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Feasibility of Ecological Momentary Assessment to Study Depressive Symptoms among Cancer Caregivers

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Abstract

Objective: Ecological momentary assessment (EMA) may help with the development of more targeted interventions for caregivers' depression, yet the use of this method has been limited among cancer caregivers. This study aimed to demonstrate the feasibility of EMA among cancer caregivers and the use of EMA data to understand affective correlates of caregiver depressive symptoms.

Methods: Caregivers (N=25) completed a depressive symptom assessment (Patient Health Questionnaire-8) and then received eight EMA survey prompts per day for seven days. EMA surveys assessed affect on the orthogonal dimensions of valence and arousal. Participants completed feedback surveys regarding the EMA protocol at the conclusion of the week-long study.

Results: Of 32 caregivers approached, 25 enrolled and participated (78%), which exceeded the a priori feasibility cutoff of 55%. The prompt completion rate (59%, or 762 of 1,286 issued) did not exceed the a priori cutoff of 65%, although completion was not related to caregivers' age, employment status, physical health quality of life, caregiving stress, or depressive symptoms or the patients' care needs (ps>.22). Caregivers' feedback about their study experience was generally positive. Mixed-effects location scale modeling showed caregivers' higher depressive symptoms were related to overall higher reported negative affect and lower positive affect, but not to affective variability.

Conclusions: Findings from this feasibility study refute potential concerns that an EMA design is too burdensome for distressed caregivers. Clinically, findings suggest the potential importance of not only strategies to reduce overall levels of negative affect, but also to increase opportunities for positive affect.

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Keywords

Cancer; Oncology; Affect; Caregivers; Depression; Ecological Momentary Assessment; Psycho-Oncology

INTRODUCTION

Novel technology-based interventions hold significant potential to increase psychosocial care accessibility and affordability for family caregivers. In addition, existing psychosocial care could be made more efficient and effective with dynamic assessment of caregivers' daily experiences, facilitated by technology, by fitting the right intervention to a caregivers' specific needs.[1] More scalable and targeted treatments may be particularly beneficial for addressing depression among cancer caregivers – approximately one in four report clinically significant depressive symptoms,[2–5] but interventions have shown minimal success in addressing these symptoms among caregivers.[6,7] Prior research provides limited information on the mechanisms related to caregivers' psychological symptoms, given that cross-sectional and retrospective self-report methods have been most common. Assessing day-to-day features of caregivers' depressive symptoms is necessary to optimize treatments for caregivers that provide them with the right interventions for their unique needs in the right time and order.

Although caregiving stress theories have sought to describe cancer caregivers' trajectories of emotional adjustment,[8,9] existing studies have not been designed to define reliable day-to-day markers of depressive symptoms among caregivers. Ecological momentary assessment (EMA) is the gold-standard method for studying dynamic phenomena to help guide the development of more optimized and timely technology-delivered interventions.[10–12] One potential candidate for a modifiable and proximal marker to target with depression interventions among caregivers is affective variability, or the degree to which an individual's mood tends to be stable versus fluctuating. In the general population, depression risk has been associated both with affective variability – both high variability, meaning frequent swings in affect intensity and type, and low variability, meaning blunted emotional responsivity.[13–16] Among caregivers, who have described their day-to-day emotional experiences as "roller coasters,"[17] cross-sectional study findings suggest that more variable affect is associated with lower caregiving burden potentially due to protective effects from upswings of positive affect.[18] Identifying proximal targets of clinical disorders common among caregivers using intensive longitudinal data collection strategies is needed to both improve existing caregiver interventions by selecting and ordering intervention components that will most effectively address caregivers' depression, as well as to develop effective technology-based health interventions that will scale to address the exponential rise in caregiver psychosocial needs.

