



## Therapeutic massage to enhance family caregivers' well-being in a rehabilitation hospital

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### ABSTRACT

**Background and purpose:** A massage therapy program was implemented to address the psychological well-being of family caregivers to patients in a rehabilitation hospital. The impact of massage “dosage” on caregiver stress and psychological well-being was examined in this study. Participants’ perspectives on the program were also explored.

**Materials and methods:** Thirty-eight family caregivers were randomized to receive either one massage per week or three massages per week for two weeks. Caregivers reported psychological symptoms and stress pre- and post-program. Program acceptability was assessed via responses on an exit survey.

**Results:** Overall, 79% of massages were received (89% among program completers). Post-program symptom scores were lower than baseline scores for both groups ( $F(1, 31) = 8.74 - 24.50, P < 0.01$ ). Exit surveys indicated high program acceptability and perceived benefits.

**Conclusion:** Findings suggest that massage services would be welcomed, utilized, and beneficial for improving the psychological well-being of family caregivers in a rehabilitation hospital.

### 1. Introduction

Profound injuries and illnesses impact the entire family, especially family members who become closely involved in caregiving [1,2]. In the immediate aftermath, caregivers often experience intense psychological distress given uncertainty regarding their family member's survival [3,4]. Distress may persist as the family member transitions from acute care to the longer-term rehabilitation setting, influenced by recognition of the need for intensive continued care and stressors associated with the transition to unfamiliar health care providers and new treatment plans [5]. Caregivers of individuals recovering from serious illness or injury can experience high levels of caregiving burden, family strain, social isolation, and problems adjusting to new roles [6–8]. In the absence of intervention, caregivers who perceive that they are not able to cope effectively with these challenges or those who experience clinical symptoms of anxiety or depression are vulnerable to persistent/worsening adjustment difficulties [9]. Over time, diminished caregiver well-being may adversely affect their capacity to support their family member's recovery.

There is a critical need to address family caregivers' psychological well-being and to reinforce the importance of self-care for these

individuals within medical rehabilitation settings. Regarding the latter, anecdotal as well as empirical evidence suggests that inadequate self-care is common among family caregivers in the health care environment, as they tend to suppress their own needs while focusing on their ill/injured family member [10]. A potentially beneficial but understudied intervention strategy for this population is therapeutic massage. Therapeutic massage is a complementary health approach used to enhance physical and mental health, prevent disease, and manage stress that involves manual manipulation of the body's soft tissues by a specially trained practitioner. Research highlights many symptomatic benefits of therapeutic massage that are central to promoting psychological adaptation and well-being in caregivers of patients recovering from serious illness/injury in the rehabilitation setting [11,12]. Moderate pressure massage leads to documented benefits [13], but what constitutes an optimal dose of massage treatment (e.g., frequency, number of sessions) has not been established [14]. Further, limited prior research has examined utility of massage therapy as a tool to alleviate caregiver distress in medical contexts although available evidence is promising. For example, in one recent study focused on family caregivers, massage was associated with significant improvements in symptoms of pain, anxiety, wellbeing, and fatigue among caregivers of

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adult patients being treated for cancer [15]. In another recent study, massage was found to reduce family caregiver emotional distress in the context of pediatric palliative care [16].

The potential benefits of therapeutic massage for improving caregiver psychological well-being in the rehabilitation hospital context are significant and in need of empirical evaluation. The objective of this pilot study was to address this knowledge and practice gap by examining the feasibility and preliminary efficacy of a hospital-based massage therapy program to improve psychological well-being and reduce stress of family caregivers to patients receiving medical rehabilitation following a severe injury/illness. The study had two specific aims. Aim 1 was to evaluate the impact of massage “dosage” on caregivers’ psychological functioning (anxiety, depression, somatization) and perceived stress. We hypothesized that caregivers receiving massage three times per week would report significantly lower anxiety, depression, somatic symptoms, and perceived stress following the program than caregivers receiving massage only once per week. Aim 2 was to identify challenges to implementation of massage therapy for caregivers in a rehabilitation hospital and to understand caregivers’ perspectives regarding the perceived benefits and negative aspects of the massage therapy program.

