

IMPROVING CAREGIVER PALLIATIVE CARE KNOWLEDGE AND ATTITUDES:
EVALUATING THE IMPACT OF A PSYCHOEDUCATIONAL INTERVENTION AMONG
FRIENDS AND FAMILIES OF THOSE WITH CANCER

AN ABSTRACT

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Abstract

Research demonstrates that palliative care is associated with improved patient and caregiver outcomes, yet palliative care is often avoided and underutilized. Caregivers of individuals with serious illnesses may contribute to this underutilization, as they assume important roles in treatment decision-making, but they may be unaware of palliative care or view it negatively. The present study evaluated the efficacy of a psychoeducational intervention in improving palliative care knowledge and attitudes among informal caregivers, patients' close friends and families. A total of 150 adults who had ever had a close friend or family member diagnosed with cancer completed a randomized clinical trial (RCT) via Qualtrics. Participants reported key demographic and health characteristics and palliative care knowledge at baseline. Participants randomized to the intervention condition viewed a psychoeducational video on palliative care, while those in the control condition viewed a video on nutrition. Participants then completed outcome measures of palliative care knowledge (primary) and attitudes (secondary). Regression analyses tested the hypothesis that group assignment significantly predicted palliative care knowledge and attitudes while controlling for baseline knowledge and key demographic and clinical characteristics. The RCT was successful on the primary outcome of increasing caregivers' palliative care knowledge ($\beta = .309, p < .001$). Attitudes were unchanged ($\beta = -.003, p = .968$). This study demonstrates that a single-session, psychoeducational video can improve understanding of palliative care among close friends and families of those with cancer, and it suggests future pathways for improving caregiver attitudes and involvement with palliative care.

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Improving Caregiver Palliative Care Knowledge and Attitudes: Evaluating the Impact of a Psychoeducational Intervention Among Friends and Families of Those with Cancer

A cancer diagnosis has widespread implications for both patients and their friends and families, who often assume the critical role of informal caregiving (de Moor et al., 2017; Kent et al., 2016). These informal caregivers provide unpaid assistance and support to those with cancer, taking on new responsibilities that demand significant time and effort (Kent et al., 2016). As a result, they are at risk for high levels of strain, emotional and psychological distress, and decreased quality of life (Hoerger & Cullen, 2017; Kehoe et al., 2019; Litzelman et al., 2015; Trevino et al., 2018).

In the face of this distress, palliative care can help alleviate both patient and caregiver burden (Dionne-Odom et al., 2015; El-Jawahri et al., 2017; Hoerger et al., 2019). Palliative care is an interdisciplinary, team-based form of care focused on supporting quality of life (Ferrell et al., 2017). Research demonstrates that palliative care is associated with improved patient and caregiver outcomes, including both physical and psychological benefits (El-Jawahri et al., 2017; Hoerger & Cullen, 2017; Hoerger et al., 2019; Rogers et al., 2020).

Despite its potential to help, palliative care is significantly underutilized. Caregivers of individuals with cancer and other serious illnesses may contribute to this phenomenon: caregivers assume important roles in medical decision-making (Lamore et al., 2017), but they often are unaware of palliative care or perceive it negatively (Collins et al., 2017; Dionne-Odom, Ornstein, et al., 2019; Zimmermann et al., 2016). Yet, research focused on improving caregivers' knowledge and attitudes related to palliative care is relatively limited. To help fill this gap, the present study aims to evaluate the efficacy of a psychoeducational intervention to improve palliative care knowledge and attitudes among patients' friends and families.

Caregiver Roles, Responsibilities, and Impacts

Informal caregivers can be defined as individuals, typically family members or close friends, who provide ongoing, uncompensated assistance to patients, often in their homes (Kent et al., 2016). These individuals are most commonly patients' romantic partners or spouses, friends, or children (de Moor et al., 2017). Caregivers play a vital role in supporting those with cancer. Their responsibilities may include assisting patients with activities of daily living, managing symptoms and side effects, providing psychological and emotional support, and facilitating treatment adherence by managing medications and performing medical tasks (Duimering et al., 2020; Tolbert et al., 2018; Ullgren et al., 2018). Caregivers also report helping patients navigate the healthcare system by communicating with healthcare providers, synthesizing health information, and engaging in healthcare decision-making (Tolbert et al., 2018). These responsibilities are in addition to their other typical or pre-existing roles professionally and at home.

Caregiving is associated with both positive and negative impacts on quality of life. As a result of this role, many individuals commonly report experiencing stronger relationships with others, greater appreciation of life, clarification of life priorities, and a sense of personal growth and satisfaction, among other benefits (Li & Loke, 2013; Mosher et al., 2017). However, assuming caregiving responsibilities takes considerable time and effort, as almost half of cancer caregivers report they provide care nearly all the time (Shin et al., 2018). This strain associated with caregiving is reflected by decreased quality of life among cancer caregivers relative to the other disease areas and the general population (Kim et al., 2015; Trevino et al., 2018; Yuen et al., 2016). More specifically, research has shown that informal caregiving can have detrimental physical and psychological impacts on quality of life, including physical health impairment and

elevated levels of depression, anxiety, and overall emotional distress (Ochoa et al., 2020). In fact, estimates of anxiety, depression, and psychological distress in cancer caregivers are at least two times higher than the general population. Some studies even report higher psychological impairment among caregivers than the patients they care for (Williams, 2018). Caregivers may also report financial, social, professional, and spiritual concerns associated with caregiving, further impacting their quality of life (Ochoa et al., 2020; Williams, 2018).

Moreover, the interdependent nature of patient and caregiver well-being further complicates the burden of caregiving (Streck et al., 2020). Research has demonstrated there is a bidirectional relationship between patient and caregiver physical and mental health (Ochoa et al., 2020; Williams, 2018). For example, caregivers of patients with depression and poor functional status are more likely to experience increased emotional distress, decreased physical functioning, and an overall lower quality of life (Kehoe et al., 2019; Tan et al., 2018). As such, caregiver quality of life is tied to the well-being of the patients they care for.

Benefits and Underutilization of Palliative Care

Although there is an abundance of high-quality evidence supporting the use of palliative care, it is a widely misunderstood and underutilized resource. Meta-analyses of randomized clinical trials have found that palliative care improves patient quality of life among adults with cancer in inpatient and outpatient settings, and it may improve survival duration marginally among those with advanced cancer in outpatient settings (Hoerger et al., 2019; Rogers et al., 2020). More specifically, outpatient palliative care may significantly improve patients' physical, psychological, and global quality of life, and it is associated with a slower mortality rate in adults with advanced cancer (Hoerger et al., 2019). In addition to supporting patients with serious cancer diagnoses, palliative care has been shown to directly benefit caregivers. Palliative care

may improve caregiver psychological distress, social well-being, overall stress and burden, and satisfaction with care (Dionne-Odom et al., 2015; El-Jawahri et al., 2017; McDonald et al., 2017; Sun et al., 2015). Accordingly, the American Society of Clinical Oncology now recommends referral to palliative care soon after diagnosis of advanced cancer (Ferrell et al., 2017).

