

Descriptive Analysis of the Most Viewed YouTube Videos  
Related to Breast Cancer Survivors

Randi K. Arias

Submitted in partial fulfillment of the  
requirements for the Degree of Doctor of Education in  
Teachers College, Columbia University

2023

© 2023  
Randi K. Arias  
All Rights Reserved

## **Abstract**

### Descriptive Analysis of the Most-Viewed YouTube Videos

#### Related to Breast Cancer

Randi K. Arias

With the increasing number of breast cancer survivors, there is a need to enhance health education to help survivors make informed decisions about maximizing their quality of life. YouTube is one of the most popular video applications that can be used for public health education. Nonetheless, there is little research on the content of health-related information that is uploaded to YouTube relevant to breast cancer survivors. This study was intended to help fill that gap in knowledge by describing the sources, formats, and content conveyed in the most widely viewed YouTube videos on breast cancer.

YouTube was searched with a cleared browsing history using the key search term “breast cancer.” The resulting videos were sorted by view count. Videos were then screened for inclusion and exclusion criteria, yielding a sample of 100 videos with the most views. Video title, link, number of views, and date of upload were coded along with content included in each video. The inter- and intra-rater reliability was acceptable (Kappa’s = .79 and .97, respectively).

The sample of 100 videos was collectively viewed 135,311,626 times, suggesting that the subject of breast cancer is a popular topic on YouTube. Nearly half of the sample videos (n = 45) were uploaded by television news/media agencies. Combined/multiple formats were the most popular format (n = 61), followed by still images/text (n = 48). General information on cancer was found to be the most common (n = 71), followed by screening for breast cancer occurrence/recurrence (n = 62), and cancer treatments/breast cancer treatments (n = 45). Several of the

content categories were rarely covered in the most-watched videos—for example, cancer rehabilitation recommendations, returning to work after cancer treatment, and financial burden/management of cancer. Thus, while topics such as breast cancer screening are widely covered, topics for breast cancer survivors regarding maximizing their quality of life are less widely covered. Few videos ( $n = 3$ ) contained misinformation, but these videos were viewed millions of times, emphasizing the need for ongoing monitoring to identify and remove misinformation.

The findings of this study indicated that YouTube videos on breast cancer gained over 135 million views. YouTube can be a great media channel for public health education. Nonetheless, there is significant need for more high-quality YouTube videos to be created to help breast cancer survivors navigate their cancer journey.

## Table of Contents

List of Tables .....	iii
List of Figures .....	v
Acknowledgements.....	vi
Dedication.....	vii
Chapter 1: INTRODUCTION.....	1
Background.....	1
YouTube .....	3
Specific Aims.....	4
Significance.....	5
Chapter 2: LITERATURE REVIEW.....	9
Breast Cancer Risk Factors.....	9
Breast Cancer Screening and Diagnosis .....	10
Breast Cancer Treatment.....	12
Brief Background on Cancer Survivors in the United States .....	12
Cancer Survivor Statistics.....	14
Reentering the Workforce Post-Treatment.....	16
Mental Health-Related Problems.....	19
Sleep and Fatigue.....	25
Pain Management.....	30
Financial Hardships .....	36
Weight Management.....	42
Nutrition and Physical Activity .....	46
Healthcare Utilization Among Cancer Survivors .....	50
Survivorship Services .....	54
YouTube and Health-Related Content.....	60
YouTube and Cancer-Related Content.....	61
YouTube and Breast Cancer-Related Content.....	63
Usage of JAMA and DISCERN Instruments.....	64
Conclusion .....	65
Chapter 3: METHODS .....	66
Design .....	66
Identification of Key Search Terms.....	66
Sampling .....	67
Inclusion and Exclusion Criteria.....	67
Measurements and Manual Coding Specification .....	68
Demonstration of Intra- and Inter-rater Reliability.....	70
Data Collection .....	70
Statistical Analysis.....	71

Chapter 4: RESULTS .....	73
Specific Aim 1 .....	73
Specific Aim 2 .....	77
Specific Aim 3 .....	91
Chapter 5: DISCUSSION .....	93
Upload Source.....	93
Format.....	95
Content.....	95
Limitations and Delimitations.....	101
Implications for Policy and Practice .....	102
Improving Availability and Accessibility of Information for People with Low Levels of Literacy .....	105
Recommendations for Future Research .....	107
Final Thoughts .....	109
References.....	110
Appendix A: Coding Manual.....	119
Appendix B: Videos Viewing Log .....	126

## List of Tables

Table 1	Frequencies, Total View Count, and Cumulative View Count Percent for the Videos Categorized by Upload Source .....	75
Table 2	Frequencies, Total View Count, and Cumulative View Count Percent for the Videos Categorized by Source of Format .....	76
Table 3	Frequencies, Total View Count, and Cumulative View Count Percent for the Videos Categorized by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Late or Long-term Physical/Mental Side Effects of Cancer/Cancer Treatment) .....	78
Table 4	Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Fear of Cancer Occurrence/ Recurrence) .....	79
Table 5	Frequencies, Total View Count, and Cumulative View Count Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Recommendations/New Perspectives on Health).....	80
Table 6	Frequencies, Total View Count, and Cumulative View Count Percent for the Videos Categorized by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Changes in Family/Relationships).....	81
Table 7	Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Returning to Work/Starting to Work After Cancer Diagnosis or Treatment) .....	82
Table 8	Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Financial Burden/Management of Cancer).....	83
Table 9	Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Cancer Rehabilitation Recommendations) .....	84
Table 10	Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Surveillance for Breast Cancer Occurrence/Recurrence) .....	85
Table 11	Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Breast Cancer Health Promotion).....	86

Table 12	Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (General Information on Cancer).....	87
Table 13	Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Cancer Treatments/Breast Cancer Treatments).....	88
Table 14	Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Other Notable Features of Video) .....	89
Table 15	Frequencies, Total View Count, and Cumulative View Count Percent for the Videos Categorized by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Potential Misinformation).....	90
Table 16	Frequencies, Total View Count, and Cumulative View Count Percent for the Videos Categorized by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Potential Misinformation).....	91



## List of Figures

Figure 1	Video Uploads by Year.....	74
----------	----------------------------	----

## **Acknowledgements**

I would like to thank my advisor, Dr. Charles Basch for his continuous support and encouragement. I am beyond grateful for his guidance throughout my doctoral studies.

Additionally, I would like to acknowledge my husband, Franco Arias, for helping me stay strong and pushing me to pursue my dreams.

I would also like to thank my family and my work colleagues for their support throughout the years.

Finally, I would like to thank my pets, Mama, Ricky, and Mochi, for always being by my side while I wrote my dissertation.

R. K. A.

## **Dedication**

This dissertation is dedicated to all cancer survivors,  
and those who have lost their battle to cancer.

May we find a cure in this lifetime.

## Chapter 1

### INTRODUCTION

#### **Background**

The word “survivor” is used in various circumstances. A survivor is someone who is alive after overcoming a life-threatening disease or hardship (National Cancer Institute, n.d.). A person is deemed a cancer survivor after receiving a cancer diagnosis. The term “cancer survivor” lasts from the time of diagnosis till the end of life (National Cancer Institute, n.d.). Another popular term among the cancer community is “survivorship.” While each cancer survivor may have a different definition of what survivorship means to them, survivorship commonly focuses on the “health and well-being of a person with cancer from the time of diagnosis until the end of life” (National Cancer Institute, n.d.). Survivorship includes mental, emotional, physical, financial, and social aspects of cancer (National Cancer Institute, n.d.).

By 2030, there will be approximately 22.1 million cancer survivors in the United States (American Cancer Society, 2021). As of 2019, the three most prevalent cancer diagnoses among females are breast (3,861,520), uterine corpus (807,860), and colon and rectum cancers (768,650) (Miller et al., 2019). Approximately 3.8 million women in the United States have a medical history of breast cancer (Miller et al., 2019).

Cancer survivors are faced with unique and challenging health problems that differentiate them from the general population, including side effects; work life, mental and behavioral health issues; chronic pain; financial challenges; ongoing treatments, and various challenges concerning weight gain, diet, and physical activity. Although cancer survivors no longer deal with the hurdles that come with having cancer, they are often faced with a lifetime of long-term side effects that may negatively impact their quality of life. They often face challenges re-entering the

workforce after cancer treatment (Stone et al., 2017). Mental health issues such as depression and anxiety are also common among cancer survivors (Cordova et al., 2017). Compared to the general population, cancer survivors also experience sleep problems and chronic fatigue at higher levels (Ebede et al., 2017). Chronic pain is another common long-term side effect of cancer and cancer treatment (Moryl et al., 2010). Since the cost of cancer treatment is not always covered by insurance and can lead to hefty medical bills, cancer survivors are often left with significant debt post-treatment (Mongelli et al., 2020). Cancer survivors may be finished with intense treatments such as chemotherapy, but they will likely need a great deal of long-term follow-up care such as screenings, surveillance, psychotherapy, physical therapy, various specialists, and oncology visits (Shaver et al., 2020). Cancer survivors may also have difficulties with weight gain and obesity after cancer treatment (Zhang, Meager, et al. 2017). Cancer survivors' difficulties with post-treatment weight gain can be managed through nutrition and physical activity recommendations (Rock et al., 2012). Due to cancer survivors' complex and unique needs, several services are offered to help cancer survivors navigate life post-cancer (Rolland & Eschler, 2018).

Cancer survivors are often overlooked in the realm of peer-reviewed research. Richardson et al.'s (2011) study argued that cancer survivors have been neglected in the peer-reviewed research, and there is a significant need for more data related to cancer survivors to facilitate the development of cancer survivor services. There have been developments in cancer survivor-related research since Richardson's et al.'s study, but the need for more well-designed research pertaining to cancer survivors still holds true.

## **YouTube**

According to Amazon's Alexa (n.d.) data, YouTube is the second most visited social media site in the United States. Likewise, YouTube is also the second most visited site globally (Alexa, n.d.). After Facebook, YouTube is the second most popular social media platform worldwide (Statista, 2021a).

YouTube is one of the most popular social media platforms among adults under 30 in the United States (Auxier & Anderson, 2021). For the past 5 years, research at the Pew Research Center suggests that seven in 10 Americans (roughly 72%) use some variation of social media. YouTube and Facebook are the most popular social media websites in the United States. Approximately 81% of adults in the United States reported using YouTube in 2021, a substantial jump from 73% in 2019. Moreover, YouTube is one of only two social media platforms that have experienced statistically significant growth since 2019 (Auxier & Anderson, 2021).

While social media platforms such as TikTok, Instagram, and Snapchat are most popular among adolescents and young adults, YouTube is popular among various age groups, including those between 18-65 years old (Auxier & Anderson, 2021). YouTube is visited daily by 54% of its users. Of these YouTube users, 35% reported visiting YouTube more than once per day (Auxier & Anderson, 2021). An integrative review found that the public is increasingly using YouTube to learn about health-related topics (Haslam et al., 2019). Cancer survivors may seek information on YouTube to discover videos concerning cancer diagnosis, prognosis, management, and treatment (Yurdaisik, 2020). Since many Americans are visiting YouTube daily, there is a significant need to assess cancer and health-related video content on the platform.

YouTube is a social media site that allows users and organizations to post content in the form of videos (YouTube, 2021b). The videos posted may range in content and length. As of 2020, there are approximately 2.1 billion YouTube users around the world (Statista, 2021b). The digital movement has led to a significant increase in the number of videos posted to YouTube. The most widely viewed genre on YouTube is music and entertainment videos. Health-related content is also widely popular on YouTube. With the surge in health-related content on YouTube, it is vital that viewers stay vigilant about the content they are consuming (Kunze, 2020).

Users can post videos on various health-related topics that may contribute to the spread of misinformation. To combat the spread of misinformation, YouTube has implemented a new workflow that pushes verified health sources when searching for health-related topics (YouTube, 2021a). Videos identified as verified health sources by YouTube now automatically appear at the top of the search when browsing YouTube for health-related videos. This allows viewers to identify whether a video is posted by an official health source or a non-official source. This new feature has been integral to preventing the spread of misinformation during the COVID-19 pandemic (Graham, 2021).

### **Specific Aims**

Because of the growing population of cancer survivors in general, and breast cancer survivors in particular, many challenges are faced by breast cancer survivors: the need for survivors to have access to accurate information to help them make informed decisions; the widespread reach of YouTube in disseminating health communications, including those relevant to breast cancer survivors; and the paucity of research on the sources and nature of content on YouTube concerning breast cancer survivors. This study has a short-term goal to examine and

describe the most widely viewed videos on YouTube related to breast cancer and cancer survivorship in terms of source, length, format, and content.

**The specific aims of the study include the following:**

1. To examine the most widely viewed YouTube videos on breast cancer and cancer survivorship in terms of upload date, source, length, and format.
2. To describe the content of the most widely viewed YouTube videos on breast cancer in terms of the number of videos that address the following topics: (a) late/long-term physical/mental side effects of cancer/cancer treatment; (b) fear of cancer recurrence; (c) cancer survivor recommendations/new perspectives on health; (d) changes in families/relationships; (e) returning to work/starting to work after cancer treatment/diagnosis; (f) financial burden/management of cancer; (g) cancer rehabilitation recommendations; (h) surveillance for breast cancer/cancer recurrence; (i) breast cancer health promotion; (j) general information on cancer; (k) cancer treatments/breast cancer treatment; (l) other notable features of video; (m) potential misinformation; and (n) overall rating.
3. To describe the content categories that yield the most views.

**Significance**

When receiving a devastating diagnosis such as cancer, people may turn to social media sites like YouTube to learn more or seek reassurance. There is a gap in research regarding the analysis of cancer survivor-related content and YouTube. While a few relevant research studies exist, the studies that have been conducted are older or cover topics such as patient narratives and cancer rehabilitation (Bahar-Ozdemir et al., 2022; Chou et al., 2011).



Chou et al. (2011) performed a narrative analysis to determine if personal cancer narratives have potential as communication tools for cancer patients and survivors. The results revealed that there are various common threads among the content in cancer survivor videos. Some of the common characteristics identified in YouTube videos were authenticity and emotional engagement (Chou et al., 2011).

Due to the lack of recent analysis of content on YouTube related to cancer survivorship, there is a need to assess the topics covered in widely viewed videos. Bahar-Ozdemir et al. (2022) explored the quality of cancer rehabilitation-related YouTube videos to determine if they were an effective source of information. The researchers found that the videos shown in the top 200 “cancer rehabilitation” and “oncology rehabilitation” categories were low-quality, according to the *Journal of the American Medical Association’s* Global Quality Score (Bahar-Ozdemir et al., 2022). These findings indicated a need for a deeper analysis into what benefits YouTube videos can provide to cancer survivors and how higher-quality cancer-related videos can be widely disseminated. Cancer videos on YouTube cover a wide range of topics. In this study, the focus was on widely viewed videos related to breast cancer survivorship.

Researchers have estimated that there were approximately 287,850 new cases of breast cancer in 2022, which accounts for 15% of all new cancer cases (National Cancer Institute, 2022). While breast cancer can occur in women and men, it is most prevalent among women (Centers for Disease Control and Prevention [CDC], 2021a). According to the U.S. Cancer Statistics Working Group (2021a), there were more than 250,000 new cases of female breast cancer in the United States in 2018. When compared to other common cancers, female breast cancer had the newest cases in recent years. Approximately 126.8 out of 100,000 women of all ethnicities and races in the United States were diagnosed with breast cancer in 2018. After lung

and bronchus-related cancer, female breast cancer has the second-highest cancer death rate for women of all races and ethnicities (U.S. Cancer Statistics Working Group, 2021a).

Breast cancer is defined as “a disease in which cells in the breast grow out of control” (CDC, 2021b). There are various kinds and stages of breast cancer. Two of the most common types of breast cancer are invasive lobular carcinoma and invasive ductal carcinoma (CDC, 2021b). When abnormalities in the breast are discovered, doctors may require additional testing to rule out breast cancer. Specialists diagnose breast cancer by using ultrasound, mammogram, breast magnetic resonance imaging, or biopsy. When diagnosing breast cancer, doctors also do additional tests such as body scans and blood work to determine if cancer has spread to other parts of the body. Breast cancer staging depends on whether cancer has spread to other parts of the breast or body. Metastasis is when the cancer has spread throughout the body (CDC, 2021b).

Female breast cancer is most prevalent among White women in the United States (U.S. Cancer Statistics Working Group, 2021b). Breast cancer also has a high prevalence among Black women, as 121.2 per 100,000 females were diagnosed with breast cancer in 2018. Furthermore, 101.0 per 100,000 Asian and Pacific Islander, 95.5 per 100,000 Hispanic, and 65.2 per 100,000 women were diagnosed with breast cancer in 2018. People of all ages, genders, races, and ethnicities can have cancer, but cancer does not impact all people the same way (U.S. Cancer Statistics Working Group, 2021b).

According to Yedjou et al. (2019), breast cancer does not equally affect racial and ethnic groups. While there is a higher incidence of breast cancer among White women, Black women are significantly more likely to die from breast cancer (Yedjou et al., 2019). Disparities among social, economic, and environmental factors are significant predictors of why cancer impacts racial and ethnic groups differently. Poverty is one of the leading indicators of poorer health

outcomes for breast cancer. Minority women are more likely to live below the poverty line; therefore, they may have more significant healthcare disadvantages. Minority women may not have the ability to take off from work to go to routine cancer screenings or regular medical checkups. Limited access to healthcare coupled with decreased cancer screenings may result in later-stage cancer diagnoses because, by the time this population goes to the doctor, cancer has already significantly progressed or metastasized (Yedjou et al., 2019).

Survivorship care is a key aspect of life after cancer diagnosis. It is recommended that all cancer survivors have an individualized cancer survivor plan to help them navigate life after cancer (American Cancer Society, 2021b). Survivorship care plans differ from person to person, but typically include recommendations and guidelines for monitoring and preserving one's health (American Cancer Society, 2021b). Cancer survivorship care is based on several key factors, including type of cancer, therapies received, and surgeries undergone (Oncolife, 2021). Since breast cancer is one of the most prevalent cancers among women, there is a need to assess the kinds of information being disseminated to survivors, including the most widely viewed YouTube videos related to breast cancer survivorship.

## Chapter 2

### LITERATURE REVIEW

#### **Breast Cancer Risk Factors**

Risk factors for breast cancer include biological, behavioral, and environmental factors (Winters et al., 2017). Notably, the risk for breast cancer increases with age, and women are at a significantly greater risk of developing breast cancer than males. Another risk factor for breast cancer is the age at menarche and menopause. Menarche before age 11 increases the risk of breast cancer by 20%. Women who start menopause at age 55 or older are also at a greater risk for breast cancer than women who start menopause earlier. Those who have previously had breast cancer are also at a greater risk for recurrence. Risk is also increased among those with dense breast tissue (Winters et al., 2017).

Hereditary risk factors associated with breast cancer are related to the inheritance or genetic mutation of the Breast Cancer susceptibility genes, also known as BRCA1 and BRCA2 (Winters et al., 2017). Women with BRCA1 or BRCA2 genes are more likely to develop cancer. Nonetheless, the BRCA1 and BRCA2 genes are not associated with breast cancer alone; they are also associated with ovarian, pancreas, and prostate cancers. Winters et al. (2017) estimated that 1 in 500 people in the United States carries the BRCA1 or BRCA2 genetic mutations. Genetic testing and counseling are recommended for individuals who have one family member diagnosed with BRCA-related cancer (Winters et al., 2017).

In addition to genetic risk factors, there are also several behavioral risk factors for developing breast cancer (Winters et al., 2017). For instance, reproductive patterns such as delayed childbirth, shorter duration of breastfeeding, or hormonal contraceptive use may increase the risk of breast cancer. Furthermore, using hormonal therapy such as estrogen and progestin

increases the risk of breast cancer development. Smoking prior to menopause is also associated with an increased risk of breast cancer. Alcohol consumption may also increase the risk of breast cancer due to alcohol's ability to increase estrogen blood levels. Regular physical activity decreases the risk of breast cancer in women (Winters et al., 2017).

Disparities in education, insurance status, and income may also affect breast cancer outcomes (Winters et al., 2017). Higher educational attainment is associated with better outcomes due to several factors, including early diagnosis and access to healthcare. Women with no insurance or Medicaid only have the highest breast cancer mortality bracket. The 5-year breast cancer survival rate is lower among women residing in low socioeconomic areas than women with higher socioeconomic status (Winters et al., 2017).

Race is also a significant indicator of the disparities observed with breast cancer diagnosis and treatment. Despite standardized treatment, Black women have the highest 5-year breast cancer mortality and are significantly more likely to die from breast cancer than White women. Genetic research reveals that Black women are also more likely to have more aggressive forms of breast cancer. Nonetheless, according to Winters et al. (2017), Asian and Pacific Islander women have the lowest incidence of breast cancer mortality in the United States. The lower incidence of breast cancer mortality among minority groups may be associated with reproductive patterns and behaviors such as having more children or having children younger (Winters et al., 2017).

### **Breast Cancer Screening and Diagnosis**

Robust screening methods have been established to screen for and diagnose breast cancer (Barba et al., 2021). Screening methods are suggested based on one's risk of developing cancer. For instance, those with a higher risk of developing breast cancer may need to go for more

frequent screenings than women with average risk. Mammography is an X-ray of the breast that gives radiologists various breast views to determine any abnormal areas or tumors in the breast. Not all governing organizations agree on when a woman should start getting mammograms (Barba et al., 2021).

Nonetheless, mammography is the most recommended screening tool for women at average risk for developing breast cancer, in addition to regular breast examination (Barba et al., 2021). A physician can do breast examination, but it is also recommended that women perform self-examinations at home regularly. Breast examinations allow one to recognize abnormalities in the breast area. Those at a higher risk of developing cancer are likely to be told to start getting mammograms earlier in life. Compared with the average woman, those who are carriers of genetic mutations or have a relative with breast cancer recommendations are to start regular screenings earlier in life. Abnormalities discovered during a mammogram or breast examination likely require additional testing, such as a positron emission tomography (PET) scan or a biopsy (Barba et al., 2021).

According to Barba et al. (2021), breast cancer is classified based on the cell types and area initially affected. Carcinomas and sarcomas are the two main categories of breast cancer, and each category includes various types of breast cancer-specific characteristics such as spread, growth rate, and tumor size. Furthermore, several molecular subtypes of breast cancer differ in properties (Barba et al., 2021).

Although various screening methods are available to detect breast cancer, it is essential to note that there are issues with some of the current screening and diagnostic tools used to identify breast cancer (Barba et al., 2021). Breast cancer diagnosis requires several visits to a medical facility, and not everyone has access to such facilities. To illustrate, those residing in rural areas

may not have access to a primary care physician or oncology facility in their town. Another issue with breast cancer screening is that the process may be very invasive and stressful for some people. Overall, the process of breast cancer screening and diagnosis is complex and varies from person to person (Barba et al., 2021).

### **Breast Cancer Treatment**

Breast cancer treatment is complex and dependent on the stage and type of cancer (CDC, 2021c). Frequently, breast cancer is treated with a combination of treatments. Some of the treatment options for breast cancer are surgery, chemotherapy, radiation therapy, hormonal therapy, and biological therapy. Oncologists and surgeons determine which treatment is best for each person by considering many factors such as cancer type, cancer stage, risk of the procedure/treatment, and if cancer has spread or metastasized throughout the body. In addition to traditional treatment methods, additional treatment options, such as yoga and meditation, may also be offered to breast cancer survivors. Yoga and meditation may complement breast cancer treatment but should not replace it (CDC, 2021c).

### **Brief Background on Cancer Survivors in the United States**

There are currently 16.9 million cancer survivors in the United States (American Cancer Society, 2021a). Due to advances in cancer treatment and management, this number will rise to approximately 22.1 million by the year 2030. The meaning of cancer survivor is not limited to disease cured. The term “survivor” varies; however, it typically includes individuals who received a cancer diagnosis and are now cancer-free or in remission (American Cancer Society, 2021a). Early detection and treatment are some of the main reasons that the number of cancer survivors continues to rise (Miller et al., 2019).

The abovementioned estimates include data from cancer survivor registries from all 50 states (Miller et al., 2019). These data include multiple types of cancer survivors, including prostate, colon, breast, thyroid, kidney, leukemia, and ovarian cancers. The most prevalent forms of cancer in the United States are colon, prostate, and melanoma. The data also include both male and female cancer survivors. The 2019 data showed that there are approximately 3,650,030 male survivors of prostate cancer. There are more male survivors of prostate cancer, compared to other types of cancers. Breast cancer survivors are the most common among women, and there are currently approximately 3,861,520 breast cancer survivors in the United States. The data available indicate that the rate of cancer survivors for women may rise slightly by 2030, whereas the rate of cancer survivors among men will rise but not to the same level as women (Miller et al., 2019).

Data suggest that most cancer survivors were diagnosed with some form of cancer between the ages of 65-84 years old. The cancer survivors included in the current data reported being diagnosed with cancer more than 5 years ago. With the increase of prevention efforts, cancer can be diagnosed at earlier stages, leading to better outcomes (Miller et al., 2019).