Of over 5,400 citations returned from a PubMed search in November 2020 with mentions of "ecological momentary assessment" – or related terms "experience sampling," "ambulatory assessment," "intensive longitudinal," or "daily diary" – in the title or abstract, seven reported findings from six unique studies among a sample of cancer caregivers (see

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Supplementary Table 1 for study citations and overviews). Of these studies, only two issued multiple prompts per day – with a maximum of three per day – and none focused on caregivers' depressive symptoms. As such, the overarching objective of this study was to establish the feasibility of EMA methodology to study affect and depressive symptoms among cancer caregivers. First, we document the feasibility of conducting an EMA study among active cancer caregivers in terms of recruitment, engagement, and acceptability; we secondarily demonstrate one novel analytic technique enabled by intensive longitudinal data examining the relation between caregivers' self-reported depressive symptoms and their affective variability.

METHODS

Participants

This study was approved by the Institutional Review Board at the University of Virginia (HSR-IRB #21308). Participants were recruited from two outpatient oncology clinics at the NCI Designated University of Virginia Cancer Center from March to September 2019. Eligible individuals were caregivers who self-reported: (1) providing unpaid care (e.g., practical, medical, or emotional support) to a family member/friend receiving anticancer therapy, (2) being aged ≥18, (3) comfort speaking and reading English, and (4) owning a smartphone (Android or iOS). Only one caregiver per patient was eligible to participate. All individuals provided written informed consent prior to participating.

Procedure

Partnering physicians identified potentially eligible caregivers and provided a warm handoff to JG who completed screening and informed consent. Participants were told that the purpose of the study was to examine cancer caregivers' day-to-day mood. Upon recruitment, enrolled caregivers completed an online baseline survey. Beginning the day following completion of the baseline survey, participants were administered eight EMA surveys per day through their smartphone for seven consecutive days. This design was selected as it is comparable to EMA designs commonly used to examine mood and depression among adults,[19] and a recent study among a college student sample suggests that higher daily sampling frequency with a brief questionnaire may not be associated with higher reported burden or compromised data quality.[20] A time-contingent sampling design was used: Qualtrics survey links were delivered by text messages sent randomly within a stratified schedule of eight 1.5-hour windows between 9 AM and 9 PM.[a] Survey link texts could be delivered between two and 180 minutes apart. Participants were instructed to complete surveys upon receiving the text message; surveys completed more than 1 hour after the prompt was issued were excluded. On the final day of completing surveys, participants were asked to complete an online feedback survey. Participants were compensated $50 for participation, which was not contingent on number of EMA surveys or feedback survey completion.

[a]Of the 25 participants, four were affected by a distribution error in Qualtrics (active August 1–6, 2019), the platform used to deliver survey text messages, resulting in only the first prompt of the day being issued. One participant experienced two affected days, one experienced four affected days, one experienced five affected days, and one experienced six affected days.

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Measures

Baseline survey.—Baseline surveys collected caregiver sociodemographic and caregiving contextual information. Depressive symptoms experienced during the 2 weeks prior to baseline were self-reported using the Patient Health Questionnaire-8 (PHQ-8).[21] Items are rated on a Likert scale from 0 (“Not at all”) to 3 (“Nearly every day”). Summed scores range from 0 to 24, with higher scores indicating higher depressive symptoms and a score of 5 or greater indicative of mild clinically significant depressive symptoms.[21,22] The scale demonstrated good reliability in the present sample (Cronbach’s α=.90).

To examine whether caregiving burden factors were associated with EMA survey completion, caregivers also reported their physical health quality of life (QOL; PROMIS Short-form Physical Functioning-4[23]; higher T-scores indicate better QOL; α=.96), caregiving stress (Pearlin Stress Scale – 4-item Caregiving Overload subscale[24]; higher mean scores indicate greater stress; α=.77), and number of Activities of Daily Living (ADL) and Instrumental ADL (IADL) for which the patient is dependent (of 15 total ADL/IADL assessed).