Nevertheless, this resource is significantly underutilized, as most patients never receive palliative care. Those who do utilize palliative care receive it late, when the patient is near death (Bailey et al., 2014; Blackhall et al., 2016; den Herder-van der Eerden et al., 2018; Roeland et al., 2016; Scibetta et al., 2016). The underutilization of palliative care may be partially due to a lack of knowledge, as well as negative attitudes, beliefs, and emotions associated with the term. Approximately 70% of adults in the United States do not know what palliative care is (Adjei Boakye et al., 2020; Patel & Lyons, 2020; Taber et al., 2019), and even those who report knowledge of palliative care may hold misconceptions or false beliefs about its goals and purpose (Shalev et al., 2018; Taber et al., 2019). Similarly, caregivers of those with cancer and other serious illnesses are also undereducated regarding palliative care. Over half of caregivers have never heard of palliative care, and even those who have heard of it maintain limited or incorrect understandings (Dionne-Odom, Ornstein, et al., 2019; Zimmermann et al., 2016). Further, caregivers report equating palliative care with death (Dionne-Odom, Ornstein, et al., 2019), and diminished care, possibility, and choice (Collins et al., 2017). Given significant caregiver involvement in patients' care and medical decision-making (Tolbert et al., 2018), these beliefs may contribute to palliative care's underutilization.

Improving Caregiver Palliative Care Knowledge and Attitudes

Although caregivers and the patients they care for stand to benefit from palliative care, they often hold negative associations with this form of care and avoid utilizing it. As such, it is

important to examine and improve caregivers' palliative care knowledge and attitudes in order to increase utilization and improve patient and caregiver quality of life. However, interventions to improve palliative care knowledge and attitudes thus far have primarily concentrated on patients, physicians, or the general public (Dionne-Odom, Ornstein, et al., 2019; Kozlov, Reid, et al., 2017; Perry et al., 2021).

The evidence for improving palliative care knowledge in caregivers is growing but still limited. Notably, a recent study conducted by Noh et al. (2020) implemented an educational intervention among caregivers of cognitively impaired adults. The authors found that the intervention, which consisted of face-to-face, individual information sessions accompanied by a palliative care brochure, significantly improved caregivers' palliative care knowledge. Similarly, Akiyama et al. (2016) found that community-wide dissemination of various educational materials – including flyers, booklets, posters, a video about palliative care, and public lectures – significantly improved palliative care knowledge among family caregivers of individuals with cancer that had recently died. Additionally, in a pilot study with Latino/a caregivers of patients with various diagnoses (e.g., heart disease, dementia, diabetes, cancer), Cruz-Oliver et al. (2016) utilized oral presentations, a culturally sensitive educational video in the form of a *telenovela*, and a structured group discussion to inform participants on topics related to end-of-life care. The authors found that only 21% of caregivers were familiar with the concept of palliative care at baseline, but 87% of caregivers could define the concept correctly after the intervention. These recent studies have demonstrated the feasibility of educating caregivers about palliative care, and they have shown evidence of benefit. However, these studies have not utilized a control group, and they have focused solely on palliative care knowledge rather than more distal outcomes such

as attitudes. Further, no known study has focused on a discrete, single-session intervention in an oncology-specific population.

Outside of caregiver populations, other notable studies have demonstrated the efficacy of educational interventions in improving both palliative care knowledge and attitudes. The EMPOWER studies examined these outcomes among patients with cancer in a series of two studies. The investigators designed these studies based on the Empowerment Theory of Palliative Care, which suggests that palliative care utilization relies on both cognitive and emotional processes. This theory emphasizes the presence of a cognitive pathway (improving knowledge of palliative care) and an emotional pathway (increasing motivation to utilize palliative care) that allow patients to gain mastery over the decision to pursue palliative care (Hoerger et al., 2017; Perry et al., 2021). Both the EMPOWER 1 and EMPOWER 2 studies employ this perspective within their different methodologies, and they demonstrated that educating patients about palliative care significantly improves their knowledge and preferences for this form of care (Hoerger et al., 2017; Perry et al., 2021). The initial EMPOWER 1 study implemented a randomized controlled trial (RCT) evaluating the impact of a written summary of the Early Palliative Care study (Temel et al., 2010) on palliative care preferences among patients with cancer. Results showed that patients receiving the intervention found palliative care more efficacious and less scary, and they indicated stronger intentions to utilize palliative care (Hoerger et al., 2017). Expanding on this initial RCT, the EMPOWER 2 study (Perry et al., 2021) developed a set of patient-centered psychoeducational videos with a stakeholder advisory board that aimed to inform patients about palliative care and improve their readiness to utilize it. The study examined the videos' preliminary efficacy in a small, uncontrolled, pilot study of individuals with cancer. Similar to the results of the first EMPOWER study (Hoerger et al.,

2017), Perry et al. (2021) found that the videos significantly improved attitudes towards palliative care. Further, the intervention improved patient knowledge by approximately 83% (Perry et al., 2021). While another RCT has found similar results to the EMPOWER studies in a non-clinical population (Kozlov, Reid, et al., 2017), other psychoeducational interventions have not demonstrated comparable effects on palliative care knowledge. Two RCTs using video-based psychoeducational interventions found no change in palliative care knowledge among women with gynecologic cancers (Graul et al., 2020) and other patients meeting palliative care referral criteria (Kamal et al., 2019). Thus, the evidence among patients varies, and the evidence among caregivers is limited.

For those reasons, further research is needed to determine the effects of psychoeducational interventions on palliative care knowledge and attitudes, particularly among caregivers of those with cancer. That said, the EMPOWER studies described above have demonstrated improvement in both palliative care knowledge and attitudes among patients, and the psychoeducational intervention may be similarly effective with cancer caregivers. The present research therefore aims to adapt the EMPOWER 2 psychoeducational intervention for use among patients' close friends and families.

Present Study

To address gaps in the literature, the present study implemented an online intervention targeting palliative care knowledge and attitudes among close friends and family members of patients with a history of cancer. The primary aims of this study were to examine the effects of a psychoeducational intervention on 1) palliative care knowledge, and 2) palliative care attitudes. The intervention was grounded in prior research (Hoerger et al., 2017; Perry et al., 2021), testing

the hypotheses that participants who view the intervention video will hold increased knowledge and view palliative care more favorably than those in the control group.

Methods

Participants and Procedures

This was a single-session, anonymous online study conducted via Qualtrics (Tulane University Institutional Review Board #2021-1041). Individuals were eligible to participate if they provided informed consent, were 18 years of age or older, and had ever had a close friend or family member diagnosed with cancer. We initially targeted spousal caregivers of those currently in treatment for cancer but expanded the sample due to limited recruitment. We primarily recruited participants through ResearchMatch, an NIH-sponsored online recruitment tool that connects interested volunteers with potential research studies (Harris et al., 2012). The research team also recruited participants via postings on websites and social media pages including Facebook, Twitter, Reddit, Craigslist, and Psychological Research on the Net (with administrator permission). We originally targeted a sample size of 400 participants to provide adequate power for future secondary analyses, but the minimum required analytical sample size was approximately 100 participants ($f^2 = .20$ at 80% power, $\alpha = .05$).

Following informed consent, Qualtrics' built-in randomization feature assigned participants to the intervention or control condition. Both groups completed baseline measures of demographic and health information, health literacy, and palliative care knowledge. Participants in the intervention condition then viewed a psychoeducational video discussing palliative care, while the control group viewed an educational video on nutrition. Both the intervention and control groups then completed post-assessments of palliative care knowledge and attitudes. For data cleaning purposes, participants also confirmed whether they carefully and honestly

completed the survey, whether they had completed the survey previously, and whether they or their family member/friend had ever received palliative care. After completing all assessments and submitting their responses, the control group received access to the intervention video, and the intervention group received access to the control video. Both groups also received additional information and resources on palliative care, supporting those with cancer, and coping and emotional support for patients and their families and friends.