It is essential to estimate how many cancer survivors there are in the United States so that healthcare facilities can have adequate healthcare resources available (Miller et al., 2019). Additionally, having more cancer survivors allows healthcare providers to continue to study cancer survivors to determine what resources they require post-treatment. Furthermore, having data on cancer survivors can help guide public health policy (Miller et al., 2019). Some of the primary reasons it is imperative to have data available on cancer survivors are improved access to care, research and drug development, prevention and early detection, and investigation of ways to improve quality of life in cancer survivors (American Cancer Society, 2019).



The cancer survivor data examined by Miller et al. (2019) also displayed significant racial and ethnic disparities among cancer diagnosis, treatment, and survivorship. For instance, the 5-year cancer survival rate for Black people is significantly lower compared to Whites for the majority of cancers (Miller et al., 2019). Ethnic groups and minorities are more likely to be diagnosed with cancer in its later stages (Blinder & Griggs, 2013). Later-stage cancers can be challenging to treat and may have metastasized by the time the cancer is diagnosed. Survivorship data also suggest that ethnic groups and minorities have decreased quality of life, psychological well-being, and access to healthcare (Blinder & Griggs, 2013). To improve outcomes among minorities and ethnic groups, public health professionals should continue to improve primary prevention methods and advocate for early cancer screenings among these groups (Blinder & Griggs, 2013).

### **Cancer Survivor Statistics**

Each year, the American Cancer Society (2021a) releases a yearly report of major cancer-related statistics. The report includes valuable information on cancer facts related to age, sex, state, incidence, number of deaths, and cancer death rates in the United States (American Cancer Society, 2021). More than 17 million Americans have a history of cancer as of today (American Society of Clinical Oncology, 2021).

Researchers predict that approximately 1.9 million cancer cases will be diagnosed in 2023 (American Cancer Society, 2023). More than 600,000 Americans are predicted to die of cancer in 2023; however, the overall cancer-related death rate has dropped. Cancer-related death has declined in the past few decades due to improvements in primary prevention, enhanced cancer treatments, and reduction in tobacco smoking (American Cancer Society, 2023).

While cancer-related death rates have dropped in recent years, cancer prevention methods were negatively impacted due to the Coronavirus Disease 2019 (COVID-19) pandemic (American Cancer Society, 2021a). Public health initiatives such as early detection and surveillance of cancer were affected by the COVID-19 pandemic since healthcare resources were diverted to individuals with COVID-19. Furthermore, the COVID-19 pandemic also affected access to screening and early treatment, which led to increased later-stage diagnoses. Due to the diversion of healthcare resources, there were significant delays in cancer screening, diagnosis, and treatment during the height of the COVID-19 pandemic (American Cancer Society, 2021a).

According to the American Cancer Society (2021a), the risk of cancer diagnosis increases with age. More than 80% of people diagnosed with cancer are over the age of 55 at the time of diagnosis (American Cancer Society, 2021a). Additionally, behavioral risk factors such as smoking tobacco, drinking alcohol, and poor nutrition are significant risks for developing cancer. In addition to behavioral risk factors, genetic and environmental risk factors may increase one's likelihood of developing cancer (American Cancer Society, 2021a).

In summary, there have been substantive gains in cancer prevention and control in recent decades, which have resulted in increasing the number of people who survive after a cancer diagnosis and treatment. The number of cancer survivors is expected to increase in the coming decade. This progress has resulted in a population comprised of millions of individuals who are now coping with a variety of challenges, which are discussed below with respect to reentering the workforce post-treatment: mental-health related problems, sleep and fatigue, pain management, financial hardships, weight management, nutrition and physical activity, health care utilization, and survivorship services.

## **Reentering the Workforce Post-Treatment**

According to Stone et al. (2017), approximately 63% of cancer survivors return to work post-cancer treatment. Returning to work after cancer treatment can be challenging, both emotionally and physically, for cancer survivors (Stone et al., 2017). Only limited research is available on the hardships faced by youth and adult cancer survivors regarding reentering the workforce. Many cancer survivors may need to return to work post-cancer treatment for multiple reasons, including limited health insurance and need for income to pay off hospital bills. Reentering the workforce can be challenging as cancer survivors may face complex issues such as mobility limitations, fatigue, or reduced capacity to work (Stone et al., 2017).

Additionally, cancer survivors may struggle with determining whether to disclose that they are a survivor in a workplace due to fear of retaliation (Stone et al., 2017). Fear of disclosure may be due to the stigma associated with the side effects of cancer. For instance, if a potential employee discloses that they are a breast cancer survivor at an interview, the prospective employer may conclude that the potential employee may use many sick days or have low energy (Stone et al., 2017).

Stone et al. (2017) examined what is currently known about young adult cancer survivors ages 15 to 39 reentering the workforce as young cancer survivors. They determined that there is a paucity of such research participants in academic research. It is vital to examine cancer survivors entering the workforce to determine what accommodations are necessary for cancer survivors since the number of cancer survivors in the United States continues to rise (Stone et al., 2017). Working after cancer treatment is crucial as it promotes self-respect and helps maintain identity and living conditions. The workplace can also be a place of socialization for cancer survivors to make friends and form relationships. Stone et al. performed an extensive literature

review and found that most of the research related to young adult cancer survivors returning to work focused on workability. Young adult cancer survivors reported feeling low levels of productivity post-cancer treatment, which can negatively affect their ability to get and keep a job. Furthermore, the literature review also identified that young adult cancer survivors experienced extreme financial burdens due to treatment costs. Having a stable job after cancer treatment is crucial to lessen the financial burden of healthcare-related bills (Stone et al., 2017).

Another topic covered in the literature available on young adult cancer survivors returning to the workplace is physical ability (Stone et al., 2017). Depending on the type of cancer treatment an individual had, they may have decreased physical ability after treatment due to medications or surgeries. Decreased physical ability may interfere with getting certain types of jobs that require physical labor. Cognitive ability post-cancer treatment may also impact whether a cancer survivor rejoins the workforce. Approximately 50% of cancer survivors reported some form of mental distress post-cancer treatment. Cognitive problems can range from difficulties paying attention, forgetfulness, and low productivity, to difficulty keeping up with work assignments. Both physical and cognitive issues can cause individuals to face challenges at work that may require them to change careers. Cancer survivors rejoining the workforce is a topic that should continue to be a focus of academic research as the number of cancer survivors is increasing every year, and workplaces should be aware of special accommodations needed to ensure that cancer survivors can continue to work throughout their life (Stone et al., 2017).

Similar to the work of Stone et al. (2017), Arndt et al. (2019) also explored the unique challenges that cancer survivors face when returning to work after the treatment. Cancer diagnosis and treatment impact emotional, physical, and social well-being (Arndt et al., 2019). Cancer survivors are at an increased risk for unemployment and early retirement. The German

healthcare system is different from the United States healthcare system because cancer survivors can receive a pension during and after their treatment to cover basic expenses such as groceries and rent. Arndt et al. found that 63% of cancer survivors returned to their previous job after treatment. Nearly 7% of cancer survivors switched careers and found a new job, whereas 6% of survivors retired early (Arndt et al., 2019).

Due to some of the health challenges cancer survivors face post-treatment, they may have difficulties working due to physical incapability, fatigue, or pain (Arndt et al., 2019). Health-related issues are one reason that 17% of cancer survivors reported a reduction in working hours. Reducing hours can lead to decreased pay. Cancer survivors who reduce their hours for personal needs are at risk of increased financial problems (Arndt et al., 2019). Cancer survivors who return to work at their previous place of employment also face the unique challenge of adjustment that can make everyday tasks more difficult (Arndt et al., 2019).

Some of the limitations that cancer survivors may face are physical or cognitive impairment, depression, and anxiety (Arndt et al., 2019). These limitations can interfere with returning to work and even impact a cancer survivor's motivation to return to work. While limitations and challenges do arise, most cancer survivors end up returning to work at some point after treatment (Arndt et al., 2019).

Since the long-term effects of cancer can be lifelong, cancer survivors may need to take time off from work to attend to their health needs (Endo et al., 2019). Endo et al. (2019) found that 11.8% of Japanese cancer survivors had to take sick leave within their first year of returning to work. Furthermore, Endo et al. discovered that over 60% of cancer survivors were still working after 5 years of returning to work. However, whether the cancer survivor continued to work was dependent on the type of cancer and treatment. For instance, Japanese lung cancer

survivors had the lowest work continuation rates, compared with people surviving other types of cancer such as breast cancer (Endo et al., 2019).

Researchers Bae and Cho (2021) sought to examine the role of returning to work in survivorship care as there is limited research on the topic in Korea. Cancer survivors reported several factors that influenced their return to work, including fear of cancer recurrence, financial status, support, and work environment (Bae & Cho, 2021). Uncertainty surrounding these factors caused cancer survivors to be hesitant to return to work post-treatment. Additionally, cancer survivors reported several changes after a cancer diagnosis that could potentially play a role in returning to work. These changes included physical, psychological, spiritual, and interpersonal. The changes experienced by cancer survivors are also some of the challenges the survivors faced when deciding if they should return to work (Bae & Cho, 2021).

Since there is limited research regarding cancer survivors returning to work, educational interventions and materials should be developed and tested (Bae & Cho, 2021). Although Korea is a medically advanced country, limited resources are available for cancer survivors to help them return to work. The transition from cancer treatment to working full-time can be challenging and laborious, and resources such as support groups and educational materials can help cancer survivors navigate their return to work (Bae & Cho, 2021).

### **Mental Health-Related Problems**

Cancer diagnosis and treatment can be highly stressful and cause long-term distress in cancer survivors (Cordova et al., 2017). While everyone responds to stressful situations differently, cancer patients often respond to a diagnosis with sadness, fear, anxiety, depression, and difficulties adjusting. Long-term chronic stress can negatively affect one's mental health and lead to mental health-related disorders such as post-traumatic stress disorder (PTSD). A

diagnosis of PTSD requires that the person experience or witness a traumatic stressor. Being diagnosed with cancer is a traumatic stressor because it can drastically change one's life and be a very stressful experience. Cancer can be a life-threatening illness, and the diagnosis can be shocking and detrimental to one's health (Cordova et al., 2017).

Due to the stressful nature of cancer, there is an abundance of literature available regarding cancer-related PTSD (Cordova et al., 2017). Self-report measures indicated that approximately 12.6% of adult cancer survivors experience cancer-related PTSD. Children with cancer and their parents or caregivers also may experience cancer-related PTSD. It is estimated that 9.8% of childhood cancer survivors and 44% of parents of cancer survivors have PTSD related to cancer. The parents of cancer survivors have a high rate of PTSD as seeing a child extremely sick can be highly stressful. In addition to parents of cancer survivors, spouses and close relatives of cancer survivors also reported experiencing cancer-related PTSD (Cordova et al., 2017).

Although PTSD is a chronic condition, cancer survivors report experiencing a decline in PTSD symptoms as time goes on (Cordova et al., 2017). The most significant indicator of cancer-related PTSD is cancer-related acute stress disorder, similar to PTSD but less severe. Cancer patients undergoing chemotherapies or various cancer treatments may not have time to go to different mental health treatments; consequently, the stress can build up over time. Some cancer survivors may be at greater risk for developing PTSD due to underlying risk factors. Common risk factors for cancer-related PTSD are advanced stage diagnosis, low socioeconomic status, young age at diagnosis, history of psychiatric disorders, invasive cancer treatment, and limited social and emotional support (Cordova et al., 2017).

Cancer-related PTSD can lead to various symptoms in cancer survivors that cause distress and difficulties functioning (Cordova et al., 2017). Some of the symptoms that cancer survivors may experience are anxiety, depression, and decreased quality of life. Additionally, cancer survivors may experience classic symptoms of PTSD, including intrusive thoughts, avoidant behavior, negative cognition and mood, and hyperarousal (Cordova et al., 2017).

According to Cordova et al. (2017), there is some debate as to whether a cancer diagnosis is sufficient for a diagnosis of PTSD. One of the requirements for diagnosing PTSD is exposure to actual or threatened death or severe injury (Cordova et al., 2017). Some may argue that cancer diagnosis is not part of the exposure criteria. However, others believe that cancer is sufficient because it is a life-threatening illness and debilitating medical condition. Whether a cancer survivor receives a diagnosis of cancer-related PTSD is dependent on their therapist and whether they believe the illness counts as a traumatic event (Cordova et al., 2017).

Since cancer survivors are at risk of developing mental health-related disorders, more focus should be placed on improving mental health while undergoing cancer treatment (Cordova et al., 2017). Focusing on mental health during cancer treatment can potentially lead to decreased mental illness and better health outcomes. Furthermore, cancer patients should be evaluated for previous mental health conditions and risk factors that may lead to mental health-related problems. Attending therapy such as cognitive behavioral therapy, mindfulness-based therapy, or group therapy throughout cancer treatment can benefit one's health and reduce feelings of stress. These interventions are promising and lead to improved mental health outcomes (Cordova et al., 2017).

Childhood cancer survivors are also at risk for developing cancer-related mental health problems throughout their lifetime (Nathan et al., 2018). Childhood cancer survivors are a



vulnerable population at a heightened risk of developing mental health disorders during adolescence. Some of the common problems childhood cancer survivors may face are suicidal ideation, PTSD, depression, and anxiety. Mental health conditions commonly arise during one's adolescent years, and childhood cancer survivors are at an increased risk, compared to healthy adolescents, due to the trauma they may have faced from having cancer (Nathan et al., 2018).

While childhood cancer survivors do experience severe mental health problems, they are not significantly at risk for mental health emergency department visits, hospitalizations, or suicide (Nathan et al., 2018). Childhood cancer survivors reported high levels of anxiety, compared to healthy controls. Approximately 41.2% of childhood cancer survivors were diagnosed with anxiety, 34.4% with substance abuse-related disorder, and 24.4% with mood or affective disorders. Childhood cancer survivors also reported more outpatient mental health-related doctor's visits than controls. Compared with their healthy counterparts, outpatient mental health appointments for childhood cancer survivors were found to be 34% higher. Children who have had cancer treatment were found to have a heightened risk for mental health disorders. To some extent, higher family income mitigated this risk. Female survivors of childhood cancer were found to be at a greater risk for developing mental illness than male cancer survivors. Many young cancer survivors reported challenges accessing mental health services after cancer treatment (Nathan et al., 2018).

Cancer may cause trauma, stress, and uncertainty, all of which put a person at increased risk for developing a mental health-related disorder (Nathan et al., 2018). Nathan et al. (2018) found that, compared with childhood survivors, adolescent survivors of cancer reported greater levels of mental healthcare utilization. However, children diagnosed with cancer as toddlers

before the age of 4 were at increased risk for severe mental health-related events (Nathan et al., 2018).

Since cancer treatments have improved throughout history, over 80% of children diagnosed with cancer will become long-term survivors (Nathan et al., 2018). With the increasing population of cancer survivors in upcoming years, oncology facilities must have resources available for childhood cancer survivors. Resources should include information on mental health treatment since the population is vulnerable and at risk for developing mental health disorders (Nathan et al., 2018).

Adolescent and young adult cancer survivors between the ages of 15 and 39 reported experiencing greater mental distress than those without cancer (Kaul et al., 2017). Adolescence and young adulthood are times of growth and development. Adding the stress of a cancer diagnosis to this timeframe can be traumatic and facilitate a mental health-related disorder. Adolescence may be stressful as students are preparing for college, having their first romantic relationships, and beginning to think about careers. Young adulthood is when many people have their first real job or serious romantic relationships and are independent without assistance from their parents. Having cancer during these times of change can cause individuals to pause their life plans and focus on their illness, thus increasing distress (Kaul et al., 2017).

Self-report measures displayed that cancer survivors have inferior mental health status than the general population (Kaul et al., 2017). Cancer survivors are also more prone to developing negative habits. While habits such as cigarette smoking or drinking are not suitable for one's health, cancer survivors might turn to them to cope with their illness. Cigarette smoking and poor sleeping have been associated with increased mental health disorders in cancer survivors. Several factors may put cancer survivors at an increased risk for developing mental

health disorders, including demographics, socioeconomic status, behaviors, and medical habits. For instance, cancer survivors with low socioeconomic status may not have access to health insurance and, in return, have more significant mental distress (Kaul et al., 2017).

In addition to not being able to afford health insurance, it can be challenging for cancer survivors to receive mental health care as they already spend a great deal of their time receiving cancer treatment (Kaul et al., 2017). According to a large-scale study done by Kaul et al. (2017), cancer survivors were much more likely to report that they could not afford mental health care, compared to the general population. Limited access to mental health services among the cancer survivor population is problematic because when one has a mental health condition and does not seek treatment, their condition may deteriorate over time. Research has also suggested that cancer survivors who were younger at the age of diagnosis reported worsened mental health, compared to cancer survivors diagnosed later in life (Kaul et al., 2017).

Non-Hispanic, White cancer survivors were at a lower risk for developing mental health issues than Hispanic cancer survivors (Kaul et al., 2017). Nonetheless, sex, age, marital status, and race/ethnicities other than Hispanic were not associated with increased mental distress. Educational attainment was associated with decreased risk of mental health-related problems for adolescent and young adult cancer survivors. Cancer survivors also reported more comorbid conditions, compared to healthy controls. The prevalence of mental health-related disorders is three times more in cancer survivors than in the general population. Cancer survivors also reported seeking mental health treatment at much higher rates than healthy controls. However, a significant number of cancer survivors reported that they had not sought out mental health treatment, even though they had feelings of distress (Kaul et al., 2017).

To lessen the gaps in mental health care, cancer organizations should develop programs to help provide mental health services to cancer survivors (Kaul et al., 2017). The services could include psychiatrists, clinical psychologists, social workers, and mental health counselors. Having services available for cancer survivors at cancer facilities could help improve mental health outcomes and increase quality of life. Overall, more work is needed to increase access to mental health services to cancer survivors as they are at a heightened risk of developing mental health disorders (Kaul et al., 2017).

### **Sleep and Fatigue**

Fatigue is one of the most common side effects of cancer diagnosis and treatment that can cause cancer survivors a great deal of distress (Ebede et al., 2017). Cancer-related fatigue is distressing both physically and emotionally and may cause extreme tiredness and exhaustion. Nearly half of cancer survivors reported experiencing cancer-related fatigue post-cancer treatment. Individuals may experience fatigue throughout their lifetime due to daily stressors; however, cancer treatments such as chemotherapy, radiation, and biological and hormone therapy significantly increase the likelihood of chronic fatigue. Cancer-related fatigue is also present during cancer treatment, and 25% to 99% of those undergoing cancer treatment reported increased tiredness and fatigue (Ebede et al., 2017).

While there are significant data that many cancer survivors experience fatigue after cancer treatment, the numbers are not accurate as many cancer survivors do not report experiencing fatigue to their oncologists or family, given their fear that they will be viewed as complainers (Ebede et al., 2017). Cancer-related fatigue may be present during treatment and continue to persist for years after. Approximately 25-30% of cancer survivors reported experiencing fatigue 5 years post-cancer treatment. Chronic fatigue may have a significant

adverse effect on one's quality of life. Living with chronic fatigue can have detrimental effects as it may affect one's relationships with others and their ability to work (Ebede et al., 2017).

According to Ebede et al. (2017), while the cause of chronic fatigue is vague, researchers believe there may be an underlying biological reason behind why cancer survivors are prone to experiencing fatigue. Research has suggested that serotonin, hypothalamic pituitary adrenal, circadian rhythm, muscle metabolism, Adenosine triphosphate, vagal afferent nerve activation, and cytokine dysregulation may be responsible for chronic fatigue (Ebede et al., 2017).

Biological dysregulation may occur during cancer treatment due to radiation, chemotherapy, or hormone therapy. Cancer patients may experience dysfunction in their circadian rhythm or their body's biological clock while undergoing treatment (Ebede et al., 2017).

In addition to biological factors that may play a role in cancer-related fatigue, many other non-biological factors contribute to cancer-related fatigue (Ebede et al., 2017), including symptom burden, pain, anxiety, depression, stress, nutritional imbalance, weight loss, anemia, surgery, and immunotherapy. The factors mentioned above are some of the many disturbances that cancer survivors may experience that cause difficulty with sleep that, in turn, may cause chronic fatigue (Ebede et al., 2017).

Various non-pharmacological and pharmacological interventions are available to help people suffering from chronic fatigue that may benefit cancer survivors (Ebede et al., 2017). Some common interventions to alleviate fatigue and promote sleep are dietary management, cognitive behavioral therapy, exercise, yoga, and sleep therapy. Medications are also available that may lessen one's fatigue, including antidepressants and psychostimulants. Since cancer-related fatigue can be very stressful and decrease one's quality of life, resources must be

available to help cancer survivors learn about fatigue and how they can improve their sleep schedule (Ebede et al., 2017).

The most common symptoms of chronic fatigue are increased tiredness and lack of energy (Oversikt et al., 2017). Researchers in Denmark found that approximately 15-35% of adult cancer survivors reported experiencing chronic fatigue. Chronic fatigue in cancer survivors is associated with negative social, occupational, and general functioning and reduced quality of life. Cancer-related fatigue occurs during cancer treatment and may persist throughout survivorship. Chronic fatigue among cancer survivors is defined by increased tiredness, lack of energy, exhaustion, and weakness. Fatigue among cancer patients may also overlap with “chemo brain,” which is cognitive dysfunction that one may experience while receiving chemotherapy (Oversikt et al., 2017).

Oversikt et al. (2017) found that chronic fatigue among adult cancer survivors was one of the most prevalent long-term side effects. A Norwegian study in the early 1990s found that 13% of women and 10% of males in the general population reported experiencing chronic fatigue (Oversikt et al., 2017). Cancer patients and survivors reported experiencing chronic fatigue at much greater rates, compared to the general population. Whether someone experiences chronic fatigue may be dependent on the type of cancer or intensity of cancer treatments. Radiotherapy may be associated with heightened levels of chronic fatigue, particularly in prostate cancer survivors. Furthermore, people who require multiple forms of cancer treatment (i.e., chemotherapy, radiation, hormone therapy, surgery) may put cancer survivors at a greater risk of developing chronic fatigue. Breast cancer survivors who were treated with a combination of chemotherapy, surgery, and radiotherapy reported increased levels of chronic fatigue instead of cancer survivors who received only one form of treatment (Oversikt et al., 2017).

Experiencing fatigue after cancer cannot fully be explained just by a cancer diagnosis (Oversikt et al., 2017). Additional risk factors may play a role in which cancer survivors develop fatigue-related issues. Low socioeconomic status, poor health, living alone, and mental health-related disorders can contribute to a cancer survivor experiencing chronic fatigue. Various physical illnesses may also be associated with sleep disturbance leading to chronic fatigue. Some illnesses that are known to have increased rates of chronic fatigue are pulmonary disease, obesity, and cardiovascular disease. Since both physical and social factors may impact whether one experiences fatigue, clinicians should evaluate individuals for risk factors (Oversikt et al., 2017).

There is currently no treatment specifically for chronic fatigue; however, several treatments can alleviate the symptoms (Oversikt et al., 2017). It is advised that cancer survivors maintain good physical activity levels and do not exhaust themselves as exhaustion may lead to fatigue. Therapies such as cognitive behavioral therapy can help reduce symptoms; however, not enough data are available to show the efficacy of such treatments. Developing and adhering to a consistent sleep schedule can help cancer survivors improve their symptoms of chronic fatigue.

Various treatment modalities exist that may be beneficial to treat and alleviate the symptoms of cancer-related fatigue (Escalante & Manzullo, 2009). Fatigue can harm one's social, emotional, and physical health. Fatigue may occur in cancer survivors who had various types of cancer at different stages. While fatigue may occur among any cancer survivor, research has suggested that patients with Hodgkin's lymphoma experienced fatigue at higher rates than other types of cancer survivors. Cancer-related fatigue commonly occurs as a comorbid disorder alongside coronary artery disease, metabolic disorders, sleep disorders, depression, or anxiety (Escalante & Manzullo, 2009).

Since cancer survivors are at risk for long-term fatigue, they should be screened for symptoms by their physicians (Escalante & Manzullo, 2009). Physicians should identify if the fatigue is mild, moderate, or severe and treat the patients accordingly. The treatment options for fatigue depend on the severity of the fatigue. For instance, mild fatigue can be treated with energy conservation methods that focus on pacing activities instead of rushing. Additionally, those with mild fatigue should limit naps to 30 minutes or less, if necessary. Patients with moderate to severe fatigue may be considered for pharmacological interventions such as antidepressants to promote a regular sleep pattern. Vitamins and supplements may also be used to help cancer survivors with moderate to severe chronic fatigue (Escalante & Manzullo, 2009).

Supplementary treatment interventions may be used to lessen the symptoms of cancer-related fatigue (Escalante & Manzullo, 2009). Stress management training, learning coping strategies, guided meditation, and behavioral interventions can be beneficial for cancer survivors with fatigue and sleep-related problems. Psychosocial interventions are the most effective for cancer survivors at reducing fatigue levels. Psychosocial interventions used to help treat chronic fatigue may also help improve the quality of life among cancer survivors. Strong evidence has suggested that exercise is an efficacious treatment for cancer-related fatigue. Exercise programs should consider the individual needs of the patient and be customized accordingly. Cancer survivors can also be taught breathing techniques that may promote relaxation and mindfulness. Acupuncture has also been used to treat cancer-related fatigue, but not much research is available to show its effectiveness (Escalante & Manzullo, 2009).