## 2. Materials and methods

### 2.1. Study design

The present research was a randomized feasibility trial in which caregivers of pediatric or adult patients receiving treatment at a rehabilitation hospital were randomized to receive either one or three massages per week for two weeks. A mixed methods approach was used where quantitative pre- and post-intervention questionnaires were complimented by qualitative analysis of a semi-structured exit survey. All data were collected between October 2017 and March 2018. For all participants, regardless of group assignment, outcomes were assessed pre-intervention (occurring at enrollment) and post-intervention (occurring after completion of the massage program).

### 2.2. Participants and recruitment strategy

Participants were caregivers of pediatric or adult patients receiving treatment at a hospital specializing in physical rehabilitation of patients with traumatic brain injuries, spinal cord injuries, severe stroke, and other neurologic and complex medical conditions. Eligibility criteria specified the following: a) participant was the adult (19 years of age or older) family caregiver for a patient receiving inpatient or outpatient care at the hospital; b) anticipated length of family members’ treatment was at least three weeks; c) caregiver available for study duration; d) English speaking; and e) caregiver did not have a medical condition that contraindicated use of massage therapy.

Hospital program managers identified patients whose treatment plans specified an expected stay of at least three weeks. Program managers and/or nursing staff then provided the family member(s) of these patients with an informational brochure that introduced the study rationale and procedures. If a potential participant expressed interest in learning more about the study, the program manager then contacted the Principal Investigator (PI) via email or telephone to inform her about the presence of a potentially eligible participant. Within three days of this notification, a research team member met with the family member at the hospital to determine interest and eligibility, and if appropriate, complete the informed consent process and enroll the family member in the study.

### 2.3. Sample size and power

An a priori sensitivity analysis was conducted using the G-Power software package (version 3.1.7) to determine the effect size that would

be obtained given a sample size of 40, a desired power level of 0.80 and an alpha level of  $\alpha = 0.05$  [17]. Specifically, the Analysis of Variance (ANOVA) model included the fixed design elements of number of groups (two groups each with 20 subjects) and the number of measurement occasions (pre vs. post). Under these assumptions, a sample size of 40 yielded a power of 80% to detect an effect size of 0.23 (as measured by Cohen’s  $f$ ), which falls within the range of small effect sizes according to established power standards [18].

### 2.4. Randomization

Participants were randomly allocated to intervention groups using a freely available computer generated program [19]. Research staff performing the pre- and post-assessments were blinded to group assignments. Participants were informed of their group assignment following informed consent and recording of baseline pre-program measures, when they were given a sealed envelope containing information regarding their massage schedule for the study.

### 2.5. Measures

The Brief Symptom Inventory 18 (BSI 18) was used to assess the presence of clinical symptoms of mental health disorders defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [20]. Specifically, the BSI 18 is a self-report measure that contains three symptom scales: Anxiety, Depression, and Somatization, as well as a Global Severity Index that measures overall psychological distress.  $T$  scores were calculated using gender-specific community norms. The BSI 18 is a widely used tool with well-established psychometric properties that is used to evaluate symptoms of mental health disorders in clinical and non-clinical populations. All subscales demonstrated acceptable internal consistency in the current sample ( $\alpha = 0.70$ – $0.88$ ).

Participants completed the Perceived Stress Scale (PSS), a 10-item self-report instrument that measures the degree to which situations in one’s life are perceived to be unpredictable, uncontrollable, and overwhelming [21]. Respondents use a 5-point Likert scale (0 = Never to 4 = Very Often) to rate the frequency they have had various thoughts or feelings within the last two weeks. A sample item on the PSS is, “*In the last month, how often have you found that you could not cope with all the things that you had to do?*”. The scale yields a total score ranging from 0 to 40, with higher scores indicating more stress. Excellent reliability and validity have been demonstrated. Cronbach’s alpha in the current sample was 0.88.

An exit survey, integrating items drawn from the Behavior Intervention Rating Scale (BIRS), was developed and administered [16]. The BIRS is a widely used and validated measure of individuals’ perceptions of the acceptability of behavioral interventions. The current study included 10-items from the BIRS Acceptability subscale. Participants responded to these items using a 6-point Likert scale (1 = Strongly Disagree to 6 = Strongly Agree). A total score was created by averaging participants’ responses on these ten items. Cronbach’s alpha for the Acceptability subscale was 0.77. In addition to the Likert scale items, the exit survey included seven open-ended items to allow participants to provide more detailed feedback regarding: (1) their experience of the massage intervention, (2) how they felt while receiving the intervention, (3) what they appreciated most about the massage program, (4) what they appreciated least, (5) what would they change about the program or do differently, (6) what they would describe to another caregiver about the program, and (7) how they would describe the massage program to a member of their loved ones’ treatment team.