Intervention. The intervention arm of this study entailed viewing a psychoeducational video developed as part of the EMPOWER 2 study. The video is grounded in the Empowerment Theory of Palliative Care and was developed with stakeholder involvement (Hoerger et al., 2017; Perry et al., 2021). The video introduced palliative care and discussed palliative care's purpose, structure, benefits, and efficacy. It was 5 minutes and 52 seconds long and suitable for all levels of education and health literacy. It contained a concrete and straightforward discussion of the topics listed above, employing an accessible vocabulary level (Flesch-Kincaid level 4.4).

Although researchers developed the video with input from many different stakeholders, including family members of patients, they designed it for use within a local patient population. Thus, we adjusted the intervention as possible to improve relevance to caregivers outside of the New Orleans area (e.g., removing video chapters that may be only pertinent to patients or New Orleans-area residents; see Appendix A). To provide further clarity, instructions informed caregivers that we initially developed the video for patients and that, based on the results of this study, we may develop more caregiver-specific videos in the future.

Control. The control group viewed a so-called neutral educational video on nutrition and healthy eating during cancer survivorship. This video acted as an attentional control because of its content, source, and duration. The video was developed in part by the American Cancer

Society, and its content was based on scientific evidence and published guidelines. The information discussed within the video was relevant to quality of life and well-being in cancer but not directly related to palliative care. Additionally, previous research on palliative care knowledge has used videos with similar content as a control (Kozlov, Reid, et al., 2017). Further, the video was similar in length (4 minutes and 3 seconds) to the intervention video, resulting in comparable time commitments for patients randomized to each group.

Baseline Measures

Demographic and health characteristics. Participants completed a battery of items at baseline pertaining to their and their family member/friend's demographic and health characteristics. Participants reported their age, gender, race/ethnicity, education, relationship status, financial status, health literacy, and overall perceived health. Participants also reported their family member/friend's age, gender, race/ethnicity, whether they were living or deceased, and key health characteristics (i.e., cancer type and stage, time since diagnosis/death, comorbidities, and treatments). Additionally, participants characterized their relationship with the patient by reporting how they were related, how close they were, how involved they were in the patient's care, and whether they provided instrumental support. Instrumental support was defined as assisting with health-related care (i.e., mobility, self-care, and/or household chores), information (i.e., gathering and communicating information), or decisions (i.e., discussing healthcare choices) (Dionne-Odom, Ejem, et al., 2019; Monin et al., 2019; Polenick et al., 2020). Finally, participants reported their and their friend/family member's previous experience with palliative care.

Palliative care knowledge. Participants also reported palliative care knowledge at baseline via a single item derived from the National Institutes of Health's Health Information

National Trends Survey (HINTS). This question asked participants to indicate their level of knowledge of palliative care, with response options including “never heard of it,” “know a little bit about it,” and “know what palliative care is and could explain it to someone else.” Prior research has used this question to assess palliative care knowledge among patients, caregivers, and the general public (Adjei Boakye et al., 2020).

Outcome Measures

Palliative care knowledge. After viewing either the intervention or control video, participants completed the Palliative Care Knowledge Scale (PaCKS) (Kozlov, Carpenter, et al., 2017). This 13-item scale measured knowledge of palliative care through a series of questions, to which respondents answered “Yes,” “No,” or “I don’t know.” Each correct answer was scored as 1, and each incorrect or unsure answer was scored as 0. The PaCKS total score was created by summing the total correct responses, with higher scores indicating greater palliative care knowledge. The PaCKS has demonstrated acceptable reliability and validity among adults (Kozlov, Carpenter, et al., 2017), and it has been used in various research populations, including caregivers (Noh et al., 2020).

Palliative care attitudes. Participants also reported their attitudes toward palliative care by completing the nine-item Palliative Care Attitudes Scale (Perry et al., 2020), adapted for use among caregivers (PCAS-9C). The PCAS-9C consisted of emotional, cognitive, and behavioral subscales with three items each. The scale asked respondents to indicate how stressful or helpful palliative care would be, as well as their willingness to attend palliative care visits.

The PCAS-9C utilized a five-point rating scale ranging from 1 to 5 throughout, and each subscale contained a unique set of response option descriptors. Subscale scores were created by summing the items within each subscale. The emotional subscale was reverse scored for

consistency, so that higher scores indicated more favorable attitudes toward palliative care. Total scores were created by adding the three subscale scores. Total scores ranged from 9 to 45, with lower scores indicating more palliative care avoidance. The original measure has demonstrated acceptable reliability and validity among adults with cancer and other serious medical conditions (Perry et al., 2020), and the present study confirmed the PCAS-9C's psychometric properties.

Analyses

Data cleaning and screening. Prior to analyses, I screened the data for response validity and missing values, assumptions for primary analyses, and psychometric performance of the outcome measures. Invalid data was identified and removed as necessary based on time spent completing the survey, and participant responses indicating their eligibility, audio/video functionality, whether they carefully and honestly completed the survey, and whether they completed the survey previously. Additionally, the analytic sample only included data from participants who indicated they or their family member/friend had never received palliative care.

Following these procedures, I identified outliers on the dependent variables and examined the distribution of the data. I replaced any outliers (>3 standard deviations from the mean) with the closest non-outlying value (Sadiq, 2013), and I examined histograms and skewness/kurtosis statistics to characterize the distributions of the dependent variables. Additionally, I confirmed the outcome measures' psychometric performance via internal consistency and factor structure.

Lastly, I examined the necessary assumptions for the core primary analysis of multiple linear regression. Residual normality was examined via histograms and p-p plots. Independence was confirmed with the Durbin-Watson statistic. Linearity and homogeneity of error variance (i.e., homoscedasticity) were examined through scatterplots of the residuals, and homoscedasticity was confirmed via the Breusch-Pagan and White tests for heteroscedasticity.

Finally, multicollinearity was examined via correlation coefficients, tolerance, and variance inflation factor values.

Primary analyses. Primary analyses characterized the sample, determined the existence of any baseline differences between groups, and examined the effect of group assignment (i.e., intervention or control) on PaCKS and PCAS-9C scores. First, I conducted descriptive statistics for baseline demographic and health characteristics and palliative care knowledge, subsequently employing t-tests and chi-square tests to determine whether statistically significant differences between the intervention and control groups existed at baseline. Descriptive statistics also characterized the distribution of scores on the outcome measures.

Following this, I examined bivariate Pearson correlation coefficients and conducted multiple linear regression to assess the effect of group assignment on PaCKS and PCAS-9C scores. Regression analyses utilized two separate regression models: one with PaCKS total scores as the dependent variable and one with PCAS-9C total scores as the dependent variable. Each model included group assignment as the independent variable and the following predictors as covariates: baseline knowledge of palliative care (present vs. absent), age, gender (male vs. other), education (Bachelor's degree present vs. absent), instrumental support (providing vs. not providing instrumental support), patient cancer type (dummy coded for the two most common diagnoses), time since diagnosis, cancer stage (metastases present vs. absent), and patient vital status (living vs. deceased). For the primary regression analyses, palliative care knowledge was dummy coded as present if the participant indicated they knew what palliative care was and could explain it to someone else. Covariates were selected based on clinical relevance and past research indicating their importance (Bazargan et al., 2021; Hoerger et al., 2017; Perry et al., 2021).

