study indicated that there is a potential relationship between interoceptive hunger and eating attitudes and behaviors, overeating, or binging in particular. Individuals with lower interoceptive awareness may be more susceptible to uncontrolled eating patterns, which demonstrates the importance of cue recognition in developing and maintaining healthy eating behaviors.<sup>30</sup>

### ***Mindful Eating: Slowing Down***

Cancer treatments target rapidly dividing cells, including those in your digestive tract and mouth, leading to inflammation, changes to digestion (discomfort and impaired nutrient absorption), and taste alterations. Slowing down while eating may prove to be beneficial in supporting improved digestion, nutrient absorption, and overall enjoyment during meals for cancer survivors. Multiple studies have been conducted that demonstrate how slowing down while eating can lead to reduced food intake and is linked to increased satiety.<sup>31</sup>

In addition to improved satiety, eating slowly has been linked to improved digestion. Chewing thoroughly and slow further breaks down food before it reaches the stomach and intestines, promoting more efficient digestion. Hamada et al. explored the effects of the number of chews and meal duration on diet-induced thermogenesis (DIT) and splanchnic blood flow (BF). In this study, eleven healthy weight individuals participated in two eating trials: one rapid eating session and one slow eating trial.<sup>32</sup> DIT was calculated using oxygen uptake and body mass, and the splanchnic BF was calculated using the diameter and blood velocity in the celiac and superior mesenteric artery. DIT and postprandial splanchnic BF in both the celiac artery and superior mesenteric artery were higher in the slow eating trial than in the rapid eating trial, indicating increased blood flow to digestive organs and increased thermogenic activity.<sup>32</sup>

### ***Mindful Eating: Gentle Nutrition***

Gentle nutrition refers to nourishing one's body in regard to health, however in a non-restrictive and flexible manner. This way of eating emphasizes the addition of nutrient dense foods, rather the elimination of foods that are typically deemed as unhealthy.<sup>23</sup> As outlined in *Intuitive Eating: A Revolutionary Program That Works*, one of the most accessible ways to practice gentle nutrition is by incorporating a wide variety of foods into one's diet, something often neglected in restrictive dieting. Choosing nutrient-dense foods does not mean sacrificing enjoyment; rather, it involves integrating them in ways that support both health and satisfaction. The authors encourage individuals to find practical, enjoyable strategies for adding fruits and vegetables to meals, for example, including them in dishes like stuffed peppers or fajitas, where they naturally complement flavor and texture.<sup>23</sup> In terms of overall diet quality, studies show an association between mindful eating and improved dietary quality. Gusnier et al., describes a study conducted in 2023 in which 13,759 participants of the NutriNet-Sante study completed a

mindful eating assessment along with a three-day 24-hour dietary record. Overall, the findings of this study revealed that a higher mindful eating score was associated with higher overall dietary quality. Additionally, it was found that mindful eating was associated with lower energy intake, lower consumption of ultra processed foods, and adherence to dietary guidelines.<sup>33</sup>

### ***Applying Self-Determination Theory to a Mindful Eating Program***

The self-determination theory offers a framework for a number of health behavior change programs to be developed, by focusing on the psychological needs-autonomy, competence, and relatedness. It is imperative that these needs are met in order to promote intrinsic motivation, which results in long-term behavior change. One article in particular examined how practitioners can support sustainable health behavior changes utilizing health and wellness coaching (HWC), a strategy that can aid individuals in meeting their needs of autonomy, competence, and relatedness<sup>34</sup> The HCW model is a patient-centered approach to behavior change, where the patient defines their goals, engages in self-discovery, is actively learning through educational content, and engages in self-monitoring<sup>34</sup>. In this approach, the practitioner pushes a patient to build autonomy, competence, and relatedness through a number of strategies. The main strategy utilized is the “coach approach,” which allows the patient to adopt self-directing behavior changes based on their own needs and readiness to change. In the coaching approach the following communication, encouragement, and engagement styles are utilized: empowering the patient to take ownership of their health, believing that the patient is the expert of their own life, a coach or practitioner guides the process instead of leading it, and a practitioner uncovers motivation from within instead of coaxing the patient to comply.<sup>34</sup>

While limited research exists on the specific application of self-determination theory in developing mindful eating programs, the insights from the HCW communication approach will

be highly valuable in shaping a mindful eating series for cancer survivors. Empowering a survivor to take ownership of their health allows mindful eating to become their choice, further enhancing autonomy. Believing that the survivor is the expert of their own life and recognizing that each survivor is the expert on their own experiences and needs, fosters empowerment, autonomy, and self-trust which are crucial elements in enhancing intrinsic motivation and engagement. Finally, a mindful eating email series that aims to uncover motivation from within instead of coaxing the patient to comply, may aid survivors in uncovering their intrinsic motivation such as eating for enjoyment, which fosters lasting motivation and behavior change.

## **Summary**

Cancer survivors face a number of challenges post treatment, including the development of food-related anxiety, emotional eating, and restrictive practices. A mindful eating program supported by Self-determination Theory, offers a promising strategy for improving the well-being of cancer survivors, and addressing these issues, by fostering autonomy, competence, and relatedness. While research into mindful eating interventions in cancer survivorship are limited, existing research highlights the potential of integrating Self-Determination principles into dietary interventions to enhance overall well-being and long-term psychological health.

## **Project Methodology and Design**

### ***Theoretical Framework***

The self-determination theory is a psychological theory of human motivation that examines how both intrinsic and extrinsic factors influence an individual's ability to change.<sup>35</sup> This theory was developed by Richard Ryan and Edward Deci and highlights the distinction between autonomous motivation versus controlled motivation.<sup>36</sup> Autonomous motivation is the drive to engage in certain activities or behaviors due to intrinsic motivation, the incentive to

complete an activity or task because one finds it rewarding. In contrast to this, controlled motivation is based on the idea that one is driven by external factors such as an external reward, praise, or punishment.<sup>35</sup>

The self-determination theory suggests that there are three basic psychological needs that must be met in order to enhance overall well-being and motivation: autonomy, competence, and relatedness.<sup>35</sup> Autonomy refers to an individual's ability to govern their own decisions or actions independently, in regard to their personal values, goals, or experiences. Competence is the need to feel effective or capable in completing a task or activity. Relatedness refers to the need to feel connected with others or valued in a relationship.<sup>37</sup> Studies suggest that interventions designed utilizing the self-determination theory lead to more desirable outcomes such as improved mental wellbeing, in addition to long lasting behavior change.

The self-determination theory is focused on autonomy, competence, and relatedness as three key needs that must be met in order to promote intrinsic motivation, and thus meaningful and long-lasting behavior change. This mindful eating email series will be designed using self-determination theory principles to help cancer survivors develop a healthier, more intuitive relationship with food by fostering these three needs. In regard to established research questions and objectives, the self-determination theory will provide insight into how a five-week mindful eating program can support the emotional well-being of cancer survivors by reducing instances of food-related anxiety and restriction. This program will aim to enhance survivor autonomy by empowering them to make food choices based on internal hunger cues rather than a restrictive mentality, increasing control over one's eating patterns and choices. Additionally, this program will provide participants with the practical skills they need in order to build confidence in their ability to practice mindful eating and nourishing themselves without food-related guilt or shame.

Finally, this program can aid in fostering the feeling of relatedness as it may decrease the feeling of isolation felt by cancer survivors by creating a sense of a shared experience, which may lead to improved emotional well-being and reduced food-related anxiety.

### ***Research Approach***

A phenomenological research approach is a method that focuses on describing and exploring the lived experiences of multiple individuals, in regard to a particular concept or phenomenon.<sup>38</sup> The core principle of this methodology is the importance of lived experiences—studying an individual’s personal experiences rather than relying on external observations or theories. This method is particularly appealing as it captures multiple personal narratives and also allows for subjectivity. Every survivor’s experience is unique; a phenomenological approach respects and centers individual perspectives rather than imposing generalizations. This is one of the core aims of the phenomenological approach: to capture the meaning and complexity of the lived human experience.

The transcendental phenomenological approach is one that is based around the ontological assumption that reality is internal to the knower, consisting of what appears in their consciousness.<sup>39</sup> During data collection, researchers must set aside their own attitudes, beliefs, and assumptions in order to fully focus on the participants’ lived experiences. This process is typically achieved through bracketing, or by writing a reflexivity statement that acknowledges and attempts to suspend personal biases.