According to Ganz and Bower (2007), cancer survivors who experienced fatigue before their cancer diagnosis are at greater risk to experience fatigue post-cancer treatment. Research has suggested that breast cancer survivors reported experiencing cancer-related fatigue up to



10 years after treatment (Ganz & Bower, 2007). The exact etiology of cancer-related fatigue is not known, but it is clear that it is a combination of physical symptoms, medical conditions, psychological factors, and pro-inflammatory cytokines that lead to chronic fatigue. Researchers should continue to focus on discovering the etiology of cancer-related fatigue to complete the clinical picture and improve treatment methods (Ganz & Bower, 2007).

### **Pain Management**

Cancer survivors may experience pain post-treatment ranging from mild to debilitating (Moryl et al., 2010). Pain may be better controlled during active cancer treatment since the cancer patient may be given pain medication in addition to chemotherapy or radiation. The transition from cancer treatment to survivorship can be difficult as the cancer survivor is likely not receiving as much pain-relieving medication anymore. Since the pain can persist post-cancer treatment, cancer survivors must be thoroughly assessed for chronic pain to determine if they should discontinue pain medication or be transitioned to a pain management program. Depending on the level of pain the individual experiences post-cancer treatment, they may be monitored on a long-term opioid program (Moryl et al., 2010).

As the long-term survival rate continues to rise in the United States, we can expect to have an increased number of cancer survivors in the coming years (Moryl et al., 2010). Cancer survivors have poorer health outcomes, compared to the general population. Additionally, underlying comorbid conditions such as mental health disorders may negatively impact one's pain experience. There are a variety of reasons that a cancer survivor may experience chronic pain. Some common reasons cancer survivors may be in chronic pain are the neoplastic process, complications, debility, or other comorbid disorders (Moryl et al., 2010).

Additionally, pain can occur due to radiation, chemotherapy, or cancer-related surgery (Moryl et al., 2010). For instance, a breast cancer survivor may experience chest pain post-cancer treatment after having a double mastectomy operation. Chemotherapy has also been found to cause neuropathy, which may be very uncomfortable (Moryl et al., 2010).

According to Moryl et al. (2010), the prevalence of pain among cancer survivors is dependent on the type and stage of cancer. Some types of cancer cause more pain among survivors than others (Moryl et al., 2010). Approximately 50% of breast cancer survivors reported experiencing cancer-related pain post-treatment for up to 1 year after treatment. Of the 50% of breast cancer survivors reporting pain, more than half reported that their post-cancer pain was moderate to severe. Seventy percent of cancer survivors who had surgery removing one or more limbs reported experiencing chronic pain and phantom limb. Pain may also occur during cancer treatment as the person may not be using their muscles or moving their body much. Many cancer survivors are disabled due to the pain post-treatment and unable to work or participate in day-to-day activities. Chronic pain may have devastating effects on one's quality of life (Moryl et al., 2010).

Pain management programs should be available as a resource to help cancer survivors transition to life after cancer (Moryl et al., 2010). Cancer survivors may be concerned to report they are experiencing pain because they fear they may be viewed as addicts or drug-seekers. Furthermore, physicians may be hesitant to put cancer survivors on long-term pain medications for fear they may become tolerant to the opioids over time. Cancer survivors may also have difficulties accessing care or being able to afford pain medicine. Pharmacological management should be considered to help cancer survivors transition to life after treatment. Pain management programs should be individualized to meet the needs and goals of the cancer survivor. Since

addiction is always a concern when prescribing pain medication, cancer survivors should be closely monitored post-treatment to follow the recommended guidelines. In addition to pain medication, other treatment modalities such as physical therapy and psychotherapy should be explored to alleviate pain among cancer survivors (Moryl et al., 2010).

Research has suggested that pain is one of the most common symptoms experienced by cancer survivors (Gallaway et al., 2020; Moryl et al., 2010). Cancer survivors reported experiencing cancer-related pain many years after cancer treatment, suggesting that pain among cancer survivors is not managed well (Gallaway et al., 2020). Nearly half of cancer survivors in the United States are expected to live more than 10 years, and a majority of these survivors will experience cancer-related pain at some point in time. Pain is dependent on several factors, including type of cancer, stage, location, and treatment method. Cancer survivors need to communicate the pain they are experiencing as it is vital for their oncologist to evaluate the reason for the pain and attempt to treat it accordingly. However, nearly 30% of cancer survivors reported that they did not receive any pain medication (Gallaway et al., 2020).

Cancer survivors experience various duration of pain, including short- and long-term pain (Gallaway et al., 2020). Approximately 90% of cancer survivors reported experiencing cancer-related pain during their first year of survivorship. The prevalence and severity of pain among cancer survivors are also impacted by gender and race. Black cancer survivors reported more significant pain severity as opposed to White cancer survivors. Furthermore, female cancer survivors reported higher levels of pain than males. Cancer survivors who reported chronic pain symptoms often have comorbid conditions as well. Some common conditions that are comorbid with chronic pain include mental health issues and insomnia. Having comorbid conditions may

worsen one's pain as the symptoms of other illness can exacerbate the pain (Gallaway et al., 2020).

Gallaway et al.'s (2020) large-scale study results were consistent with previous research suggesting that female cancer survivors reported pain at higher levels than males. Cancer survivors above 65 reported fewer pain symptoms than younger survivors (Gallaway et al., 2020). Cancer survivors with severe pain reported that they cannot work due to the physical pain of treatment. Gallaway et al. also found that survivors of lung, breast, leukemia, lymphoma, and colorectal cancer reported higher levels of pain, compared to other types of cancer. Risk behaviors such as frequent cigarette smoking were also associated with greater levels of pain. Cancer survivors with high levels of pain also reported a lack of sleep and insomnia. Chronic pain can be challenging to live with, and cancer survivors with high pain levels have a poor health-related quality of life, compared to healthy controls (Gallaway et al., 2020).

In addition to cancer treatment as the source of chronic pain, various cancer-related tests may also cause chronic pain (Gallaway et al., 2020). Cancer survivors reported pain from biopsies, various scans, lab work, and physical therapy. Cancer survivors must be adequately assessed for pain symptoms because untreated pain can lead to frequent hospital visits that may be unnecessary. Furthermore, it is essential for practitioners to monitor their chronic pain patients closely as they may become dependent on narcotics or other substances if not checked on frequently. Overall, cancer-related pain after treatment is a severe health concern experienced by most cancer survivors. Pain management is an integral part of cancer care both during and after treatment. Cancer survivors should continue to be evaluated for pain and recommended treatments to manage the pain accordingly. Cancer survivors who have their pain under control are more likely to have improved health outcomes and quality of life (Gallaway et al., 2020).

With the rapidly increasing number of cancer survivors worldwide, we will continue to see more cancer survivors report cancer-related pain (Brown & Farquhar-Smith, 2017). Brown and Farquhar-Smith's (2017) research explored common pain types that cancer survivors reported experiencing post-treatment. Pain from tumors is often reported among cancer survivors. A cancerous tumor may grow anywhere in the body and can cause pain in the surrounding areas. For instance, a tumor may push against the spine and cause the person to experience widespread nerve pain (Brown & Farquhar-Smith, 2017).

Additionally, cancer survivors may report experiencing bone pain (Brown & Farquhar-Smith, 2017). Bone pain may occur due to weakness of bones after treatment or from a spontaneous flare-up. Tumors may also cause bone pain depending on their location. Tumors on the bone may metastasize and kill the healthy bone tissue, which may become very uncomfortable over time (Brown & Farquhar-Smith, 2017).

Cancer survivors also report high rates of treatment-related pain (Brown & Farquhar-Smith, 2017). Treatment is different for every patient; however, many cancer survivors may need surgery to remove a tumor or implant a mediport. Surgical procedures can be painful, and post-surgical pain may persist. Many cancer survivors have reported chronic post-surgical pain. Surgical procedures such as herniorrhaphy, thoracotomy, breast surgery, and limb amputation have the highest rates of chronic post-surgical pain, compared to other cancer surgeries. Chronic post-surgical pain may feature both physical and neurological pain, such as numbing and sensory issues. High body mass index (BMI) may be a risk factor for chronic post-surgical pain among cancer survivors. Furthermore, acute postoperative pain, comorbidities, anxiety, and pre-existing pain are risk factors for developing pain post-surgery (Brown & Farquhar-Smith, 2017).

Another type of pain reported by cancer survivors is neuropathy (Brown & Farquhar-Smith, 2017). Neuropathy is associated with several cancer treatments, including chemotherapy and newer myeloma treatments. Additionally, the route of treatment administration may also facilitate neuropathy as those who receive treatment through the intravenous route experience neuropathy at higher rates. Radiotherapy or radiation may also cause pain, numbness, and neuropathy. Since cancer survivors are at risk of experiencing various types of pain, more research must explore how oncologists can better manage cancer survivors' pain (Brown & Farquhar-Smith, 2017).

According to Brown and Farquhar-Smith (2017), there is not one single treatment for cancer-related pain; the treatment must be individualized. Some patients may prefer that their pain be treated with opioids or other narcotics, whereas others may prefer more holistic approaches such as physical therapy. Topical treatments such as menthol may be given to alleviate pain. Ketamine, clonidine, and antidepressants have also been used temporarily to relieve pain among cancer survivors. Pain among cancer survivors continues to be a challenge for researchers. More information and resources are needed to develop pain management programs that cater to the unique needs of cancer survivors (Brown & Farquhar-Smith, 2017).

Minimally invasive interventional procedures such as epidurals are often used to manage pain and can be used to alleviate cancer-related pain in patients and survivors (Bhaskar, 2020). Interventional pain management may be a successful way to treat pain, but it is not widely researched regarding cancer-related pain. Radiofrequency ablation, neurolytic celiac plexus blocks, fluoroscopy, and endoscopic ultrasound-guided approaches can be used to treat pain among cancer survivors. These procedures are typically outpatient procedures that have minimal downtime. Interventional pain management may be used as an alternative method to opioids and

narcotics, preventing cancer survivors from becoming dependent or addicted to substances. Additionally, it may require fewer visits to the doctor or emergency room. More research is needed to explore how cancer patients and survivors can benefit from interventional pain management (Bhaskar, 2020).

### **Financial Hardships**

Cancer survivors in the United States face a substantial financial burden from the cost of cancer treatment and lost wages (Mongelli et al., 2020). Mongelli et al. (2020) explored how thyroid cancer survivors face a significant financial burden as many people are diagnosed with cancer before the age of 65, meaning they are not eligible for Medicare services. Financial distress can cause a significant financial burden, which can be stressful both financially and emotionally. The approximate cost to treat thyroid cancer in the United States per year is 21 billion dollars. Approximately 44,000 Americans are diagnosed with thyroid cancer per year and are faced with a hefty treatment bill (American Cancer Society, 2021c). Having large medical bills may also cause distress in other financial domains as the cancer survivor may not afford other necessities such as rent or food costs (Mongelli et al., 2020).

Cancer treatment may be laborious, and many cancer patients may need to take a medical leave or quit their job to attend chemotherapy sessions, sometimes daily (Mongelli et al., 2020). Thyroid cancer disproportionately poses a financial burden to younger cancer survivors as they do not qualify for Medicare or government assistance. The health-related quality of life in thyroid survivors may be low due to cancer survivors' financial hardship. A large-scale study examining the financial hardships and quality of life among thyroid cancer survivors found that 18.1% of survivors reported being unemployed due to their cancer or treatment. High

unemployment rates among cancer survivors caused distress as the patients had difficulties affording both medical and primary care (Mongelli et al., 2020).

Mongelli et al. (2020) explored financial topics related to thyroid cancer, including savings accounts, borrowing money from the bank, credit cards, and questions related to collection agencies. They found that 23.7% of cancer survivors used up most of their savings to pay for cancer-related costs. Additionally, 15.1% of cancer survivors borrowed money from relatives or friends to help pay for treatment. Nearly 12% of cancer survivors reached their maximum credit card limit, and 3% declared bankruptcy due to spending all of their money on health-related costs. The financial burden caused by thyroid cancer often leads to decreased health-related quality of life, in addition to high rates of depression and anxiety among cancer survivors. Unemployed cancer survivors reported an even lower quality of life due to the uncertainty of not being able to afford treatment or necessities (Mongelli et al., 2020).

Health-related quality of life is a psychological measure of well-being that highlights various levels of functioning (Mongelli et al., 2020). Health-related quality of life is greatly influenced by anxiety, depression, fatigue, pain, sleep, and physical and social functioning. Thyroid cancer survivors may experience hardships in all domains of their quality of life when they have a significant financial burden from the cost of treatment. Financial hardship can be highly stressful and cause cancer survivors to have poorer mental health outcomes. Cancer diagnosis and treatment are stressful by nature, and having to worry about finances on top of cancer can be detrimental to one's mental and physical health. Although some services are available such as disability, government assistance, and financing options, cancer survivors still experience significant financial burdens due to the high cost of cancer treatment. In addition to paying for cancer treatment, patients may also need to cover the costs of prescription



medications, transportation, travel, and housing. These fees add up over time and may collect interest as well. To ease the financial burden for cancer patients and survivors, oncology hospitals should offer financial resources, reduced charges, and interest-free payment plans for cancer patients. Having financial advisors available to discuss payment plans may also benefit cancer patients and survivors (Mongelli et al., 2020).

Cancer survivors are responsible for some of the most significant medical expenditures in the United States (Nipp et al., 2017). Cancer patients and survivors experience severe financial burden that has been found to worsen treatment outcomes, lessen the quality of life, and impact symptom burden. For instance, cancer patients struggling financially may not stick to their treatment regimen because of their inability to afford prescription medications. Childhood survivors of cancer may experience significant financial burdens as they are likely to develop comorbid illnesses throughout their lifetime that may be costly. Uninsured childhood cancer survivors experience high levels of anxiety related to the financial hardships associated with their cancer treatment (Nipp et al., 2017).

A study done by Nipp et al. (2017) sought to determine how childhood cancer survivors' medical bills differ from their healthy siblings. They found that childhood cancer survivors are more likely to have expensive medical bills than their healthy siblings, who had reasonable medical expenses (Nipp et al., 2017). Additionally, childhood cancer survivors spent more money on out-of-pocket medical expenses than their healthy siblings. Survivors of childhood cancer may be left with large medical bills in adulthood from their treatment and survivorship care. There is an apparent need to examine in more depth the financial hardships experienced by childhood cancer survivors (Nipp et al., 2017).

Cancer survivors and their immediate families are faced with high medical expenditures and financial toxicity due to the high cost of cancer treatment and care (Zheng et al., 2019). Research has suggested that the average cost of cancer care in the United States is \$10,000 per month. The cost of cancer treatment has risen exponentially, as it previously was about \$1,000 per month in 2000. Cancer survivors are faced with large medical bills that may lead to excessive debt or bankruptcy over time. Younger cancer survivors often face a more significant financial burden because they may be paying off student loans and first homes, in addition to their cancer-related bills. Financial toxicity is closely related to lower quality of life, lower treatment adherence, and increased stress (Zheng et al., 2019).

Financial hardship associated with cancer care costs causes patients to worry about medical bills, delay care due to costs, and experience difficulties paying bills in other domains of their life such as mortgages or necessities (Zheng et al., 2019). Cancer survivors are much more likely to experience financial toxicity, compared to healthy individuals. People over the age of 65 with cancer may experience less financial hardship because they qualify for government assistance and Medicare, which may cover most of their cancer care. Younger cancer survivors may be left with increased financial stress because they may be uninsured or they do not qualify for government assistance financial programs. Zheng et al. (2019) also found that type of cancer diagnosis may influence financial hardship. Breast and prostate cancer survivors reported similar levels of financial hardship. Financial strain can be detrimental for cancer survivors' health as it may cause them to not seek necessary care for fear of being unable to afford the hospital bills (Zheng et al., 2019).

Overall, younger cancer survivors are the most at risk for financial hardships associated with cancer care costs (Zheng et al., 2019). Financial hardship from cancer care is found to cause

material, psychological, and behavioral problems among cancer survivors. Insurance companies should consider how financial burden may affect medical care among cancer survivors and increase coverage among cancer patients (Zheng et al., 2019).

Several risk factors make cancer survivors more likely to experience financial burdens than others (Han et al., 2020). Risk factors that may increase cancer survivors' likelihood of financial hardship include sociodemographic factors such as age, gender, race, and ethnicity. Additionally, lack of health insurance, high-cost insurance, low family earnings, and employment status may also influence financial burden. Clinical factors as well may impact financial distress, including adjunct cancer treatments and expensive medications. Medicaid is only available to low-income individuals, and Medicare is offered for those above the age of 65. Cancer survivors who earn above the poverty line and do not qualify for Medicare may experience a more significant financial burden (Han et al., 2020).

Due to the high cost of cancer treatment, cancer survivors may be forced to make sacrifices, including reducing spending on food, using up their savings, moving houses, skipping care, or asking for loans from the bank (Han et al., 2020). Han et al. (2020) found that cancer survivors who are minority races or ethnic groups are more likely to experience financial hardship than Caucasians. Additionally, cancer survivors who were unemployed or had lower family incomes are at risk of experiencing financial toxicity. Approximately 54.2% of middle-aged cancer survivors reported that they had made a sacrifice due to the financial hardship of paying for cancer care. Common sacrifices include dipping into savings accounts intended for other purposes (e.g., college fund), delaying purchases, reducing overall spending, and not taking vacations or time off (Han et al., 2020).

Cancer patients may have to take medical leave or quit their job to get treatment (Han et al., 2020). While those on medical leave may still get paid, they do not get paid the same amount as working in person. The cancer survivors who have to leave their job to seek treatment may risk losing their health insurance. It can be challenging for cancer survivors to get a job after cancer treatment, leaving them without pay for extended periods. Depending on the level of hardship, some cancer survivors are forced to file for bankruptcy or borrow money from family members or the bank. Although cancer patients over 65 are eligible to receive Medicare from the government, 42% of senior cancer survivors reported having financial hardships due to the high cost of cancer care (Han et al., 2020).

Overall, cancer survivors are at significant risk for experiencing financial hardships (Han et al., 2020). The financial well-being of cancer survivors is very poor, compared to healthy individuals who do not have excessive medical bills. With the number of increasing cancer survivors in the United States, more individuals will experience financial distress. Some ways to ease the stress of financial burden for cancer survivors would be for employers to offer paid and unpaid sick leave for those undergoing cancer treatment without retaliation or risk of losing one's job. Additionally, employers could offer work from home so cancer patients could still keep their job and work from home or hospital. Workplace accommodations could be beneficial for easing the financial burden experienced by cancer survivors. The cost of life-saving cancer medications continues to increase year after year (Han et al., 2020). Pharmaceutical companies should consider lowering the cost of these essential services and make cancer treatment more affordable.

Furthermore, hospitals should consider lowering the costs of clinic visits, hospital stays, and follow-ups for cancer patients as they have trouble affording primary care (Han et al., 2020).

There is a dire need for financial intervention for cancer survivors in the United States. Cancer is a very stressful disease and facing financial toxicity on top of undergoing cancer treatment may be detrimental to one's health. Efforts must continue to be made to improve the financial well-being of cancer patients and survivors in order to improve overall outcomes (Han et al., 2020).

### **Weight Management**

Since cancer survivors may be prone to develop comorbid disorders, they must maintain a healthy weight to prevent the development of illness (Zhang, Meager, et al., 2017). Various chronic illnesses are associated with obesity, including diabetes and cardiovascular disorders. Furthermore, obesity also puts people at risk of developing cancer. Being overweight is also associated with psychological disorders as a person may become depressed if they are overweight or develop a binge eating disorder. Overall, obesity may lead to poorer health outcomes among cancer survivors (Zhang, Meager, et al., 2017).

Zhang, Meager, et al. (2017) surveyed 209 cancer survivors to assess weight management perception, interest, and interventions. They found that the average BMI among the participants was 27.9 kg/m<sup>2</sup>. Of the 209 participants, 35% of cancer survivors were overweight, and 27% were obese. The majority of the cancer survivors expressed interest in losing weight. Those who expressed interest in losing weight were younger than those who said they did not desire to lose weight. Those who were obese according to their BMI score were likely to report being interested in losing weight or weight management (Zhang, Meager, et al., 2017).

Obesity is a severe problem among cancer patients and survivors, leading to adverse health outcomes (Zhang, Meager, et al., 2017). Many cancer survivors report significant weight gain after cancer treatment. Weight gain may occur because cancer patients undergoing chemotherapy or other anti-cancer medications often lose weight during treatment due to loss of

appetite, nausea, and vomiting. Cancer providers recognize that maintaining a healthy weight is imperative for cancer survivors to stay healthy and reduce the risk of comorbid illnesses.

Nonetheless, cancer survivors may not recognize or understand the significance of healthy weight management post-cancer treatment. Cancer providers must reiterate the importance of weight management to cancer patients and survivors. Resources are also needed to help cancer patients maintain a healthy weight post-treatment (Zhang, Meager, et al., 2017).

Evidence suggests that obesity is associated with poorer cancer-related health outcomes (Demark-Wahnefried et al., 2018). Additionally, obesity among cancer survivors is associated with lower quality of life and increased fatigue. Obesity may also lead to mortality among cancer survivors. Obesity is associated with increased cardiotoxicity among cancer survivors. Weight management is a significant part of survivorship care as it helps cancer survivors maintain a healthy weight and reduces the risk of comorbid disorders. Weight management can include various vital elements such as coaching, therapy, and physical activity. Clinicians should promote weight management programs to cancer survivors to help improve health outcomes and quality of life among survivors (Demark-Wahnefried et al., 2018).

Physical activity has positively influenced the quality of life among cancer survivors (Demark-Wahnefried et al., 2018). To maintain a healthy weight post-cancer, it is recommended that survivors eat healthily and exercise regularly. Cancer survivors may be susceptible to weight gain with loss of muscle mass after chemotherapy. The loss of muscle mass may put cancer survivors at risk. Weight management programs that include physical activity can be helpful for cancer survivors to gain back healthy muscle mass (Demark-Wahnefried et al., 2018).

Furthermore, physical activity has been shown to improve cognitive ability and decrease peripheral neuropathy among cancer survivors (Demark-Wahnefried et al., 2018). Physical

activity has been proven to be an efficacious intervention to help cancer patients stay healthy after treatment. Nonetheless, physical activity has not been shown to reduce risk of cancer recurrence in cancer survivors (Demark-Wahnefried et al., 2018).

Behavior modification is also an essential element of weight management (Demark-Wahnefried et al., 2018). Dietary modifications, lifestyle changes, and regular exercise all require one to change lifestyle and behavior. Coaching and counseling can be helpful tools to help cancer survivors successfully implement these changes. It is also helpful for cancer survivors to set attainable goals and expectations regarding weight management. Behavior change theories may be used for cancer survivors to develop healthy habits related to diet and exercise (Demark-Wahnefried et al., 2018).

Not all cancer survivors struggle with weight management issues post-cancer treatment (Demark-Wahnefried et al., 2018). Ethnic minorities and low-income populations are often burdened by cancer. Furthermore, ethnic minorities and low-income populations are more likely to be obese or overweight, putting them at greater risk for comorbid illnesses. Minority populations are also less likely to participate in physical activity. Minority cancer survivors are less likely to adhere to nutrition and exercise suggestions, which may be why they are more likely to report poorer health outcomes than non-minority cancer survivors. Weight management programs for cancer survivors must be inclusive and address the unique needs of minority groups such as African American and Hispanic populations. Developing and implementing inclusive and culturally competent care is an effective way to reduce disparities (Demark-Wahnefried et al., 2018).

Although cancer may affect people of any age, including children, more than half of cancer survivors are above 65 (Demark-Wahnefried et al., 2018). Approximately 71% of cancer

survivors over the age of 65 are overweight or obese. Children and adolescents may also be overweight or obese but at much lower rates. Weight management must be an essential part of post-cancer care for survivors of all ages, as proven to improve health outcomes. Weight management programs for cancer survivors must be feasible, efficacious, and low-cost. Physical activity programs should also be offered for cancer survivors. Overall, cancer survivors who are overweight or obese may be jeopardizing their health and should be referred to specialized weight management programs to improve their lifestyle (Demark-Wahnefried et al., 2018).

Sawicka-Zukowska et al. (2020) aimed to determine the effects of obesity and increased weight in cancer survivors at a pediatric oncology clinic. Childhood cancer survivors are at greater risk of being overweight and obese than their healthy siblings (Sawicka-Zukowska et al., 2020). The risk of obesity after childhood cancer may be higher for those with specific types of cancer and treatment methods. Obesity is a greater risk among childhood cancer survivors of central nervous system tumors, acute lymphoblastic leukemia, and hematopoietic cell transplants, compared to other types of cancer and treatments. In turn, obesity may facilitate other comorbid conditions in childhood cancer survivors, such as cardiovascular conditions and diabetes (Sawicka-Zukowska et al., 2020).

After examining the data from their study, Sawicka-Zukowska et al. (2020) found that childhood survivors of acute lymphoblastic leukemia had significantly higher BMI than survivors of other types of cancer. A high BMI is associated with being overweight and obese. Additionally, the researchers found that obesity in childhood cancer survivors was more common among boys than girls. Approximately 50% of the male leukemia survivors were obese, whereas only 35% of females were obese. These levels were consistent even 5 years post-cancer treatment. Childhood cancer survivors may also have abnormal amounts of muscle and fat. Some



of the fat or muscle loss may be attributed to the type of treatment method. Irradiation and megachemotherapy may also increase fat mass in cancer patients (Sawicka-Zukowska et al., 2020).