EMA surveys: Affect.—Affect was assessed based on two intersecting, orthogonal dimensions of valence (displeasure to pleasure) and arousal (deactivated to activated). Twenty emotion words reported by Kuppens and colleagues[13] from their model of affective variability were used.[14] Participants rated how much they currently felt each emotion item on a scale from 0 (“Do not feel this way at all”) to 6 (“Feel this strongly”). Four discrete categories of emotion were first computed: Negative active affect (NAA) represents the average of responses to nervous, stressed, tense, embarrassed, and upset; negative deactive affect (NDA) averages sluggish, sad, bored, depressed, and disappointed; positive active affect (PAA) averages enthusiastic, happy, proud, excited, and alert; and positive deactive affect (PDA) averages calm, peaceful, satisfied, relaxed, and content. In accordance with Kuppens’ and colleagues’ formulas,[13] affect scales were computed as the following: total negative affect represents the difference between NAA and its inverse of PDA; total positive affect represents the difference between PAA and its inverse of NDA; valence represents the sum of PAA and PDA less the sum of NAA and NDA; activation represents the sum of NAA and PAA less the sum of NDA and PDA.

Feedback survey.—Participants reported feedback about the daily EMA surveys on five items adapted from prior work (see Figure 2 for items).[25] Responses were recorded using a six-item Likert response format (“Strongly Disagree” to “Strongly Agree”). If a participant rated an item unfavorably (e.g., disagreed with the item “the questions were easy to understand”), an open-ended response item appeared to solicit additional feedback.

Data Analysis

Descriptive statistics (medians [Mdn] with interquartile ranges or frequencies, as appropriate) for study variables are presented in Table 1. Descriptive analyses were conducted using R software (version 3.6.3). Statistical significance was set at α=.05, two-tailed tests.

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Our primary aim was to examine EMA feasibility in terms of recruitment, engagement, and participant feedback. To determine recruitment feasibility, an a priori benchmark of 55% enrollment was set based on national norms for recruitment to studies of cancer caregivers.[26] For EMA engagement feasibility, due to a dearth of EMA studies in chronic health populations, an a priori benchmark of 65% prompt completion was set based on national norms for prompt completion in typical EMA studies.[27,28] The correlations between survey response completion rate and participants' age, employment status, physical health quality of life, caregiving stress, and depressive symptoms and patient ADL/IADL dependency were examined. Quantitative and qualitative data from participant feedback surveys were tabulated.

Our secondary aim was to demonstrate an analytic technique, mixed-effects location scale modeling, enabled by the collection of intensive longitudinal data, which we use to examine relations between caregivers' depressive symptoms and affect variability. Mixed-effects location scale models extend traditional mixed effects models by directly modeling within-subjects variability in terms of subject-level random effects in order to capture and explain individual differences in participants' variability (stage 1) and the extent to which these individual differences in variability relate to other constructs (stage 2).[29] To illustrate, fictional data is presented in Figure 1 for four hypothetical participants: A and B have similar high "location" estimates because they both report high overall mean negative affect over the course of a day relative to participants C and D. However, A and B differ in their affective variability, or "scale": Participant A has a higher scale estimate as their negative affect reports are more erratic, while participant B has a lower scale estimate as their reports are more consistent. These random effect estimates for each participant's affective location and scale are extracted from the stage 1 models and used as independent variables in stage 2 to detect associations with an identified outcome variable. These models have been used to understand cancer-related health behaviors like physical activity[30] and smoking cessation[31] in the general population, but have not yet been used to characterize affective variability among people with a history of cancer or their family caregivers.