In regard to applying phenomenology to researching mindful eating, as well as the development and application of a mindful eating email series for cancer survivors, there are a number of advantages to utilizing this approach. One main advantage of this approach is that it allows researchers to capture the emotional and psychological impact of a certain event or

experience; it allows participants to provide a subjective perspective on their potential transformation or shift in beliefs and behaviors.

### ***Methodology***

This study utilized a qualitative phenomenological approach to explore how cancer survivors' lived experiences with food-related anxiety, emotional well-being, and dietary restrictions before, during, and following participation in a five-week mindful eating series.

Eligible participants included adult cancer survivors (18 years of age or older) who were currently undergoing cancer treatment or had previously undergone cancer treatment. Eligible participants must have completed the previously discussed *Nutrition After Cancer: What to Eat and What to Avoid* email series. A marketing email was sent to all participants who had subscribed to the previous program, with information relating to the mindful eating program. Once the link was clicked, participants were taken to a web page containing the *Mindful Eating Kickstart* pre-survey. Additionally, this webpage contained a disclaimer about how this program is a part of a program being conducted as a part of graduate project, and that all information collected will remain confidential and will only be utilized in the sense of academic writing.

The primary purpose of this questionnaire was to assess participants' starting point on their mindful eating journey, identify any challenges they might be facing, and to understand how best to support them throughout the program. It also served as a baseline for both participants and researchers to track progress after the completion of the email series. The questionnaire was structured to capture key areas, including participants' personal background (type of cancer, treatment status, and dietary restrictions), emotional and physical relationship with food (with a focus on how cancer and treatment have impacted their attitudes toward food and body image), their familiarity with and understanding of mindful eating, eating behaviors,

perceptions of food choices, and their sense of empowerment and the support they feel they receive from their social environment. At the conclusion of the program, participants completed a follow-up survey, similar to the initial one but with a few modifications, to assess how the program influenced their behaviors and beliefs.

### ***Metrics For Assessment***

As previously discussed, participants completed both pre- and post- intervention surveys designed to assess various dimensions of mindful eating. The survey questions were constructed to quantify overall mindful eating behaviors, as well as four specific subdomains: mindful eating awareness (MEA), emotional and stress eating (ESE), food beliefs and flexibility (FBF), and food empowerment and enjoyment (FEE). Participants responded to items indicating the frequency with which they engage in particular behaviors or thought patterns, and by rating their level of agreement with specific statements. Each answer choice was assigned a value ranging from one to five, with higher values reflecting greater alignment with mindful eating principles and beliefs. Composite scores for total mindful eating, as well as for each subdomain, MEA, ESE, FBF, and FEE, were calculated by summing the scores of relevant items. The following questions correspond to each representative subdomain:

#### **Mindful Eating Awareness**

- How often do you notice you are physically hungry before eating?
- How often do you stop eating when you feel full or satisfied?
- Before eating, do you ever consider how the food choices you made will make you feel?
- How often do you choose a food based on its nutrition value when making decisions?
- I am able to eat without distractions, such as the TV or scrolling on my phone.
- I feel confident in my ability to recognize hunger and fullness cues.

- I can distinguish between emotional hunger and physical hunger.

### **Emotional and Stress Eating (ESE)**

- How often do you experience food-related stress or anxiety?
- How often do you find yourself eating in response to emotions (stress, sadness, etc.) rather than physical hunger cues?
- Do you ever feel a sense of guilt, shame, or regret after eating certain foods?
- How often do you feel at peace with your food choices, rather than thinking about them in a critical way?

### **Food Empowerment and Enjoyment**

- I believe food should be enjoyed, not just viewed as fuel or something to avoid.
- I enjoy meals as a social or personal experience rather than just a necessity.
- I feel supported by my social environment (family, friends, health providers, etc.) in making food choices that feel right to me.
- I feel equipped with the knowledge and skills to make food choices that support my well-being.

### **Food Belief and Flexibility**

- How often do you find yourself restricting certain foods or food groups (e.g., cutting out sweets, avoiding carbs) due to guilt, fear, or the desire to lose weight?
- There are 'good' and 'bad' foods and eating the wrong food could hurt my recovery.
- I am comfortable with the idea of eating all types of foods without labeling them as 'good' or 'bad'.
- I place emphasis on trying to control my eating habits.
- I must follow a strict diet to keep cancer from returning.

- I eat based on my personal preferences rather than external rules or restrictions.
- I trust my body to guide my eating decisions.

## **Disclaimer**

Originally, this email series was designed to span five weeks. However, due to technical issues, several emails that were believed to have been sent were not delivered as intended. To ensure data collection could still occur in a timely manner, the remaining emails were distributed every three days, ultimately shortening the series to approximately two weeks. As a result of these delivery issues, it's likely that some participants who initially signed up did not fully engage with the series or may not have participated at all. However, the information provided by participants at the time of sign-up was still utilized in the pre-survey results and analysis to offer insight into the nutritional and support needs of cancer survivors more broadly.

## **Results**

### ***Mindful Eating Kickstart Results: Qualitative***

A total of 80 individuals enrolled in the email series and completed the required pre-survey at the time of sign-up. Survey responses were exported from the WordPress platform used to administer the program and organized in Microsoft Excel for analysis. Due to the volume of the responses (n=80) and the limited number of participants who completed the entire series, analysis of all open-ended answers was not feasible or appropriate. A subset of responses were reviewed for completeness and relevance to the questions being asked. From this subset, responses were randomly selected to identify overarching themes that reflect common experiences and perspectives among participants. The following themes were identified: heightened awareness and intentionality, emotional eating and food guilt, confusion and mixed

messaging, physical changes impacting eating habits and body image, challenges with self-compassion and acceptance, and a strong motivation to improve and learn.

*Table 1. Coding of Pre-Survey Responses*

Question	Response	Theme	Code
How would you describe your current relationship with food?	Challenging. It's a willpower issue.	Challenges with self-compassion and acceptance	Self-criticism
	I want to eat healthy. Enjoy eating. Love fruits and vegetables.	Motivation to improve and learn	Desire for growth
	It is a fight to eat simple meals as I have done in the past.	Physical changes impacting eating and body image	Appetite change
	My appetite is fine but I should eat better foods.	Heightened awareness and intentionality	Nutrition awareness/health motivation
	I am overweight but I love food, especially sweets.	Challenges with self-compassion and acceptance	Body image/self-criticism
	Fair I'm trying to eat more nourishing food.	Motivation to improve and learn	Behavior change
	Difficult. I am a compulsive overeater.	Emotional eating and food guilt	Compulsive behavior, self-criticism
	Awful! I have had a lifelong struggle between eating to sustain my life vs eating to supplement my emotional deficiencies.	Emotional eating and food guilt	Emotional eating, lifelong struggle, self-criticism
	Overeating when anxious	Emotional eating and food guilt	Emotional eating
	At times it taste metallic otherwise no issues	Physical changes impacting eating	Taste change
Good, eat fairly health but always more to do.	Motivation to improve and learn	Self-improvement	
How do you feel cancer diagnosis and treatment has impacted your relationship with food and your body?	I know what I should eat, but it's difficult to stay focused.	Challenges with self-compassion and acceptance	Self-criticism
	Confused about what I should or shouldn't eat.	Confusion and mixed messaging	Confusion, conflicting information