Sensitivity analyses. Following primary analyses, I conducted a set of sensitivity analyses. First, I conducted multiple linear regression with the three subscale scores of the PCAS-9C as dependent variables in three separate models. The predictors remained the same as within the primary analyses. Second, any additional demographic and health variables that were significantly correlated with PaCKS or PCAS-9C total scores or any variables that differed across groups at baseline were added to the primary analysis regression models as a covariate. Finally, I transformed any outcome variables that did not adequately adhere to analytical assumptions and re-ran the primary regression analyses with the transformed data.

Results

Sample Selection

A total of 395 participants consented to participate and accessed the survey via Qualtrics between December 19, 2021, and March 26, 2022. Of these 395 participants, 198 were randomized to the intervention condition, and 197 were randomized to the control condition. Across both conditions, cases were removed for the following reasons: previewing the survey (viewing the survey but providing no or very few responses; $n = 123$), previously participating ($n = 3$), completing the survey too quickly (less than the length of the condition's video; $n = 1$) or too slowly (>4 hours, suggesting distractibility; $n = 8$), ineligibility (never having a friend or family member with cancer; $n = 1$), responding carelessly (self-reporting not answering truthfully or carefully; $n = 4$), having no audio or video functionality ($n = 5$), or having previous palliative care experience ($n = 100$). This resulted in a final analytic sample of 150 participants, with 77 participants in the intervention and 73 participants in the control condition. Participants' median study completion time was 16 minutes and 28 seconds. For the core primary analysis of multiple linear regression, the study was powered to detect an effect size of $f^2 = .15$ as

statistically significant ($\alpha = .05$) at 90% for the entire model and 99% for individual coefficients within the model (two-tailed). Please see Figure 1 for a CONSORT diagram outlining sample selection.

Data Cleaning and Screening

Among the outcome scores, six outliers on the PaCKS and one outlier on the PCAS-9C were identified and replaced with the closest non-outlying value prior to any inferential statistics. Following replacement, skewness and kurtosis statistics were within recommended ranges (Hair, 2010) of ± 2 for skewness (PaCKS = -1.83, PCAS-9C = -.387) and ± 7 for kurtosis (PaCKS = 2.54, PCAS-9C = .079). While visual inspection of the PaCKS data indicated negative skew, the primary analysis of multiple linear regression does not require normality of the dependent variable scores. Additionally, there was no missing data among any model variables. Any missing data among other variables were imputed with the mean or mode depending on the variable type. Furthermore, screening of the PaCKS and PCAS-9C factor structure and internal consistency (PaCKS $\alpha = .914$, PCAS-9C $\alpha = .765$) confirmed the measures' satisfactory performance within the study.

Lastly, I examined regression assumptions of normality, independence, linearity, homoscedasticity, and multicollinearity. The data met nearly all assumptions, except for the homoscedasticity assumption in model 1 (palliative care knowledge via PaCKS total scores). To adjust for heteroskedasticity, the primary analysis utilized robust standard errors within model 1, and subsequent sensitivity analyses transformed the PaCKS data and re-ran the primary regression analysis.

Sample Characteristics

Table 1 presents descriptive characteristics for the intervention group, control group, and total sample. Participants (i.e., caregivers) had a mean age of 49.66 (*standard deviation [SD]* = 16.19) and were primarily female ($n = 125$, 83.3%) and educated with a Bachelor's degree or higher ($n = 114$, 76.0%). Participants predominantly reported being White and non-Hispanic or Latino/a ($n = 121$, 80.7%), with the next most frequently reported race/ethnicities being Black or African American ($n = 12$, 8.0%) and Hispanic or Latino/a ($n = 7$, 4.7%). Participants were most commonly patients' adult children ($n = 60$, 40.0%) or spouses/romantic partners ($n = 34$, 22.7%). Most participants provided instrumental support ($n = 117$, 78.0%) and were at least "a little involved" in the patient's medical care ($n = 128$, 85.3%). At baseline, participants self-reported that they never heard of palliative care ($n = 27$, 18.0%), knew a little bit about it ($n = 60$, 40.0%), or knew what palliative care was and could explain it someone else ($n = 63$, 42.0%).

Caregivers also reported patients' demographic and health information. Patients were primarily female ($n = 88$, 58.7%), and their mean current age or age at death was reportedly 63.37 years old ($SD = 14.94$). Patients were most frequently reported as White and non-Latino/a ($n = 120$, 80.5%), followed by Black or African American ($n = 12$, 8.0%) and Hispanic or Latino/a ($n = 7$, 4.7%). Patients were most commonly diagnosed with breast ($n = 41$, 27.3%) or lung ($n = 17$, 11.3%) cancer, and they were diagnosed an average of 10.30 ($SD = 11.84$) years ago. A total of 32.0% ($n = 48$) of patients had metastatic cancer, and 66.0% ($n = 99$) of patients were currently living. Among both caregiver and patient characteristics, the intervention and control groups only differed with respect to patient receipt of chemotherapy (intervention: $n = 42$, 54.5%; control: $n = 53$, 72.6%; $p = .022$). Sensitivity analyses adjusted for this difference by including chemotherapy as a covariate in regression.

Knowledge and Attitudes: Descriptive Statistics and Bivariate Associations

Table 2 characterizes the PaCKS and PCAS-9C outcome scores. Scores on the PaCKS ranged from 0 to 13 (*mean [M]* = 10.92, *SD* = 3.22), where 0 indicates no correct answers and 13 indicates all correct answers. The intervention group's mean score was 11.94 (*SD* = 1.96), which is approximately 91.8% correct answers. The control group's mean score was 9.85 (*SD* = 3.89), or 71.8% correct. Approximately 92.2% of the intervention group scored above the control group's mean PaCKS score. Scores on the PCAS-9C ranged from 21 to 44 (*M* = 34.77, *SD* = 4.36), where higher scores indicate more favorable attitudes towards palliative care. Mean scores for each group were similar, with intervention and control group means of 34.73 (*SD* = 4.12) and 34.82 (*SD* = 4.64), respectively.

Table 3 presents associations between intervention group assignment, model covariates, and palliative care knowledge (PaCKS) and attitudes (PCAS-9C). Palliative care knowledge was significantly correlated with the intervention ($r = .335, p < .001$), caregiver baseline palliative care knowledge ($r = .394, p < .001$), and caregiver age ($r = .214, p = .008$). Palliative care attitudes were significantly correlated with caregiver gender ($r = -.230, p = .005$). Furthermore, palliative care knowledge and attitudes were significantly correlated with one another ($r = .211, p = .010$).

Hypothesis Testing

Table 4 presents the results of the multiple linear regression analyses predicting palliative care knowledge via PaCKS total scores (model 1) and attitudes via PCAS-9C total scores (model 2). As hypothesized for the primary outcome, the intervention increased knowledge of palliative care ($\beta = .309, p < .001$), even when controlling for baseline knowledge and demographic and health covariates. Among these covariates, baseline knowledge of palliative care ($\beta = .332, p <$

.001) and caregiver age ($\beta = .180, p = .019$) significantly predicted outcome knowledge.