To test the relation between affective variability and depressive symptoms, separate two-stage mixed-effects location scale models were run for each affective construct (i.e., NAA, NDA, PAA, PDA, total positive affect, total negative affect, activation, and valence). In stage 1, individuals' own mean NAA (i.e., random intercepts or "location") and their own variability in NAA (i.e., random within-subject variance or "scale") were estimated as random subject effects. These random effects from stage 1 were then included as independent variables (main effects of scale and location) and crossed as an interaction effect (scale by location effect) in a regression model of depressive symptoms as outcome in stage 2. Analyses are conducted via MixWILD standalone software.[32]

RESULTS

Sample Characteristics

Sample characteristics of the 25 participating caregivers are listed in Table 1 and summarized here. Participant ages ranged from 27 to 75 (Mdn=54) and approximately two-thirds were women (n=17), two in five reported a yearly household income under

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$100,000 (n=9), and half were formally employed (n=13). Approximately half of the caregivers reported their care recipient was dependent for one or more ADL/IADL (n=13), two-thirds were the spouse of the cancer patient (n=16), and caregivers reported on average that they felt “somewhat” overloaded by caregiving (Mdn=2). About two-thirds of the participants were recruited from the outpatient gastrointestinal cancer clinic (n=16; 64%) and the remaining nine participants were recruited from the outpatient head and neck cancer clinic (36%). About half of the participants reported mild depressive symptoms or higher on the PHQ-8 (n=12; 48%).

EMA Feasibility

Recruitment.—As detailed in Figure 1, thirty-two individuals were approached by the research assistant, with three refusing screening (9%, all cited being too busy). Of the 29 individuals screened, two were ineligible (7%; one due to not having an Internet-enabled smartphone, one due to another caregiver for the same patient having already enrolled in the study). Of the 27 individuals screened and eligible, one was lost to follow-up prior to enrollment (4%), but all others enrolled. Of the 26 enrolled participants, one was lost to follow-up prior to completing any assessments (4%) and was excluded from analyses. The 25 participating individuals represent 93% of confirmed eligible individuals and 78% of all individuals approached for recruitment, exceeding our a priori benchmark of 55% for determining recruitment feasibility.

EMA engagement.—Of 1,286 total prompts issued, participants completed 762 surveys (total completion rate=59%), falling short of our a priori benchmark of a 65% prompt completion rate for determining EMA design feasibility. The median percentage of surveys completed by each participant was 61% (e.g., 34 of 56 total prompts). Twelve participants (48%) surpassed our a priori benchmark of completing ≥65% of issued prompts. The range of prompt completion rates was 20% to 98%. Prompt completion rates did not differ between weekend days versus weekdays ($t[24]=0.04$, $p=.97$), nor did rates differ by participants’ age ($r=.26$, $p=.22$), being employed ($t[22.78]=0.15$, $p=.88$), physical health quality of life ($r=0.23$, $p=.28$), patient dependency on 1 or more ADL/IADL ($t[21.60]=-0.10$, $p=.92$), caregiving stress ($r=-.12$, $p=.57$), or depressive symptoms ($r=-.05$, $p=.91$).

Participant feedback.—Of the 25 enrolled participants, 19 (76%) completed the final feedback survey. Responders completed more prompts (Mdn=37 prompts) and reported lower depressive symptoms (PHQ-8 Mdn=3) compared to the six non-responders (Mdn=21 prompts, PHQ-8 Mdn=7.5). Quantitative and qualitative data are presented in Figure 2. Feedback was generally positive – for instance, all 19 respondents agreed that the survey questions were easy to understand, 17 of the 19 were satisfied with the time required to complete each survey, and 16 of the 19 indicated surveys didn’t affect their activities. Two-thirds also indicated surveys did not affect their mood and found the number of surveys acceptable; among the remaining one-third, some participants indicated that surveys could be an “annoyance” and some would have preferred fewer prompts per day.

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Relation of Depressive Symptoms with Affective Variability

Two-stage mixed effects location-scale models tested whether individuals' affective means (location) or affective variability (scale) relate to their depressive symptoms. As reported in Table 2, individuals who reported higher average NAA, NDA, total negative affect, and activation relative to the sample (positive location estimates) also tended to endorse higher depressive symptoms; those who reported lower average PDA, total positive affect, and valence relative to the sample (negative location estimates) also tended to endorse higher depressive symptoms. There were no reliable effects detected for individual affective variability (scale estimates) on depressive symptoms. Although there was a trend towards individuals who reported more erratic total positive affect relative to the sample (positive scale estimate) also tending to report higher depressive symptoms (p=.07), the 95% confidence interval included 0, limiting the ability to conclude that a robust relationship exists between these variables. There were also no reliable effects detected between depressive symptoms and the interaction effects of individuals' affective means with their affective variability.