Weight gain and obesity may be one of the long-term side effects of certain cancers and cancer treatments (Sawicka-Zukowska et al., 2020). Obesity is a severe problem among cancer survivors as it may lead to chronic conditions such as cardiovascular disease. Sawicka-Zukowska et al. (2020) found that oncologists and general practitioners regularly monitor pediatric cancer patients and survivors for cardiovascular-related disorders. Early detection and prevention are essential to ensure that childhood cancer survivors stay healthy throughout their life (Sawicka-Zukowska et al., 2020).

### **Nutrition and Physical Activity**

Healthy eating and regular exercise are crucial elements that can help keep cancer survivors healthy (Rock et al., 2012). Weight gain is a standard post-cancer treatment; thus, cancer survivors need to adopt healthy eating and regular physical activity. Different types of cancer can also cause metabolic and physiological alterations, affecting the amount of macro- and micronutrients one requires. Cancer treatments such as chemotherapy, radiation, and surgery may alter how the body absorbs, digests, and utilizes food. Individualized dietary advice should be provided to cancer survivors post-treatment to ensure they have the best possible outcomes (Rock et al., 2012).

Rock et al. (2012) also discussed how minerals, supplements, and vitamins can be offered to cancer survivors who lack certain nutrients in their diet. Dietary suggestions such as a diet high in fruits, vegetables, whole grains, poultry, and fish can be suggested to cancer survivors as these diets effectively reduce mortality (Rock et al., 2012). Diets that include a high intake of

processed red meat, desserts, high-fat dairy products, and refined grains can negatively affect one's health. The researchers found that breast cancer survivors who ate five or more servings of fruit and vegetables per day, in addition to 30 minutes of exercise 6 days per week, have higher survival rates, compared to those who do not meet the recommended dietary and physical activity requirements. Another study found that patients with colorectal cancer whose diet mainly consisted of red meat, desserts, and refined grains were more likely to have a cancer recurrence and poorer health outcomes. Since cancer survivors are at high risk for developing other comorbid health conditions, a healthy diet is recommended to decrease the risk of comorbid conditions (Rock et al., 2012).

Several studies have explored which diets are the best to keep cancer survivors healthy (Rock et al., 2012). Food rich in omega-3 fatty acids are beneficial for cancer survivors and may even enhance the effects of some treatments. Protein intake is also crucial, and cancer survivors should focus on eating fish, lean meats, poultry, nuts, seeds, low-fat dairy, and eggs. Vegetarian and vegan diets have both positive and negative outcomes and depend on whether the person is still getting enough protein and vital nutrients. It is also essential for cancer survivors to have healthy carbohydrates, fiber, and antioxidants as a part of their diet. Alcohol may have positive and negative effects on cancer survivors; thus, it is recommended that they keep alcohol consumption to a minimum (Rock et al., 2012).

In addition to eating a healthy diet, regular physical activity is an essential part of post-cancer care (Rock et al., 2012). Regular physical activity has been shown to improve quality of life and physical functioning and decrease fatigue among cancer survivors. Physical activity and physical therapy can be used to help improve and maintain strength post-cancer treatment. Some standard guidelines recommended to cancer survivors are to exercise at least 150 minutes per

week, strength training twice per week, and return to normal daily activities as soon as one is ready post-treatment. A healthy diet and exercise are good ways to promote overall health and quality of life among cancer survivors. A consistently healthy diet and physical activity can also help cancer survivors maintain a healthy weight post-cancer treatment (Rock et al., 2012).

Survivors of childhood cancer may experience excessive weight gain post-cancer treatment (Zhang, Kelly, et al., 2017). Childhood cancer survivors are significantly more likely to die from cardiovascular-related disorders than the general, healthy population. Childhood cancer survivors are also more likely to have high BMIs and be obese, compared to healthy children. Obesity can be prevented and reduced through the use of physical activity and nutrition programs. Regular physical activity and healthy eating can help childhood cancer survivors live an overall healthier life and reduce the risk of obesity and cardiovascular diseases (Zhang, Kelly, et al., 2017).

In addition to being at risk for several chronic health conditions, childhood cancer survivors are at significant risk for being overweight and suffering comorbid disorders due to obesity (Zhang, Kelly, et al., 2017). Research has suggested that children with cancer undergoing treatment will experience an increase in BMI at some point during the first 22 months of therapy. Some of the main reasons childhood cancer survivors are at risk are low levels of physical activity and sedentary lifestyles. Cancer patients or survivors may not have the energy or be physically able to exercise, which leads them to be more sedentary. Psychosocial factors may also influence a child's physical activity patterns. Parents of cancer patients may be more likely to say yes to their child, resulting in them eating more sweets and junk food. Children with cancer may also be more vulnerable to stress, impacting poor eating choices (Zhang, Kelly, et al., 2017).

Childhood cancer survivors and their parents should be provided with resources that provide dietary suggestions (Zhang, Kelly, et al., 2017). Enhancing dietary quality among cancer survivors could help reduce the risk of developing obesity. Dietary information could include food suggestions and nutritional needs for cancer survivors. Since childhood cancer survivors report high rates of stress, fatigue, and food cravings, practitioners must help survivors make healthy lifestyle changes. Practitioners should also empower cancer survivors' parents to help their children improve their diet and exercise more in order to have the best possible health outcomes. Severe risks are associated with obesity post-cancer treatment, such as hypertension, diabetes, and dyslipidemia. Cancer survivorship guidelines must encourage both child and adult survivors of cancer to adopt a healthy lifestyle to prevent the development of comorbid disorders (Zhang, Kelly, et al., 2017).

Behavior change programs can be effective at helping cancer survivors remain active and healthy post-cancer treatment (Stacey et al., 2017). Guidelines for cancer survivors emphasize the importance of regular physical activity and eating a healthy diet. Lifestyle and behavior interventions are successful at helping motivate people to eat a healthier diet and exercise more. Behavior interventions provide cancer survivors with support and guidance to improve their lifestyles. Interventions should be developed so that people can maintain their newly adopted behaviors, as long-term maintenance is a significant part of health outcomes (Stacey et al., 2017).

Stacey et al. (2017) developed a lifestyle intervention program called Exercise and Nutrition Routine Improving Cancer Health (ENRICH) to improve the health of cancer survivors and their caregivers. The ENRICH program focuses on promoting healthy weight, healthy eating habits, and resistance training (Stacey et al., 2017). The ENRICH program occurred for 8 weeks and was facilitated by a dietician, exercise specialist, and resistance trainer. The program focused

on several health behavior changes such as walking, resistance training, and physical activity and encouraging participants to improve their diet by eating more fruits and vegetables. The ENRICH program was guided by several social cognitive constructs that are efficacious at encouraging people to make health-related behavior changes (Stacey et al., 2017).

Researchers have found that social cognitive theories can help people initiate, change, and maintain health-related behaviors (Stacey et al., 2017). Setting goals, improving self-efficacy, and improving social support are some social cognitive constructs that can be helpful for those trying to change their behavior. Social cognitive constructs can be beneficial for cancer survivors who wish to make health-related behavior changes. Additional social cognitive constructs that were also used included impediments and managing outcome expectations (Stacey et al., 2017).

Since the 8-week trial done by Stacey et al. (2017) was small-scale, it is not easy to evaluate the effectiveness of the study. Low participation among cancer survivors and their family members may skew the data and cause inconsistencies. Only three of the six trials observed statistically significant changes. The ENRICH program was unable to improve vegetable consumption among cancer survivors. Additionally, only 48% of the 60 participants completed the full 8 weeks of intervention sessions. Further research should focus on developing large-scale studies that aim to improve nutrition and physical activity among cancer survivors. Interventions should be guided by social cognitive constructs as the social cognitive theory effectively facilitates and maintains behavior change (Stacey et al., 2017).

### **Healthcare Utilization Among Cancer Survivors**

As the number of cancer survivors continues to rise year after year, cancer-related healthcare costs will also continue to grow (Shaver et al., 2020). In 2020, Americans spent

approximately 200 billion dollars on cancer care. Cancer patients and survivors are concerned with the cost of cancer treatment and other healthcare expenditures, such as yearly physicals and follow-up appointments. The Affordable Care Act (ACA) became a law in the United States in 2010 and resulted in the expansion of Medicaid. More than eight million people were enrolled in Medicaid and now had access to healthcare services for free or low-cost. Shaver et al. (2010) sought to examine healthcare utilization after implementing the ACA among non-elderly cancer survivors. The study consisted of 578 participants ages 18-64, all identified as cancer survivors (Shaver et al., 2020).

Shaver et al. (2020) found that health care expenditure among non-elderly cancer survivors who were privately insured decreased after the ACA was implemented in the United States. Nonetheless, healthcare expenditures among those who were privately insured or who did not have health insurance rose after implementing the ACA. Privately insured, publicly insured, and non-insured cancer survivors all reported significant decreases in out-of-pocket spending and miscellaneous health-related spending. Cancer survivors did not report changes in patient care experience after the ACA was introduced. Overall, a more significant number of cancer survivors now have health insurance covered by the ACA. The increase in insurance coverage is significant because cancer survivors often require more healthcare visits than healthy individuals to ensure they are healthy and cancer-free (Shaver et al., 2020).

Healthcare utilization is significantly higher among cancer survivors than the general, healthy population (Mols et al., 2007). With the increased prevalence of cancer and cancer survivors, it is expected that healthcare utilization among cancer survivors will also continue to increase. Although cancer treatments such as chemotherapy may end after a certain amount of time, long-term follow-up is necessary for cancer survivors. Some types of cancer may require

more post-treatment follow-up than others. For instance, a significant amount of prostate cancer survivors may experience erectile dysfunction after treatment, which requires regular evaluation. Furthermore, survivors of Hodgkin's lymphoma report high levels of mental distress and are likely to require regular mental health visits. Breast cancer survivors also may require increased medical care post-treatment, including oncology visits, psychotherapy, and physical therapy (Mols et al., 2007).

Mols et al. (2007) interviewed over 1,000 cancer survivors to determine if cancer survivors utilize healthcare services at greater rates than their healthy counterparts of the same gender. The study found that cancer survivors were significantly more likely to use healthcare services than non-cancer survivors. Cancer survivors often visit specialists, oncologists, psychologists, and physical therapists. The amount of follow-up care varies by patient and cancer type. For instance, survivors of endometrial cancer may only need to see their oncologists for 5 years post-treatment. In comparison, other cancer survivors may need to follow up with a specialist for the rest of their life. Overall, Mols et al.'s (2007) study provided insight into how much cancer survivors use healthcare services, compared to the general population. Research should continue to explore healthcare usage among cancer survivors as they are more likely to experience health-related problems throughout their life (Mols et al., 2007).

Survivors of childhood cancer are at a significantly higher risk for comorbid conditions than the general population, which may lead to higher healthcare utilization rates (Rebholz et al., 2011). With the improvement of cancer screening and treatment, the long-term survivorship of childhood cancer has dramatically increased in the past few decades. The increase in childhood cancer survivors also suggests an increase in individuals who require complex healthcare throughout their lifetime. Rebholz et al.'s (2011) large-scale study examined the risk of

heightened healthcare utilization among childhood cancer survivors to gain more insight into healthcare utilization among childhood cancer survivors.

Using a national cancer database, Rebholz et al. (2011) examined the questionnaire data of 10,483 childhood cancer survivors. The questionnaire was administered to participants via mail and included questions that discussed the use of healthcare services (Rebholz et al., 2011). The data were compared to the general population who completed a national survey in Great Britain. The study results found that 16.5% of the childhood cancer survivors had spoken to a doctor in a healthcare setting in the past 2 weeks, which was significantly higher than the general population, of which only 1.2% reported healthcare use in the past 2 weeks. Furthermore, 25% of childhood cancer survivors went to an outpatient medical facility in 3 months. Only 2.5% of the general population reported healthcare utilization in the past 3 months. The research suggested that survivors of various types of childhood cancer report higher rates of healthcare utilization than the general, healthy population (Rebholz et al., 2011).

Rebholz et al. (2011) also found that several risk factors may have led cancer survivors to use healthcare services, compared to others. For instance, female survivors of childhood cancer were more likely to seek medical attention, compared to male survivors (Rebholz et al., 2011). Individuals with lower educational attainment were also more likely to use healthcare services than survivors with higher educational attainment. Survivors of childhood cancer who reported smoking also used healthcare services at greater rates than non-smokers. Childhood cancer survivors who had a cancer relapse were significantly more likely to use healthcare services than those who remained cancer-free or in remission. Cancer survivors who did not consume alcohol also utilized health services more than those who drank alcohol (Rebholz et al., 2011).



Survivors of childhood cancer are at heightened risk of increased healthcare utilization throughout their life (Rebholz et al., 2011). Frequent healthcare utilization may be due to several risk factors, as mentioned above. Greater healthcare utilization is also associated with higher healthcare expenditures. The excess morbidity that survivors of childhood cancer may face throughout their lifetime puts them at an increased risk for frequent healthcare utilization (Rebholz et al., 2011).

### **Survivorship Services**

Although cancer survivors may be done with cancer treatment, they may require specialized care throughout their life (Rolland & Eschler, 2018). Cancer survivors may experience physical and emotional changes that can often require long-term medical attention by exploring what services are available to cancer survivors. Rolland and Eschler (2018) provided readers with an idea of the special medical care that cancer survivors should have access to post-cancer treatment. To do so, the researchers analyzed the websites of 47 NCI-designated cancer centers. Having an idea of what services are available and frequently used by cancer survivors is vital for cancer centers to know how to implement programs relevant to their facilities (Rolland & Eschler, 2018).

With the growing increase of cancer survivors over the past few decades, there is a specific increase in cancer survivors who require specialized care post-cancer treatment (Rolland & Eschler, 2018). To improve cancer care, cancer centers must have services available that meet the unique needs of cancer survivors. Cancer survivors may have different clinical needs than the general population due to their diagnosis, treatment, or surgery. Rolland and Eschler (2018) assessed that the majority of cancer centers had survivorship information on their online websites available for cancer survivors. One of the unique needs of cancer survivors is that they may

require surveillance care. Since cancer survivors may be at risk of relapsing or developing a new form of cancer, they must regularly receive cancer screenings. Regular cancer screenings can help identify cancer in its early stages (Rolland & Eschler, 2018).

Cancer centers should also have access to preventive care focused on both cancer and other medical conditions (Rolland & Eschler, 2018). Rolland and Eschler (2018) found that while many cancer centers mentioned the importance of prevention on their website, they did not offer specific services to aid prevention efforts. Some preventive tips include eating healthy, staying active, avoiding tanning beds, and wearing sunblock to prevent skin cancer. Prevention is a vital part of survivorship as it helps cancer survivors remain healthy and reduces the risk of other chronic illnesses. Intervention is also an essential component of survivorship care. Some cancer survivors may require interventions after cancer treatment, including psychotherapy, physical therapy, or support groups. There is a great need for cancer centers to offer these services to cancer survivors as their needs differ from the general population (Rolland & Eschler, 2018).

According to Rolland and Eschler (2018), coordination is also an essential part of cancer survivorship. Cancer centers should help cancer survivors navigate survivorship by ensuring they know long-term side effects and how to manage health, reenter the workforce, and cover insurance costs (Rolland & Eschler, 2018). Cancer survivors have unique needs, and the interventions should be tailored to each individual. Survivorship care must also be culturally competent and meet the language needs of every patient. Many cancer centers do have cancer survivorship clinics that can be used for cancer survivors to access long-term care (Rolland & Eschler, 2018).

Rolland and Eschler (2018) suggested that all cancer centers either offer a survivorship center or have information readily available regarding survivorship for cancer survivors on their website. Survivorship care should include surveillance, prevention, and interventions (Rolland & Eschler, 2018). Services such as support groups and counseling should also be offered to support cancer survivors. Inclusive survivorship centers should be the standard at all cancer centers and available to all cancer survivors. Having access to individualized survivorship care may improve the quality of life among cancer survivors (Rolland & Eschler, 2018).

After curative treatment such as chemotherapy, radiation, and surgeries, cancer survivors are faced with a lifetime of healthcare visits (Smith et al., 2019). Cancer survivors may need to see various doctors after curative treatment, including primary care physicians, oncologists, psychiatrists, and physical therapists. Cancer survivors are at greater risk of developing second cancer; thus, survivors must see their physicians for regular screenings. Furthermore, cancer survivors experience various long-term side effects such as pain, stress, fatigue, and mental health challenges. All of these long-term side effects may require medical attention to help improve the health of cancer survivors. The three main reasons that cancer survivors should seek care after curative treatment are: surveillance for cancer recurrence, screening for new cancers or disorders, and treatment for comorbid conditions such as pain or depression (Smith et al., 2019).

While cancer survivors require much medical attention post-cancer treatment, it is unclear whether oncologists or primary care physicians are best suited for long-term follow-up care (Smith et al., 2019). Oncologists are well-versed regarding the long-term side effects of cancer and cancer treatment. Some primary care physicians may not be as well versed in long-term cancer care because there are many types of cancer, and some are extremely rare. Oncologists typically spend their time treating current cancer patients and may not treat cancer

survivors in the long run. Thus, primary care physicians must understand the complex needs of cancer survivors. Cancer survivors who receive follow-up treatment from oncologists only may receive less optimal care when it comes to prevention or comorbid disorders. Primary care physicians are more likely to be better at preventative care (i.e., influenza vaccine) and treating comorbid conditions than oncologists, whose primary focus is treating and stopping the spread of cancer (Smith et al., 2019).

To best treat the cancer survivors' needs, they receive patient-centered care (Smith et al., 2019). Smith et al. (2019) examined long-term cancer survivors' preferences regarding long-term care. Additionally, the researchers examined which factors influenced survivors' preferences. Smith et al. surveyed participants (n = 2,107) who were all long-term cancer survivors. Approximately 63% of the participants reported their preference that long-term follow-up care be handled by both a primary care physician and an oncologist. About 25% of the participants preferred seeing an oncologist for their post-cancer care, whereas 12% preferred seeing a primary care physician for their long-term care. Cancer survivors also reported that they preferred their post-cancer care to include a mix of preventative health, comorbid conditions, cancer screening, and cancer follow-up (Smith et al., 2019).

Smith et al. (2019) also found that while most cancer survivors reported preferring seeing both an oncologist and a primary care physician, only 42% of cancer survivors reported seeing an oncologist in the past year. Nonetheless, the majority of cancer survivors reported visiting a primary care doctor in the past year. Since cancer survivors are likely to visit a primary care physician, it is vital that primary care is patient-centered and tailored to the unique needs of cancer survivors. Both primary care physicians and oncologists should lead survivorship care to cover the complex medical needs of cancer survivors. Primary care physicians should also be

educated on common long-term side effects of cancer and how they can better attend to cancer survivors (Smith et al., 2019).

After cancer treatment, cancer survivors require care that ranges from medical and psychosocial to informational (Islam & Harris, 2018). Due to the complex needs of cancer survivors, they may require medical care from a multidisciplinary team, which may include primary care providers, dietitians, surgeons, oncologists, psychotherapists, psychiatrists, physical therapists, and other specialty doctors. Since the needs of cancer survivors are complex compared to the healthy population, cancer survivors must be aware of what long-term follow-up is required of them. For instance, cancer survivors must be educated on the signs and symptoms of cancer recurrence. Furthermore, cancer survivors should be advised of possible long-term side effects in order to watch for hearing loss or heart problems (Islam & Harris, 2018).

Some of the expected long-term side effects of cancer treatment that survivors should be mindful of are fatigue, insomnia, and pain (Islam & Harris, 2018). While fatigue, insomnia, and pain are present in the general population, they are often more prevalent and chronic among cancer survivors. Cancer survivors are also faced with increased comorbidities such as depression, anxiety, and self-esteem issues. According to Islam and Harris, there is a significant need for more cancer-informed care since the number of cancer survivors is rapidly increasing. Cancer-informed care is when a medical practitioner is aware of the unique issues faced by cancer survivors, such as recurrence or long-term side effects. The care needed for cancer survivors may be more complex than the care provided to the general population (Islam & Harris, 2018).

The American Cancer Society (2021b) offers several resources that cancer survivors can use to find treatment or support. Some of the shared resources offered are financial planning,

treatment information, lists of common side effects, tips for understanding the diagnosis, and information for caregivers. There are also resources available for children with cancer and parents of children with cancer. For those with terminal cancer, there are supportive resources relating to end-of-life care. The survivorship care plan can be a valuable resource for cancer patients and survivors who wish to access more information regarding anything related to cancer (American Cancer Society, 2021b).

The CDC (2021) also offers various online resources that can benefit cancer patients and survivors. The CDC offers a guide to healthy living for cancer survivors that focuses on physical, emotional, and sexual health. The online CDC guides can be a valuable resource for cancer patients, survivors, caregivers, and healthcare providers. Additionally, the CDC provides videos and blog posts of stories from cancer survivors. Watching and reading about others who are also cancer survivors may be helpful for cancer survivors as they can feel they are not alone and others have gone through similar experiences. Overall, the resources provided by the CDC can help cancer survivors continue to live healthy lives (CDC, 2021).

Memorial Sloan Kettering Cancer Center (MSKCC, 2021) is a top cancer center located in New York City, and it has curated online resources for cancer survivors to access worldwide. MSKCC provides both in-person and online resources that can be useful for cancer survivors. Several in-person and online support groups are available for survivors that typically are specific to one's cancer. MSKCC also provides survivors with a great deal of information on life after cancer, counseling and emotional support, rehabilitation, exercise, palliative care, pain management, nutrition, screening services, and more. The cancer survivor resources provided by MSKCC can significantly help cancer survivors navigate survivorship (MSKCC, 2021).

The Association of Community Cancer Centers (ACCC) (2021) provides cancer survivors with blogs, podcasts, videos, and articles relating to cancer survivorship. Cancer survivors can use the ACCC survivorship website to help access cancer centers and learn more about life after cancer treatment. Additionally, cancer survivors can connect with other cancer survivors, which is a great way to build relationships and be social. Additionally, the ACCC has events and support groups that cancer survivors and their caregivers may attend; it also provides information for cancer survivors who wish to learn more about advocating for themselves in healthcare. The ACCC resources are beneficial for cancer survivors to engage with other cancer survivors and learn how to advocate for themselves (ACCC, 2021).

The Children's Oncology Group (2021) provides survivors of childhood cancer and their families with information on cancer survivorship. The Children's Oncology Group conducts clinical research that helps guide cancer care. The research is also used to create guidelines for childhood cancer survivors to follow. The guidelines include vital information such as long-term side effects of various treatment types, surgeries, and cancer medications. The Children's Oncology Group website is an excellent resource for parents of childhood cancer survivors to learn more about treatment side effects. In addition to survivorship guidelines, parents of childhood cancer survivors access supportive care. Parents of cancer patients may also find information on current and upcoming trials that may benefit their children (Children's Oncology Group, 2021).

### **YouTube and Health-Related Content**

YouTube is a popular social media site that allows users and organizations to post content in the form of videos (YouTube, 2021b). According to Statista (2021), there are approximately 2.1 billion YouTube users around the world as of 2020. The digital movement has led to a

significant increase in the number of videos posted to YouTube. The most widely viewed genre on YouTube is music and entertainment videos. Nonetheless, health-related content is also widely popular. With the increase in health-related content on YouTube, it is vital that viewers stay vigilant about the sources and content they are consuming related to health (Kunze, 2020).

Users can post videos on various health-related topics that may contribute to the spread of misinformation. To combat health-related misinformation, YouTube has implemented a new workflow that pushes verified health sources when searching for health-related topics (YouTube, 2021a). Health professionals and healthcare organizations are automatically pushed to the top of the search when browsing YouTube for health-related content. This allows viewers to identify easily whether a video is posted by an official health source or a non-official source, such as a non-physician content creator. This new feature has been integral to preventing the spread of misinformation during the COVID-19 pandemic (Graham, 2021).

### **YouTube and Cancer-Related Content**

When receiving a devastating diagnosis such as cancer, people may be tempted to turn to social media sites like YouTube to learn more or seek reassurance. There is a gap in research regarding the analysis of cancer survivor-related content and YouTube. While a few relevant research studies exist, the studies are older or cover other topics such as cancer rehabilitation (Bahar-Ozdemir et al., 2022; Chou et al., 2011).

Chou et al. (2011) performed a narrative analysis of YouTube videos to determine if personal cancer narratives hold the potential to be used as communication tools for cancer patients and survivors. People with chronic illness use the online platform to search for health-related content as it may provide opportunities to share stories, foster support, and network with others going through similar experiences (Chou et al., 2011). Sharing health narratives can be an



effective way to encourage others to do something positive for their health. For instance, a woman who shares her story about breast cancer may influence other women to get a mammogram. Chou et al. suggested that narrative communication methods can be utilized to promote desirable health behaviors like cancer screenings. Stories of hope, survivor interviews, patient stories, and cancer awareness campaigns are some of the many types of health-related videos found online (Chou et al., 2011).

Chou et al. (2011) used linguistic narrative analysis to assess *what* is said and *how* it is said in personal cancer narratives on YouTube. The analysis included assessing the content and storytelling process of 35 YouTube videos identified using the key search terms “cancer survivor” and “cancer stories.” Chou et al.’s analysis focused on themes, authenticity, and emotional engagement of the cancer narrative YouTube videos. The results found various common threads among the content in cancer survivor videos. Some of the common characteristics identified in YouTube videos were authenticity and emotional engagement. The analysis was informed using William Labov’s sociolinguistic narrative theories. It is difficult to determine if the results of this study can be generalizable to cancer survivors, considering the descriptive analysis and small sample size (Chou et al., 2011).