Contrary to hypotheses for the secondary outcome, the intervention did not affect palliative care attitudes ($\beta = -.003, p = .968$). Among covariates, only caregiver gender ($\beta = -.234, p = .006$) was significant, with males having less favorable attitudes towards palliative care.

Sensitivity Analyses

Follow-up sensitivity analyses adjusted the primary regression models in the following ways: 1) employed PCAS-9C subscale scores as dependent variables, 2) included additional covariates based on baseline differences and bivariate correlations, and 3) used a transformed version of the PaCKS total score as a dependent variable (see Tables B1 and B2). The first sensitivity analyses among PCAS-9C subscales confirmed that, like overall attitudes, the intervention did not significantly predict emotional ($\beta = .034, p = .684$), cognitive ($\beta = .044, p = .589$), or behavioral ($\beta = -.107, p = .153$) attitudes towards palliative care.

The second set of sensitivity analyses expanded the primary regression models to include covariates for variables that differed between groups at baseline and additional variables that significantly correlated with PaCKS and PCAS-9C scores. Chemotherapy was added as a covariate in both primary regression models because of baseline differences between groups (see Table 1). Caregiver race/ethnicity, financial strain, caregiver closeness to patient, caregiver health literacy, and patient gender were included as covariates predicting palliative care knowledge because they were significantly correlated with PaCKS total scores. Health literacy and patient gender were added as covariates predicting palliative care attitudes because they were significantly correlated with PCAS-9C total scores (see Tables B1 and B2). Even when accounting for these new covariates, the intervention significantly predicted palliative care knowledge ($\beta = .331, p < .001$) but not attitudes ($\beta = -.006, p = .942$).

Finally, the PaCKS total score was transformed (reflected and inverse) and used as the dependent variable within the primary regression model (see Table B2). I opted to transform the data because it improved residuals' heteroscedasticity, lessened the data's skew and further improved raw score and residual normality, and it provided an alternative approach to outliers. The intervention remained a significant predictor of palliative care knowledge when using this transformed score ($\beta = .254, p < .001$).

Discussion

The present study was an online, single-session RCT evaluating the impact of a psycho-educational video intervention on palliative care knowledge and attitudes among informal caregivers, the close friends and family members of people with a history of cancer. Results found that the intervention was associated with increased knowledge of palliative care, and this finding remained even when controlling for pre-existing knowledge and other relevant demographic and health covariates. While there was no evidence for a significant impact of the intervention on attitudes, the impact on knowledge was robust across multiple sensitivity analyses. Given the intervention's strong influence on palliative care knowledge and its brief and accessible format, these findings have important implications for education within clinical settings and promoting communication among clinicians, patients, and informal caregivers.

Knowledge Findings

The present research provides valuable insight into palliative care education among cancer caregivers. Even though the sample was generally educated about palliative care at baseline, the intervention video still significantly improved their understanding. The strong effect of the intervention is clearly demonstrated in the groups' outcome knowledge scores, with 92.2% of the intervention group scoring above the control group's mean.

This is the first known RCT to examine a psychoeducational intervention's impact on palliative care knowledge among informal caregivers, specifically patients' close friends and family members. To the best of my knowledge, all previous studies examining caregiver palliative care education have been uncontrolled, focusing only on pretest-posttest changes in a single group (Cruz-Oliver et al., 2016; Noh et al., 2020) or level of knowledge based on unrandomized community exposure (Akiyama et al., 2016). Further, these studies have either utilized non-cancer samples (Noh et al., 2020), not differentiated between cancer caregivers and other serious illness caregivers (Cruz-Oliver et al., 2016), or focused on bereaved family members of those with cancer (Akiyama et al., 2016). Moreover, these studies employed longer interventions consisting of various educational materials (e.g., verbal presentations paired with videos or written materials), ranging from 30-minute sessions (Cruz-Oliver et al., 2016; Noh et al., 2020) to three-year public educational campaigns (Akiyama et al., 2016). Thus, this study is unique in terms of its randomization and control group, its cancer-specific focus and inclusion of current cancer caregivers, and its sole use of a brief, single-material video intervention, which significantly reduces barriers to implementation.

More broadly, this study also helps to clarify the overall impact of video-based interventions on palliative care knowledge across various populations. Prior RCTs in non-caregiver populations have found both significant and null effects of videos on palliative care knowledge (Perry et al., 2021): while one RCT among laypersons demonstrated a relatively small but significant effect of a video intervention on knowledge (Kozlov, Reid, et al., 2017), two other video-based RCTs among patients found no significant effect on knowledge (Graul et al., 2020; Kamal et al., 2019). The present research reveals strong evidence of palliative care

knowledge improvement with a psychoeducational video, further supporting the potential utility of this accessible intervention format for educational purposes.

Attitude Findings

This was also the first known RCT to examine palliative care attitude improvement among patients' close friends and family members. However, contrary to hypotheses, the intervention did not significantly improve palliative care attitudes. This null finding may be due to a number of reasons.

First, the sample had quite positive attitudes towards palliative care, and the manipulation may not have been strong enough to improve the sample's already-favorable attitudes. Second, while the intervention video was accessible to all education and health literacy levels, this study's highly-educated sample may have benefitted from a more nuanced version of the intervention that discussed palliative care in greater depth. Third, the original intervention video contained more chapters than were included in the present study. Some of these chapters had important information that may have influenced attitudes, but they weren't well-suited to the current study and were thus removed (see Table A1). Lastly, researchers originally designed the video to improve patients' attitudes. It is possible that caregivers may have separate fears or reservations about palliative care than patients, and the intervention – while still informative about palliative care's purpose, structure, and benefits – may not have adequately addressed these concerns. Future research may wish to further emphasize caregiver-specific benefits of palliative care and assess different facets of caregivers' attitudes towards palliative care utilization.

Limitations

It is important to interpret these findings in the context of this study's limitations. First, this sample is relatively homogenous with regard to race/ethnicity, gender, and education. Future studies should recruit more representative samples and consider differences among sociodemographic groups, especially considering research finds differential palliative care utilization across various racial and ethnic groups (Gardner et al., 2018; Mossman et al., 2021). Additionally, the study design did not include pre-test assessments of the PaCKS and PCAS-9C, which may have revealed differential changes among the intervention and control groups. Furthermore, the sample included participants with a range of involvement in patients' healthcare, including those who described themselves as "not involved at all." The intervention may ultimately be more impactful among those who are more actively involved in patients' medical care and decision-making. Subsequent studies should aim to examine knowledge and attitude improvement in current caregivers, particularly those assisting a patient who may be eligible for palliative care.

Implications and Future Directions

The present findings have implications for caregiver palliative care education, attitudes, and utilization. Results indicate that this brief, one-time video may effectively educate caregivers about palliative care, and this format is conducive to its potential use in clinical settings. Prior work has shown that caregivers and patients rarely, if ever, have conversations with their clinicians about end-of-life care preferences, including palliative care (Brighton & Bristowe, 2016). Caregivers, patients, and clinicians tend to avoid the topic and may all be waiting for the other party to start the discussion (Brighton & Bristowe, 2016; Collins et al., 2018a). This conversation may be further deferred due to clinicians' inadequate training, uncertainty of patient

readiness to discuss the topic, or fear of causing distress (Brighton & Bristowe, 2016). However, caregivers report a desire for increased communication about the end of life, including routine education about palliative care before the time of referral (Collins et al., 2018b). This brief video format may be a helpful and effective conversational aid that allows patients, caregivers, and clinicians to discuss palliative care and other end-of-life care preferences. Therefore, this may enable timelier referral to palliative care and, ultimately, medical care that more closely aligns with patients' wishes.