	Because of taking prednisone daily along with Zytiga, I am hungry often and I have gained weight	Physical changes impacting eating and body image	Appetite change, treatment side effects
	Made me more concerned and informed about choices and being more committed to healthy and fresh foods.	Motivation to improve and learn	Commitment to change/behavior change
	More emotional eating	Emotional eating and food guilt	Emotional eating
	Stress eating	Emotional eating and food guilt	Anxiety
	I don't feel I trust my body to do what I ask or that it is unable to. I feel like I've used cancer to ask my excuse to give up and not try and now I've spun out to the worst place I've ever been in terms of taking care of myself	Self-compassion and acceptance challenges	Body distrust, self-criticism
	It has prompted me to nurture myself in deeper ways	Heightened awareness and intentionality	Intentionality
If able, please tell us why you chose to enroll in this mindful eating email series.	I would like to educate myself better on my eating habits	Motivation to improve and learn	Nutrition learning, desire for growth
	Ready to continue learning and eating better for my health = physical and mental.	Motivation to improve and learn	Health motivation
	Guilt, I am not eating to help in my cancer battle	Emotional eating and guilt	Food guilt
	I would like to get back on track. I am under a lot of stress and transition and know food is my medicine	Motivation to improve and learn	Emotional Stress, expression of wanting to improve
	I am very discouraged about my out of control eating and the impact it has on my body. I've been looking for a legitimate, healthy eating program that acknowledges the challenges of being a cancer patient. The timing	Self-compassion and acceptance challenges	Self-criticism, body image, desire for growth

	of the receipt of this email is perfect for me.		
	I have gained so much weight that I can't seem to lose.	Physical changes impacting eating and body image	Frustration, body changes

**Theme 1: Heightened Awareness and Intentionality**

While not all responses are presented in *Table 1.*, many participants’ answers to the three open-ended questions reflected an increased mindfulness around eating habits and a more deliberate approach to food choices aimed at improving their nutritional well-being. Participants described becoming more aware of the foods they consumed and expressed a desire to be more intentional about nourishing their bodies. One participant responded to the question, “How do you feel your cancer diagnosis and treatment has impacted your relationship with food and your body?” by stating, “The diagnosis was a wake-up call! I want to pay more attention to what I am eating and putting in my body.” Another shared, “It has helped me see food as a source of healing and a source of energy.” These responses underscore a shift towards greater intentionality and a more reflective approach to eating.

**Theme 2: Emotional Eating and Food Guilt**

Emotional eating and associated feelings of guilt emerged as a common theme in participant responses. Many individuals reported an increased food intake in response to stress and anxiety related to their cancer diagnosis. For some, these struggles with food predated their diagnosis. One participant described their experience by stating, “Awful! I have had a lifelong struggle between eating to sustain my life vs eating to supplement my emotional deficiencies,” when asked about their current relationship with food. Another participant, when explaining their reason for enrolling in the series, shared, “Guilt, I am not eating to help in my cancer battle.”

These responses illustrate how some survivors use food as a coping mechanism and how this behavior may contribute to ongoing feeling of guilt around eating.

### **Theme 3: Confusion and Mixed Messaging**

As discussed previously, cancer survivors are exposed to a vast array of nutritional information. Some of this information may be misleading or even confusing, as evidenced by one participant's response when asked to describe their current relationship with food as the following, "Confused about what I should or shouldn't eat," while others simply responded with the word "confused." These responses highlight a potential gap in the availability of clear, simple, and evidence-based resources for cancer survivors. Additionally, it suggests that there is a potential area for further exploration, such as the need to address the continued spread of non-evidence-based health information and potential regulatory strategies to ensure all patients are receiving factual and quality information.

### **Theme 4: Physical Changes Impacting Eating and Body Image**

Cancer treatment often leads to physical changes including weight loss or gain, hair loss, altered taste, and reduced appetite. A side effect that was commonly reported was alterations in taste; many participants noted experiencing a metallic sensation after beginning treatment. Others described physiological changes such as declined appetite and unintentional weight loss. It is these physical changes that many noted to be a source of distress for them, one participant expressed the following, "My daily oral medication causes weight gain overtime. My emotional overeating has also caused weight gain. I currently hate the way my body looks." This sentiment demonstrates both the need for and the importance of providing nutritional support alongside mental health resources during and following treatment to help survivors navigate these

challenging psychological changes and psychological factors contributing declined body satisfaction and acceptance in cancer survivors.

### **Theme 5: Self-Compassion and Acceptance Challenges**

The theme of self-compassion and acceptance challenges is used to encapsulate the shared experiences of survivors who reported struggles with appearance, body trust, and self-compassion. Many individuals expressed a high level of self-criticism in their responses, even after enduring the challenges of cancer. Their words reflected how hard they continue to be on themselves despite all they have been through. One participant expressed this struggle stating, “I don’t feel I trust my body to do what I ask or that it is unable to. I feel like I’ve used cancer to as my excuse to give up and not try, and now I’ve spun out to the worst place I’ve ever been in terms of taking care of myself.”

### **Theme 6: Motivation to Improve and Learn**

This theme emerged prominently when participants were asked to describe why they chose to enroll in this mindful eating email series. Many expressed a desire to continue learning, leading to further improvements in their overall health. The following captures this theme, “Ready to continue learning and eating better for my health = physical and mental.”

### ***Mindful Eating Kickstart Results: Quantitative***

As previously mentioned, participants responded to items indicating the frequency with which they engage in particular behaviors or thought patterns, and by rating their level of agreement with specific statements. Each answer choice was assigned a value ranging from one to five, with higher values reflecting greater alignment with mindful eating principles and beliefs. The following tables present the percentage of participants who selected each response option for each survey question:

Table 2. Quantitative Results from Mindful Eating Kickstart Survey

	<b>Never</b>	<b>Rarely</b>	<b>Sometimes</b>	<b>Often</b>	<b>Always</b>
How often do you notice you are physically hungry before eating?	2.4% (n=2)	15.9% (n=13)	47.6% (n=39)	31.7% (n=26)	2.4% (n=2)
How often do you stop eating when you feel full or satisfied?	1.25% (n=1)	12.50% (n=10)	45% (n=36)	37.50% (n=30)	3.75% (n=3)
How often do you experience food-related stress or anxiety?	10% (n=8)	22.50% (n=18)	38.75% (n=31)	26.25% (n=21)	2.50% (n=2)
How often do you find yourself eating in response to emotions (stress, sadness, etc.) rather than physical hunger cues?	7.50% (n=6)	13.75% (n=11)	41.25% (n=33)	33.75% (n=27)	3.75% (n=3)
Do you ever feel a sense of guilt, shame, or regret after eating certain foods?	8.75% (n=7)	7.50% (n=6)	48.75% (n=39)	23.75% (n=19)	11.25% (n=9)
Before eating, do you ever consider how the food choices you made will make you feel?	8.75% (n=7)	17.50% (n=14)	46.25% (n=37)	23.75% (n=19)	3.75% (n=3)
How often do you chose a food based on its nutrition value when making decisions?	0% (n=0)	7.50% (n=6)	36.25% (n=29)	51.25% (n=41)	5% (n=4)
How often do you find yourself restricting certain foods or food groups (e.g., cutting out sweets, avoiding carbs) due to guilt, fear, or the desire to lose weight?	6.25% (n=5)	17.50% (n=14)	37.50% (n=30)	31.25% (n=25)	7.50% (n=6)
How often do you feel at peace with your food choices, rather than thinking about them in a critical way?	6.25% (n=5)	15% (n=12)	51.25% (n=41)	26.25% (n=21)	1.25% (n=1)

Table 3. Quantitative Results from Mindful Eating Kickstart Survey

	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
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I am able to eat without distractions, such as the TV or scrolling on my phone.	15% (n=12)	32.50% (n=26)	18.75% (n=15)	27.50% (n=22)	6.25% (n=5)
I believe food should be enjoyed, not just viewed as fuel or something to avoid.	29.63% (n=24)	48.15% (n=39)	17.28% (n=14)	2.47% (n=2)	2.47% (n=2)
I am comfortable with the idea of eating all types of foods without labeling them as 'good' or 'bad'.	5% (n=4)	31.25% (n=25)	31.25% (n=25)	27.50% (n=22)	5% (n=4)
I place a emphasis on trying to control my eating habits.	10% (n=8)	57.50% (n=46)	25% (n=20)	6.25% (n=5)	1.25% (n=1)
There are 'good' and 'bad' foods, and eating the wrong food could hurt my recovery.	12.35% (n=10)	55.56% (n=45)	19.75% (n=16)	11.11% (n=9)	1.23% (n=1)
I must follow a strict diet to keep cancer from returning.	7.41% (n=6)	28.40% (n=23)	35.80% (n=29)	22.22% (n=18)	6.17% (n=5)
I feel that I have control over my food choices.	2.50% (n=2)	62.50% (n=50)	15% (n=12)	8.75% (n=7)	2.50% (n=2)
I eat based on my personal preferences rather than external rules or restrictions.	10% (n=8)	45% (n=36)	22.50% (n=18)	20% (n=16)	2.50% (n=2)
I trust my body to guide my eating decisions.	1.25% (n=1)	25% (n=20)	35% (n=28)	28.75% (n=23)	10% (n=8)
I feel supported by my social environment (family, friends, health providers, etc.) in making food choices that feel right to me.	7.50% (n=6)	36.25% (n=29)	32.50% (n=26)	18.75% (n=15)	5% (n=4)
I enjoy meals as a social or personal experience rather than just a necessity.	17.50% (n=14)	46.25% (n=37)	20% (n=16)	11.25% (n=9)	5% (n=4)
I feel equipped with the knowledge and skills to make food. choices that support my well-being.	8.64% (n=7)	35.80% (n=29)	35.80% (n=29)	17.28% (n=14)	2.47% (n=2)