DISCUSSION

Findings from this first study using EMA to understand day-to-day markers of depressive symptoms among cancer caregivers suggests that cancer caregivers are amenable to participating in studies with an EMA design and allays potential concerns that these designs may be too burdensome for this population. Although prompt completion rates in the present study did fall closely below the typical rates in prior EMA research,[27,28] engagement was not related to factors including caregivers' depressive symptoms, subjective caregiving burden, or the patients' care needs. Findings also support that caregivers' depressive symptoms relate in expected directions with their overall levels of self-reported day-to-day negative and positive affect, although effects were not detected between caregivers' depressive symptoms and their affective variability. Taken together, this study demonstrates the capability of EMA designs to feasibly and acceptably study affective markers of depression among cancer caregivers with the potential to guide the development of more scalable, effective, and timely interventions.

Because repeated assessment in the context of daily routines is less biased by retrospection,[10–12] EMA methodology is especially beneficial for the study of a psychological disorder such as depression, which by its nature includes cognitive biases affecting the recollection of mood-incongruent events. Feasibility data from this study suggest that the one-week EMA design with baseline and feedback surveys was acceptable to most caregivers. With more than three caregivers enrolled in this study of every four approached, the recruitment rate for this study far exceeds the average recruitment rate of 55% across prior cancer caregiving studies.[26] Importantly, engagement in this study, as measured by percentage of survey prompts completed, was not associated with factors including caregivers' self-reported caregiving burden or depressive symptoms. These findings together refute potential concerns that an EMA design is too burdensome for distressed caregivers.

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Our overall engagement of about 60% of prompts completed did not exceed our a priori benchmark of 65%, meaning our recorded engagement was slightly lower than average engagement typical in other EMA studies reported among the general population.[27,28] Our engagement was also low compared to a previously published EMA study among cancer caregivers that recorded a 90.5% survey completion rate, though a key difference is that the previously published study examining communication and relationship satisfaction employed a design of twice-daily prompts over 14 consecutive days.[33] Although EMA studies invoke a common methodology of repeated longitudinal assessments, there is considerable variation in the frequency of assessments and the duration of the study period, which should be determined based on the research question. In the current study, we used a relatively heavy sampling strategy to understand variations in daily mood – a subjective experience more subject to recall bias than reporting more discrete events like social interactions. Studies that implement more (vs. less) frequent surveys in a short period of time can collect richer data about daily life, but tend to be susceptible to lower EMA completion rates.[34]

Our engagement was also below that from a study among dementia caregivers with a similar design (10 prompts per day for six days), which reported over 78% of prompts completed by participants.[25] A key difference, however, is that the study among dementia caregivers provided one to two phone calls to participants during the EMA period to resolve problems completing assessments, whereas we provided no outreach to participants. Design choices to increase compliance to EMA should be carefully considered in terms of costs versus benefits for each study. Although compliance monitoring is common,[27,28] it adds research staff costs; although fewer prompts per day may have been preferred by caregivers, more frequent assessment results in richer data affording a more nuanced understanding of time-varying experiences.[35]

Datasets generated by an EMA design facilitate nuanced examinations between caregivers' depressive symptoms and their day-to-day affective patterns. Results from the intra-individual variability modeling technique revealed that, as expected, caregivers who reported higher depressive symptoms tended to report higher overall levels of negative affect and lower overall levels of positive affect across their completed EMA prompts relative to the sample; however, the degree to which a caregivers' affect was relatively consistent versus erratic was not related to their depressive symptoms. These results differ from prior work that demonstrated affective variability – both too much and too little – relates to depression risk.[13–16] While our analytic methods differ from those prior studies, these discrepant findings suggest close examination of how risk factors and mechanisms of depression among non-caregivers compare and contrast to those among caregivers may help to improve caregiver interventions. Future studies should examine the extent to which these states of higher NA and lower PA not only characterize caregivers with concurrently higher depressive symptoms, but also whether these affective characteristics represent individual risk factors for developing depression throughout the course of caregiving.