Moving forward, studies should aim to further elucidate the relationship between caregivers' knowledge and attitudes towards palliative care. This research may benefit from using more caregiver-specific psychoeducational materials that are tailored to their perspectives, concerns, and behaviors. Further, future studies should examine whether increased understanding of palliative care ultimately translates to increased utilization among both patients and caregivers.

In sum, the present study contributes to the growing literature on improving caregiver knowledge and attitudes towards palliative care in oncology. This research demonstrates the efficacy of a video-based psychoeducational intervention in educating patients' close friends and family members, and it outlines pathways for additional research on improving caregivers' attitudes towards palliative care. Future work should further explore the relationship between knowledge and attitudes, ultimately aiming to increase palliative care's utilization and improve patient and caregiver quality of life.

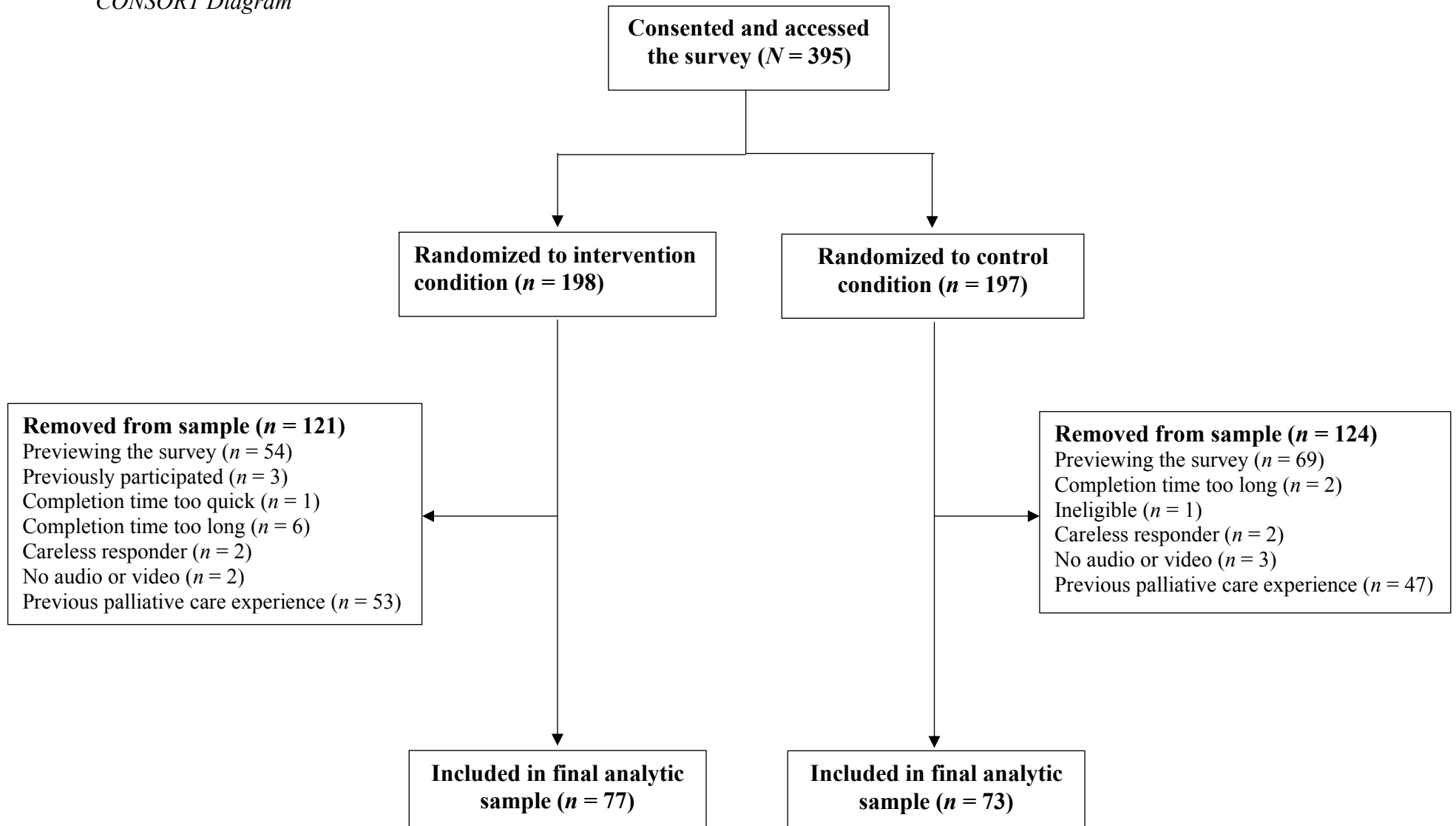
Figure 1*CONSORT Diagram*

Table 1*Caregiver and Patient Baseline Characteristics*

Characteristic	M (SD) or <i>n</i> (%)			<i>p</i> ^a
	Intervention (<i>n</i> = 77)	Control (<i>n</i> = 73)	Total (<i>N</i> = 150)	
Caregiver characteristics				
Age, years	49.78 (17.15)	49.53 (15.22)	49.66 (16.19)	.927
Gender, male	14 (18.2%)	10 (13.7%)	24 (16.0%)	.454
Race/Ethnicity, White and non-Latino/a	65 (84.4%)	56 (76.7%)	121 (80.7%)	.232
Education level, Bachelor's or higher	58 (75.3%)	56 (76.7%)	114 (76.0%)	.842
Marital status, married	42 (54.5%)	43 (58.9%)	85 (56.7%)	.590
Financial strain, present	17 (22.1%)	21 (28.8%)	38 (25.3%)	.346
Location				.975
Southern U.S.	25 (32.5%)	23 (31.5%)	49 (32.7%)	
Western U.S.	21 (27.3%)	22 (30.1%)	43 (28.7%)	
Midwestern U.S.	21 (27.3%)	17 (23.3%)	38 (25.3%)	
Northeastern U.S.	8 (10.4%)	9 (12.3%)	17 (11.3%)	
International	2 (2.6%)	2 (2.7%)	4 (2.7%)	
Relationship to patient				.951
Adult child/child-in-law	31 (40.3%)	29 (39.7%)	60 (40.0%)	
Spouse/partner	17 (22.1%)	17 (23.3%)	34 (22.7%)	
Sibling/Sibling-in-law	8 (10.4%)	8 (11.0%)	16 (10.7%)	
Friend	9 (11.7%)	6 (8.2%)	15 (10.0%)	
Grandchild	6 (7.8%)	7 (9.6%)	13 (8.7%)	
Niece/Nephew	4 (5.2%)	2 (2.7%)	6 (4.0%)	
Other	2 (2.6%)	4 (5.5%)	6 (4.0%)	
Closeness to patient, 0-10 rating ^b	9.06 (1.69)	9.11 (1.57)	9.08 (1.63)	.826
Provided instrumental support ^c	60 (77.9%)	57 (78.1%)	117 (78.0%)	.981
Duration of instrumental support provision, years	3.33 (6.42)	2.83 (5.02)	3.09 (5.76)	.641
Involvement in healthcare, 1-5 rating ^d	3.16 (1.41)	3.18 (1.33)	3.17 (1.36)	.921
Health literacy, 0-20	18.44 (2.66)	18.74 (1.74)	18.59 (2.26)	.420
Baseline knowledge of palliative care, present ^e	36 (46.8%)	27 (37.0%)	63 (42.0%)	.226
Perceived health, 1-5 rating ^f	3.88 (.86)	3.85 (.92)	3.87 (.87)	.817
Patient characteristics				
Age, years ^g	63.94 (16.14)	62.76 (13.63)	63.37 (14.94)	.634
Gender, male	32 (41.6%)	30 (41.1%)	62 (41.3%)	.954
Race/Ethnicity, White and non-Latino/a	62 (80.5%)	58 (79.5%)	120 (80.5%)	.870
Cancer diagnosis				
Breast	22 (28.6%)	19 (26.0%)	41 (27.3%)	.727
Lung	8 (10.4%)	9 (12.3%)	17 (11.3%)	.708
Gastrointestinal, non-Colorectal	8 (10.4%)	8 (11.0%)	16 (10.7%)	.910
Colorectal	7 (9.1%)	6 (8.2%)	13 (8.7%)	.850
Prostate	9 (11.7%)	4 (5.5%)	13 (8.7%)	.177
Lymphoma	5 (6.5%)	6 (8.2%)	11 (7.3%)	.685
Urinary tract	8 (10.4%)	3 (4.1%)	11 (7.3%)	.140
Gynecological	2 (2.6%)	6 (8.2%)	8 (5.3%)	.126