Bahar-Ozdemir et al. (2022) explored if YouTube videos can be a high-quality source of information relating to cancer rehabilitation. The researchers analyzed 53 of the most viewed YouTube videos using the key search terms “oncology rehabilitation” and “cancer rehabilitation.” Video quality and reliability were measured using various quality measures, including the DISCERN, JAMA, and global quality score indexes. The methods also included collecting view count, like ratio, upload date, and uploader profile data. The researchers found that the most frequent subjects among the videos were related to cancer rehabilitation, patient

experience, and physical or occupational therapy. Bahar-Ozdemir et al. stated that higher-quality videos had common characteristics such as greater view count and longer duration. Overall, Bahar-Ozdemir et al. found that videos with the highest rating had low-quality content on cancer rehabilitation and there is a need for more accurate videos with information about cancer rehabilitation.

Due to the lack of recent analysis of the digital cancer-related content on YouTube, there is a need to assess the topics covered in cancer patient and survivor-related videos. These findings indicated a need for a deeper analysis into what benefits YouTube videos can provide to cancer patients or survivors and how higher-quality cancer-related videos can be widely disseminated.

### **YouTube and Breast Cancer-Related Content**

A recent study by Yurdaisik (2020) analyzed 50 of the most viewed videos on breast cancer videos on YouTube. The purpose of the study was to analyze the scientific accuracy and quality of the most viewed videos using the keyword “breast cancer” (Yurdaisik, 2020). In order to evaluate the YouTube videos with the greatest views, the “most viewed” option was used to filter the videos by view count. Video popularity was assessed using the Video Power Index (VPI), which takes into account video likes and dislikes. Two observers evaluated scientific accuracy and video quality. The scores were obtained using DISCERN’s Quality Criteria for Consumer Health Information tool and the *Journal of American Medical Association* (JAMA) scoring instrument. To avoid experimenter bias, the mean score of the two scoring systems was used. The statistical analysis found that both observers agreed regarding JAMA and DISCERN scores (Yurdaisik, 2020).

Yurdaisik (2020) found that the contents of the videos covered topics such as patient experience, cancer diagnosis, nonsurgical treatment options, and surgical treatment. The most widely viewed breast cancer videos were uploaded by various sources, including patients, physicians, new channels, herbalists, physicians, blogs, and activists. Based on the DISCERN scale, Yurdaisik found that approximately 66% of the most-viewed breast cancer videos were very poor in quality. The researcher found no significant difference between YouTube videos posted by physicians and non-physicians. Additionally, videos uploaded by physicians were lower in the number of YouTube likes, compared to non-physician uploaded videos. Overall, most videos assessed were determined to be poor in quality, and there is a need for healthcare professionals to post high-quality videos related to breast cancer screening (Yurdaisik, 2020).

While Yurdaisik's (2020) was among the first studies available on breast cancer and the most-viewed YouTube videos, a deeper analysis is needed to assess further the content of these widely viewed videos and the extent to which they cover cancer side effects, challenges, or difficulties, and healthcare utilization.

### **Usage of JAMA and DISCERN Instruments**

Assessments of health-related content of YouTube videos have been gaining popularity in the academic world. Researchers are not in agreement whether instruments such as DISCERN or JAMA scoring systems can be used to assess the health-related content in videos. The purpose of the DISCERN quality criteria for consumer health information instruments is to evaluate the quality of written information about health treatment choices (British Library & University of Oxford, 1997). The DISCERN instrument is intended to be used on written health-related materials such as treatment pamphlets, publications, checklists, and screening tools. While the DISCERN instrument is a reliable source regarding the quality of written treatment materials, it

is not intended to be used as a method to assess health-related video content. Similarly, JAMA's benchmark criteria have also been used to analyze YouTube content (Aydin & Akyol, 2020; Yurdaisik, 2020). According to Cassidy and Baker (2017), the JAMA benchmark criteria instrument is used to evaluate websites in terms of authorship, disclosure, attribution, and currency.

While Yurdaisik (2020) and Bahar-Ozdemir et al. (2022) used both the JAMA and DISCERN instruments to assess the quality and scientific information in breast cancer YouTube video content, other researchers such as Azer (2020) argued that these instruments are not effective at assessing health-related video content. Azer recommended that for future studies, researchers must use tools that are specifically designed to assess videos as opposed to websites or written materials effectively. Further research should explore practical ways to assess the quality of health-related video content.

## **Conclusion**

Overall, it is clear that the post-cancer experience for cancer survivors is complex and different from the general population. Cancer survivors experience higher levels of unemployment, mental illness, financial hardships, weight gain, pain, and fatigue. Due to the complex nature of cancer survivors, research should continue to explore how to improve health outcomes among cancer survivors. Cancer survivors often turn to the internet to find out more information regarding navigating survivorship. YouTube is one of the most popular social media and video websites. In this dissertation, the researcher explored some of the most-watched YouTube videos on breast cancer and cancer survivorship and examined if the content was consistent with peer-reviewed recommendations for breast cancer survivors.

## Chapter 3

### METHODS

#### **Design**

For this study, the researcher used a cross-sectional study design and collected data from YouTube at a single point in time. The search process was identified using Google Chrome browser. The researcher cleared her browser history and opened an incognito. The key search term “cancer survivor” was then input into YouTube’s search bar. Once results were yielded, the researcher filtered the search by view count to obtain the sample, collect the data, and close the browser. The process then took place a second time using the key search term “breast cancer.” Approximately 100 videos from the search term were identified, and the URLs were saved into an Excel file. The videos were viewed over the course of a 2-month period, and the following information was collected and coded: number of views, source, length (minutes), date uploaded, format, and video content. The study was deemed exempt by the Institutional Review Board (IRB) at Teachers College, Columbia University.

#### **Identification of Key Search Terms**

Search term identification involved piloting several key terms related to cancer survivorship and determining which of the phrases yielded the highest cumulative view count for the 1st, 10th, 20th, and 30th videos, respectively. In this first pilot, the search terms “cancer survivor,” “cancer survivorship,” “post-cancer tips,” “life after cancer,” “post-chemo life,” “I am a cancer survivor,” “cancer blog,” “cancer vlog,” “cancer story time,” “cancer tips,” “surviving cancer,” and “living with cancer” were separately searched, and video source and cumulative view count for the 1st, 10th, 20th, and 30th were recorded in an Excel spreadsheet. This process helped the researcher eliminate search terms that yielded videos with content that had low

viewership or was not relevant to cancer survivorship. Based on this pilot, the researcher determined that the search term “cancer survivor” would be most relevant to the study.

A second pilot took place to examine additional search terms related to breast cancer. The key search terms “breast cancer survivor,” “living with breast cancer,” and “breast cancer” were used, and the video source and cumulative view count for the 1st, 10th, 20th, and 30th videos were collected and input into Excel. Based on the findings from the pilot studies, the search term “breast cancer” was selected for this study. After piloting other cancer survivor-related search terms, “breast cancer” yielded videos with high cumulative view counts and content that may be relevant to cancer survivorship and breast cancer. The first and second pilot took place in September 2021 and October 2021, respectively. Due to the large view count on the top-30 videos, the search term “breast cancer” was the most beneficial for the purpose of this study.

### **Sampling**

Sampling took place at a single point in time. The search process of using “breast cancer” then occurred and the top-100 videos were selected and transferred to an Excel file. The Excel file stored information such as view count, date uploaded, and video URL. The total number of views were based on the sampling done at a single point in time. Duplicate videos were eliminated and the ~100 videos with the most view views comprised the sample.

### **Inclusion and Exclusion Criteria**

The videos identified must be in English. The primary topics of the video must be breast cancer, cancer, and/or cancer survivorship. Reality television shows were excluded from the sample. Animal-related cancer content were also excluded.

## Measurements and Manual Coding Specification

The instrument used to code the YouTube videos was adapted based on existing instruments from Randolph-Krisova (2018) and Baquero (2017). The YouTube coding instrument included tracking general information relevant to each video identified, specifically name of coder, video upload date, video coding date, video length (minutes), total views, video title, and video identification number (Randolph-Krisova, 2018). Similar to the work of Randolph-Krisova, the coding instrument was comprised of the following three sections: (a) upload source, (b) video format, and (c) video content. Dichotomous variables (yes, no) were used to code the abovementioned sections and were later recoded using dummy variables (0,1) for the purpose of statistical analysis. The coding instrument can be found in Appendix A.

The upload source for each video was coded into one of the following categories: Non-professional experienced person, Professional/provider, Government agency, Non-government agency, Television news/media company, Authoritative health source, Celebrity, and Other.

The “non-professional experienced person” category of upload source included videos of (a) person with lived experience (i.e., cancer patient/survivor); (b) parent of cancer patient/survivor; (c) sibling of cancer patient/survivor; (d) caregiver of cancer patient/survivor; or (e) other relative of cancer patient/survivor. A “non-professional experienced person” is someone who has had cancer or has had close experience with someone who had cancer but is not affiliated with a professional organization (i.e., hospital, government agency) and has no obvious medical credentials.

The “Professional/provider” category is comprised of established organizations or someone with professional credentials: (a) General hospital/medical facility, (b) Oncology hospital/facility, (c) Physician/medical doctor, (d) Academic professional/professor, or

(e) Clinical professional (non-physician). The “Government agency” category included videos that are uploaded by recognized U.S. government agencies and have a .gov URL. Videos uploaded in the “Non-government agency” category are defined as non-government organizations (i.e., volunteer organizations, fundraising organizations). The “Television news/media company” included videos uploaded by television networks or social media companies. The “Authoritative health source” upload source category identified videos that were recognized by YouTube as “from health sources” identified by experts. The “Celebrity” upload source was comprised of videos uploaded by a famous person or public figure. The category of “Other” was reserved for videos whose upload source did not fit into any of the abovementioned source categories.

The video format category was coded as: Talk by professional, Interview, Animation, News report, Video blog, still images/text, Talk by non-professional, Documentary, Combined/multiple formats, or Other.

Content coding specifications were adapted from established breast cancer survivorship guidelines and general cancer survivorship guidelines from the American Cancer Society (ASC) and the American Society of Clinical Oncology (ASCO, 2021; Runowicz et al., 2016). The ASCO creates education materials for cancer survivors that are oncologist-approved. Eleven content categories are included, each with several subtopics: (a) Late/long-term physical/mental side effects of cancer/cancer treatment; (b) fear of cancer recurrence; (c) recommendations/new perspectives on health; (d) changes in families/relationships; (e) returning to work/starting to work after cancer treatment/diagnosis; (f) financial burden/management of cancer; (g) cancer rehabilitation recommendations; (h) surveillance for breast cancer/cancer recurrence; (i) breast cancer health promotion; (j) general information on cancer; (k) cancer treatments/breast cancer



treatment; (l) other notable features of video; (m) potential misinformation; and (n) overall rating.

The coding manual was also reviewed by an advisory board consisting of a breast cancer survivor and an oncology clinician. Feedback was solicited individually from the advisory committee to substantiate the coding manual. The two individuals consented prior to participating in the advisory group. Their feedback was reviewed and implemented to strengthen the coding manual.

### **Demonstration of Intra- and Inter-rater Reliability**

Intra- and inter-rater reliability was demonstrated prior to coding the data for the study sample. Intra-rater reliability was demonstrated by the researcher coding five videos that were not in the sample at two points in time, approximately 7 days apart. Inter-rater reliability was demonstrated by the researcher and a second-rater coding five videos and comparing the results. In both cases, the number of consistently coded variables was compared with the total number coded. Percent agreement due to chance was adjusted by calculating Cohen's kappa coefficient. These reliability studies took place as a pilot study during February of 2022, and the results were used to make minor changes to the coding instrument. The intra-rater reliability pilot found that there was near perfect agreement (96.5%,  $p < 0.05$ ). The inter-rater reliability pilot found that the two raters had an agreement of 79% ( $p < 0.05$ ).

### **Data Collection**

Data collection took place at a single point in time. The researcher collected and coded all the videos during March and April of 2022. The search process took place with a cleared browsing history, and the videos were sorted by most viewed. The YouTube URLs of the top-100 videos that appeared for the search term "breast cancer" were copied and pasted into an

Excel file. Overlap among videos was not suspected as there was only one search term. Each video was assigned a video number. In addition to video number and URL, the coder number, date coded, length of video (minutes), number of views, date uploaded, and video title were gathered and input into Excel. The aforementioned information was also collected using pen and paper to ensure adequate records were kept. Dummy codes were used to code upload source, format, and content. The dummy codes were defined as 1 = presence and 2 = absence. For the content coding section, if a topic was mentioned or discussed in the video, it was assigned a value of “1” denoting the presence of topic. A value of “0” was used to denote the absence of a topic/content category.

### **Statistical Analysis**

All analyses were done using the Statistical Package for Social Sciences (SPSS). The statistical analysis conducted is outlined below.

1. To examine the most widely viewed YouTube videos on breast cancer in terms of upload date, source, length, and format.

To address the first aim, frequencies and percentages were calculated as well as mean and standard deviation for video length.

2. To describe the content of the most widely viewed YouTube videos on breast cancer in terms of the number of videos that addressed the following topics: (a) late/long-term physical/mental side effects of cancer/cancer treatment; (2) fear of cancer recurrence; (c) cancer survivor recommendations/new perspectives on health; (d) changes in families/relationships; (e) returning to work/starting to work after cancer treatment/diagnosis; (f) financial burden/management of cancer; (g) cancer rehabilitation recommendations; (h) surveillance for breast cancer/cancer recurrence;

(i) breast cancer health promotion; (j) general information on cancer; (k) cancer treatments/breast cancer treatment; (l) other notable features of video; (m) potential misinformation; and (n) overall rating.

The second aim was addressed by calculating the cumulative view count for the videos covering each content category. Additionally, the proportion of total cumulative views (for all 100 videos) was calculated for the videos covering each content category.

3. To describe the content categories that garnered the most views.

The third aim was addressed by presenting a descriptive analysis of the videos covering various content categories that garnered the highest number and proportion of cumulative views.

## Chapter 4

### RESULTS

YouTube was searched using one key search term “breast cancer” on March 20, 2022, and again on October 17, 2022. The results for the search term “breast cancer” were filtered by number of views. Information from the video, including video title, length, view count, date of upload, and URL link, were saved to an Excel file. This process generated 140 videos (n = 140 videos with the key search term “breast cancer”).

Videos were screened for inclusion criteria. A total of 40 videos was excluded from the study for various reasons, including not in English language (n = 30), discussed reality television shows (n = 2), and were duplicates of other videos already included in the study sample (n = 8). This left the investigator with a total of 100 videos with the key term “breast cancer” in the final sample (n = 100). The videos varied in view count ranging from a high of 12,558,825 to a low of 102,967. The 100 videos in the sample were collectively viewed 135,311,626 times.

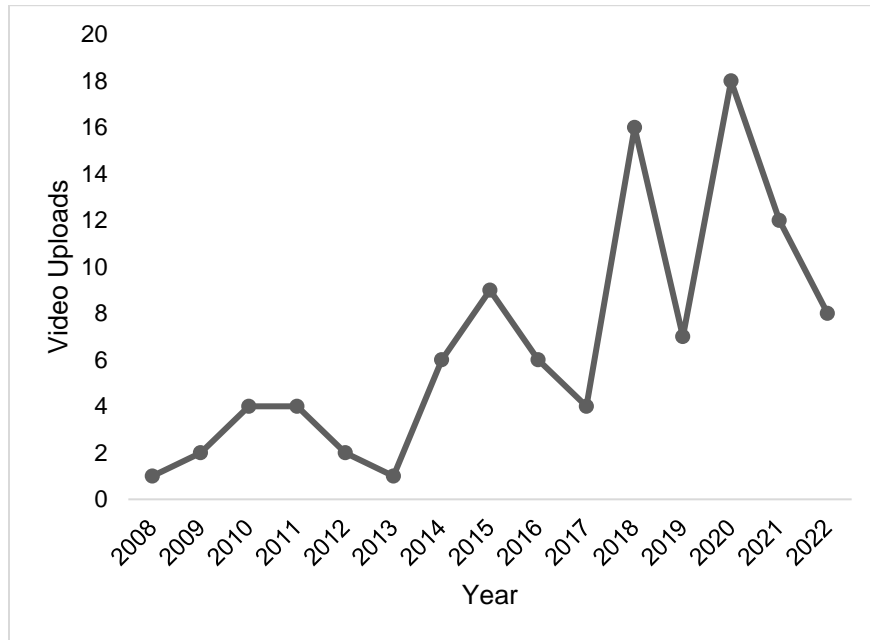
#### **Specific Aim 1**

The first aim of the study was to examine the most widely viewed YouTube videos on breast cancer in terms of upload date, length, source, and format.

The most videos were uploaded in 2020 (n = 18, 18%), followed by 2018 (n = 16, 16%) (Figure 1). Videos uploaded in 2020 (with 31,422,361 views) and in 2018 (with 8,735,474 views) represented 29.7% of the total views in the study sample. The sample included 24 videos with more than one million views, which were uploaded in 2022 (n = 2), 2021 (n = 1), 2020 (n = 4), 2018 (n = 1), 2016 (n = 4), 2015 (n = 4), 2014 (n = 1), 2013 (n = 1), 2011 (n = 1), 2010 (n = 3), 2009 (n = 1), and 2008 (n = 1).

**Figure 1**

*Video Uploads by Year*



The 100 videos varied in length. The longest video was 62 minutes and 53 seconds, and the shortest was 30 seconds. The median duration of the videos was 8 minutes and 7 seconds. The duration of 18 of the 24 videos with over one million views was under 10 minutes. The median duration of the videos with over one million views was 8 minutes and 29 seconds. The shortest video with over one million views was 1 minute and 53 seconds, whereas the longest video was 43 minutes and 44 seconds long (see Appendix B).

Table 1 shows frequencies and percentages, total view count, and cumulative view count percent for the videos categorized by source of primary upload source. The greatest number of videos were uploaded by television news/media agencies (n = 45, 61.8% of cumulative views). Non-professional experienced person also garnered many views (n = 11, 12.2% cumulative views). The professional/provider upload source category yielded 16,542,522 views, accounting for 12.2% of cumulative views. While videos uploaded by non-governmental agencies garnered

almost 10% of cumulative views, the five videos uploaded by governmental agencies attracted less than 1% of cumulative views. Only one video from the sample was uploaded by a celebrity, yielding only 949,961 views (less than 1% of cumulative views).

**Table 1**

*Frequencies, Total View Count, and Cumulative View Count Percent for the Videos Categorized by Upload Source*

Upload Source	N	View Count	Cumulative View%
<b>U1. Non-professional experienced person</b>	<b>11</b>	<b>16,531,588</b>	<b>12.2</b>
U1a. person with lived experience (cancer patient/survivor)	11	16,531,588	12.2
U1b. Parent of cancer patient/survivor	0	0	0
U1c. Sibling of cancer patient/survivor	0	0	0
U1d. Caregiver of cancer patient/survivor	0	0	0
U1e. Other relative of cancer patient/survivor	0	0	0
<b>U2. Professional/Provider</b>	<b>22</b>	<b>16,542,522</b>	<b>12.2</b>
U2a. General hospital/medical facility	9	5,489,109	4.1
U2b. Oncology hospital/facility	7	8,345,233	6.2
U2c. Physician/medical doctor	4	2,149,020	1.6
U2d. Academic professional/professor	2	559,160	0.4
U2e. Clinical professional (non-physician)	0	0	0
<b>U3. Government agency</b>	<b>5</b>	<b>875,920</b>	<b>0.6</b>
<b>U4. Non-government agency</b>	<b>9</b>	<b>12,642,282</b>	<b>9.3</b>
<b>U5. Television news/media agency</b>	<b>45</b>	<b>83,623,868</b>	<b>61.8</b>
<b>U6. Celebrity</b>	<b>1</b>	<b>949,961</b>	<b>0.7</b>
<b>U7. Other</b>	<b>7</b>	<b>4,294,132</b>	<b>3.2</b>

Several subcategories from the non-professional experienced person category accounted for none of the videos in the sample, including parent of cancer patient/survivor, sibling of cancer patient/survivor, caregiver of cancer patient/survivor, and other relative of cancer patient/survivor. Only one of the subcategories in the professional/provided category yielded no views (i.e., clinical professional).

A total of 11 videos were noted as authoritative health content recognized by YouTube, yielding 16,737,825 views and accounting for 12.4% of cumulative views.

**Table 2**

*Frequencies, Total View Count, and Cumulative View Count Percent for the Videos Categorized by Source of Format*

Format	N	View Count	Cumulative View%
<b>F9. Combined/multiple formats</b>	61	81,087,058	59.9
<b>F6. Still images/text</b>	48	63,038,508	46.6
<b>F3. Animation</b>	28	39,950,365	29.5
<b>F4. News reporter</b>	22	32,768,507	24.2
<b>F1. Talk by professional</b>	30	28,701,337	21.2
<b>F5. Video blog</b>	16	26,245,760	19.4
<b>F2. Interview</b>	23	21,084,408	15.6
<b>F7. Talk by non-professional</b>	13	21,005,086	15.5
<b>F8. Documentary</b>	10	19,676,636	14.5
<b>F10. Other</b>	13	14,481,821	10.7

*Note.* Total (N) will be more than 100 as videos could be identified as numerous formats.

With respect to the format of the sample videos, more than half of the sample's format was "combined/multiple formats," yielding 81,087,058 views (n = 61, 59.9% cumulative views). Note, videos could be selected as multiple formats; thus, the total N for format will be more than 100. Another popular video format was "still images/text," which yielded 63,038,508 views (n = 48, 46.6% cumulative views). Each of the format categories yielded more than 14 million views. The format categories that yielded the least number of videos were "talk by non-professional" (n = 13), "documentary" (n = 10), and "other" (n = 7). Format categories "talk by non-professional," "interview," "video blog," "talk by professional," "news reporter," "animation," "still images/text," and "combined/multiple formats" all yielded more than 20 million views, and each accounted for more than 15% of cumulative views.

## **Specific Aim 2**

The second aim of the study was to describe the content of the most widely viewed YouTube videos on breast cancer in terms of the number of videos that addressed the following topics: (a) late/long-term physical/mental side effects of cancer/cancer treatment; (b) fear of cancer recurrence; (c) cancer survivor recommendations/new perspectives on health; (d) changes in families/relationships; (e) returning to work/starting to work after cancer treatment/diagnosis; (f) financial burden/management of cancer; (g) cancer rehabilitation recommendations; (h) surveillance for breast cancer/cancer recurrence; (i) breast cancer health promotion; (j) general information on cancer; (k) cancer treatments/breast cancer treatment; (l) other notable features of video, (m) potential misinformation, and (n) overall rating.



**Table 3**

*Frequencies, Total View Count, and Cumulative View Count Percent for the Videos Categorized by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Late or Long-term Physical/Mental Side Effects of Cancer/Cancer Treatment)*

Content	N	View Count	Cumulative View%
<b>C1. Late or long-term physical/mental side effects of cancer/cancer treatment</b>	<b>42</b>	<b>39,795,125</b>	<b>29.4</b>
C1i. Physical body changes/body image concerns	28	34,817,901	25.7
C1c. Emotional difficulties (distress, depression, anxiety)	24	18,761,151	13.9
C1f. Hormone/endocrine problems	7	4,883,085	3.6
C1k. Infertility	4	4,586,969	3.4
C1m. Pain	12	4,468,382	3.3
C1d. Fatigue	6	3,509,805	2.6
C1n. Sleep problems	3	3,396,095	2.5
C1e. Cardiac problems	2	1,643,315	1.2
C1a. Attention, memory, and or thinking problems	5	1,438,356	1.1
C1b. Bone, joint, and or soft-tissue problems	5	1,349,099	1
C1l. Premature menopause	1	1,190,874	0.9
C1q. Nausea	2	1,015,833	0.8
C1j. Sexual health	1	1,051,700	0.8
C1g. Lymphedema	2	840,744	0.6
C1p. Weight loss	1	118,003	0.1
C1h. Peripheral neuropathy	1	102,967	0.1
C1o. Weight gain	0	0	0

Late or long-term physical/mental side effects of cancer/cancer treatment was covered in 42 videos and attracted nearly 40 million views (29.4% of cumulative views). The most-viewed subtopics of this category were “physical body changes/body image concerns,” which was addressed in 28 videos, attracting 34,817,901 views (25.7% cumulative views), and “emotional difficulties,” which was covered in 24 videos and attracted 18,761,151 views (13.9% cumulative views). In contrast, “pain” was discussed in 12 videos but only yielded 4,468,382 views (3.4% cumulative views). Subtopics “bone, joint, and or soft-tissue problems,” “premature menopause,” “nausea,” “sexual health,” “lymphedema,” “weight loss,” and “peripheral neuropathy” yielded 1% or fewer cumulative views.