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Clinical Implications

Dynamic, in vivo assessment of caregivers' psychological distress could provide important insights into matching the right intervention component to a caregiver's specific needs and to provide that intervention at the most appropriate time. Findings from data analyses suggest the potential importance of not only strategies to reduce overall levels of negative affect, but also to increase opportunities for positive affect – even if only sporadically – to managing depressive symptoms among cancer caregivers. Considering the time demands of caregiving, some caregivers have reported feeling frustrated by, or just being unable to enact, well-meaning directives to "take care of themselves,"[36] or feel guilty when they do.[37] Directly addressing competing demands while incorporating strategies to feasibly cultivate and enjoy positive experiences may be important to buffer against depressive symptoms among caregivers. The ubiquity of smartphones[38] – and particular use of smartphones among caregivers[39,40] – suggests this medium may be uniquely suited to deliver interventional "nudges" to increase positive emotions across the day while decreasing negative ones may sum to reduced risk for chronic depression among caregivers over time. Further research to identify modifiable markers of caregiver depressive symptoms will be essential to develop such models of more effective and accessible technology-delivered depression interventions for caregivers.

Study Limitations

This study was not pre-registered. Given the primary aims of this study were related to understanding feasibility in terms of study recruitment, engagement, and acceptability, the sample size was not determined specifically to power analyses examining the effects between depressive symptoms and daily measured constructs. Future research with a larger sample size powered for main hypotheses related to depressive symptoms and daily constructs is warranted. Despite the small sample size, a strength of our sample was the wide range of depressive symptom ratings reported across participants. Related to the primary aim of feasibility, we were less likely to receive feedback surveys from participants who engaged less frequently with the EMA surveys and who reported higher depressive symptoms, despite multiple contacts to request feedback. Findings from our feedback questionnaire must therefore be interpreted with caution.

Conclusions

From this first study to describe the feasibility of EMA to understand day-to-day markers of depressive symptoms among cancer caregivers, findings suggests that this ecologically-valid, repeated assessment methodology is feasible and generally acceptable among caregivers. Moreover, caregiver depressive symptoms and subjective caregiving burden were not related to how many prompts caregivers completed, refuting potential concerns that this design is too burdensome for distressed caregivers. Caregivers' overall average levels of positive and negative affect were related to their depressive symptoms, which suggests the pertinence of interventional strategies to both reduce general negative affect as well as enhance experiences of positive affect in depression interventions for caregivers. Continued EMA research is warranted to better understand trajectories of caregiver psychological

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distress and potential intervention targets in order to develop more effective and accessible interventions.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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DATA AVAILABILITY STATEMENT:

Data available upon reasonable request from the authors.