The Client Expectations of Massage Scale (CEMS) was used to measure caregiver expectancies about massage therapy, a potential confounder of treatment effects [22]. The CEMS is specific to client expectations in the context of massage and it assesses both role and outcome expectancies. The CEMS is a self-report questionnaire and

**Table 1**  
Outline of 60-min massage protocol.

Phase	Activity
Welcome	Client entered room led by therapist who instructed client to disrobe, lie face down (prone) on massage table, and put draping sheet over body. Therapist left room temporarily.
Massage (55 min)	<p>Therapist returned. Massage techniques included stroking, kneading, gilding, percussion, friction, vibration, compression, passive or active stretching, effleurage, and petrissage.</p> <ul style="list-style-type: none"> <li>● Therapist laid hands on top of sheets covered client so client felt therapist's touch.</li> <li>● Therapist briefly assessed participant by gliding hands softly along sheets to palpate tightness and areas where client indicated areas of concern. Assessment techniques included active, passive and resistive range of motion, and soft tissue palpation as required. (5 min)</li> <li>● Sheets lowered to expose upper body discretely</li> <li>● Upper and middle back region addressed bilaterally, including trapezius, erector spinae, and rhomboids. (10 min)</li> <li>● Low back and upper buttocks worked bilaterally including latissimus dorsi, erector spinae, gluteus minimus, gluteus maximus, gluteus medius. (5 min)</li> <li>● Left, then right, posterior leg addressed including calf (gastrocnemius and soleus) and hamstring (semimembranosus, semitendinosus and biceps femoris) region. (10 min total)</li> <li>● Next, client turned over (supine) and table, bolsters, sheets, and blankets adjusted as needed.</li> <li>● Left, then right, anterior leg addressed including foot (abductor hallucis, abductor digiti minimi and flexor digitor brevis) and extensor muscles, as well as quadriceps femoris. (10 min total)</li> <li>● Left, then right, arm addressed including deltoid, biceps brachii, triceps brachii brachioradialis, and hand flexors and extensors. (10 min total)</li> <li>● Neck and shoulder muscles addressed including trapezius, levator scapulae, splenius, semispinalis, suboccipital muscles and sternocleidomastoid. (5 min)</li> </ul>
Closing	Therapist told client massage was finished and that when ready she/he can get up from table and dress. Client dressed, exited therapy room, briefly met with therapist, who instructed him/her to drink water throughout day and scheduled next massage appointment.

yields three subscales: Clinical, Educational, and Interpersonal. Scores from all subscales range from 3 to 21. The CEMS has acceptable internal consistency of the three subscales ( $\alpha$ 's = 0.69 to 0.87), construct validity, and convergent and discriminant validity. In the current sample, Cronbach's alpha for the scales ranged from 0.79 to 0.88.

## 2.6. Intervention procedures and therapist training

All massages followed a standardized 60-min moderate pressure therapeutic massage protocol specifying body regions to be addressed and the order and time allocated to various regions. Details of the massage protocol are outlined in Table 1. This protocol was developed with guidance from the lead massage therapist on the study and was informed by descriptions of the implementation of standardized massage sessions for research interventions. Use and sequencing of specific massage techniques (e.g., stroking, kneading, gliding, percussion, effleurage, petrissage) were at the discretion of the massage therapist to allow for treatment individualization based on client needs and therapist preference. Based on caregiver preference, massages were delivered either in a private massage therapy room located at the rehabilitation hospital to minimize caregiver separation from their family member, or at a nearby medical fitness center operated by the same organization.

The massage therapists were employees within the rehabilitation organization. Both were licensed in the state where the research took place and had earned a National Board Certification in Therapeutic Massage and Bodywork (BCTMB) credential, the highest attainable credential within the massage therapy and bodywork profession in the United States. Both therapists had extensive experience providing massage services within the rehabilitation setting. Prior to initiating the massage intervention, a half-day training was conducted with the massage therapists in which the massage protocol was reviewed in detail, and therapists were provided instruction on how to complete the associated forms (e.g., post-session checklists). Concerns and questions regarding the protocol, study, or participants were also addressed. In the following week, therapists practiced administering the massage protocol at the study site with two mock participants who and were informed regarding the training purpose of the massage. These practice massage sessions were videotaped, and videos were reviewed by the PI to assess therapists' comfort and adherence to the protocol. Feedback was provided to the therapists prior to initiating the study the following week.

