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Development of a Novel Positive Psychology-Based Intervention for Couples Post-Stroke

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Abstract

Objective—Stroke provides challenges for survivors and partner caregivers. Stroke survivors and caregivers are interconnected in their emotional health, including depression, a common stroke sequelae. The purpose of this study was to develop and test the feasibility of a dyadic positive psychology-based intervention (PPI) for couples coping post-stroke.

Design—Community-dwelling couples consisted of one partner who had a stroke >6 months ago and a cohabiting partner caregiver. One or both partner(s) had to report depressive symptoms. The PPI consisted of one brief face-to-face training session and an 8-week self-administered intervention in which participants were instructed to engage in at least two activities alone and two together each week. Two dyads were randomly assigned to a waitlist control to test feasibility of this process. Baseline, post-intervention, and 3-month follow-up assessments and post-program feedback were obtained. Descriptive statistics were used to analyze sample characteristics, recruitment and retention rates, adherence, key pre- and post-intervention outcomes, and satisfaction with the intervention.

Results—Eleven of 20 couples responding to recruitment letters were enrolled in the study. Ten of 11 dyads completed the program. All participants engaged in activities for at least 6 of 8 weeks. Feedback data indicated participant satisfaction with the intervention, and key outcome measures demonstrated adequate variability.

Conclusions—The self-administered dyadic PPI is feasible for implementation with couples post-stroke. The PPI represents a first step in a novel dyadic approach in this population. Recruitment, enrollment and attrition rates, and feedback will be used to inform a larger randomized trial.

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Keywords

couples; positive psychology; stroke; depression

Introduction

Nearly 800,000 US residents experience a stroke each year (Go et al., 2014), making it a leading cause of long-term disability. The majority of stroke survivors (80%) return to the community after initial treatment but still rely on the support of an informal caregiver such as a spouse or partner (McCarthy & Bauer, 2015), who may be unprepared for the challenges of caring for a person with the physical and cognitive impairments that are common after stroke. Stroke significantly impacts spousal relationships. As structured rehabilitation services cease and informal social support lessen, significant strain may emerge as the couple attempts to re-integrate into “normal” life (Northcott, Moss, Harrison, & Hilari, 2015). McKevitt et al. (2011) found that nearly half (42%) of respondents with a partner at the time of stroke reported a negative change in the relationship. Social support and relationship harmony also deteriorate significantly from 1–3 years post-stroke while depressive symptoms increase (Visser-Meily, Post, van de Port, van Heugten, & van den Bos, 2008).

Depression is common in both survivors and caregivers, with estimated rates ranging from 30 to over 50% (Berg, Palomaki, Lonnqvist, Lehtihalmes, & Kaste, 2005; Hackett & Pickles, 2014) and is associated with a number of serious negative consequences. Depression in the stroke survivor is associated with greater dependence in activities of daily living, lower participation in meaningful activities, social isolation, increased institutionalization and mortality, and poorer quality of life (Ayerbe, Ayis, Wolfe, & Rudd, 2013; Skolarus, Burke, Brown, & Freedman, 2014). Similarly, depression in the caregiver is associated with social isolation and decline in health, but also carries negative consequences for the survivor, including increased rehospitalization rates and interference with rehabilitation (Perrin, Heesacker, Stidham, Rittman, & Gonzalez-Rothi, 2008; Tooth, McKenna, Barnett, Prescott, & Murphy, 2005). Importantly, mental health is interdependent in survivors and caregivers; if one partner is depressed, the other partner is at greater risk of being depressed as well (Cameron, Cheung, Streiner, Coyte, & Stewart, 2011; Grant et al., 2013). This highlights the importance of interventions targeting both stroke survivors and caregivers to optimize recovery after stroke.

The Relationship as a Means to Foster Resilience in Couples After Stroke

The dyadic nature of depression may be one reason why current single person treatment approaches are often insufficient for individuals with stroke and their partner caregivers (Broomfield et al., 2011). A new model is needed for stroke survivors and partner caregivers that focuses on existing relationship strengths in order to foster resilience in the couple. Couples-based resilience refers to the strategies partners engage in to strengthen and/or maintain their relationship and promote adaptation to life challenges (Canary, Stafford, & Semic, 2002; Stafford & Canary, 1991). These strategies, which include positivity or interacting with one’s partner in an optimistic way, mutual assurances, building and

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maintaining shared social relationships, and engaging in everyday activities together, promote positive feelings and commitment to the relationship. This can be especially important in populations predisposed to more negative thoughts or behavior. In the cancer literature, a growing body of research supports that couples-based interventions utilizing some of these strategies foster improved psychosocial adjustment to cancer in both patient and partner caregiver (e.g., Badr & Krebs, 2013; Regan et al., 2012). Similarly, a dyadic approach to dealing with the psychosocial challenges of post-stroke recovery may also be helpful for couples coping with stroke. Recent trends in the stroke survivor/caregiver literature have espoused the benefits of using a dyadic approach in this population (Bakas et al., 2014; McCarthy, Lyons, & Powers, 2011). In 2014, the American Heart Association gave Class IIa Level of Evidence A (moderate support based on high quality evidence from RCTs and meta-analyses) support for dyadic interventions targeting stroke survivor outcomes such as mood (depression and anxiety), social function, physical function, and health-related quality of life (Bakas et al., 2014). However, evidence of outcomes for caregivers of individuals with stroke is not as clear. This is likely due to existing dyadic interventions in stroke populations being focused only on the stroke survivor's needs (Bakas et al., 2014), such as managing patient symptoms, rather than being responsive to the needs of the caregiver or couple.