Characteristic	M (SD) or <i>n</i> (%)			<i>p</i> ^a
	Intervention (<i>n</i> = 77)	Control (<i>n</i> = 73)	Total (<i>N</i> = 150)	
Brain	2 (2.6%)	6 (8.2%)	8 (5.3%)	.126
Skin	3 (3.9%)	5 (6.8%)	8 (5.3%)	.421
Other	13 (16.9%)	14 (19.2%)	27 (18.0%)	.715
Time since diagnosis (years)	9.7 (11.58)	10.93 (12.16)	10.30 (11.84)	.527
Treatment types				
Chemotherapy	42 (54.5%)	53 (72.6%)	95 (63.3%)	.022
Surgery	47 (61.0%)	45 (61.6%)	92 (61.3%)	.939
Radiation	41 (53.2%)	35 (47.9%)	76 (50.7%)	.516
Metastases present	22 (28.6%)	26 (35.6%)	48 (32.0%)	.355
Comorbidities present	43 (55.8%)	40 (54.8%)	83 (55.3%)	.897
Vital status, living	55 (71.4%)	44 (60.3%)	99 (66.0%)	.149

^a *p*-values derived from chi-square tests (categorical variables) and t-tests (continuous variables)

^b Participants indicated how well they knew their friend/family member on a 0-10 numeric rating scale, where 0 = Not well at all and 10 = Extremely well

^c Instrumental support was defined as providing assistance via health-related care, information, or decision-making

^d Participants rated how involved they were in the patient's healthcare on a 1 to 5 scale, with response options "Not involved at all," "A little involved," "Somewhat involved," "Very involved," and "Extremely involved"

^e Knowledge of palliative care was considered present at baseline if participants indicated that they "know what it is and could explain it to someone else"

^f Participants rated their perceived overall health on a scale from 1 (Poor) to 5 (Excellent)

^g Patient's current age or age at death, if deceased

Table 2*Palliative Care Knowledge and Attitude Outcome Scores*

Outcome	Score Range^a	Mean (SD)		
		Intervention	Control	Total
Knowledge, PaCKS total score	0-13	11.94 (1.96)	9.85 (3.89)	10.92 (3.22)
Attitudes, PCAS-9C total score	21-44	34.73 (4.12)	34.82 (4.64)	34.77 (4.36)

Note. PaCKS = Palliative Care Knowledge Scale. PCAS-9C = Palliative Care Attitudes Scale – Caregiver version.

^aPossible scores range from 0 to 13 for the PaCKS and 9 to 45 for the PCAS-9C.

Table 3*Correlation Between Group Assignment, Covariates, and Palliative Care Knowledge and Attitudes*

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Palliative care knowledge ^a	.914 ^a											
2. Palliative care attitudes ^b	.211 ^{**}	.765 ^a										
3. Intervention	.335 ^{***}	-.013	--									
4. Caregiver baseline palliative care knowledge	.394 ^{***}	.131	.099	--								
5. Caregiver age	.214 ^{**}	.115	.008	.050	--							
6. Caregiver gender, male	-.043	-.230 ^{**}	.061	-.187 [*]	-.010	--						
7. Caregiver education	.058	-.083	-.016	.194 [*]	-.114	-.095	--					
8. Caregiver instrumental support	.142	.081	-.002	.061	.238 ^{**}	.012	-.110	--				
9. Breast cancer	-.127	-.093	.029	-.007	-.025	-.104	.134	-.144	--			
10. Lung cancer	-.043	.057	-.031	-.006	.141	.073	-.242 ^{**}	.088	-.172 [*]	--		
11. Time since diagnosis	.038	.098	-.052	-.093	.185 [*]	.039	-.061	-.031	.019	.133	--	
12. Metastases present	.111	.061	-.075	.053	.023	-.027	-.183 [*]	.088	-.196 [*]	.160	.004	--
13. Patient vital status	.076	-.053	.118	.183 [*]	-.109	.006	.124	.060	.156	-.232 ^{**}	-.503 ^{**}	-.202 [*]

^aCronbach's alpha for outcome measures are presented for the control group. Alphas for the intervention group are less meaningful indicators of internal consistency due to response to the intervention.

***Significant at $p < .001$

**Significant at $p \leq .01$

*Significant at $p < .05$

Table 4

Multiple Linear Regression: Impact of Intervention on Palliative Care Knowledge and Attitudes

<i>Model 1 (Knowledge^a)</i>			<i>Model 2 (Attitudes^b)</i>		
Predictor	β (95% CI)	p-value^c	Predictor	β (95% CI)	p-value
Intervention	.309 (.166, .452)	< .001	Intervention	-.003 (-.165, .159)	.968
Covariates			Covariates		
Caregiver baseline knowledge of palliative care	.332 (.200, .464)	< .001	Caregiver baseline knowledge of palliative care	.104 (-.066, .275)	.229
Caregiver age	.180 (.033, .328)	.019	Caregiver age	.066 (-.104, .235)	.443
Caregiver gender, male	-.003 (-.184, .178)	.973	Caregiver gender, male	-.234 (-.399, -.069)	.006
Caregiver education ^d	.041 (-.109, .191)	.589	Caregiver education ^d	-.092 (-.263, .080)	.294
Caregiver instrumental support	.062 (-.094, .218)	.431	Caregiver instrumental support	.038 (-.130, .205)	.659
Cancer type			Cancer type		
Breast	-.131 (-.410, .151)	.363	Breast	-.099 (-.268, .069)	.247
Lung	-.092 (-.215, .029)	.133	Lung	.012 (-.159, .183)	.893
Time since diagnosis	.103 (-.080, .288)	.267	Time since diagnosis	.112 (-.076, .300)	.244
Metastases present	.117 (-.028, .261)	.112	Metastases present	.010 (-.159, .180)	.903
Patient vital status, living	.065 (-.135, .264)	.522	Patient vital status, living	.023 (-.176, .222)	.821

Note. Model 1 R²=.327; Model 2 R²=.106.