Study procedures were monitored continuously to ensure treatment protocol compliance, promote consistency in delivery across participants, and reduce likelihood of therapist drift from the massage

protocol over the course of the study. Specifically, massage therapists completed a comprehensive session checklist after each massage including the date, time of day, and length of each massage administered, and treatment adherence and integrity (i.e., whether each protocol component was completed). Protocol deviations (e.g., body region not massaged, or spent less time massaging an area than specified) were noted and the therapist provided an explanation, and whether it was by therapist or caregiver choice. The therapist also rated the caregiver's attitude towards the massage and noted any caregiver comments regarding the massage. Checklists were reviewed weekly by the study PI. Second, caregivers rated their attitude towards the massage and completed a feedback form that included items mirroring content of the therapists' checklist (e.g., "What areas did you not want massaged?" "What areas did the therapist not massage?" "What time did your massage begin and end?"). Checklist and feedback forms were reviewed and compared weekly by the PI. No discrepancies between caregiver and therapist session reports were noted.

All data were collected by two research assistants (one graduate student and one undergraduate student). Research assistants had completed training in the ethical conduct of human subjects research as well as the study protocol. Both research assistants were directly supervised by the PI.

## 2.7. Data analysis

Descriptive statistics were generated for all demographic and outcome measures. All analyses were performed using SAS version 9.4. Chi-square and t-tests tested for group differences in socio-demographic characteristics, massage expectancies, and the main study outcome variables at baseline between those participants who completed the study and those who did not complete to establish group equivalence pre-intervention, and identify potential confounding variables to be included as covariates in the main study analyses. Repeated measures ANOVA models determined the effect of group (one vs. three massages/week) and time (pre vs. post) as well as the interaction effect of group and time. This latter effect is of primary interest given the information it provides about the effect of dosage of massage. Each of the proposed outcome measures was included in a separate model with group and time as primary predictor variables. For the open-ended responses on the exit survey, crystallization/immersion analysis was used to develop themes to better understand participants' experiences with the program [23].

### 2.8. Ethical considerations

This study was approved by the Institutional Review Boards (IRBs) at Madonna Rehabilitation Hospital and the University of Nebraska-Lincoln (UNL), who evaluated and monitored this research in accordance with the ethical principles of the Declaration of Helsinki. UNL is fully accredited by the Association for the Accreditation of Human Research Protection Programs (AAHRPP), a nonprofit organization that requires maintenance of rigorous standards in research ethics and compliance. Informed consent was obtained from all participants in accordance with the United States Department of Health and Human Services regulations.

The informed consent process took place prior to participants' enrollment in the study and before any data were collected. This process involved the research assistants describing each element of consent to the prospective participants during an individual face-to-face meeting. Elements of consent that were described in detail included a description of the research and study procedures, the risks and benefits of participation, the voluntary nature of participation and their right to withdraw from the study without penalty, details related to confidentiality and the maintenance of records, and alternatives to participation. All participants were provided the opportunity to ask questions before agreeing to participate. Participants who wished to enroll in the study documented their consent by signing the IRB-approved informed consent form. They were then provided a copy of the consent form which included contact information for the study PI and the IRBs overseeing the research.

### 3. Results

#### 3.1. Participant socio-demographic characteristics

A total of 38 caregivers were enrolled (Table 2). Caregivers were primarily mothers (52.6%) or spouses (34.2%) of patients. Their average age was 45.9 years (Standard Deviation (SD) = 14.6) and most were married (84.2%), identified as White/Caucasian (92.1%), and reported a college degree or some college (65.8%) as their highest level of education. The most common diagnosis for caregivers' family members was brain injury (47.4%) and spinal cord injury (23.7%), followed by stroke (10.5%) and other neurological condition (10.5%). No significant differences were found between treatment groups on demographic characteristics.