**Table 4**

*Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Fear of Cancer Occurrence/Recurrence)*

Content	N	View Count	Cumulative View%
<b>C2. Fear of cancer occurrence/recurrence</b>	<b>24</b>	<b>13,458,094</b>	<b>10</b>
C2d. Recognizing emotions	17	7,136,645	5.3
C2a. Depression, fear, anxiety	10	6,516,042	4.8
C2h. Tracking health/diagnosis information	13	6,421,940	4.7
C2e. Self-care	13	6,163,299	4.6
C2c. Discussing fear with healthcare professional	5	5,626,289	4.2
C2b. Coping mechanisms	4	2,322,628	1.7
C2f. Support groups	0	0	0
C2g. Stress reduction	0	0	0

Fear of cancer occurrence/recurrence was addressed in nearly one-fourth of the sample, yet these 24 videos garnered only ~13.5 million views (10% of cumulative views). This suggested that while those uploading videos recognized the salience of this topic, those videos were attracting a disproportionately small percentage of cumulative views. It was not clear whether the comparatively low views were attributed to consumers not being interested in this topic, the nature of the videos that covered this topic, or some other reason. The subtopic under “fear of cancer occurrence/recurrence” that received the greatest coverage was “recognizing emotions,” which was included in 17 videos, attracting ~5.3% of cumulative views (7,136,645). Both “tracking health/diagnosis information” and “self-care” were covered in 13 videos each, yielding less than 5% cumulative views. The subtopic “depression, fear, anxiety” was addressed in 10 videos, garnering over six million views (4.8% cumulative views). Several of the subtopics were not covered in any of the videos (“support groups” and “stress reduction”), and other videos were only mentioned in a few videos (“discussing fear with healthcare professionals” and “coping mechanisms”).

**Table 5**

*Frequencies, Total View Count, and Cumulative View Count Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Recommendations/New Perspectives on Health)*

Content	N	View Count	Cumulative View%
<b>C3. Recommendations/new perspectives on health</b>	<b>7</b>	<b>2,909,665</b>	<b>2.2</b>
C3c. Healthy eating/nutrition	4	2,314,963	1.7
C3d. Exercise/physical activity	6	2,187,782	1.6
C3a. Tobacco use cessation	2	311,240	0.2
C3e. Stress management	1	168,224	0.1
C3b. Alcohol use reduction	1	168,224	0.1

“Recommendations/new perspectives on health” was not a widely viewed topic in the sample of videos. Only seven videos covered one or more subtopics (yielding nearly 3 million views and 2.2% cumulative views). All of the six subtopics coded were covered in six or fewer videos (garnering less than 1.7% of cumulative views). The subtopic that received the most coverage in terms of frequency, “exercise/physical activity,” was included in six videos, but these videos attracted only 1.6% of cumulative views (2,187,782 views). The subtopic that received the most coverage in terms of view count, “healthy eating/nutrition,” was included in four videos, attracting only 1.7% of cumulative views (2,314,963 views).

Table 6

*Frequencies, Total View Count, and Cumulative View Count Percent for the Videos Categorized by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Changes in Family/Relationships)*

Content	N	View Count	Cumulative View%
<b>C4. Changes in families/relationships</b>	<b>22</b>	<b>10,285,581</b>	<b>7.6</b>
C4a. Spouse/partner changes	10	8,093,144	6
C4d. Spouse/partner emotional needs	9	7,040,798	5.2
C4f. Changes among friends/adult family members	16	5,725,662	4.2
C4b. Spouse/partner responsibility	5	4,095,867	3
C4e. Spouse/partner sexual health/intimacy	1	1,051,700	0.8
C4g. Communication with children	4	756,741	0.6
C4h. Changes in children’s behavior	1	178,338	0.1
C4c. Spouse/partner physical needs	0	0	0
C4i. Role reversal in adult children	0	0	0

“Changes in families/relationships” was covered in just over 1 in 5 videos (garnering over 10 million views, 7.6% of cumulative views). However, six of the nine subtopics examined were covered in five or fewer videos (garnering less than 3% of cumulative views). The subtopic that received that greatest coverage was “Changes among friends/adult family members,” which was included in 16 videos, but these videos only attracted ~4% of cumulative views (5,725,662 views). “Spouse/partner changes” and “spouse/partner emotional needs” were covered in 10 and 9 videos, respectively, attracting approximately seven to eight million views (5% to 6% of the total cumulative views). Several of the subtopics were not covered in any of the videos (“spouse/partner physical needs” and “role reversal in adult children”), and others were only mentioned in one video (“spouse/partner sexual health/intimacy” and “changes in children’s behavior”).

**Table 7**

*Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Returning to Work/ Starting to Work After Cancer Diagnosis or Treatment)*

Content	N	View Count	Cumulative View%
<b>C5. Returning to work/starting to work after cancer diagnosis or treatment</b>	<b>11</b>	<b>5,990,707</b>	<b>4.4</b>
C5f. Changes in work abilities	7	4,505,324	3.3
C5a. Going back to work	7	2,287,284	1.7
C5b. Talking with coworkers	5	1,947,089	1.4
C5c. Discrimination in the workplace	2	1,406,252	1
C5e. Disclosing cancer diagnosis/treatment during job search	2	1,109,123	0.8
C5d. Job search	1	481,451	0.4

Returning to work/starting work after cancer diagnosis or treatment had little representation in the sample and was covered in only 11 videos, garnering just under six million views (4.4% of cumulative views). Both “changes in work abilities” and “going back to work” were covered in 7 videos, each yielding less than five million views. Subtopics “discrimination in the workplace,” “disclosing cancer diagnosis/treatment during job search,” and “job search” yielded 1% or fewer cumulative views.

**Table 8**

*Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Financial Burden/Management of Cancer)*

Content	N	View Count	Cumulative View%
<b>C6. Financial burden/management of cancer</b>	<b>6</b>	<b>1,865,892</b>	<b>1.4</b>
C6d. Insurance	6	1,865,892	1.4
C6e. Coverage denied by insurance	3	406,598	0.3
C6f. Insurance appeals	1	148,431	0.1
C6c. Bill organization/prioritization	1	138,616	0.1
C6a. Disability	0	0	0
C6b. Hospital bills	0	0	0
C6g. Loans	0	0	0
C6h. Asking for help	0	0	0

Financial burden/management of cancer was not a widely viewed content topic in the sample of videos. Only 6 videos covered one or more of the subtopics, yielding nearly 2 million views (1.4% cumulative views). The most viewed subtopic, “insurance,” was covered in only six videos, yielding 1,865,892 views (1.4% cumulative views). Several subtopics were not covered in any of the videos (“disability,” “hospital bills,” “loans,” and “asking for help”), while others were only addressed in one video (“insurance appeals” and “bill organization/prioritization”).

**Table 9**

*Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Cancer Rehabilitation Recommendations)*

Content	N (%)	View Count	Cumulative View%
<b>C7. Cancer rehabilitation recommendations</b>	<b>9</b>	<b>4,866,602</b>	<b>3.6%</b>
C7e. Counseling/therapy	3	3,396,095	2.5%
C7a. Health/fitness programs or classes	3	1,621,447	1.2%
C7j. Social work consult	1	1,531,546	1.1%
C7o. Survivorship support groups/online forums	3	1,154,449	0.9%
C7g. Nutritional planning	2	1,015,833	0.8%
C7i. Physical therapy	1	361,082	0.3%
C7b. Clinical trials	2	224,697	0.2%
C7d. Home care	1	202,984	0.2%
C7f. Marriage/couples therapy	0	0	0
C7h. Occupational therapy	0	0	0
C7n. Career counseling	0	0	0
C7k. Recreational therapy	0	0	0
C7c. Family counseling	0	0	0
C7l. Survivor matching program	0	0	0
C7m. Tobacco cessation program	0	0	0

Cancer rehabilitation recommendations was not a widely viewed content topic in the sample of 100 videos. Only nine videos covered one or more of the subtopics (yielding nearly 5 million views and 3.6% cumulative views). The most-viewed subtopic, “counseling/therapy,” was covered in only three videos, yielding 3,396,095 views (2.5% cumulative views). Subtopics

“survivorship support groups/online forums,” “nutritional planning,” “physical therapy,” “clinical trials,” and “home care” each represented less than 1% cumulative views. Several subtopics were not covered in any of the sample’s videos (“marriage/couples therapy,” “occupational therapy,” “career counseling,” “recreational therapy,” “family counseling,” “survivorship matching program,” and “tobacco cessation program”).

**Table 10**

*Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Surveillance for Breast Cancer Occurrence/Recurrence)*

Content	N	View Count	Cumulative View%
<b>C8. Surveillance for breast cancer occurrence/recurrence</b>	<b>62</b>	<b>62,631,221</b>	<b>46.3</b>
C8b. Breast cancer screening	48	53,260,279	39.4
C8a. History/physical Exam	25	22,693,221	16.8
C8d. Imaging/scans	28	17,872,216	13.2
C8e. Risk evaluation	7	11,124,880	8.2
C8c. Laboratory tests	13	9,064,323	6.7
C8h. Metastatic cancers	16	7,718,832	5.7
C8f. Genetic counseling	5	4,093,359	3
C8g. Screening for second primary cancers	2	680,358	0.5

Surveillance for breast cancer occurrence/recurrence was covered in more than 60% of the videos (n = 62) and yielded over 62 million views (46.3% of cumulative views). “Breast cancer screening” was the most widely covered subtopic in this content category, which was discussed in nearly half of the sample videos (n = 48), yielding more 53 million views (39.4% of cumulative views). The subtopics “history/physical exam” and “imaging/scans” were covered in 25 to 28 videos, respectively, and each attracted over 17 million views. In contrast, “metastatic



cancers” was covered in 16 videos, but these videos only attracted seven million views (less than 6% cumulative views). Subtopics “genetic counseling” and “screening for second primary cancers” were addressed in few videos and attracted only a small proportion of cumulative views.

**Table 11**

*Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Breast Cancer Health Promotion)*

Content	N	View Count	Cumulative View%
<b>C9. Breast cancer health promotion</b>	<b>44</b>	<b>55,696,607</b>	<b>41.2</b>
C9a. Information on breast cancer/risks	39	53,714,496	39.7
C9c. Physical activity	8	2,787,297	2.1
C9d. Nutrition	6	2,637,800	1.9
C9e. Smoking cessation	2	311,240	0.2
C9b. Obesity	1	143,016	0.1

Breast cancer health promotion was addressed in nearly half of the videos (n = 44) and garnered more than 55 million views (41.2% cumulative views). The most covered subtopic in this content category was “information on breast cancer/risks,” which was covered in 39 videos, attracting almost 54 million views (39.7% of cumulative views). All of the remaining subtopics coded in this category were addressed in fewer than 10 videos and attracted only a very small proportion of cumulative views.

**Table 12**

*Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (General Information on Cancer)*

Content	N (%)	View Count	Cumulative View%
<b>C10. General information on cancer</b>	<b>71 (71)</b>	<b>103,165,277</b>	<b>76.2</b>
C10f. Cancer screening	43	56,413,847	41.7
C10c. Cancer treatments	33	36,628,666	27.1
C10e. Genetic factors	15	27,679,660	20.5
C10g. Reducing risk of cancer	16	23,185,529	17.1
C10a. What is cancer	8	18,781,814	13.9
C10b. Cancer risk factors	17	7,892,867	5.8
C10d. Cancer survivorship	6	1,481,166	1.1

The content category “General information on cancer” was covered in the 71 videos in the sample, making it the most viewed topic of all the content categories and garnering more than 100 million views (76.2% cumulative views). The most viewed subtopic of this category was “cancer screening,” which was addressed in 43 videos, attracting 56,413,847 views (41.7% cumulative views). The subtopic “cancer treatments” was addressed in approximately one-third of the videos, attracting almost 37 million views (27.1% of cumulative views). “Reducing risk of cancer” and “genetic factors” were covered in 16 to 15 videos, respectively, and attracted over 20 million views. In contrast, while the subtopic “cancer risk factors” was covered in 17 videos, these videos only attracted under eight million views (under 6% of cumulative views). The subtopic “cancer survivorship” was the least covered topic in this category and accounted for less than 1.5 million views (1.1% cumulative views).

**Table 13**

*Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Cancer Treatments/Breast Cancer Treatments)*

Content	N (%)	View Count	Cumulative View%
<b>C11. Cancer treatments/breast cancer treatments</b>	<b>45 (45)</b>	<b>65,213,835</b>	<b>48.2</b>
C11a. Surgery	38	59,478,788	44
C11b. Chemotherapy	26	38,201,422	28.2
C11n. Mastectomy	16	33,203,493	24.5
C11o. Double mastectomy	9	22,790,228	16.8
C11c. Radiation therapy	20	21,398,731	15.8
C11p. Lymph node removal	8	13,683,786	10.1
C11d. Targeted therapy	4	12,564,349	9.2
C11e. Immunotherapy	3	12,303,793	9.1
C11q. Breast reconstructive surgery	11	9,771,003	7.2
C11m. Breast conserving surgery	4	765,504	0.6
C11g. Palliative care	2	634,894	0.5
C11k. Dietary supplements	2	363,347	0.3
C11l. Complementary and integrative medicine	2	363,347	0.3
C11h. Clinical trials	2	224,697	0.2
C11f. Stem cell/bone marrow transplant	0	0	0
C11i. Off-label drug use	0	0	0
C11j. Blood transfusion	0	0	0

Cancer treatments/breast cancer treatments was a widely viewed content category and covered in 45 videos in the sample, garnering more than 65 million views (48.2% cumulative views). “Surgery” was the most widely viewed subtopic in the sample, attracting nearly 60 million views (44% cumulative views). Subtopics “chemotherapy” and “mastectomy” also had high viewership, both garnering more than 30 million views each. The subtopic “radiation therapy” was covered in 20 videos, yielding more than 20 million views (15.8% cumulative views). In contrast, “breast reconstructive surgery” was covered in 11 videos, but these videos attracted less than 10 million views (7.2% cumulative views). Subtopics “breast conserving surgery,” “palliative care,” “dietary supplements,” “complementary and integrative medicine,” and “clinical trials” each accounted for less than 1% cumulative views. Few subtopics from this content category were not covered (“stem cell/bone marrow transplant,” “off-label drug use,” and “blood transfusion”).

Table 14

*Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Other Notable Features of Video)*

Content	N (%)	View Count	Cumulative View%
C13. Other Notable features of video	73	109,931,039	81.2

The content category “other notable features” was noted in 73 videos (n = 73) and garnered 109,931,039 views (81.2%). This content category was used when a significant element of the video was not accounted for in the other content categories (see Table 15). The other notable features category was used when a prominent element of the video was present, but it was not covered in any of the content categories. Seventy-three of the 100 videos on breast

cancer were found to have other notable features that were not included in the content categories. Twelve of the videos marked with other notable features had content showcasing how to do a breast cancer screening at home. Four of the videos in this content category involved dancing to raise awareness for breast cancer. The remainder of the videos listed as having other notable features contained a variety of content ranging from tattoos for breast cancer, fertility treatment for breast cancer survivors, breast cancer staging, male breast cancer, and metastatic breast cancer.

Only three of the 100 videos were found to contain potential misinformation, yielding 6,751,987 views (5% cumulative views) (see Table 15). Only three of the 100 sample videos related to breast cancer were found to have misinformation. One of the videos that was flagged as misinformation discussed how cell phone radiation can cause breast cancer. Another video that was marked as potential misinformation included some tips to prevent breast cancer that may be harmful to one’s health. For instance, the video suggested not wearing sunblock to prevent breast cancer which, in turn, could lead to sunburn or skin cancer. The final video that was noted as spreading potential misinformation suggested that things such as herbal teas can be used to prevent breast cancer. These videos were flagged as misinformation because the content of them can be harmful and have a negative impact on the public’s health.

**Table 15**

*Frequencies, Total View Count, and Cumulative View Count Percent for the Videos Categorized by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Potential Misinformation)*

Content	N (%)	View Count	Cumulative View%
C13. Potential misinformation	3	6,751,987	5

Each of the 100 videos was also given a final “overall rating” of useful (educational), misleading, or useful (personal experience) (see Table 16). Most of the videos were given a rating of “useful—educational” (n = 56), which garnered 73,807,889 views (55% cumulative views). Forty-one videos (n = 41) were given a rating of “useful—personal experience,” yielding 54,751,750 views (40% cumulative views). Only a small number of videos were given a rating of “misleading” (n = 3), yielding 6,751,987 views (5% cumulative views).

**Table 16**

*Frequencies, Total View Count, and Cumulative View Count Percent by Selected Content Categories in 100 YouTube Videos Related to Breast Cancer (Overall Rating)*

Content Overall Rating	N (%)	View Count	Cumulative View%
C14a. Useful (Educational)	56	73,807,889	55
C14b. Misleading	3	6,751,987	5
C14c. Useful (Personal experience)	41	54,751,750	40

**Specific Aim 3**

The goal of the third specific aim was to describe the content of the most-viewed content categories. The most widely viewed content category was general information on cancer, which was in 71 videos (n = 71), garnering over 100 million views (76.2% cumulative views). Popular subcategories in this category included cancer screening, cancer treatments, genetic factors, and reducing risk of cancer. Surveillance for breast cancer occurrence/recurrence was among the most-viewed content categories, viewed 62,631,221 times and accounting for 46.3% of cumulative views. The subcategories of this content category that accounted for most of these views were “breast cancer screening,” “history/physical exam,” and “imaging/scans.” Another content category that was widely viewed is “breast cancer health promotion,” which garnered

55,696,607 views and accounted for 41.2% of cumulative views. Most of the views in this category were related to information on breast cancer/risks. Finally, cancer treatments/breast cancer treatments were also among the most widely viewed content categories, accounting for nearly 50% of cumulative views (64,213,835 total views). The most viewed subcategories were “surgery,” “chemotherapy,” “mastectomy,” “double mastectomy,” and “radiation therapy.”

## Chapter 5

### DISCUSSION

The videos in this study were viewed over 135 million times. Other studies of similar nature had lower viewership, compared to the videos related to breast cancer. For instance, Basch et al. (2016) found that the 100 most viewed videos related to prostate cancer were viewed approximately 50 million times, which is less than half of the views of this study. Furthermore, Basch et al. (2015) found that the top 140 videos on skin cancer were viewed about 33 million times. Another similar study on YouTube videos and BRCA genes found that the top 100 videos were viewed only 5.5 million times (Laforet et al., 2022). The high viewership of breast cancer-related videos suggests that YouTube is an important method of communicating breast cancer-related information to the public. Healthcare systems and nonprofits responsible for disseminating breast cancer-related information to the public should focus on finding ways to produce high-quality videos that attract high viewership as there is a significant opportunity here to use YouTube as a health education resource to enhance breast cancer awareness.

#### **Upload Source**

The main source of the most widely viewed YouTube videos on breast cancer were television news/media agencies, which accounted for more than 60% of cumulative views. Compared with professional/provider uploaded video views, those uploaded by television news/media agencies had nearly five times as many cumulative views (12.2% vs. 61.8%). These results suggested that videos uploaded by television news/media agencies reach a large audience.

The upload source findings were not consistent with the findings of Güloğlu et al. (2022), who reported that most of the videos they analyzed about breast cancer surgery were uploaded by universities, professional organizations, physicians, and physical therapists. That study was



focused on arm and shoulder exercise after breast cancer surgery. In addition, Güloğlu et al. mentioned that these were the upload sources of high-quality breast cancer videos, not all the videos in the sample. Another study examining breast augmentation and lymphoma found that the majority of the YouTube videos analyzed was posted by professional entities, including surgeons, companies, or general medical practitioners (Ben-Naftali et al., 2021).

Findings from this study showed that videos uploaded by professionals and providers only accounted for 12.2% of overall cumulative views. The professional/provider category included general hospitals, medical facilities, oncology facilities, medical doctors, and clinical professionals. Non-professional experienced persons also accounted for 12.2% of cumulative views, and this category included videos uploaded by cancer survivors, parents of cancer survivors, siblings of cancer survivors, and caregivers of cancer survivors. Government agency and celebrity uploaded videos each accounted for less than 1% of cumulative views. Videos in the “other” category accounted for over 3% of cumulative views. The findings of this study suggested that people are more likely to watch a video if it is uploaded by a television news channel or media agency, compared to other upload sources.

Based on the findings regarding upload source, there is an opportunity here for television news/media agencies to upload health-related educational content since it yields the most views. Public health agencies such as the CDC and the Food and Drug Administration (FDA) should collaborate with these agencies to develop and post health education videos in hopes of reaching a large audience. Specifically, there is a need for these videos to relate to breast cancer survivorship so that cancer survivors can have educational videos to help them navigate survivorship.

## **Format**

The main format of the most viewed YouTube videos related to breast cancer were combined/multiple formats, which accounted for nearly 60% cumulative views. Videos with a format of still images and text were also widely viewed and accounted for nearly 50% of cumulative views. Animated videos had nearly 30% of cumulative views, and both news reporters and talks by professionals received more than 20% of cumulative views. Interviews, talks by non-professionals, documentaries, and the “other” category formats received less than 20% of cumulative views. Public health professionals should consider video format when creating health-related content videos. Since multiple formats and still images/text tended to have higher viewership, public health professionals should use these formats to their advantage when creating educational resource videos.

## **Content**

The category “general information on cancer” was widely viewed and yielded nearly 80% of total cumulative views. Several content categories received nearly 50% of cumulative views, including cancer treatments/breast cancer treatments, breast cancer health promotion, and surveillance for breast cancer occurrence/recurrence. “Late or long-term physical/mental side effects of cancer or cancer treatment” was a moderately viewed category and accounted for nearly 30% cumulative views. The other content categories examined received 10% or less of cumulative views, including “fear of cancer occurrence/recurrence,” “recommendations/new perspectives on health,” “changes in families/relationships,” “returning to work/starting work after cancer diagnosis or treatment,” “financial burden/management of cancer,” and “cancer rehabilitation recommendations.” These results suggested that there is a need for professionals to create high-quality YouTube videos related to the content categories that received less than 10%

cumulative views as they are important components of breast cancer survivorship; thus, there is a significant need for more educational resources to be created that are easily accessible by the public.

“Late and long-term effects of cancer treatment” was a widely viewed content category, as this topic was covered in 42 videos, accounting for nearly 30% cumulative views. Breast cancer survivors may experience many changes, both physically and mentally, after being diagnosed with cancer and undergoing various treatments. Videos on the side effects of breast cancer tended to be popular, suggesting this information is widely sought out. There is an opportunity here for healthcare professionals to develop educational resource videos for breast cancer survivors on YouTube.

Topics related to fear of cancer occurrence/recurrence were covered in 24 videos and yielded ~10% cumulative views. Fear of cancer recurrence is a serious issue among breast cancer survivors (Schapira et al., 2021). Many young breast cancer survivors experience increased fear of cancer returning, which suggested a need to help these survivors manage their fear and anxiety. Interventions are needed to help breast cancer survivors reduce their psychological stress and focus on their health in a positive way (Schapira et al., 2021). Research has also suggested there is a need to develop interventions to minimize fear of cancer occurrence among cancer survivors (Prins et al., 2022). Educational YouTube videos could be used as intervention tools to help breast cancer survivors navigate their fears regarding cancer occurrence and recurrence.

The content category “recommendations/new perspectives on health” was covered in seven videos, yielding less than 3% of cumulative views. Some common recommendations for breast cancer survivors are to eat healthy, exercise regularly, manage stress, reduce alcohol

consumption, and stop tobacco use (Runowicz et al., 2015). Following these recommendations can lead to better health outcomes and enhanced quality of life among breast cancer survivors. Due to YouTube's popularity, there is great opportunity here to create videos related to positive perspectives on health for breast cancer survivors. There is also opportunity here for more exercise videos, healthy recipes, and stress management tips. Furthermore, cancer survivors who struggle with alcohol or tobacco use could benefit from watching videos of other cancer survivors describe how they quit/reduced alcohol or tobacco. Breast cancer survivors can significantly benefit from regular exercise, and YouTube offers a way for people to access free exercise from the comfort of their home (Pudkasam, 2018).

A breast cancer diagnosis may lead to changes in relationships. Navigating relationship changes can be difficult, especially while undergoing cancer treatment. Thus, it is an important topic related to breast cancer survivorship. Twenty-two of the sample's videos touched on the topic of relationship changes during breast cancer treatment, accounting for almost 8% of the cumulative views. Cancer is a serious diagnosis and may potentially impact one's relationship with partners, family, friends, in both positive and negative ways (ASCO, 2021). For instance, a woman with breast cancer may go from being the caregiver of her young children to needing to be taken care of by her husband. This sudden change in relationships can be challenging and psychologically draining to both the cancer survivor and their family or friends. Breast cancer survivors must learn how to navigate relationship changes, and YouTube videos can help as people can learn from others' personal experiences.

Another challenge breast cancer survivors may face relates to the workforce. Breast cancer survivors may have to disclose their diagnosis to colleagues, which can be uncomfortable. Furthermore, breast cancer survivors may have to leave their jobs to get treatment. Finally, breast

cancer survivors may also experience stressors surrounding returning to work after cancer treatment, including requiring new accommodations or disclosing cancer status. Content related to breast cancer and the workforce was covered in 11 of the most viewed YouTube videos, accounting for less than 5% of cumulative views. Breast cancer survivors may face many challenges when returning to work, including fatigue, pain, and psychological/cognitive problems (Schmidt et al., 2019). Breast cancer survivors must learn to navigate these challenges to return to work. Personal experience videos or videos uploaded by other breast cancer survivors describing how they approached returning to work after treatment could greatly benefit breast cancer survivors. YouTube is the ideal platform to upload such videos.