I feel confident in my ability to recognize hunger and fullness cues.	5% (n=4)	37.50% (n=30)	31.25% (n=25)	21.25% (n=17)	5% (n=4)
I can distinguish between emotional hunger and physical hunger.	8.75% (n=7)	36.25% (n=29)	31.25% (n=25)	17.50% (n=14)	6.25% (n=5)

A total of 80 participants responded to the pre-survey. It should be noted that one participant selected two responses for a question; however, their data was retained in analysis due to its overall usefulness. Additionally some participants did not answer every question. Despite this, the majority of questions received complete responses from all 80 participants, resulting in a sample size of n=80 for most items. Overall, the most meaningful findings are as follows:

- 65% sometimes or often experience food-related stress or anxiety.
- About 75% sometimes or often eat in response to emotions rather than hunger.
- Nearly 73% sometimes or often feel guilt, shame or regret after eating certain foods.
- About 68% sometimes or often restrict food due to guilt, fear, or weight concerns.
- About 36% felt supported by their social environment in food decisions.
- About 36% strongly agreed or agreed strict diets are necessary to prevent cancer recurrence.

***Mindful Eating Self-Growth Survey Results: Qualitative***

A total of twelve individuals who enrolled in the program completed it fully by completing the self-growth survey attached to the final email of the series. However, three emails address could not be matched to any of the exiting addresses that were entered in order to sign up for the series, preventing these responses from being used. In order to determine whether this

program had a meaningful impact on participants' relationship with food, responses to two pre-survey questions were compared to three corresponding questions from the post-survey in the chart presented below.

Table 4. Pre- and Post-Survey Comparison (n=9)

Participant	How would you describe your current relationship with food? (Pre)	How do you feel cancer diagnosis and treatment has impacted your relationship with food and your body? (Pre)	How would you describe your relationship with food following this email series? (Post)	What is your view on mindful eating following this email series? (Post)	What is one thing you learned that you found to be the most meaningful? (Post)
A	Relationship based on impulse, habits, traditions	Changed the way I approach food	Understand food in a different way, and understand what is healthy for me, and things to avoid.	It is positive and it helps me and my family to appreciate food, and its importance to enjoying it by slowing down	Be mindful when eating and making food choices
B	At times it taste metallic otherwise no issues	I do not eat as much in one setting	Friendly	Learned some things	Not to eat in front of the tv
C	pretty good	yes	very helpful	good and to be more thoughtful with my food choices	food choices
D	no problem with this either	Same answer	Fine it's ok	No problem	I can always learn something new
E	I've definitely tweaked my diet to include better food choices, but I find myself becoming stressed if I eat sweets or coffee and things like that.	It's definitely helped me make better food choices but has also caused a lot of anxiety around things I can and cannot eat.	I'm definitely working on not labeling foods either good or bad now and I'm giving myself more grace when it comes to food choices.	I've tried to be more focused on slowing down and taking my time when eating.	I really liked the statement that instead of labeling foods either good or bad to think about what it provides even if that means energy, satisfaction or comfort. Sometimes it's okay to be comforted by food.
F	OK	Made me more conscious of the need to increase protein	I know what to do and why. I just need to improve my actions.	It's important but hard to do consistently	To be kind to myself
G	On my mind too much	Try to eat well	More mindful	Helpful	All food is ok
H	not good	stress eating	thinking of food as medicine	inspired	No one thing. It was all interesting.
I	I love food and generally love cooking, but have been struggling with my husband's selective taste buds, very limited, but I keep working on finding common ground without getting bored	I thought I was eating really healthy, but have been shown after diagnosis and treatment that I wasn't eating as healthy as I thought	Healthy	Mindful eating is something I've been actively cultivating; this series has supported my intentions.	Reinforced my quest for nonjudgement and acceptance

While not directly evident for some participants, the responses presented in the table above represent an evolution in participants' relationships with food and their understanding of mindful eating concepts. For the purpose of examining the effectiveness of this program, only a few of the responses will be discussed, as many were limited in detail and difficult to analyze. Due to this, the choice was made to not make large assumptions based on shorter responses in order to maintain the integrity of the analysis. The responses from participants A, E, and H discussed as they demonstrate a clear improvement in behavior, and shift in food-related perspective.

Prior to the initiation of this program, participant A expressed that their food habits were based strongly on impulse, habits, and tradition. Additionally, their cancer diagnosis changed the way that they approached food. Following the email series, this participant expressed that they understand food in a different way now, and that they, "understand what is healthy for me, and things to avoid." Without further explanation from the participant, it is difficult to assess what they fully meant by the latter part of that statement. However, based on the sentiment expressed earlier, one potential interpretation is that they now may have a better understanding of what foods make them feel their best and limit those that may not. When explaining their view on mindful eating following the email series, participant A expressed that it is "positive," and that it is a practice that they have shared with their family, helping all of them further appreciate and enjoy the foods they are eating.

Participant E expressed extensive feelings of guilt and shame surrounding food choices many label as "bad," such as sweets or coffee. When further discussing how their cancer diagnosis impacted their relationship with food, this participant shared that it helped motivate them to make "better" food choices. However, their response also revealed extensive food-

related distress, particularly around foods that they felt that they “should” or “should not” eat. Remarkably, a complete shift is observed when examining the post-survey responses from this participant. Following this series, participant E is working on not labeling foods as “good” or “bad,” a component of the program that was discussed extensively. It is also worth noting the participant’s increased practice of grace in relation to food choices. This sentiment and practice are captured by the participant’s response to the aspect of the program that they found to be the most meaningful: “I really liked the statement that instead of labeling foods either good or bad to think about what it provides even if that means energy, satisfaction or comfort. Sometimes it’s okay to be comforted by food.”

Based on additional responses provided by participant H, mindfulness was a practice that they were actively working on prior to this email series. In regard to this and program effectivity, participant H expressed that this series supported their ongoing efforts, stating, “Mindful eating is something I've been actively cultivating, this series has supported my intentions.” They also noted this email series helped reinforce their journey towards greater acceptance and non-judgement.

### ***Mindful Eating Self-Growth Survey Results: Quantitative***

In order to assess whether the numerical project objectives were met, the average change for each subdomain was calculated, and a paired two tailed T-test was run to identify statistically significant changes. The average change in the total mindful eating scores are as follows: Total Mindful Eating (12.56), Mindful Eating Awareness (2.67), Emotional and Stress Eating (1.89), Food Belief and Flexibility (4.22), Food Empowerment and Enjoyment (2.89). The corresponding p-values from the t-tests were: Total Mindful Eating Score (P=0.014), Mindful

Eating Awareness (P=0.05), Emotional and Stress Eating (P=0.02), Food Belief and Flexibility (P=0.09), and Food Empowerment and Enjoyment (P=0.04).

## **Discussion**

### ***Pre-Survey Findings***

One of the original aims of this project was to identify how cancer survivors perceive the impact of treatment on their relationship with their food and body, and to determine how a mindful eating email series may alter this perception. Based on the qualitative results from the pre-survey, it was identified that many participants had challenges associated with self-compassion and acceptance, emotional eating, and body image distress.

As previously discussed, many individuals expressed a high level of self-criticism in their responses, even following the difficult challenges associated with cancer. These responses raise important questions about how we can better support cancer survivors in cultivating self-compassion and grace, while also encouraging personal accountability when it comes to investing in overall well-being and health. It highlights the need for a balanced approach that helps an individual affirm their health status, while also empowering them to recognize that they are able to make gradual and meaningful steps towards improving their health.