#### 3.2. Baseline levels of psychological functioning and massage expectations

Examination of BSI 18 scores at baseline revealed that 39.5% reported clinically significant anxiety symptoms, 15.8% reported clinically significant depression symptoms, and 29.0% reported clinically significant somatic symptoms. About one-third of caregivers (29.0%) had a T score at or above the clinical threshold (i.e., ≥ 63) on the Global Severity Scale of the BSI 18. The average PSS total score was 20.4 (SD = 6.8), consistent with moderate stress. No significant differences were found between treatment groups on baseline levels of psychological functioning or expectancies about massage therapy (Table 3).

#### 3.3. Participant retention

Of the 38 enrolled participants who completed the baseline assessment and were randomized, six (16%) dropped out prior to intervention completion. The primary reason for non-completion was an earlier than anticipated discharge of the participants' family member (i.e., return home, readmission to acute care, or transfer to long-term care facility). Two participants had a family member receiving inpatient pediatric rehabilitation and indicated they were too overwhelmed with the instability of their child's medical condition to complete the study. There was not differential attrition by group assignment ( $\chi^2 (1,38) = 0.79$ ,

**Table 2**  
Descriptive characteristics of massage study participants.

Variable	1x/week	3x/week	t or $\chi^2$	Full sample
N	19	19		38
Relationship to patient, n (%)			0.41	
Mother	10 (52.6)	10 (52.6)		20 (52.6)
Father	1 (5.3)	1 (5.3)		2 (5.3)
Spouse or partner	7 (36.8)	6 (31.6)		13 (34.2)
Son or daughter	1 (5.3)	2 (10.5)		3 (7.9)
Age, M (SD)	42.7 (15.2)	49.1 (13.6)	-1.36	45.9 (14.6)
Marital status, n (%)			3.00	
Single, never married	3 (15.8)	1 (5.3)		4 (10.5)
Married	16 (84.2)	16 (84.2)		32 (84.2)
Legally separated	0	1 (5.3)		1 (2.6)
Divorced	0	1 (5.3)		1 (2.6)
Educational attainment, n (%)			3.20	
Less than high school	1 (5.3)	2 (10.5)		3 (7.9)
High school diploma	2 (10.5)	2 (10.5)		4 (10.5)
Some college	7 (36.8)	3 (15.8)		10 (26.3)
College degree	6 (31.6)	9 (47.4)		15 (39.5)
Some graduate school	2 (10.5)	1 (5.3)		3 (7.9)
Graduate degree	1 (5.3)	2 (10.5)		3 (7.9)
Race/ethnicity, n (%)			0.36	
Black/African American	2 (10.5)	1 (5.3)		3 (7.9)
White/Caucasian	17 (89.5)	18 (94.7)		35 (92.1)
Family member's diagnosis, n (%)			4.89	
Brain injury	7 (36.8)	11 (57.9)		18 (47.4)
Stroke	3 (15.8)	1 (5.3)		4 (10.5)
Spinal cord injury	6 (31.6)	3 (15.8)		9 (23.7)
Other medical condition	1 (5.3)	0		1 (2.6)
Other neurological condition	1 (5.3)	3 (15.8)		4 (10.5)
Other orthopedic condition	1 (5.3)	1 (5.3)		2 (5.3)

Note. Percentages may not equal 100 due to rounding. M = Mean, SD = Standard deviation.

ns). There were no significant differences between groups in socio-demographic characteristics. For the main study outcome variables, the only significant difference was observed for anxiety symptoms. Specifically, compared with completers, non-completers reported more anxiety symptoms ( $\chi^2 (1,38) = 2.31, p < 0.05$ ).

#### 3.4. Program compliance

The number of massage sessions received was used as an indicator of program compliance. Participants in "low dose" group had an expected "dosage" of two massage sessions (1/week x 2 weeks). The mean number of massages received by the 19 individuals randomized to this group, including non-completers, was 1.6 (SD = 0.76, Median = 2). Among the 15 participants in the "low dose" group who completed the study, the mean number of massages received by individuals in this group was two (SD = 0, Median = 2). Participants in "high dose" group had an expected "dosage" of 6 massage sessions (3/week x 2 weeks). The mean number of massages received by 19 individuals in this group, including non-completers, was 4.7 (SD = 1.9, Median = 6). Among the 17 individuals in this group who completed the study, the mean number of massages received was 5.1 (SD = 1.5, Median = 6). Overall, 79% of the planned massages were received, with 89% of the planned massages received among the 32 study completers. Reasons cited for missed massage sessions among completers were changes in schedule of the caregivers' family member necessitating the caregiver to be present, other logistical reasons (e.g., unexpected trips back home, illness), or forgetting about the scheduled massage session.