Breast cancer treatment is costly and may leave one with significant medical debt, especially if a person does not have health insurance. Financial toxicity is so prevalent among cancer survivors that it is an adverse effect of cancer diagnosis (Greenup et al., 2019). Nearly 80% of cancer survivors reported experiencing financial hardships due to the expensive cost of cancer treatment. Furthermore, the high costs of cancer treatment cause people to consider whether to pursue a treatment based on its potential financial burden. Researchers have found that breast cancer treatment costs were financially catastrophic to 25% of breast cancer survivors (Greenup et al., 2019). Since financial stress can lead to physical and mental distress, it is an important topic that should be addressed. Only few videos cover the financial management of cancer, and there is a need for breast cancer survivors to have better access to such information.

Cancer rehabilitation methods such as physical therapy, counseling, nutritional programs, and fitness classes are important elements of cancer survivorship. Cancer rehabilitation recommendations were covered in only nine videos, accounting for less than 4% of cumulative views. YouTube videos could be a great source of education related to cancer rehabilitation

recommendations, yet the most-viewed videos rarely covered such topics. Some of the most common recommendations for breast cancer survivors are exercise/physical activity, yoga, lymphoedema treatment, psychosocial interventions, and complementary and alternative medicine (Möller et al., 2019). These health recommendations are found to be efficacious at enhancing quality of life among breast cancer survivors and to lower levels of anxiety and depression while enhancing sleep and reducing fatigue.

“Surveillance for breast cancer occurrence/recurrence” was among the most viewed content categories in the study, as it was featured in 62 of the 100 videos, accounting for nearly 50% of cumulative views. Surveillance for breast cancer includes medical exams, cancer screenings, imaging, and genetic counseling. Breast cancer surveillance recommendations vary based on type of cancer and how far out someone is from treatment (Smith, 2013). It is important that breast cancer survivors be aware of what surveillance recommendations apply to them so they can better manage their health outcomes. Medical professionals should develop YouTube videos that outline breast cancer surveillance recommendations so that people can better navigate their survivorship.

Topics related to the breast cancer health promotion content category also attracted high viewership among the most watched videos, as they were covered in 44 of the sample videos and accounted for over 40% of cumulative views. Health promotion covers a variety of content, including ways for breast cancer survivors to stay healthy during and after treatment. But in this study, the majority of videos categorized under this topic heading dealt with risk factors. While health promotion typically includes cancer screening, it can also include other ways to stay healthy, such as nutrition and physical activity programs. There is a dire need for public health professionals to enhance health promotion efforts for breast cancer survivors (Agide et al., 2018).

Cancer treatments and breast cancer treatments were also widely viewed content categories, covered in 45 videos and accounting for nearly 50% of cumulative views. Breast cancer survivors may turn to YouTube to learn about different types of treatments that their oncologists recommend. Breast cancer survivors may also be interested in learning about how others have handled cancer treatment and if they have any recommendations or tips for those undergoing cancer treatment. YouTube videos are also a place where one can learn about some of the many side effects of cancer treatment. These videos have significant potential to benefit breast cancer survivors positively. Health professionals and organizations should continue to monitor these highly viewed videos on cancer treatment to ensure the information is accurate and lessen the spread of misinformation.

Of the 100 videos analyzed in this study, only three of the most-viewed videos on breast cancer presented information that could potentially be misinformation or misleading. This suggested that the majority of the YouTube videos related to breast cancer with high viewership are providing reasonably accurate information. Despite the small number of videos identified as containing misinformation, however, these three videos were viewed almost 7 million times, indicating a need for vigilance by YouTube to remove misleading or inaccurate information. The content of these videos varied. One video suggested that cell phone radiation can cause cancer. Another video suggested ways to prevent breast cancer that could potentially be harmful. For instance, one of the recommendations was to not wear sunblock when outside, which can in turn, lead to sun damage. Finally, a video suggested holistic treatments to breast cancer, including herbal methods such as tea. These three videos were among the 100 most widely viewed videos on breast cancer. The high viewership on these videos is concerning as the information in them

has potentially harmful health effects. This suggests a need to better vet health-related content on popular social media platforms.

### **Limitations and Delimitations**

It is necessary to consider the limitations of this study when interpreting the findings and conclusions, including (a) cross-sectional design, (b) newly designed coding instrument, (c) sampling and sample, (d) inability to determine who viewed the videos or if videos were fully viewed, and (e) ways in which the scope of the study was narrowed.

This study used a cross-sectional design and collected data at a single point in time. This is a limitation as YouTube videos are uploaded to the platform on a daily basis and the number of views changes for videos every day. The total number of views for the study sample is likely higher at the current time than it was at the time of collection. The distribution of views may change over time.

The instrument used to code the content of the YouTube videos was developed specifically for this study. The coding instrument was designed based on authoritative cancer survivorship guidelines from the American Cancer Society (ASC) and the American Society of Clinical Oncology (ASCO, 2021; Runowicz et al., 2016). A related issue is that data collection relied on a single coder. Demonstration of high inter- and intra-rater reliability mitigated this issue to some degree.

The sampling method relied on an unknown YouTube algorithm to identify videos on breast cancer and to sort the videos based on view count. Despite conducting the search with a cleared browser, the researcher had no way to ensure that the same videos would result from searches conducted by other people in other places. Another potential sampling limitation is that



only 100 videos were included. Nevertheless, the fact that the videos in the sample were viewed more than 135 million times suggested that these videos are worth studying.

Another design limitation is that the YouTube view count was based on how many people have clicked on the video. There is no way to identify who, if anyone, watched a video or viewed it in its entirety. This is an inherent limitation of research on YouTube and public health.

A significant delimitation of the study design was the exclusion criteria. The study only included videos that were in English. Many widely viewed YouTube videos on breast cancer were in languages other than English, including Hindi and Spanish. Other delimitations included quantitative (versus qualitative) data collection methods and the scope of information that was coded. These delimitations were planned to increase the feasibility of conducting this study.

### **Implications for Policy and Practice**

There is a gap in high-quality videos available online regarding breast cancer survivorship. This is a concomitant opportunity to enhance the knowledge of cancer survivors and others in their support network by creating videos on particular topics related to health and well-being for cancer survivors. Several issues related to this opportunity are discussed below.

The governmental agencies of the U.S. Public Health Service are responsible for public health education and reducing health disparities. These agencies are not producing YouTube videos that are widely viewed. Only 5 of the 100 videos (garnering less than 1% of cumulative views) were uploaded by a governmental agency. More attention by these agencies seems warranted.

In this study, the most widely viewed topics related to breast cancer were breast cancer screening, treatments and their physical and mental side effects, and cancer risks. These are all important topics, and it is encouraging that they are been widely viewed. In contrast, however,

some important topics for public health education were not widely covered, including recommendations/new perspectives on health for cancer survivors, returning to work/starting work after cancer diagnosis/treatment, the financial burden/management of cancer, and cancer rehabilitation recommendations. These topics were only covered in few videos which garnered a comparative small proportion of cumulative views. Therefore, one of the main educational implications from this study is that it is important to improve availability and accessibility of information concerning substantive aspects of health and well-being after breast cancer diagnosis and treatment.

Oncology and other healthcare providers should make a conscious effort to enhance education efforts regarding cancer survivorship. These cancer care professionals are often in a good position to understand the challenges faced by their patients and, in many cases, are highly trusted sources of credible information. While cancer care professionals may have up-to-date accurate information and can be important messengers of relevant content, the videos uploaded by television/news media had attracted the most views. The implication is that partnerships between cancer care professionals and television/news journalists may be a promising way to increase the availability and accessibility of health education for cancer survivors.

An important topic for cancer survivors that was widely covered was treatments and their physical and mental side effects. For example, 42 of the 100 videos garnering almost 40 million views addressed the long-term side effects of breast cancer diagnosis and treatment. Breast cancer treatments may be temporary, but the side effects of breast cancer diagnosis and treatment can last a lifetime (BCRF, 2022). With the increasing number of breast cancer survivors, there is a priority to educate the public about making informed decisions to improve their quality of life.

Thus, it is encouraging that information about treatments with harmful mental and physical side effects was one of the most widely viewed topics.

Universities are already catching on to the significant need to enhance cancer survivorship education among physicians. Stanford Medicine (2023) offers a course to increase awareness about cancer survivorship for primary care physicians. The program focuses on teaching primary care physicians about the physical and psychosocial needs of cancer survivors. Furthermore, it also teaches physicians about helping cancer survivors have the best possible outcomes after cancer treatment. Courses like the one offered at Stanford University can assist physicians in training about ways to support the increasingly high number of cancer survivors in the United States and the increased need for cancer-informed care.

Cancer survivorship guidelines are an important resource that should be used not only to assess cancer survivors at annual health examinations (Ruddy et al., 2020), but also to conceptualize and design educational materials, including videos. Breast cancer survivors are advised to follow up with an oncologist and primary care physician annually after completing treatment. Regular, long-term follow-up for breast cancer survivors may lead to better outcomes as the person can discuss concerns with their provider, and the provider can screen the person for cancer. Creating more videos that are free and easily accessible to the general public would be a great way to help primary care physicians and oncologists enhance their educational efforts with breast cancer survivors.

Although only a small amount of misinformation was found in the content of the most-viewed videos on breast cancer, it is still noteworthy. For example, one troubling finding was a video viewed over 6 million times falsely claiming that the use of sunscreen caused breast cancer. YouTube recently implemented a process that notifies viewers when information is

uploaded by an authoritative health source. These authoritative health sources are identified by YouTube as accredited institutions. But only 10 of the 100 most widely viewed videos were explicitly deemed authoritative. While these videos may give viewers peace of mind knowing that the information they are consuming has been validated by a healthcare professional, they will only confer benefits if they are engaging and viewed by their intended audience.

## **Improving Availability and Accessibility of Information for**

### **People with Low Levels of Literacy**

Health literacy involves understanding, evaluating, and using health-related information that one reads (Nutbeam & Lloyd, 2021). Low literacy is considered to be a social determinant of health as poor literacy may be associated with employment status or lifetime income. People with low literacy have been found to be less likely to utilize preventive healthcare services due to not being able to understand health education resources fully. Less usage of preventative healthcare services leads to poorer outcomes when it comes to managing chronic diseases (Nutbeam & Lloyd, 2021).

Health literacy is an important element of health education because educators must ensure that the education materials they are providing to the public are easy to understand, utilize, and access. Health-related communications that are too complex and filled with medical jargon should be modified so they are easily understood by the general population and those with low levels of literacy. Having good health literacy can lead to better outcomes and allows a person to have increased autonomy when making decisions about their health. Health education materials are suggested to have a readability of Grade 6 or lower in order for the general public to understand the information presented (Mbanda et al., 2021). In today's society, it is easy to obtain medical related information via the internet or social media. There is much health-related

information on the internet that can be accessed for free with the click of a button. However, challenges may arise when individuals trust information without doing research and are unable to identify untrustworthy or unreliable information (Nutbeam & Lloyd, 2021).

The internet and websites such as YouTube offer a platform for health-related information to be shared and easily accessed by the public. While the health-related information on these websites may be free and seem easy to access, the internet is often used more by wealthy people with high health literacy levels (Nutbeam & Lloyd, 2021). The content of health education videos on YouTube must be uniquely tailored so that broad audiences can easily understand the information, regardless of their level of literacy. Using visual aids in health education resources have been found to benefit people with low levels of literacy significantly (Mbanda et al., 2021). Visual aids are an alternative or supplemental method to written educational materials that can be beneficial to those with low literacy. Visual aids are photos, drawings, pictures, graphics, charts, videos, and presentations. YouTube videos are an example of a communication channel that uses visual aids. Videos have been found to be one of the most effective types of visual aids for people with low literacy to understand (Mbanda et al., 2021).

Since videos are an effective way to communicate health-related information to those with low levels of literacy, there is a significant opportunity here to use YouTube as an educational resource. Future research should explore how breast cancer-related YouTube videos can be tailored to be understood by wide audiences. Those with low literacy would significantly benefit from the videos that encourage at-home breast cancer screenings and going to the doctor for regular checkups because low health literacy is associated with having perceived barriers to breast cancer screening (Poon et al., 2023). Ninety-seven of the 100 videos in this dissertation sample were found to be “useful” or “personal experiences,” all of which could be beneficial for

individuals with low literacy to watch if they wish to learn more about breast cancer. Overall, there is a significant opportunity to use YouTube as a health education resource to create easily accessible videos for the public about breast cancer.

### **Recommendations for Future Research**

Fewer than 3,000 peer-reviewed articles were available on PubMed with the search word “YouTube” as of February 2023. This suggests that examining the health-related content of YouTube videos is in its beginning stages. There is a significant gap in research examining the health content of one of the most popular social media sites worldwide. The high viewership of YouTube videos on breast cancer suggests there is a significant opportunity here to disseminate accurate health-related information widely to breast cancer survivors. YouTube is an excellent online tool that can be used to raise awareness about breast cancer. Future research should focus on understanding how to best design videos for YouTube that will attract high viewership.

To best understand how to design acceptable YouTube videos, more research is needed to examine the sources, formats, and content of videos that garner significant viewership. Future research should also include study participants and examine how the highly viewed YouTube videos on cancer survivorship made the viewers feel. For instance, it would be interesting to learn if viewers felt they learned something from watching the videos. It would also be beneficial to understand what viewers liked about each video so that public health professionals can replicate this when creating health education videos.

There are several possible reasons for why some of the abovementioned topics on survivorship may not have been more widely viewed. One is that the search term used in this study was not specific to breast cancer survivors. A second is that it is not clear whether people are or are not interested in learning about these topics, even though they are important elements

of cancer survivorship. A third is that the videos covering these topics were not engaging. These are all example of questions that can be explored.

Another opportunity for future research would be to examine the comments of the highly viewed YouTube videos on breast cancer. Understanding what people are saying around the world about these YouTube videos would be beneficial. People may mention what they like or dislike about the videos, which would be important for public health professionals to know and understand.

Since YouTube is a platform that is available worldwide, many highly viewed videos uploaded are not in English. This study excluded a large number of videos that were not in English. Many of these videos are in Hindi or Spanish. There is a significant opportunity here for researchers who speak Hindi or Spanish to examine the most widely viewed YouTube videos on breast cancer in different languages. It is important to know if the information being viewed in English is similar to what is being viewed by other people who speak different languages.

Another opportunity for future research is to identify potential misinformation that may be spreading in the most-watched YouTube videos related to cancer. It would be important to understand what is incorrect about this information and how future videos could combat the spread of misinformation by providing facts and statistics. The goal would be for YouTube to have high-quality videos related to health information because it would be detrimental to have a widely viewed video spread false information regarding health.

YouTube should be viewed as a significant resource for healthcare professionals to disseminate health-related information worldwide. There are many benefits to using YouTube as a platform to spread health-related information, including easy access, availability throughout the world, and free use. YouTube videos have the potential to reach millions of viewers and portray

accurate information related to breast cancer survivorship. Additional research should be conducted to improve understanding about how health professionals do or do not use YouTube videos and how they may help cancer survivors make informed decisions and provide social support.

### **Final Thoughts**

The topic of breast cancer attracts millions of views on YouTube, which suggests that people are interested in this topic and turn to YouTube for answers or information. It should be a priority to produce high-quality YouTube videos that convey accurate information consistent with peer-reviewed literature related to breast cancer. Since YouTube is easily accessible to everyone, the government should consider how it could be used as an educational tool to inform the public on health-related topics, such as breast cancer survivorship. There is a significant opportunity here for public health-related information to be widely disseminated via YouTube. Professionals should make a point to learn how to produce high-quality videos, given that videos with better quality receive more views.

When I began this study, I knew that breast cancer was going to be a widely viewed topic on YouTube. Breast cancer involves many different aspects because it is a unique illness that affects millions of women. There is a dire need to educate the public on the long-term side effects of breast cancer so that breast cancer survivors can have more information available to them throughout their survivorship journey.



## References

- Agide, F. D., Sadeghi, R., Garmaroudi, G., & Tigabu, B. M. (2018). A systematic review of health promotion interventions to increase breast cancer screening uptake: From the last 12 years. *European Journal of Public Health*, 28(6), 1149-1155. doi:10.1093/eurpub/ckx231
- Alexa. (n.d.). *Top sites in United States the sites in the top sites lists are ordered by their 1 month Alexa Traffic rank*. <https://www.alexacom/topsites/countries/US>.
- American Cancer Society (ACS). (2019). Cancer treatment and survivorship. Facts and figures 2019-2021. <https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/cancer-treatment-and-survivorship-facts-and-figures/cancer-treatment-and-survivorship-facts-and-figures-2019-2021.pdf>
- American Cancer Society (ACS). (2021a). Cancer facts and figures 2021. <https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2021/cancer-facts-and-figures-2021.pdf>
- American Cancer Society (ACS). (2021b). Survivorship care plans. <https://www.cancer.org/treatment/survivorship-during-and-after-treatment/survivorship-care-plans.html>
- American Cancer Society (ACS). (2021c). How common is thyroid cancer? <https://www.cancer.org/cancer/thyroid-cancer/about/key-statistics.html>
- American Cancer Society (ACS). (2023). Cancer facts & figures. <https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/2023-cancer-facts-figures.html>
- American Society of Clinical Oncology (ASCO). (2021). ASCO answers: Cancer survivorship. Retrieved from: [https://www.cancer.net/sites/cancer.net/files/cancer\\_survivorship.pdf](https://www.cancer.net/sites/cancer.net/files/cancer_survivorship.pdf)
- Arndt, V., Koch-Gallenkamp, L., Bertram, H., Eberle, A., Holleczeck, B., Pritzkeleit, R., Waldeyer-Sauerland, M., Waldmann, A., Zeissig, S.R., Doege, D., Thong, M. S. Y., & Brenner, H. (2019). Return to work after cancer: A multi-regional population-based study from Germany. *Acta Oncologica*, 58(5), 811-818. doi:10.1080/0284186X.2018.1557341
- Association of Community Cancer Centers (ACCC). (2021). Survivorship resources. <https://www.accc-cancer.org/projects/supportive-care-resource-hub/survivorship-resources>
- Auxier, B., & Anderson, M. (2021). Social media use in 2021. Pew Research Center. <https://www.pewresearch.org/internet/2021/04/07/social-media-use-in-2021/>
- Aydin, M. A., & Akyol, H. (2020). Quality of information available on YouTube videos pertaining to thyroid cancer. *Journal of Cancer Education*, 35(3), 599-605. <https://doi.org/10.1007/s13187-019-01502-9>

- Azer, S. (2020). Are DISCERN and JAMA suitable instruments for assessing YouTube videos on thyroid cancer? Methodological concerns. *Journal of Cancer Education*, 35(1), 1267-1277. <https://doi.org/10.1007/s13187-020-01763-9>
- Bae, K. R., & Cho, J. (2021). Changes after cancer diagnosis and return to work: Experience of Korean cancer patients. *BMC Cancer*, 21(86), 1-11. <https://doi.org/10.1186/s12885-021-07812-w>
- Bahar-Ozdemir, Y., Ozsoy-Unubol, T., & Akyuz, G. (2022). Is YouTube a high-quality source of information on cancer rehabilitation? *Journal of Cancer Survivorship*, 16(5), 1016-1022. doi:10.1007/s11764-021-01093-9
- Baquero, E. P. (2017). *A descriptive analysis of the most viewed YouTube videos related to depression*. [Dissertation, Teachers College, Columbia University]. ProQuest Dissertations & Theses Global.
- Barba, D., León-Sosa, A., Lugo, P. Suquillo, D., Torres, F., Surre, F., Trojman, L., & Caicedo, A. (2021). Breast cancer, screening and diagnosis: All you need to know. *Critical Reviews in Oncology/Hematology*, 157, epub.
- Basch, C. H., Basch, C. E., Hillyer, G. C., & Reeves, R. (2015). YouTube videos related to skin cancer: A missed opportunity for cancer prevention and control. *Journal of Medical Internet Research*, 1(1). doi:10.2196/cancer.4204
- Basch, C. H., Menafro, A., Mongiovi, J., Hillyer, G. C., & Basch, C. E. (2016). A content analysis of YouTube videos related to prostate cancer. *American Journal of Men's Health*, 11(1), 154-157. <https://doi.org/10.1177/15579883166714>
- BCRF. (2022). What we talk about when we talk about breast cancer survivorship. Web. <https://www.bcrf.org/blog/breast-cancer-survivorship-common-issues-after-treatment/>
- Ben-Naftali, Y., Eromenko, R., Pikkell, Y. Y., Duek, O. S., & Meir, E. D. B. (2021). *Plastic and Reconstructive Surgery Global Open*, 9(5), n.p.
- Bhaskar, A. (2020). Interventional pain management in patients with cancer-related pain. *Postgraduate Medicine*, 132(S3), 13-16. doi:10.1080/00325481.2020.1807796
- Blinder, V. S., & Griggs, J. J. (2013). Health disparities and the cancer survivor. *Seminars in Oncology*, 40(6), 796-803. doi:10.1053/j.seminoncol.2013.09.003
- British Library & University of Oxford. (1997). The DISCERN instrument. [http://www.discern.org.uk/discern\\_instrument.php](http://www.discern.org.uk/discern_instrument.php)
- Brown, M., & Farquhar-Smith, P. (2017). Pain in cancer survivors; filling in the gaps. *British Journal of Anaesthesia*, 119(4), 723-736. doi:10.1093/bja/aex202

- Cassidy, J. T., & Baker, J. F. (2016). Orthopaedic patient information on the world wide web: An essential review. *Journal of Bone and Joint Surgery*, 98(4), 325-338. doi:10.2106/JBJS.N.01189
- Centers for Disease Control and Prevention (CDC). (2021a). Cancer survivors guides to healthy living: Physical, emotional, and sexual health. <https://www.cdc.gov/cancer/survivors/index.htm>
- Centers for Disease Control and Prevention (CDC). (2021b). How is breast cancer diagnosed? [https://www.cdc.gov/cancer/breast/basic\\_info/diagnosis.htm](https://www.cdc.gov/cancer/breast/basic_info/diagnosis.htm)
- Centers for Disease Control and Prevention (CDC). (2021c). How is breast cancer treated? [https://www.cdc.gov/cancer/breast/basic\\_info/treatment.htm](https://www.cdc.gov/cancer/breast/basic_info/treatment.htm)
- Children's Oncology Group. (2021). Children's Oncology Group: The world's childhood cancer experts. <https://www.childrensoncologygroup.org/>
- Chou, W. S., Hunt, Y., Folkers, A., & Augustson, E. (2011). Cancer survivorship in the age of YouTube and social media: A narrative analysis. *Journal of Medical Internet Research*, 13(1). doi:10.2196/jmir.1569
- Cordova, M. J., Riba, M. B., & Spiegel, D. (2017). Post-traumatic stress disorder and cancer. *Lancet Psychiatry*, 4(4), 330-338. doi:10.1016/S2215-0366(17)30014-7
- Demark-Wahnefried, W., Schmitz, K. H., Alfano, C. M., Bail, J. R., Goodwin, P. J., Thomson, C. A., Bradley, D. W., ... Basen-Engquist, K. (2018). Weight management and physical activity throughout the cancer care continuum. *CA: Cancer Journal for Clinicians*, 68, 64-89. doi:10.3322/caac.21441
- Edebe, C. C., Jang, Y., & Escalante, C. P. (2017). Cancer-related fatigue in cancer survivorship. *Medical Clinics of North America*, 101, 1085-1097. doi:10.1016/j.mcna.2017.06.007
- Endo, M., Haruyama, Y., Muto, G., Imai, Y., Mitsui, K., Mizoue, T., Wada, H., Kobashi, G., & Tanigawa, T. (2019). Recurrent sick leave and resignation rates among female cancer survivors after return to work: The Japan sickness absence and return to work (J-SAR) study. *BMC Public Health*, 19, 1248. doi:10.1186/s12889-019-7509-3
- Escalante, C. P., & Manzullo, E. F. (2009). Cancer-related fatigue: The approach and treatment. *Journal of General Internal Medicine*, 24(2), 412-416. doi:10.1007/s11606-009-1056-z
- Gallaway, M. S., Townsend, J. S., Shelby, D., & Puckett, M. C. (2020). Pain among cancer survivors. *Preventing Chronic Disease: Public Health Research, Practice, and Policy*, 17(54), 1-10.