A significant number of participants reported instances emotional eating, food-related anxiety, and guilt as demonstrated by the open-ended responses above, as well as the quantitative data presented in *Table 2* and *Table 3*. In addition to this, instances of body dissatisfaction due to physiological changes were also reported. The insights obtained through the collection and analysis of this data underscores the need for both nutritional and psychological support relating to body acceptance and emotional regulation, both during and following treatment.

In addition to these findings, it is important to note and further discuss one surprising finding; 55.56% of participants agreed with the idea that eating the ‘wrong’ types of foods could hurt their recovery; 12.35% strongly agreed. Additionally, 19.75% of participants took a neutral stance on this sentiment, 11.11% disagreed, and 1.23% of participants strongly disagreed. In order to be eligible to enroll in this mindful eating email series, participants must have completed the *Nutrition After Cancer: What to Eat and What to Avoid* email series. This email series provided dietary guidance tailored to cancer survivors while emphasizing the principle of moderation. It conveyed that no single food is likely to hinder recovery or cause recurrence; rather, it is long term dietary patterns and habits that may influence these outcomes. Despite receiving evidence-based guidance, over half of participants continued to believe that certain types of foods could harm their recovery, highlighting the level of importance individuals place on pre-existing food rules, practices, and beliefs regardless of whether or not these practices are supported by scientific evidence.

### ***Post-Survey Findings: Program Effectiveness***

As previously discussed, portions of the qualitative data presented in *Table 4.*, highlight increased awareness of mindful eating and a more positive relationship with food. In addition to these findings, the quantitative data outlined above further demonstrate that the program was effective in achieving its intended objectives. Mean changes in each subdomain were positive, indicating that a majority of participants responded to corresponding questions with an answer choice that was further aligned with mindful eating tendencies. Additionally, a statistically significant change of  $P=0.014$  was calculated for Total Mindful Eating Scores, Food Empowerment and Enjoyment, as well as for Emotional and Stress Eating. The significant change relating to Emotional and Stress Eating may potentially indicate reduced instances of

emotional eating following this program for some participants, however a larger sample size would be needed to confirm this hypothesis.

### ***Self-Compassion***

The theme of increased self-compassion emerged from the analysis of the post-survey results. This finding offers a valuable perspective through which both the previous research and the implemented program can be understood. Specifically, it aligns with the theoretical model of self-compassion developed by Kristin D. Neff. By definition, self-compassion refers to the way we relate to ourselves during moments of perceived failure, inadequacy, or personal suffering.<sup>40</sup> The three main domains of this theoretical framework consist of the following: self-kindness vs self-judgement, common humanity vs isolation, and mindfulness vs over-identification. The first domain highlights the manner in which an individual treats themselves in face of failure, suffering, or inadequacy. Rather than responding with self-judgment or criticism, practicing self-kindness means offering oneself care and compassion during difficult times. It involves acknowledging pain or failure in a supportive manner, and recognizing the imperfect nature of life.<sup>41</sup> The second domain, common humanity involves recognizing the shared human experiences of suffering, failure, and pain. Practicing this means reminding ourselves that challenges are a normal part of life and are not burdens to be beard alone in isolation. The third domain involves acknowledging pain or suffering in a mindful way, rather than letting these feeling become overwhelming or something that becomes over-identified with.<sup>41</sup>

### ***Language Use***

It is important to note that the term mindful eating was intentionally used throughout this program following a discussion with Julie Lanford, who expressed a preference for the terminology. While the content of the email series was largely inspired by the book *Intuitive*

*Eating: A Revolutionary Program That Works*, the decision to use “mindful eating,” was made to better suit the needs of the intended audience. Unlike intuitive eating, which involves a more in-depth framework, mindful eating offers a simpler, accessible approach. Since one of the primary goals in developing this program was to ensure that the content was digestible and approachable for participants, “mindful eating,” was the chosen guiding term.

### **Implications and Recommendations**

The findings of this project carry meaningful implications not only for the development of nutrition education interventions for cancer survivors, but also for the broader range of support services that contribute to overall quality of life during survivorship. As previously discussed, there are a number of considerations that must be taken into account. These include: identifying accessible resources that can be provided to all cancer patients to raise awareness about emotional eating while also introducing them to alternative coping strategies; exploring ways to support survivors in cultivating self-compassion and grace while also encouraging personal accountability and improving the delivery of both nutritional and mental health resources during and after treatment. Additionally, it is important to acknowledge the limited availability of mindful eating programs specifically designed for cancer survivors. It is hoped that this project, alongside existing materials and interventions, can offer valuable insight into how mindful eating practices may support improvements in both physical health and overall quality of life within this population.

As previously discussed, due to technological difficulties this program was shortened from five weeks to about two weeks. As a result of these delivery issues, it is likely that some participants who initially signed up did not fully engage with the series or may not have participated at all. If this program were to be replicated, it is recommended that the emails be

distributed over a five-week period as originally intended and be accompanied by interactive materials or activities for participants to complete and submit each week. This approach would allow for more in-depth understanding of the program's impact on participants and support more cohesive evaluation. In addition to these modifications, it would be beneficial for participants to complete the Self-Compassion Scale, a self-reported questionnaire developed by Neff that measures key components of self-compassion. Since increased self-compassion emerged as a central theme, incorporating this tool would allow for the quantification of changes in self-compassion over time.

In conclusion, this program successfully achieved its primary objectives while uncovering valuable opportunities for future research. Although the original aim was to improve overall eating behaviors and beliefs, the results highlighted a notable increase in self-compassion among participants. Future research and programs should further explore the role of self-compassion in cancer survivors and its potential health implications.

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## Appendices

**Appendix A.** Artificial intelligence (AI), specifically OpenAI's ChatGPT, was used during the development of this project and report to support the writing and analysis process. AI assistance contributed to revising writing for improved clarity, tone, flow, and readability. It was also utilized to edit participant facing materials to adopt a more conversational and approachable tone. Additionally, AI played a supplementary role in the qualitative analysis process by helping to identify initial patterns and potential themes in the data; however, all final thematic decisions were made through human interpretation and researcher judgment.

## **Appendix B.** Marketing Email for Program Recruitment

Cancer treatment can disrupt your life, including your relationship with food—but that is one aspect of your life where you can take back control! Nourish & Thrive is a five-week mindful eating email series designed to help you connect with your body, ease food-related anxiety, and improve your quality of life.

Through simple, supportive weekly lessons, you'll learn how to:

- Reconnect with your natural hunger and fullness cues
- Reduce restrictive eating behaviors driven by fear, while fueling your body with nutrient-dense foods
- Slow down and savor your meals
- Practice gentle nutrition aligned with your body's needs
- Cultivate a non-judgmental, positive relationship with food and respecting your body

Whether you're currently undergoing treatment or navigating life after, this program empowers you to make peace with food while supporting your overall well-being.

Join us on this mindful eating journey and take the first step toward food freedom.

To sign up go to: [www.cancerdietitian.com/mindfuleating](http://www.cancerdietitian.com/mindfuleating)

PS. This series is designed to tag team with Julie's Survivor Diet email series, which you registered for sometime in the last 5 years (which is why you're getting this email)! We hope you will participate in this NEW "Part 2" and provide your feedback to help us refine it!

## Appendix C. Email #1

We are so glad you are here! Over the next five weeks, we'll explore mindful eating practices to help you rebuild trust with your body and feel more at ease around food. Today, we're diving into a key piece of the puzzle: honoring your hunger and fullness cues. What does this mean exactly?

Let's find out!

### Cancer Treatment: How Does This Impact My Hunger Cues?

If you've been through cancer treatment, you already know how much treatment can affect your body in unexpected ways. Fatigue, body aches, and changes in appetite are just a few of the common side effects. One of the less talked about impacts is how treatment can disrupt your natural hunger and fullness cues.

You may have noticed:

- Changes in appetite (either increased or decreased)
- Shifts in food preferences
- Irregular eating patterns
- Difficulty recognizing when you're hungry or full

These physical changes, combined with the emotional stress of your cancer journey, can make it hard to listen to and trust your body's signals. Even after treatment ends, you might still struggle to reconnect with those natural cues.