#### 3.5. Program effects

Post-program scores on the three BSI 18 subscales and the PSS were significantly lower than baseline scores for both treatment groups ( $F (1,$



**Table 3**  
Descriptive statistics and group comparisons for main study variables at baseline.

Variable	Full Sample (N = 38)			1 massage per week (n = 19)			3 massages per week (n = 19)			t
	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range	
BSI Anxiety Scale	60.9	9.9	38–80	62.4	10.8	38–80	59.4	8.8	45–80	0.94
BSI Depression Scale	53.9	8.7	40–77	54.3	8.9	40–70	53.5	8.8	40–77	0.27
BSI Somatization Scale	53.7	9.8	41–73	54.7	11.2	41–73	52.7	8.4	41–66	0.62
BSI Global Severity Index	58.2	8.6	39–79	59.4	9.2	39–74	57.1	8.0	47–79	0.41
Perceived Stress Scale	20.4	6.8	5–33	21.3	7.6	5–33	19.6	6.0	7–31	0.78
Message expectancies										
Clinical	17.3	3.4	3–21	17.2	4.2	3–21	17.4	2.3	13–21	–0.19
Educational	16.1	4.2	3–21	15.6	5.1	3–21	16.5	3.3	8–21	–0.68
Interpersonal	11.2	4.6	3–21	11.4	5.4	3–21	11.1	3.9	3–18	0.24

Note. BSI = Brief Symptom Inventory.

**Table 4**  
Results of Repeated Measures Analysis of Variance models testing main effects of time and dosage effects for the massage program.

Variables	Pre-intervention		Post-intervention		Main Effect		Group x Time	
	1 massage per week	3 massages per week	1 massage per week	3 massages per week	F (1,31)	P	F (1,31)	P
BSI Anxiety Scale	60.1 ± 10.7	58.8 ± 9.1	51.9 ± 11.0	53.9 ± 9.9	14.90	0.0006	0.93	0.3426
BSI Depression Scale	51.9 ± 8.2	53.6 ± 9.2	47.1 ± 8.9	49.3 ± 10.6	8.74	0.0060	0.02	0.8862
BSI Somatization Scale	53.6 ± 11.0	53.1 ± 8.3	45.2 ± 9.9	46.1 ± 5.1	24.50	0.0000	0.22	0.6413
BSI Global Severity Index	57.3 ± 8.9	56.8 ± 8.4	48.8 ± 10.7	49.9 ± 10.5	23.53	0.0000	0.25	0.6202
Perceived Stress Scale	20.5 ± 8.2	18.8 ± 5.6	15.8 ± 6.5	16.1 ± 6.4	13.28	0.0010	0.99	0.3286

Note. Analyses included 32 participants who completed the study (n = 15 for 1x/week, n = 17 for 3x/week). BSI = Brief Symptom Inventory 18.

31) = 8.74–24.50, p < 0.01; Table 4). No significant group differences were found.

### 3.6. Program acceptability

Among study completers, the mean BIRS Acceptability score was 5.64 (SD = 0.33). Four themes were identified in participants' qualitative responses on the exit survey: *Physical Benefits*, *Emotional Benefits*, *Enhanced Caregiving Capacity*, and *Improved Health Care Experience*. These themes are elaborated in Table 5. Participants' feedback also suggested several areas for program improvement. Scheduling massage sessions was one major challenge. Several participants reported that it was “hard to find times to schedule” due to the “therapist's schedule”.

Others indicated that this made it difficult to get all three massages in a week. Anecdotally, massage therapists reported that participants' failure to show for scheduled appointments, at times, resulted in an inefficient use of their services. In an effort to control for the impact of varying massage techniques on outcomes, the current study limited the number of individuals delivering the therapeutic massages to two. However, an unintended consequence of this approach may have been scheduling challenges. One participant suggested that massages be placed in their child or family member's schedule, so the participant would not forget to go. Participants highlighted the positive impact massage had on them, and also their desire to extend this service to others. One participant asked that the massages be “added for inpatient families” as well, “once a week for the duration of the child's stay.”