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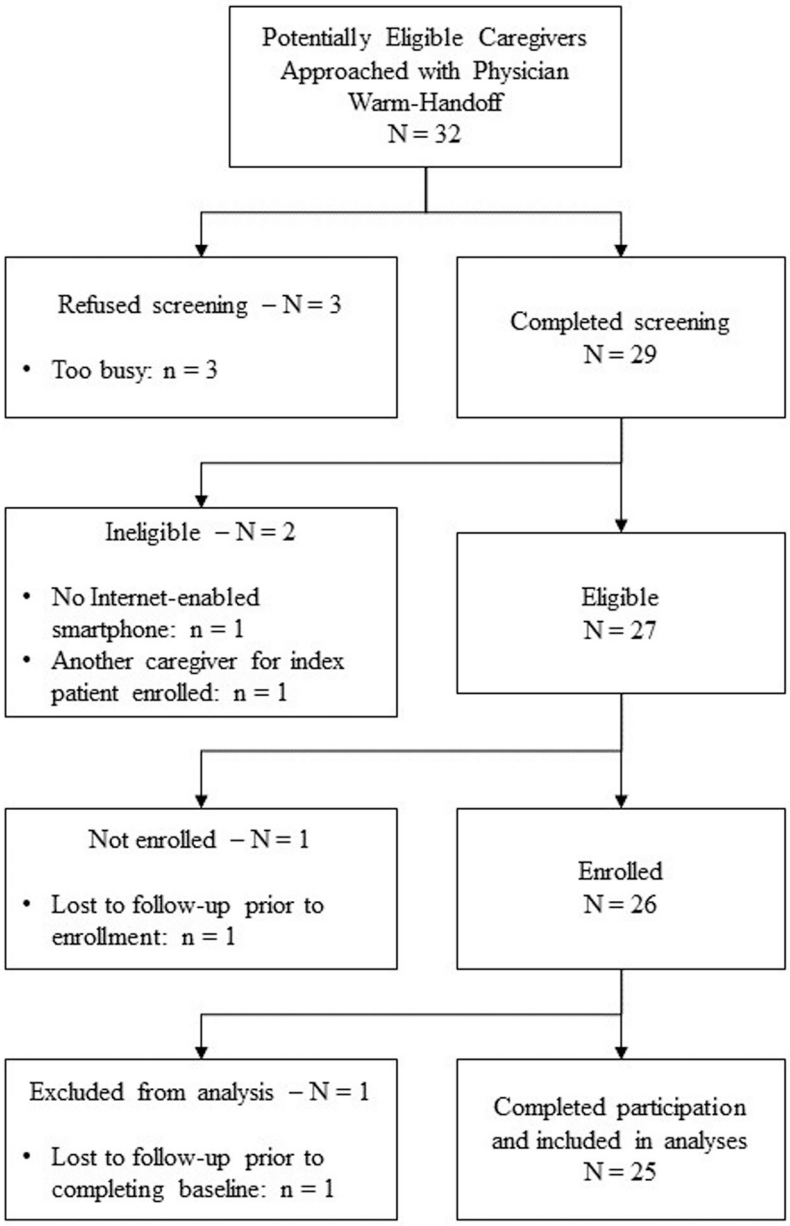

Figure 1.
Recruitment and Enrollment Flow Diagram

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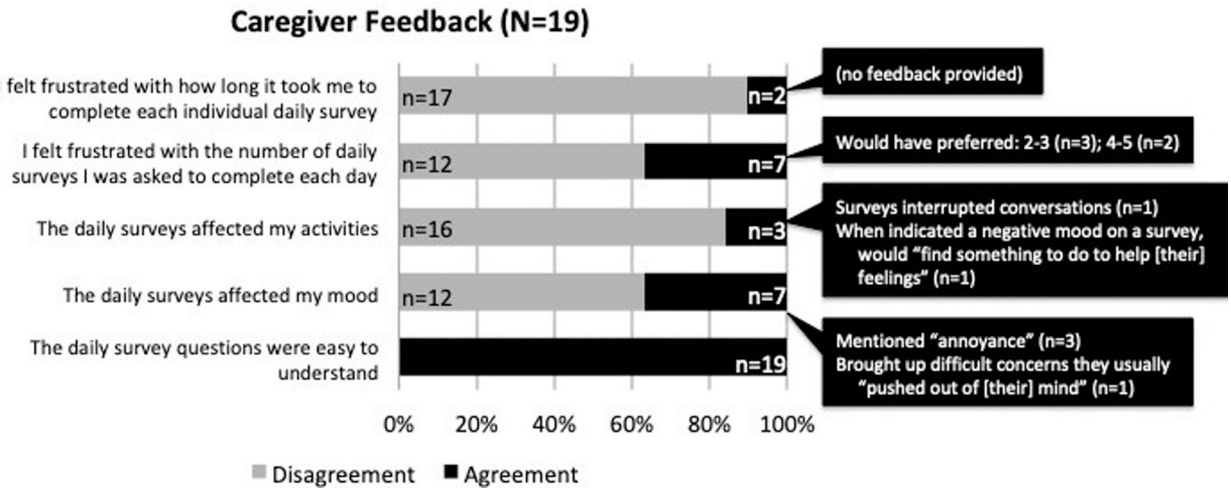

Figure 2.
Caregiver feedback

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Table 1.