That's where mindful eating comes in. It's a powerful tool that helps you tune back into your body's wisdom, easing anxiety around food choices and encouraging a more peaceful relationship with eating.

**Understanding Hunger & Fullness:** Our bodies are designed to tell us when we need to fuel ourselves, and when we need to stop. However, sometimes our bodies may be telling us in ways we may not recognize as hunger or fullness.

### *What does hunger look like?*

The answer isn't as simple as you think. While yes, a growling stomach is a common symptom many people associate with hunger, the truth is your body may begin to tell us we are hungry way before this. Check out some of the ways your body may be hinting to you that you may need to grab a snack to fuel it as it works hard for you throughout the day!

Some signs of hunger to look for:

- Mood swings
- Feeling faint
- Changes in energy levels
- Difficulty concentrating
- Irritability
- Headache

- Stomach gurgling
- And of course growling noises!

Additionally, everyone's body works differently, meaning everyone experiences hunger differently!

**ACTION STEP!** One of my assignments for you over the next few days is to make note of whenever you start to feel your stomach growl or feel hungry. Then... think back to *before you may have felt your stomach growl*, was your body giving you any other hints that you may need to eat?

*What does fullness look like?*

What does it mean to be full? Many people associate fullness with a full stomach. Well, fullness isn't about being uncomfortably stuffed- instead it is your body's way of gently telling you that it is satisfied and that it has enough fuel at the moment.

Before we dive into what exactly it means to be "full," I want to take a second to address some of the key reasons that people in general may eat past the point of satisfaction (i.e. past the point of respecting fullness).

- The Clean Plate Club-the habit of finishing all food on your plate:
  - Many people were taught as children to finish all their food to avoid "wasting" it, and this is a lesson that often sticks with us into adulthood.
  - In some households, it is seen as a sign of respect, gratitude, or good manners to finish your plate.
  - Avoiding waste may be important for those who value or who have experienced food insecurity.
- Emotional eating: Food can often offer us comfort in times of stress, and it may be used as a coping mechanism.
- Restriction or diet mentality: Extremely restrictive eating patterns can lead to a feeling of deprivation, making it easier to overeat when given the opportunity. Also, I want to make a point that may hit home for many-our bodies do not know the difference between a diet, and starvation! This idea is rooted in our body's natural survival mechanisms, showing how the body responds to reduced calorie intake in a way that is similar to how it would respond during times of food scarcity or starvation.
- Distractions: We tend to overeat when we are distracted because distractions such as scrolling, watching TV, or working keep us from tuning into our body's natural signals of hunger and fullness. They can delay our recognition of these signs, causing us to overeat.

*So what does comfortable fullness or satiety look like?*

- Decreased preoccupation with food
- Improved energy and focus
- A subtle feeling of stomach fullness
- Nothingness- Feeling neither hungry or full

### Tips for Building Awareness Around Fullness:

- Pause in the middle of eating a meal or snack to check in with yourself. Ask yourself if you are still enjoying what you are eating? How does the food taste? Is your hunger disappearing? Do you feel like you could be satisfied?
- If you continue to eat past the point of fullness, ask yourself if you are eating just because the food is there?
- After eating, evaluate your fullness level. Did you reach a comfortable fullness level (i.e. are you satisfied)? Are you still hungry? Did you surpass satisfaction? (If so, remember that is OKAY! This is a learning experience, and this is a hard skill to master! Show yourself kindness and grace!)
- Avoid eating while distracted: Avoiding distracting activities while eating, as this helps you stay mindful of hunger and fullness cues making it easier to recognize when you are satisfied and avoid overeating. It also allows you to enjoy your food more by allowing you to be more present!
- Recognize the power in saying “No Thank You”: This is a key aspect of mindful eating. It empowers you to make choices aligned with your true hunger and satisfaction levels. Saying “No Thank You” is a way to politely decline, while you are choosing to listen to your body and make decisions based on how you feel in the moment, rather than feeling obligated to eat food just because it is offered!

### ACTION STEP: Use the Hunger & Fullness Scale

Before starting to eat and following, assess where you fall on this scale! Try to eat when you feel like you are at 3-4, and assess whether you should stop eating around a feeling of 5-6.

- 0-2: Extremely hungry, light headed, potentially weak
- 3-4: Physical feeling of hunger, such as stomach growling or feeling of emptiness
- 5-6: Comfortable and satisfied (not full or hungry)
- 7-8: Feeling full, but comfortable
- 9-10: Uncomfortably full

Coming Next Week: We'll explore how to nourish your body with nutrient-dense foods-without falling into the trap of food rules or restrictions. Until then, be kind to yourself and trust what your body is telling you.

Warmly,

Dani Foust

Virginia Tech Dietetics Intern- Your Future Dietitian In Training :)

Cancer Services Inc.

## Appendix D. Email #2

Thanks for joining us for the second week of the *Nourish & Thrive: A Mindful Eating Journey for Cancer Survivors*. We are especially excited about this week's topic: Finding Peace with Food and Nourishing Your Body Without Guilt or Fear.

As cancer survivors, fueling your body is incredibly important! There is A LOT of information out there about what foods to avoid, and what foods to eat- and some of it can be quite misleading.

Many cancer survivors are given dietary guidelines that emphasize nutrient-dense foods to help support the body during and following treatment. These guidelines provide general recommendations to ensure you get the vitamins, minerals, and nutrients needed for optimal health. However, it is also essential to understand that there is room in your diet for foods that you enjoy, without feeling restricted. While it is important to prioritize nutrient-dense options, such as fruits, vegetables, whole grains, and lean proteins, there is no need to eliminate foods you love all together! The key here is moderation-enjoying all foods in a balanced way, as long as they do not become a habit (3+ days a week).

Making peace with food means being able to trust your body's hunger and fullness cues (as well as its cravings), rather than worrying about rules and restrictions. Let's go ahead and dive deeper into how to embrace food freedom without guilt or fear, while nourishing your body with nutrient- dense foods!

### Redefining the Role of Food In Your Life:

Many people struggle with labeling certain foods as “good” or “bad,” as if food itself determines a person's “goodness”. This mindset can lead to a feeling of guilt when eating “bad” foods and a feeling of pride when eating “good” ones- making it harder to maintain a balanced and peaceful relationship with food.

Let's get down to it- your body needs fuel to function, even for the simplest tasks like breathing. Everytime you eat, your body breaks food down into a usable form of energy. Without regular and adequate nourishment, your body shifts into “survival mode,” conserving energy for the most essential functions. If your body goes too long without fuel, it even begins breaking down muscle for energy- something we definitely want to avoid!

Here's a key takeaway: All foods provide energy in the form of calories- and that's a good thing. Somewhere along the way, you may have been taught that the lower the calories, the better the food. But the truth is, calories are not the enemy. Many nutrient-dense foods are naturally higher in calories because they contain important macronutrients- proteins, fats, and carbohydrates- that the body needs to thrive.

Avocado is a great example! It is higher in calories because it contains fats and fats provide more energy per gram than proteins or carbohydrates. More calories, or more fat, doesn't make avocados “bad.” In fact, they're packed with heart-healthy monounsaturated and polyunsaturated

fats (like omega-3s and omega-6s) that support your body in many positive ways. Avoiding foods just because they're higher in calories means you could miss out on valuable nutrients your body needs to feel well and function at its best.

So, here's the mindset shift: Calories = energy. Energy = life. Food isn't something to fear or restrict- it's fuel that powers everything you do. Embrace food as a source of nourishment, joy, and support for your body, because you deserve to feel strong, energized, and well-cared for.

### Overcoming Food Fears & Anxiety

As cancer survivors, well intentioned individuals may advise you to *limit*- not completely avoid- certain foods. Let's take a moment to emphasize this point. To *limit* means to consume specific foods less often, not to eliminate them entirely.

There is solid scientific evidence supporting this balanced approach to eating. However, research studies don't account for the hot dogs at your family reunion or the champagne toast at your granddaughter's college graduation. Life is full of meaningful moments, and food is often a part of those celebrations.