**Table 5**  
Summary of qualitative feedback on program exit survey.

Theme	Descriptions with representative quotations
<i>Physical Benefits</i>	Participants identified specific physical benefits of massage, including pain relief, tension release, stopped muscle spasms, improved sleep, and physical relaxation. One participant stated that the massages “decreased stress in my neck/shoulder muscles and helped to notably decrease chronic neck pain.” Others reported “relieving muscle tension” or “removing the knots from my shoulder’s” or having no “stress pain in shoulder’s and back” as important. One participant stated, “Due to the neck injury and back surgery I have muscle spasms to some degree, all the time. This (as a result of the massages) was the least amount of stress throughout the whole process with my husband’s illness.”
<i>Emotional Benefits</i>	Nearly every participants reported that the massage program improved their mental health by decreasing their feelings of anxiety (“it cleared my head”) and helped them “let go of stress during a very difficult time” in his or her life. One participant noted that because of the massages they “felt relaxed mentally and physically” and that it created “peace, a sort of calmness” in their life. Others described it as “very relaxing” in helping them “forget about all the stresses of everyday life” and that “it was the most looked forward to event in the two-week period.” Two participants said “It helped me break up the stress and severity of the situation of having to be at < hospital name > for rehab” which resulted in one’s “overall outlook on life was much better.”
<i>Enhanced Caregiving Capacity</i>	Participants indicated that the massage program was critical in them “slowing down” and implement self-care. One participant said, “It created a ‘forced’ time to pause and not have to go a thousand miles an hour to get everything done.” Others described it as their “down time” which was critical in “refuel (ing) self-care which is important in providing care for (their) child.” Participants indicated that the massages sessions were a “brief break from day to day stress, from being with your child” and helped them to feel renewed energy for caregiving tasks. Others reported they had a better/more positive attitude, coped with stressors better, and were more focused.
<i>Improved Health Care Experience</i>	The massage program positively affected participants' feelings about the hospital and the health care team caring for their family member. Several participants described feeling valued and affirmed as a caregiver (“It showed me that < hospital name > not only cares for patients but also family members.”) Others described being overwhelmed that “someone wanted to do something for me to help me cope with my situation” which seemed outside of their experience with health care professionals. Another participant stated, “This was the nicest thing that could have been offered to me or any other caregiver ... I would also tell them to advocate for others to do the same. It was a wonderful relaxing comforting experience. I hope the study shows great benefit and promise to keep massage therapy for other caregivers.” It was clear participants felt that this was “a great perk for parents” and a “nice offering and in a way to give back” and “even acknowledged as a caregiver.”

Another suggested that participants have a place to recover from the massage in an adjacent room. Several suggestions focused on ensuring continuity in massage therapists and that massage rooms were devoid of noise or distraction.

Overall, the qualitative data suggests that participants found significant benefits from the massage program. Several participants commented encouragingly for prospective clients, indicating “I would highly recommend it. Offer it to everyone that comes in and really push for them to try it. If they aren't interested in the beginning of their stay, ask them again, in a couple weeks or a month. They may be more comfortable with their surroundings with stay and open to trying it.” It is important to take care of yourself even in stressful times ... do not feel guilty ... take time for yourself ... to be an effective caregiver.”

#### 4. Discussion

While significant attention over the past decade has focused on strategies for enhancing rehabilitation outcomes for individuals who have experienced serious injuries and illnesses, relatively limited research has focused on approaches to ameliorate the short- and long-term negative psychological sequelae for patients' family members. Our baseline data underscore the need to address the psychological well-being of caregivers. Prior to program participation, nearly one-third of caregivers in our sample had a *T* score at or above the clinical threshold on the BSI's global severity scale measure of overall psychological distress. Examination of individual symptom scales revealed that caregivers had clinically significant anxiety symptoms (~40% of caregivers), somatic symptoms (~30%), and depression symptoms (~16%). These findings are consistent with anecdotal reports from the medical teams at our hospital, and are also consistent with prior studies.