- Ganz, P.A., & Bower, J.E. (2007). Cancer related fatigue: A focus on breast cancer and Hodgkin's disease survivors. *Acta Oncologica*, 46, 474-479. doi:<http://dx.doi.org/10.5888/pcd17.190367>
- Graham, G. (2021). Introducing new ways to help you find answers to your health questions. <https://www.youtube.com/howyoutubeworks/product-features/health-information/>
- Greenup, R. A., Rushing, C., Fish, L., Campbell, B. M., Tolnitch, L., Hyslop, T., Peppercorn, J., Wheeler, S. B., Zafar, Y., Myers, E. R., & Hwang, S. (2019). Financial costs and burden related to decisions for breast cancer surgery. *Journal of Oncology Practice*, 15(8), e666-676. doi:10.1200/JOP.18.00796
- Güloğlu, S., Özdemir, Y., Basim, P., & Tolu, S. (2022). YouTube English videos as a source of information on arm and shoulder exercise after breast cancer surgery. *European Journal of Cancer Care*, 31(6). doi:10.1111/ecc.13685
- Han, X., Zhao, J., Zheng, Z., Moor, J. S. D., Virgo, K. S., & Yabroff, R. (2020). Medical financial hardship intensity and financial sacrifice associated with cancer in the United States. *Cancer Epidemiology Biomarkers and Prevention*, 29(2), 308-317. doi:10.1158/1055-9965.EPI-19-0460
- Haslam, K., Doucette, H., Hachey, S., MacCallum, T., Zwicker, D., Smith-Brilliant, M., & Gilbert, R. (2019). YouTube videos as health decision aids for the public: An integrative review. *Canadian Journal of Dental Hygiene*, 53(1), 53-66.
- Islam, J., & Harris, G. D. (2018). Cancer survivor health needs for women. *Primary Care: Clinics in Office Practice*, 45, 659-676. doi:10.1016/j.pop.2018.07.005
- Kaul, S., Avila, J. C., Mutambudzi, M., Russell, H., Kirchhoff, A. C., & Schwartz, C. L. (2017). Mental distress and health care use among survivors of adolescent and young adult cancer: A cross-sectional analysis of the national health interview survey. *Cancer*, 123(5), 869-878. doi:10.1002/cncr.30417
- Kunze, K. N. (2020). Editorial commentary: YouTube videos provide poor-quality medical information: Don't believe what you watch! *Arthroscopy: The Journal of Arthroscopic and Related Surgery*, 36(12), 3048-3049. <https://doi.org/10.1016/j.arthro.2020.07.042>
- Laforet, P. E., Yalamanchili, B., Hillyer, G. C., & Basch, C. H. (2022). YouTube as an information source on BRCA mutations: Implications for patients and professionals. *Journal of Community Genetics*, 13(2), 257-262. doi:10.1007/s12687-022-00576-1
- Mayo Clinic. (2023). Breast self-exam for breast awareness. <https://www.mayoclinic.org/tests-procedures/breast-exam/about/pac-20393237>

- Mbanda, N., Dada, S., Bastable, K., Ingalill, G. B., & Ralf, W. S. (2021). A scoping review of the use of visual aids in health education materials for persons with low-literacy levels. *Patient Education and Counseling, 104*(5), 998-1017. doi:10.1016/j.pec.2020.11.034
- Memorial Sloan Kettering Cancer Center (MSKCC). (2021). Living beyond cancer: Services for survivors. <https://www.mskcc.org/experience/living-beyond-cancer/services-survivors>
- Miller, K. D., Nogueira, L., Mariotto, A. B., Rowland, J. H., Yarbrough, R., Alfano, C. M., Jemal, A., Kramer, J. L., & Siegel, R. L. (2019). Cancer treatment and survivorship statistics, 2019. *CA: Cancer Journal for Physicians, 69*, 363-385. doi:10.3322/caac.21565
- Möller, U. O., Beck, I., Rydén, L., & Malmström, M. (2019). A comprehensive approach to rehabilitation interventions following breast cancer treatment—A systematic review of systematic reviews. *BMC Cancer, 19*(1), 472. doi:10.1186/s12885-019-5648-7
- Mols, F., Helfenrath, K. A., Vingerhoets, J. J. M., Coebergh, J. W. W., & Van de Poll-Franse, L. V. (2007). Increased health care utilization among long-term cancer survivors compared to the average Dutch population: A population-based study. *International Union Against Cancer, 121*, 871-877. doi:10.1002/ijc.22739
- Mongelli, M. N., Giri, S., Peipert, B. J., Helenowski, I. B., Yount, S. E., & Sturgeon, C. (2020). Financial burden and quality of life among thyroid cancer survivors. *Surgery, 167*, 631-637. doi:10.1016/j.surg.2019.11.014
- Moryl, N., Coyle, N., Essandoh, S., & Glare, P. (2010). Chronic pain management in cancer survivors. *Journal of the National Comprehensive Cancer Network, 8*(9), 1104-1110.
- Nathan, P. C., Nachman, A., Sutradhar, R., Kurdyak, P., Pole, J. D., Lau, C., & Gupta, S. (2018). Adverse mental health outcomes in population-based cohort of survivors of childhood cancer. *Cancer, 124*, 2045-2057. doi:10.1002/cncr.31279
- National Cancer Institute (NCI). (2022). Cancer stat facts: Female breast cancer. <https://seer.cancer.gov/statfacts/html/breast.html>
- National Cancer Institute (NCI). (n.d.). NCI dictionaries: Survivor. <https://www.cancer.gov/publications/dictionaries/cancer-terms/def/survivor>
- Nipp, R. D., Kirchhoff, A. C., Fair, D., Rabin, J., Hyland, K. A., Kuhlthau, K., Perez, G. K., Robinson, L. L., Armstrong, G. T., Nathan, P. C., Oeffinger, K. C., Leisenring, W. M., & Park, E. R. (2017). Financial burden in survivors of childhood cancer: A report from the Childhood Cancer Survivor Study. *Journal of Clinical Oncology, 35*(30), 3474-3481. doi:10.1200/JCO.2016.71.7066
- Nutbeam, D., & Lloyd, J. E. (2021). Understanding and responding to health literacy as a social determinant of health. *Annual Review of Public Health, 42*, 159-173. doi:10.1146/annurev-publhealth-090419-102529

- Oncolife. (2021). Survivorship care plan. <https://oncolife.oncolink.org/>
- Osei-Afriye, S., Addae, A. K., Oppong, S., Amu, H., Ampofo, E., & Osei, E. (2021). Breast cancer awareness, risk factors and screening practices among future health professionals in Ghana: A cross-sectional study. *PLOS ONE*, *16*(6), e0253373. doi:10.1371/journal.pone.0253373
- Oversikt, K., Loge, J. H., Brekke, M., & Kiserud, C. (2017). Chronic fatigue in adult cancer survivors. *Tidsskriftet*, *137*(21). doi:10.4045/tidsskr.17.0040
- Poon, P. K., Tam, K. W., Lam, T., Luk, A. K. C., Chu, W. C. W., Cheung, P., Wong, S. Y. S., & Sung, J. J. Y. (2023). Poor health literacy associated with stronger perceived barriers to breast cancer screening and overestimated breast cancer risk. *Frontiers in Oncology*, *12*, <https://doi.org/10.3389/fonc.2022.1053698>
- Prins, J. B., Deuning-Smit, E., & Custers, J. A. E. (2022). Interventions addressing fear of cancer recurrence: Challenges and future perspectives. *Current Opinion in Oncology*, *34*(4), 279-284. doi:10.1097/CCO.0000000000000837
- Pudkasam, S., Polman, R., Pitcher, M., Fischer, M., Chinlumprasert, N., Stojanovska, L., & Apostolopoulos, V. (2018). Physical activity and breast cancer survivors: Importance of adherence, motivational interviewing and psychological health. *Maturitas*, *116*, 66-72. <https://doi.org/10.1016/j.maturitas.2018.07.010>
- Randolph-Krisova, A. (2018). *Descriptive analysis of the most viewed YouTube videos related to the opioid epidemic*. [Doctoral Dissertation, Teachers College, Columbia University]. ProQuest Dissertations Publishing.
- Rebholz, C. E., Reulen, R. C., Toogood, A. A., Frobisher, C., Lancashire, E. R., Winter, D. L., Kuehni, C. E., & Hawkins, M. M. (2011). Health care use among long-term survivors of childhood cancer: The British childhood cancer survivor study. *Journal of Clinical Oncology*, *29*(31), 4181-4188. doi:10.1200/JCO.2011.36.5619
- Richardson, A., Addington-Hall, J., Amir, Z., Foster, C., Stark, D., Armes, J., Brearley, S. G., Hodges, L., Hook, J., Jarrett, N., Stamatakis, Z., Walker, S. J., Ziegler, L., & Sharpe, M. (2011). Knowledge, ignorance and priorities for research in key areas of cancer survivorship: Findings from a scoping review. *British Journal of Cancer*, *105*, S82-S94. doi:10.1038/bjc.2011.425
- Rock, C. L., Doyle, C., Demark-Wahnefried, W., Meyerhardt, J., Courneya, K. S., Schwartz, A. L., ... & Gansler, T. (2012). Nutrition and physical activity guidelines for cancer survivors. *CA: Cancer Journal for Clinicians*, *62*(4), 241-274. doi:10.3322/caac.21142
- Rolland, B., & Eschler, J. (2018). Searching for survivor-specific services at NCI-designated comprehensive cancer centers: A qualitative assessment. *Journal of the National Comprehensive Cancer Network*, *16*(7), 839-844. doi:10.6004/jnccn.2018.7019

- Ruddy, K. J., Herrin, J., Sangaralingham, L., Freedman, R. A., Jemal, A., Haddad, T. C., Allen, S. V., Hieken, T., Boughey, J., Ganz, P. A., Hayver, R. D., & Shah, N. D. (2020). Follow-up care for breast cancer survivors. *Journal of the National Cancer Institute*, *112*(1), 111-113. doi:10.1093/jnci/djz203
- Runowicz, C. D., Leach, C. R., Henry, N. L., Henry, K. S., Mackey, H. T., Cowens-Alvarado, R. L., Cannady, R. S., Pratt-Chapman, M. L., Edge, S. B., Jacobs, L. A., Hurria, A., Marks, L. B., LaMonte, S. J., Warner, E., Lyman, G. H., & Ganz, P. A. (2016). American Cancer Society/American Society of Clinical Oncology Breast Cancer Survivorship Care Guideline. *CA: Cancer Journal for Clinicians*, *66*, 43-73. <https://doi.org/10.3322/caac.21319>
- Sawicka-Zukowska, M., Tuczynski, W., Dobroch, J., & Krawczuk-Rybak, M. (2020). Factors affecting weight and body composition in childhood cancer survivors: Cross-sectional study. *Ecancer*, *14*, 999-1010. doi:10.3332/ecancer.2020.999
- Schapira, L., Zheng, Y., Gelber, S. I., Poorvu, P., Ruddy, K., Tamimi, R. M., Peppercorn, J., Come, S. E., Borges, V. F., Partridge, A. H., & Rosenberg, S. M. (2021). Trajectories of fear of cancer recurrence in young breast cancer survivors. *Cancer*, *128*(2), 335-343. doi:10.1002/cncr.33921
- Schmidt, M. E., Scherer, S., Wiskemann, J., & Steindorf, K. (2019). Return to work after breast cancer: The role of treatment-related side effects and potential impact on quality of life. *European Journal of Cancer Care*, *28*(4), e13501. doi:10.1111/ecc.13051
- Shaver, A. L., Cao, Y., & Noyes, K. (2020). General health care utilization among nonelderly cancer survivors before and after affordable care act implementation: Early results. *American Society of Clinical Oncology*, *16*(7), 377-E589. doi:10.1200/JOP.19.00498
- Smith, T. G., Strollo, S., Hu, X., Earle, C. C., Leach, C. R., & Nekhlyudov, L. (2019). Understanding long-term cancer survivors' preferences for ongoing medical care. *Journal of General Internal Medicine*, *34*(10), 2091-2097. doi:10.1007/s11606-019-05189-y
- Smith, T. J. (2013). Breast cancer surveillance guidelines. *Journal of Oncology Practice*, *9*(1), 65-67. doi:10.1200/JOP.2012.000787
- Stacey, F. G., Lubans, D. R., Chapman, K., Bisquera, A., & James, E. L. (2017). Maintenance of lifestyle changes at 12-month follow-up in nutrition and physical activity trial for cancer survivors. *American Journal of Health Behavior*, *41*(6), 784-795. doi:10.5993/AJHB.41.6.12
- Stanford Medicine (2023). Cancer survivorship course for primary care physicians. <https://med.stanford.edu/aftercancer/our-programs/cancer-survivorship-course-primary-care-physicians.html>

- Statista Research Department. (2021a). Most popular social networks worldwide as of July 2021, ranked by number of active users (in millions). <https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/>
- Statista Research Department. (2021b). YouTube—Statistics and facts. <https://www.statista.com/topics/2019/youtube/#dossierKeyfigures>
- Stone, D. S., Ganz, P. A., Pavlish, C., & Robbins, W. A. (2017). Young adult cancer survivors and work: A systematic review. *Journal of Cancer Survivorship, 11*, 765-781. doi:10.1007/s11764-017-0614-3
- U.S. Cancer Statistics Working Group. (2021a). U.S. Cancer Statistics Data Visualizations Tool, based on 2020 submission data (1999-2018). U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. [www.cdc.gov/cancer/dataviz](http://www.cdc.gov/cancer/dataviz)
- U.S. Cancer Statistics Working Group. (2021b). U.S. Cancer Statistics Data Visualizations Tool, based on 2019 submission data. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. [https://gis.cdc.gov/Cancer/USCS/?CDC\\_AA\\_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcancer%2Fdataviz%2Findex.htm#/AtAGlance/](https://gis.cdc.gov/Cancer/USCS/?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcancer%2Fdataviz%2Findex.htm#/AtAGlance/)
- Winters, S., Martin, C., Murphy, D., & Shokar, N. K. (2017). Breast cancer epidemiology, prevention, and screening. *Progress in Molecular Biology and Translational Science, 151*, 1-32. doi:10.1016/bs.pmbts.2017.07.002
- Yedjou, C. G., Sims, J. N., Miele, L., Lowe, L., Fonseca, D. D., Alo, R. A., Payton, M., & Tchounwou, P. B. (2019). Health and racial disparity in breast cancer. *Advances in Experimental Medicine and Biology, 1152*, 31-49. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6941147/pdf/nihms-1065348.pdf>
- Yoon, H. Y., You, K. H., Kwon, J. H., Kim, J. S., Rha, S. Y., Chang, Y. J., & Lee, S. (2022). Understanding the social mechanisms of cancer misinformation spread on YouTube and lessons learned: Infodemographic study. *Journal of Medical Internet Research, 24*(11), e39571. doi:10.2196/39571
- YouTube. (2021a). Authoritative health information. <https://www.youtube.com/howyoutube works/product-features/health-information/>
- YouTube. (2021b). Ever wonder how YouTube works? [web] <https://www.youtube.com/howyoutubeworks/>
- Yurdaisik, I. (2020). Analysis of the most viewed first 50 videos on YouTube about breast cancer. *BioMed Research International, 2020*(15), 1-7. doi:10.1155/2020/2750148



- Zhang, F. F., Kelly, M. J., & Must, A. (2017). Early nutrition and physical activity interventions in childhood cancer survivors. *Current Obesity Reports*, 6(2), 168-177. doi:10.1007/s13679-017-0260-0
- Zhang, F. F., Meager, S., Koch-Weser, S., Singer, M. B., Dhaundiyal, G., Erban, J., & Saltzman, E. (2017). Weight management perception, interest, and preferences in adult cancer survivors. *Clinical Journal of Oncology Nursing*, 21(1), 65-71. doi:10.1188/17.CJON.65-71
- Zheng, Z., Jemal, A., Han, X., Guy, G. P., Li, C., Davidoff, A. J., Banegas, M. P., Ekwueme, D. U., & Yabroff, R. (2019). Medical financial hardship among cancer survivors in the United States. *Cancer*, 125(10), 1737-1747. doi:10.1002/cncr.31913



	<b>U6. Authoritative health source</b>	1 = Yes, 0 = No
	<b>U7. Celebrity</b>	1 = Yes, 0 = No
	<b>U8. Other</b>	1 = Yes, 0 = No
<b>FORMAT</b>		
	<b>F1. Talk by professional</b>	1 = Yes, 0 = No
	<b>F2. Interview</b>	1 = Yes, 0 = No
	<b>F3. Animation</b>	1 = Yes, 0 = No
	<b>F4. News reporter</b>	1 = Yes, 0 = No
	<b>F5. Video blog</b>	1 = Yes, 0 = No
	<b>F6. Still Images/text</b>	1 = Yes, 0 = No
	<b>F7. Talk by non-professional</b>	1 = Yes, 0 = No
	<b>F8. Documentary</b>	1 = Yes, 0 = No
	<b>F9. Combined/multiple formats</b>	1 = Yes, 0 = No
	<b>F10. Other</b>	1 = Yes, 0 = No
<b>CONTENT</b>		
	<b>C1. Late or long-term physical/mental side effects of cancer/cancer treatment</b>	1 = Yes, 0 = No
	C1A. Attention, memory, and/or thinking problems	1 = Yes, 0 = No
	C1B. Bone, joint, and/or soft tissue problems	1 = Yes, 0 = No
	C1C. Emotional difficulties (distress, depression, anxiety)	1 = Yes, 0 = No
	C1D. Fatigue	1 = Yes, 0 = No
	C1E. Cardiac problems	1 = Yes, 0 = No
	C1F. Hormone/endocrine problems	1 = Yes, 0 = No
	C1G. Lymphedema	1 = Yes, 0 = No
	C1H. Peripheral neuropathy	1 = Yes, 0 = No
	C1I. Physical body changes/body image concerns	1 = Yes, 0 = No
	C1J. Sexual health	1 = Yes, 0 = No

	C1K. Infertility	1 = Yes, 0 = No
	C1L. Premature menopause	1 = Yes, 0 = No
	C1M. Pain	1 = Yes, 0 = No
	C1N. Sleep problems	1 = Yes, 0 = No
	C1O. Weight gain	1 = Yes, 0 = No
	C1P. Weight loss C1Q. Nausea	1 = Yes, 0 = No 1 = Yes, 0 = No
	<b>C2. Fear of cancer recurrence</b>	1 = Yes, 0 = No
	C2A. Depression, fear, anxiety	1 = Yes, 0 = No
	C2B. Coping mechanisms	1 = Yes, 0 = No
	C2C. Discussing fear with healthcare professional	1 = Yes, 0 = No
	C2D. Recognizing emotions	1 = Yes, 0 = No
	C2E. Self-care	1 = Yes, 0 = No
	C2F. Support groups	1 = Yes, 0 = No
	C2G. Stress reduction	1 = Yes, 0 = No
	C2H. Tracking health/diagnosis information	1 = Yes, 0 = No
	<b>C3. Recommendations/new perspectives on health</b>	1 = Yes, 0 = No
	C3A. Tobacco use cessation	1 = Yes, 0 = No
	C3B. Alcohol use reduction	1 = Yes, 0 = No
	C3C. Health eating/nutrition	1 = Yes, 0 = No
	C3D. Exercise/physical activity	1 = Yes, 0 = No
	C3E. Stress management	1 = Yes, 0 = No
	<b>C4. Changes in families/relationships</b>	1 = Yes, 0 = No
	C4A. Spouse/partner role changes	1 = Yes, 0 = No
	C4B. Spouse/partner responsibility	1 = Yes, 0 = No
	C4C. Spouse/partner physical needs	1 = Yes, 0 = No
	C4D. Spouse/partner emotional needs	1 = Yes, 0 = No

	C4E. Spouse/partner sexual health/intimacy	1 = Yes, 0 = No
	C4F. Changes among friends/adult family members	1 = Yes, 0 = No
	C4G. Communication with children	1 = Yes, 0 = No
	C4H. Changes in children's behavior	1 = Yes, 0 = No
	C4I. Role reversal in adult children	1 = Yes, 0 = No
	<b>C5. Returning to work/starting to work after cancer diagnosis or treatment</b>	1 = Yes, 0 = No
	C5A. Going back to work	1 = Yes, 0 = No
	C5B. Talking with coworkers	1 = Yes, 0 = No
	C5C. Discrimination in the workplace	1 = Yes, 0 = No
	C5D. Job search	1 = Yes, 0 = No
	C5E. Disclosing cancer diagnosis/treatment during job search	1 = Yes, 0 = No
	C5F. Changes in work abilities	1 = Yes, 0 = No
	<b>C6. Financial burden/management of cancer</b>	1 = Yes, 0 = No
	C6A. Disability	1 = Yes, 0 = No
	C6B. Hospital bills	1 = Yes, 0 = No
	C6C. Bill organization/prioritization	1 = Yes, 0 = No
	C6D. Insurance	1 = Yes, 0 = No
	C6E. Coverage denied by insurance	1 = Yes, 0 = No
	C6F. Insurance appeals	1 = Yes, 0 = No
	C6G. Loans	1 = Yes, 0 = No
	C6H. Asking for help	1 = Yes, 0 = No
	<b>C7. Cancer rehabilitation recommendations</b>	1 = Yes, 0 = No
	C7A. Health/fitness programs or classes	1 = Yes, 0 = No
	C7B. Clinical trials	1 = Yes, 0 = No
	C7C. Family counseling	1 = Yes, 0 = No

	C7D. Home care	1 = Yes, 0 = No
	C7E. Counseling/therapy	1 = Yes, 0 = No
	C7F. marriage/couples therapy	1 = Yes, 0 = No
	C7G. Nutritional planning	1 = Yes, 0 = No
	C7H. Occupational therapy	1 = Yes, 0 = No
	C7I. Physical therapy	1 = Yes, 0 = No
	C7J. Social worker consult	1 = Yes, 0 = No
	C7K. recreational therapy	1 = Yes, 0 = No
	C7L. survivor matching programs	1 = Yes, 0 = No
	C7M. Tobacco cessation programs	1 = Yes, 0 = No
	C7N. Career counseling	1 = Yes, 0 = No
	C7N. Survivorship support groups/online forums	1 = Yes, 0 = No
	<b>C8. Surveillance for breast cancer recurrence</b>	1 = Yes, 0 = No
	C8A. History/physical exam	1 = Yes, 0 = No
	C8B. Breast cancer screening	1 = Yes, 0 = No
	C8C. Laboratory tests	1 = Yes, 0 = No
	C8D. Imaging/Scans	1 = Yes, 0 = No
	C8E. Risk evaluation	1 = Yes, 0 = No
	C8F. Genetic counseling	1 = Yes, 0 = No
	C8G. Screening for second primary cancers	1 = Yes, 0 = No
	C8H. Metastatic Diseases	1 = Yes, 0 = No
	<b>C9. Breast Cancer Health Promotion</b>	1 = Yes, 0 = No
	C9A. Information on breast cancer/risks	1 = Yes, 0 = No
	C9B. Obesity	1 = Yes, 0 = No
	C9C. Physical Activity	1 = Yes, 0 = No
	C9D. Nutrition	1 = Yes, 0 = No

	C9E. Smoking cessation	1 = Yes, 0 = No
	<b>C10. General information on cancer</b>	1 = Yes, 0 = No
	C10A. What is cancer	1 = Yes, 0 = No
	C10B. Cancer risk factors	1 = Yes, 0 = No
	C10C. Cancer treatments	1 = Yes, 0 = No
	C10D. Cancer survivorship	1 = Yes, 0 = No
	C10E. Genetic factors	1 = Yes, 0 = No
	C10F. Cancer screening	1 = Yes, 0 = No
	C10G. Reducing risk of cancer	1 = Yes, 0 = No
	<b>C11. Cancer treatments/breast cancer treatments</b>	1 = Yes, 0 = No
	C11A. Surgery	1 = Yes, 0 = No
	C11B. Chemotherapy	1 = Yes, 0 = No
	C11C. Radiation therapy	1 = Yes, 0 = No
	C11D. Targeted therapy	1 = Yes, 0 = No
	C11E. Immunotherapy	1 = Yes, 0 = No
	C11F. stem cell/bone marrow transplant	1 = Yes, 0 = No
	C11G. Palliative care	1 = Yes, 0 = No
	C11H. Clinical trials	1 = Yes, 0 = No
	C11I. Off-label drug use	1 = Yes, 0 = No
	C11J. Blood transfusion	1 = Yes, 0 = No
	C11K. Dietary supplements	1 = Yes, 0 = No
	C11L. Complementary and integrative medicine	1 = Yes, 0 = No
	C11M. Breast conserving surgery	1 = Yes, 0 = No
	C11N. Mastectomy	1 = Yes, 0 = No
	C11O. Double mastectomy	1 = Yes, 0 = No
	C11P. Lymph node removal	1 = Yes, 0 = No

	C11Q. Breast reconstructive surgery	1 = Yes, 0 = No
	<b>C12. Other Notable Features of Video</b> <i>Specify:</i> _____	1 = Yes, 0 = No
	<b>C13. Potential Misinformation</b> <i>Specify:</i> _____	1 = Yes, 0 = No
	<b>C14. Overall Rating</b> C14A. Useful (Educational) C14B. Misleading C14C. Useful (Personal Experience)	1 = Yes, 0 = No 1 = Yes, 0 = No 1 = Yes, 0 = No



## Appendix B: Videos Viewing Log

Videos with over one million views, length (in minutes), and year of upload.

Number of Views	Length in Minutes	Year of Upload
12,558,825	19:47	2020
12,087,587	2:53	2015
11,650,136	4:36	2020
10,360,624	2:06	2014
7,642,551	2:27	2011
6,433,748	2:57	2008
5,424,674	4:01	2009
5,137,798	5:44	2016
5,091,285	4:05	2018
4,202,084	4:09	2016
4,150,162	3:00	2010
4,145,667	4:01	2010
3,675,662	1:53	2016
3,050,429	2:34	2013
2,986,704	2:06	2015
2,894,392	10:12	2016
2,287,041	3:33	2010
1,584,617	10:37	2020
1,531,546	25:10	2022
1,358,141	3:06	2020
1,190,874	32:03	2021
1,115,009	4:43	2015
1,103,787	4:08	2015
1,051,700	43:44	2022