It's easy to fall into the trap of cutting certain foods out completely- especially when you're doing everything in your power to prevent cancer recurrence or progression. But here's what's important to remember: it's not a single meal or indulgence that affects your health. It's the overall pattern of your lifestyle- what you eat consistently, how active you are, and your daily habits over time- that matters most.

This brings us to an important topic-fear foods. It's completely understandable to feel anxious about certain foods, especially when you have been told to *limit* them. When you're focused on staying healthy, it is easy to believe cutting out specific foods entirely is the safest choice. But like we just talked about- one meal, one snack, or one celebration won't make or break your health.

Additionally, it is important to remember that when we label foods as "good" or "bad," it can create a guilt filled mindset around eating. This mindset not only takes the joy out of food, but can also lead to feelings of restriction making it difficult to maintain a balanced eating approach. Instead of viewing certain foods as "off limits," consider how they fit into your broader lifestyle. Below are some tips on how you can challenge some of your "fear foods," release guilt, and find freedom in your food choices.

#### Tips for Challenging Your Fear Foods:

- Reframe your mindset- remind yourself that no single food or occasion will make or break your health. It is the overall BIG PICTURE!
- Give yourself unconditional permission to eat whatever you really like in a reasonable manner. Ask yourself what are you craving? How much do I really want?
- Allow yourself to eat fear foods without conditions or forms of pseudo-permission. An example of pseudo-permission is "I can have the cookie if I workout". Instead, tell yourself "I can have the cookie if I want to have a cookie, whether I workout or not!"

- Check in with yourself throughout the entire experience- how is this food making you feel? Was this experience as scary as you thought? How does your body feel after eating that specific food?
- Do not deprive yourself of foods that sound appealing.
- Expose yourself gradually to the food, by reintroducing it in a low pressure environment.
- Pay attention to the flavor and texture of the food- are they enjoyable?
- Do not label the foods as “good” or “bad.”

### The Bottom Line

Food is not something to fear-it is a source of nourishment and enjoyment. By practicing gentle nutrition, you can build a balanced, flexible approach to eating that best supports you!

Coming Next Week: Fueling Your Body with Nutrient-Dense Foods (Without Restriction)

Warmly,  
 Dani Foust  
 Virginia Tech Dietetics Intern- Your Future Dietitian In Training :)  
 Cancer Services Inc.

### Appendix E. Email #3

Welcome back to Week 3 of the *Nourish & Thrive: A Mindful Eating Journey for Cancer Survivors!* Last week, we talked about Gentle Nutrition and Food Freedom- the idea that eating well doesn't mean following rigid food rules! This week, we're focusing on how to prioritize nutrient-dense foods while still enjoying flexibility and balance.

#### What Are Nutrient-Dense Foods?

Nutrient-dense foods are foods that are rich in essential vitamins, minerals, and other nutrients that help your body function at its best. These foods support energy levels, immune health, and overall well-being. Here are some key, nutrient-dense food groups:

- **Fruits & Vegetables:** Packed with antioxidants, fiber, and essential vitamins, fruits and vegetables help fight inflammation and support digestion. Some great options include strawberries, apples, bananas, leafy greens, and bell peppers.
- **Whole grains:** Unlike refined grains, whole grains retain their nutrient-packed bran, germ, and endosperm. They provide fiber, essential vitamins, and healthy fats that can help lower cholesterol. Examples include barley, farro, bulgar, quinoa, and brown rice.
- **Lean Meats:** Lean meats such as chicken and fish offer high quality protein and healthy fats that support muscle repair and overall strength.
- **Healthy Fats:** Healthy fats, such as Omega-3s and Omega-6s, are essential for brain health and function. Foods in healthy fats include avocados, nuts and seeds, and salmon.

## Fueling With Nutrient Dense Foods & Finding Flexibility

While you will be giving yourself unconditional permission to eat specific foods, it is also important to remember that nutrient-dense foods are a key component of a well-balanced diet, which plays a crucial role in supporting overall health and maintaining quality of life. Nutrient-dense foods-like fruits, vegetables, whole grains, lean proteins, nuts, and seeds-provide essential vitamins, minerals, and energy that help your body function optimally and promote recovery.

Striking a balance between allowing yourself to enjoy all foods and prioritizing nutrient-dense options can be challenging, but it's worth the effort. There is no "perfect" way to eat- what matters most is finding an approach that works for you and makes you feel your best. Aim to focus on fueling your body with nourishing foods most of the time while leaving room to enjoy the foods you love without guilt.

A helpful way to think about it is to prioritize nutrient-rich foods as the foundation of your meals while incorporating less nutrient-dense options in moderation. This flexible approach allows you to meet your nutritional needs while maintaining a positive, sustainable relationship with food.

### Tips and Tricks For Fueling With Flexibility

- **Focus On What You Can Add:** One of the easiest ways to start thinking about fueling with flexibility is to think about what you can add to your meal to nourish your body, instead of what you can cut out. For example, at breakfast instead of thinking "*I do not need to add brown sugar, there is too much sugar,*" instead think about what you can add that makes your breakfast more nourishing like chia seeds or nut butter for healthy fats and protein! You can completely add the brown sugar too, just think about what else you can add to increase the nutritional value to your meal.
- **Build Your Meals Around Nutrient-Rich Foods:** Just like we talked about earlier, build your meals around nutrient-dense foods such as fruits and vegetables most of the time, while also leaving room for foods that you enjoy. Remember it is about Balance, not Perfection!
- **Mix & Match Nutrients for Long-Lasting Energy:** Combine nutrients at meals or snacks. For example, if you have toast for breakfast (a carbohydrate), add peanut butter and banana for protein, healthy fats, and fiber to keep you fuller longer.
- **Leave Room For Treats:** Give yourself unconditional permission to enjoy treats mindfully.
- **Listen to Your Body:** It may sound surprising, but as you become more in tune with your body's needs, you might naturally start craving more nutrient-dense foods! Some days, you may want a fresh salad; other days, you might crave ice cream- and both are okay. Your body knows what it needs, so trust it.
- **And Finally Practice Kindness & Grace!** Eating is a lifelong journey, not a test to be passed or failed. Some days you'll eat more nutrient-rich foods, other days you'll enjoy comfort foods- and that is completely normal. Be kind to yourself and remember that food is meant to be enjoyed!

Coming Next Week: We'll explore how to slow down and enjoy the experience of eating- an essential part of mindful eating that can transform your relationship with food.

Warmly,

Dani Foust

Virginia Tech Dietetics Intern- Your Future Dietitian In Training :)

Cancer Services Inc.

## Appendix F. Email #4

Welcome back to week 4 of the *Nourish & Thrive: A Mindful Eating Journey for Cancer Survivors*. This week, we're focusing on something that might seem simple-even a little silly at first- but it is incredibly important: slowing down while eating.

If you've gone through or are currently undergoing cancer treatment, you've probably noticed how it can take a toll on your digestive system-causing nausea, bloating, or difficulty digesting food. That's because many treatments target rapidly dividing cells, including those in your digestive tract, leading to inflammation and changes to digestion. The same thing happens to your taste buds, which is why food may taste different or less enjoyable during and after treatment. While these cells do regenerate, it can take weeks or even months, meaning some changes may stick around for a while.

Slowing down when you eat can help you digest food more comfortably, absorb nutrients better, and even find enjoyment in meals again-something we'll explore further here in a second! Let's go ahead and dive into this week's content!

### Why Slowing Down Matters:

There is no denying it, life moves fast- there's always another meeting, appointment, or email demanding your attention. It can be tempting to rush through meals or snacks while multitasking, but making the time to eat without distractions can have a big impact on how you feel. Here's why slowing down is worth it:

- **Better digestion:** Taking the time to chew thoroughly and pause between bites helps your body break down food more easily. When you chew well, digestion starts sooner, giving the stomach a head start, making things easier on your gut.
- **Improved Nutrient Absorption:** The more you chew, the more efficiently your body can extract and absorb important nutrients, helping you get the most out of meals.
- **Tuning Into Hunger & Fullness:** Remember our Week 1 discussion on honoring hunger and fullness cues? Your stomach takes about 20 minutes to tell your brain it's full. Slowing down helps you recognize those signals and avoid eating past comfort.
- **Enjoying the Experience:** If your meal disappears in minutes, did you really enjoy it? Eating slowly allows you to truly savor the flavors, textures, and aromas of your food, turning meals into something to look forward to rather than just another tasks.