Collectively, the quantitative and qualitative findings of this study suggest that therapeutic massage may be a useful tool for improving psychological well-being of family caregivers in rehabilitation hospital settings. While contrary to our hypothesis, the discovery that lower “dosage” massage was as effective as higher “dosage” massage in reducing symptoms of psychological distress has important implications. First, caregivers may be more likely to participate in a hospital-based massage program when the time commitment required to experience benefits is minimal. This is important given that time commitment and scheduling concerns were noted among caregivers in the higher “dosage” group. Second, facilities electing to implement a massage therapy program for caregivers could potentially minimize expense by offering only one versus multiple massages per week.

Attrition is a widely recognized challenge that can compromise internal and external validity of interventions; thus, participant retention is an important consideration for evaluating the feasibility of any pilot program. It has been suggested that an attrition rate  $\geq 20\%$  is problematic in terms of introducing bias. Our massage intervention had a 16% post-randomization attrition rate. This is lower than the  $\geq 20\%$  attrition benchmark, and also lower than the mean attrition rate reported in a meta-analysis of cognitive-behavioral interventions targeting caregivers to individuals with serious medical conditions (20% for initial follow-up, 32% for extended follow-up) [24].

Our success with participant retention may have arisen from our purposeful inclusion of strategies to reduce attrition (e.g., tailoring recruitment efforts, maintaining consistent study procedures, carefully tracking enrolled participants' study progression, and flexibility in rescheduling missed massages and data collection visits). Participant retention may also have been higher in our study because participants perceived the program as having immediate needed benefits for them as expressed via qualitative responses (e.g., mental and physical stress relief, feeling valued as a caregiver, having time for themselves to engage in a pleasurable activity without leaving hospital).

Challenges encountered in implementing this program included caregivers' reticence to leave their family members to have massages,

feeling too overwhelmed to participate in the study, and earlier than anticipated hospital discharges that prevented completion. These significant hurdles to participation for family members of hospitalized patients have been reported elsewhere [25,26]. One potential strategy for overcoming this challenge is having practitioners discuss the benefits of self-care with their patients' family members during treatment planning conferences. Caregivers may feel less guilty taking time away from their family member and more motivated to engage in self-care if they are made aware that self-care has benefits not only for them as caregivers, but also for their family member who is the care recipient, and this practice is seen as valuable by health care providers. Another strategy for addressing challenges to participation would be to provide additional on-site locations for massage (e.g., patient rooms if privacy concerns were addressable).

Several study limitations should be noted. The study lacked a no-treatment control group. This was intentional and reflected our research objective of determining the optimal dosage of massage, but prohibits us from determining whether caregivers' improvement in psychological wellbeing was due to massages or passage of time. Our sample was not racially or ethnically diverse and was comprised mostly of female caregivers. This homogeneity limits the generalizability of our findings. Additionally, we were not able to access any additional information from the medical record to provide insight into the clinical severity of the family members' conditions or aspects of their treatment, including length of stay. However, the hospital setting where the research was conducted treats the top 1% in the United States in terms of patient complexity. Thus, generalizability to family caregivers of patients with less complex or severe functional disabilities is unknown. Another limitation is that our study outcomes were assessed via caregiver self-report, which is subject to social desirability bias and recall bias. We did not collect data from the patient, medical staff or hospital administrators to determine the feasibility and acceptability of the massage program from their perspective. Examination of how this type of program is perceived by others is important for program sustainability. Likewise, an important topic for future study is the program's cost-effectiveness. Attrition from the study may have resulted in reduced power to detect effects. Finally, this study did not include a long term follow-up. Future research is needed to evaluate how long the effects of massage interventions are sustained in this population and setting.

#### 5. Conclusion

Participants who completed the study provided positive feedback, highlighting the potential benefits of massage for caregivers in the rehabilitation setting. Our findings suggest that massage services would be welcomed, utilized, and beneficial for improving the psychological well-being of family caregivers to patients in medical rehabilitation. Results also have implications related to what constitutes optimal dosage for reducing psychological distress, as we found no treatment group effect between caregivers who received one versus three massages per week. A larger randomized controlled trial is an important next step for this research.

#### Conflicts of interest

The authors have no conflicts of interest to disclose.

#### Conflicts of interest

The authors have no conflicts of interest relevant to this article to disclose.

#### Data accessibility statement

Data cannot be publically shared due to restrictions of the governing

hospital institutional review board approval for this study.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ctcp.2019.03.020>.

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