Sample descriptives (N=25)

Participant characteristics	**n(%) or Mdn(Range)**
Age	54 (27–75)
Gender (female)	17 (68%)
Household income * (<$100,000)	9 (43%)
Formally employed (yes)	13 (52%)
Physical health quality of life	57.00 (33.20–57.00)
Patient dependent for 1 or more ADL/IADL * (yes)	13 (54%)
Caregiving stress	2 [1.50–2.25]
Relationship to patient	
Spouse	16 (64%)
Adult child	3 (12%)
Other	6 (24%)
Patients' Outpatient Cancer Clinic	
Gastrointestinal	16 (64%)
Head and Neck	9 (36%)
Feasibility Metrics	**n(%) or Mdn%[IQR%]**
Total survey responses **	762 (59%)
Proportion of surveys receiving responses per participant	61% [39%−75%]
Participants responding to ≥65% of surveys	12 (48%)
Mood	**Mdn[IQR]**
Depressive symptoms	3 [1–7]

* Percentage responding – 4 declined to provide income, 1 declined to report ADL/IADL.

** Responses logged within 1 hour from survey issuance.

Note: Mdn = Median; IQR = Interquartile range; PHQ-8 = Patient Health Questionnaire-8; PSS = Pearlin Stress Scale, Caregiving Stress Overload subscale.

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Table 2.

Linear Regression Estimates from Mixed-Effects Location Scale Modeling Stage 2 Models Testing Effects of Affect on Depressive Symptoms

Model	Unstandardized Effect (*b*)	95% Confidence Interval of *b*	Standardized Effect (*z*)	*p*
Negative Active Affect				
Location	3.36	1.95, 4.76	4.68	<.001
Scale	−0.05	−1.42, 1.31	−0.08	.94
Location × Scale	0.12	−1.44, 1.68	0.15	.88
Negative Deactive Affect				
Location	3.49	2.27, 4.72	5.59	<.001
Scale	−1.14	−2.60, 0.33	−1.52	.13
Location × Scale	0.14	−1.43, 1.71	0.17	.86
Total Negative Affect				
Location	3.06	1.73, 4.39	4.52	<.001
Scale	−0.07	−1.53, 1.39	−0.09	.93
Location × Scale	0.19	−1.61, 1.98	0.20	.84
Positive Active Affect				
Location	−0.59	−2.50, 1.31	−0.61	.54
Scale	0.88	−0.95, 2.71	0.94	.35
Location × Scale	−0.56	−2.57, 1.45	−0.55	.59
Positive Deactive Affect				
Location	−2.32	−3.87, −0.77	−2.94	.003
Scale	−0.45	−2.35, 1.45	−0.47	.64
Location × Scale	0.49	−1.53, 2.50	0.47	.64
Total Positive Affect				
Location	−2.15	−3.64, −0.65	−2.81	.005
Scale	1.36	−0.13, 2.85	1.78	.07
Location × Scale	−0.67	−2.04, 0.71	−0.95	.34
Valence				
Location	−2.85	−4.26, −1.43	−3.94	<.001
Scale	0.67	−0.91, 2.25	0.83	.40
Location × Scale	−0.44	−1.94, 1.07	−0.57	.57
Activation				
Location	2.41	0.61, 4.22	2.62	.009
Scale	0.53	−1.23, 2.29	0.59	.56
Location × Scale	−0.41	−2.01, 2.19	−0.31	.76