### Tips for Slowing Down:

- Sit down at a desk or table to eat meals...free of distractions if possible!
- Taste each bite of food you put into your mouth, experiencing the different textures and taste the food can provide.
- Put your fork down every now and then (Tip: If you are struggling with this, it may be helpful to put your fork down between each bite until you get the hang of it).

- Chew thoroughly: Aim to chew 20-30 times per bite
- Take a breath between each bite (Tip: Take a few deep breaths before even starting to eat to help your body relax, this may help aid in digestion)
- Avoid eating in front of the TV, computer, or scrolling on your phone so you are fully present while you eat.

This Week's Challenge:

Here is my challenge for you this week: For at least one meal a day, try slowing down your eating by using one or more of these tips. Pay attention to how you feel before, during, and after the meal. Does your digestion improve? Do you enjoy your meal more than you typically do? Do you notice that you feel fuller faster?

Coming Next Week: We'll explore Respecting Your Body and Forming a Non-judgemental Relationship with Food!

Warmly,

Dani Foust

Virginia Tech Dietetics Intern- Your Future Dietitian In Training :)

Cancer Services Inc.

## Appendix G. Email #5

Welcome to week 5, the final week of the *Nourish & Thrive: A Mindful Eating Journey for Cancer Survivors* email series. We hope you've found these last five weeks insightful and that you've discovered mindful eating strategies to apply in your daily life.

This week, we're shifting our focus to a topic that, while not always directly tied to mindful eating, is essential to a healthy relationship with food: Respecting Your Body & Developing A Non-Judgemental Relationship with Food. Let's dive in.

### Respecting Your Body

Our bodies naturally change over time- there's no disputing that. However, as cancer survivors, you've likely experienced profound shifts, both internally and externally, that may have reshaped the way you view your body. These changes might include weight fluctuations, energy level shifts, scars from surgery, hair loss or regrowth, digestive challenges, or new found sensitivities to foods you once enjoyed. While these transformations can feel unfamiliar, challenging, or even frustrating, they are also a powerful reminder of your resilience and strength.

Respecting your body doesn't mean loving every aspect of it all the time. It means acknowledging what it has endured and continues to do for you. Here are a few ways to practice body respect in your daily life.

- Reframe the way you think: Instead of focusing on what you have lost or the things that have changed, try to focus on the things that you continue to be grateful for.
- Stop comparing yourself to a previous version of you: Your body has served you in different ways throughout life. Instead of measuring yourself against the past, honor what your body needs now.
- Practice affirmative statements: Try repeating statements like"
  - *"My body deserves to be fed."*
  - *"My body deserves to be treated with dignity and respect."*
  - *"My body deserves to be dressed comfortably, in clothing that makes me feel my best."*
  - *"My body has, and continues to fight for me."*
- Dress in a way that makes you feel comfortable: Wear clothes that fit well and make you feel good in your body as it is today.
- Replace the negative with the positive: When a critical thought arises, challenge it. For example, if you catch yourself thinking negatively about your appearance, counter with a positive statement like, *"I appreciate my body for getting me through each day."*

### Non-Judgemental Relationship with Food:

Having a non-judgemental relationship with food means removing guilt, shame, and rigid rules from eating. It is about seeing food as nourishment and enjoyment, rather than something to control, fear, or moralize. Looking back to week three, we had a brief discussion about labeling

food as “good” or “bad.” Assigning moral value to food can lead to feelings of guilt and shame when eating certain foods that we label as “bad” or feelings of pride when we eat those that we label as “good.” True food freedom comes from neutralizing these labels and allowing yourself to eat without judgement. Here is how:

- Ditch the “good” and “bad” food labels: Instead of labeling foods, think about what a food provides- whether its energy, satisfaction, or comfort.
- Practice self compassion: Be kind to yourself, especially while eating something you previously restricted yourself from eating.
- Allow yourself permission to eat all foods: When we tell ourselves that we can not eat certain foods, we tend to crave them more. When we allow ourselves to eat all foods, cravings tend to decrease.
- Practice mindful eating: Take what you have learned throughout this entire series, and apply it to your life. Slow down, savor food, honor your hunger and fullness cues, and focus on the way certain foods make you feel!

As we wrap up this mindful eating journey, I want to thank you for taking this step toward food freedom and body respect. Healing your relationship with food is not about perfection- it’s about progress, self compassion, and trusting your body’s wisdom.

Continue to listen to your body, release food guilt, and nourish yourself in ways that make you feel your best- because you deserve to thrive.

Before you go, I invite you to take a moment to reflect: *How has your perspective on mindful eating and body respect evolved over the past five weeks?* Please fill out the attached Self-Growth Survey to celebrate your progress.

Warmly,  
Dani Foust  
Virginia Tech Dietetics Intern- Your Future Dietitian In Training :)  
Cancer Services Inc.

## **Appendix H. Reflexivity Statement**

As an aspiring dietitian, my goal is to provide exceptional, evidence-based care for future patients and clients. My background in nutrition education and health sciences has profoundly shaped my perspective on mindful eating, as well as the complex relationship between food and body image. Food is more than just sustenance, it is a source of connection, joy, and cultural expression. In today's society, it serves as a powerful tool for bringing people together. However, despite these positive aspects, many individuals struggle with their relationship with food and their bodies. Social media, in particular, perpetuates unrealistic beauty standards, distorting self-perception and fostering a culture of body dissatisfaction. Body dissatisfaction can profoundly impact an individual's relationship with food, often leading to cycles of extreme dieting or restrictive eating behavior. Beyond personal perception, external factors play a significant role in shaping dietary patterns. Socioeconomic status, food availability, social norms, peer influence, diet culture, fear-based messaging, stress, emotional eating, and health status all contribute to one's eating attitudes. While these influences exist beyond an individual's direct control, they exert a powerful effect on food choices, body image, and overall dietary behaviors. Understanding these external pressures is essential in fostering a healthier, more balanced relationship with food. These beliefs and influences have shaped my approach to mindful eating research for cancer survivors post treatment; this approach being rooted in kindness, compassion, and curiosity.

As previously noted, cancer treatments such as radiation, chemotherapy, and hormonal therapies place immense stress on the body, leading to metabolic, physical, and psychological changes that can impact dietary habits long after treatment ends. In late 2020, my mother was diagnosed with post-menopausal ductal breast cancer. The treatment for which was a double

mastectomy, and five years of estrogen-blocking therapy. These treatments brought profound changes to my mother's body; changes that were both physically and emotionally challenging. The double mastectomy altered her perception of her own body, forcing her to navigate a new sense of self in the absence of a feature so closely tied to femininity and self-identity.

Additionally, estrogen-blocking therapy led to increased fat distribution in her abdominal area, loss of lean muscle mass, and joint stiffness that made physical activity she once loved incredibly painful. This form of treatment simultaneously helped save my mother's life, while leaving her struggling with body image and self-confidence in a way that altered her approach to food, movement, and the way she saw herself. Observing my mother's complete experience with breast cancer, her treatment process, and her journey towards mindful eating served as the primary inspiration for my research.

While planning a mindful eating email series based on research for cancer survivors, I have made several assumptions that may influence the way in which my study is conducted. For example, I have assumed that mindful eating can help improve an individual's relationship with food, fostering healthier eating habits. This assumption has shaped the way I have structured the first few draft emails to the series, in which I have emphasized mindfulness over restriction. However, this approach may cause more individualized dietary needs to be overlooked as they may not be aligned with general mindfulness practices.

A number of ethical concerns may arise when developing a mindful eating series for cancer survivors, as this project involves individuals who are or were, navigating physical and emotional challenges. Additionally, information obtained from the pre, and post intervention surveys will relate to personal and private aspects of a participant's life, such as eating habits, body image, emotional well-being, and health history. If used or accessed in an inappropriate

manner, this data could compromise the confidentiality of participants. The moral principles involved in this instance are both confidentiality and trustworthiness. Trustworthiness is built through confidentiality, by safeguarding participants' personal data and by being transparent about the use of this information. While conducting research, identifying information will be anonymized and it will be clearly communicated to participants how the collected data will be used, further ensuring their consent before any information is gathered.