^a Based on Palliative Care Knowledge Scale (PaCKS) total scores. Higher scores indicate more knowledge of palliative care.

^b Based on Palliative Care Attitudes Scale – Caregiver (PCAS-9C) total scores. Higher PCAS-9C scores indicate more favorable attitudes towards palliative care.

^c *p*-values and confidence intervals based on robust standard errors adjusting for heteroskedasticity.

^d Presence of a Bachelor's degree or higher.

Appendix A: Intervention Chapters

Table A5*Video Chapters Developed as Part of the EMPOWER 2 Study vs. Chapters Included in the Present Study*

Chapter title	Developed in EMPOWER 2	Included in present study	Rationale for exclusion
Welcome	✓	✓	--
What is Palliative Care?	✓	✓	--
Who Provides Palliative Care?	✓	✓	--
What is Palliative Care Like?	✓	✓	--
Who Should Get Palliative Care?	✓	✓	--
Can Palliative Care Help Family and Friends?	✓	✓	--
Does Palliative Care Work?	✓	✓	--
Conversation Tips	✓	X	Focused on providing a script for patient use
Where Can I Get Palliative Care?	✓	X	Focused on local resources; not relevant to a broader population outside the New Orleans area
Did the Pandemic Change Palliative Care?	X ^a	X	Information is based on local resources' palliative care delivery

^aChapter was developed for use within the ongoing EMPOWER 3 RCT to educate patients on palliative care programs' responses to the COVID-19 pandemic.

Appendix B: Supplemental Results

Table B1*Bivariate Correlations between Additional Baseline Characteristics and Outcome Variables*

Variable	Palliative Care Knowledge ^a		Palliative Care Attitudes ^b	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Caregiver characteristics				
Race/Ethnicity, White and non-Latino/a	.166	.042	.018	.827
Marital status, married	.041	.618	.114	.165
Financial strain, present	-.260	.001	.019	.818
Location	-.083	.315	.027	.741
Relationship to patient	-.116	.157	-.011	.894
Closeness to patient	.214	.008	.076	.355
Duration of caregiving	.046	.624	-.099	.210
Involvement in care	.117	.156	.089	.279
Health literacy	.208	.011	.206	.012
Perceived health	.128	.119	.149	.069
Patient characteristics				
Age	.047	.571	<.001	.996
Gender, male	.174	.033	.171	.037
Race/Ethnicity, White and non-Latino/a	.136	.098	.086	.294
Cancer diagnosis				
Gastrointestinal, non-Colorectal	.139	.089	-.067	.413
Colorectal	-.016	.845	.054	.512
Prostate	.088	.282	.136	.097
Lymphoma	<.001	>.999	-.003	.967
Urinary tract	.061	.460	-.063	.447
Gynecological	.050	.541	-.139	.090
Brain	-.060	.463	.012	.883
Skin	.030	.714	.087	.287
Other	.041	.617	-.040	.624
Treatment types				
Chemotherapy	-.066	.424	-.099	.226
Surgery	-.019	.822	-.100	.221
Radiation	-.154	.060	.048	.556
Comorbidities present	.009	.912	-.095	.246

Note. *N* = 150^a Based on Palliative Care Knowledge Scale (PaCKS) total scores.^b Based on Palliative Care Attitudes Scale – Caregiver (PCAS-9C) total scores.

Table B2*Sensitivity Analyses Results (N = 150)*

Model	Outcome and Measure	Predictors	β	<i>p</i> -value	R ²
Primary Model with PCAS-9C Subscale	Emotional Palliative Care Attitudes (PCAS-9C emotional subscale)	Intervention	.034	.684	.258
		Caregiver baseline knowledge of palliative care	-.001	.990	
		Caregiver age	.211	.017	
		Caregiver gender, male	.034	.691	
		Caregiver education	-.105	.240	
		Caregiver instrumental support	.028	.750	
		Cancer type			
		Breast	-.023	.794	
		Lung	-.056	.531	
		Time since diagnosis	-.003	.979	
		Metastases present	.013	.884	
		Patient vital status, living	-.001	.990	
		Primary Model with PCAS-9C Subscale	Cognitive Palliative Care Attitudes (PCAS-9C cognitive subscale)	Intervention	.044
Caregiver baseline knowledge of palliative care	.031			.717	
Caregiver age	-.191			.027	
Caregiver gender, male	-.214			.011	
Caregiver education	-.048			.583	
Caregiver instrumental support	-.047			.578	
Cancer type					
Breast	-.015			.861	
Lung	.066			.445	
Time since diagnosis	.134			.162	
Metastases present	.034			.691	
Patient vital status, living	-.076			.452	
	Intervention			-.107	.153

Primary Model with PCAS-9C Subscale	Behavioral Palliative Care Attitudes (PCAS-9C behavioral subscale)	Caregiver baseline knowledge of palliative care	.205	.010		
		Caregiver age	.043	.583		
		Caregiver gender, male	-.358	<.001		
		Caregiver education	.000	.998		
		Caregiver instrumental support	.095	.220		
		Cancer type				
		Breast	-.179	.022		
		Lung	.042	.595		
		Time since diagnosis	.121	.167		
		Metastases present	-.037	.635		
		Patient vital status, living	.149	.105		
		<hr/>				
		Primary Model + Additional Covariates	Palliative Care Knowledge (PaCKS total score)	Intervention	.302	<.001
Caregiver baseline knowledge of palliative care	.305			<.001		
Caregiver age	.120			.156		
Caregiver gender, male	-.001			.987		
Caregiver education	.012			.885		
Caregiver instrumental support	.075			.352		
Cancer type						
Breast	-.096			.278		
Lung	-.105			.172		
Time since diagnosis	.118			.171		
Metastases present	.117			.140		
Patient vital status, living	.051			.576		
Chemotherapy use	.003			.970		
Caregiver race/ethnicity	.018			.824		
Financial strain	-.151			.066		
Caregiver closeness to patient	.005			.950		
Caregiver health literacy	.031			.709		
Patient gender, male	.040	.647				
<hr/>						
		Intervention	-.006	.942	.153	

Primary Model + Additional Covariates	Palliative Care Attitudes (PCAS-9C total score)	Caregiver baseline knowledge of palliative care	.034	.703			
		Caregiver age	-.017	.851			
		Caregiver gender, male	-.215	.010			
		Caregiver education	-.103	.241			
		Caregiver instrumental support	.057	.496			
		Cancer type					
		Breast	-.038	.692			
		Lung	.011	.895			
		Time since diagnosis	.137	.157			
		Metastases present	.034	.698			
		Patient vital status, living	.016	.876			
		Chemotherapy use	-.115	.178			
		Caregiver health literacy	.171	.057			
		Patient gender, male	.131	.180			
		<hr/>					
				Intervention	.254	<.001	.327
		Primary Model with Transformed PaCKS Score	Palliative Care Knowledge (reflected and inverse PaCKS total score)	Caregiver baseline knowledge of palliative care	.356	<.001	
Caregiver age	.170			.023			
Caregiver gender, male	.003			.964			
Caregiver education	.124			.101			
Caregiver instrumental support	.084			.256			
Cancer type							
Breast	-.068			.363			
Lung	.015			.844			
Time since diagnosis	.078			.346			
Metastases present	.173			.022			
Patient vital status, living	.046			.599			

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