Dyadic Positive Psychology-based Intervention

Just as negative mood states are reciprocal in couples, positive mood states can also be "contagious" and may offer a way to bolster resilience. Based on the broaden-and-build theory (Fredrickson, 2001), positive emotions can broaden an individual's thought-action repertoire, which, in turn, create behavioral flexibility that over time builds personal resources such as resilience, social closeness, and even physical health (Garland et al., 2010). Research suggests that positive emotionality after stroke is associated with improved functional status and social participation (Berges, Seale, & Ostir, 2012). Positive psychology interventions (PPIs) may be particularly useful for rehabilitation populations as they aim to increase well-being by cultivating positive emotions, thoughts, and behaviors (Dunn & Dougherty, 2005; Ehde, 2010). PPIs have not yet been tested in stroke, they have been effectively used in indiviudals with other chronic conditions, including cancer (e.g., Casellas-Grau, Font, & Vives, 2014), diabetes (e.g., Cohn, Pietrucha, Saslow, Hult, & Moskowitz, 2014), and chronic pain due to spinal cord injury, muscular dystrophy, multiple sclerosis, or post-polio syndrome (Müller et al., 2016).

Although PPIs are typically targeted at an individual, they are ideally suited as a dyadic intervention due to the reciprocal nature of positive affect and positive close relationships (Ramsey & Gentzler, 2015; Repetti, Wang, & Saxbe, 2011). In addition, many PPI activities align with the resilience-building strategies described previously (positivity, mutual assurances, building and maintaining shared social relationships, and engaging in everyday activities together) that have been shown to benefit adjustment in couples coping with cancer. Based on these premises of potential benefits associated with interpersonal positive emotionality and strengthening relationships, we developed a dyadic PPI in the stroke population by adapting a PPI protocol originally designed for patients with spinal cord

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injury (Muller et al., 2016) and aimed at patients only. Activities were adapted so that they could be completed individually as well as together by stroke survivors and partners.

There is a lack of studies – and especially rigorous clinical trials– utilizing the dyadic design despite the evidence that supports potential benefits of using a dyadic approach in this population (e.g. Bakas et al., 2014; McCarthy, Lyons, & Powers, 2011). One reason for this is that interventions addressing both survivor and caregiver needs are challenging to implement. Further, recruiting couples to participate in research together can be challenging (Wittenborn, Dolbin-Macab, & Keiley, 2013). Demonstrating feasibility of carrying out this type of intervention is an important initial step in clinical trial design. As such, the purpose of this study was to develop and test the feasibility of a positive psychology intervention in dyads consisting of stroke survivors and their caregiver partners, including recruitment, retention, and acceptability. We also obtained descriptive data for key pre- and post-intervention outcome measures to explore variability in scores and potential directionality of change.

Methods

Design

The study was based on original data collected using pre-, post-intervention, and 3-month follow-up assessments for the purpose of testing feasibility of the dyadic PPI in 11 couples post-stroke. Two dyads were randomly assigned by coin toss (one from dyads 1–5, one from dyads 6–11) to the waitlist control group for purposes of testing the feasibility of the waitlist design in this population.

Participants

Participants were recruited in person and through clinician referrals at University of Utah affiliated outpatient rehabilitation and neurology clinics. In addition, recruitment letters were sent to individuals listed in a database of patients from the University's Physical Medicine & Rehabilitation Clinic who agreed to be contacted for potential research participation. To be eligible for inclusion, couples had to consist of one partner who had an ischemic or hemorrhagic stroke at least 6 months prior and a cohabiting partner who self-identified as the caregiver and was also willing to enroll in the study. Couples had to be community-dwelling, with caregivers being independent in activities of daily living (ADLs) and instrumental activities of daily living (IADLs). Either one or both partner(s) had to report at least mild depressive symptoms such as low mood, apathy and/or anhedonia, as assessed by self-report on the 9-item Patient Health Questionnaire with a minimum score of 5 out of 27 (Kroenke, Spitzer, & Williams, 2001). No formal diagnosis of depression was required.

For this pilot study, we restricted participation to only those who were able to understand printed English instructions and had no more than mild cognitive impairment. Cognitive impairment was assessed by the Montreal Cognitive Assessment (MoCA), a validated screening instrument for cognitive performance; MoCA scores <19 excluded participants (either patient or caregiver) (Rossetti, Lacritz, Cullum, & Weiner, 2011). Potential participants were also excluded if the caregiving partner had a history of stroke or other

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major neurological condition, or if either partner did not want to participate. The Institutional Review Board approved all study procedures prior to data collection. All participants (stroke survivors and caregivers) provided informed consent.

Measures

Recruitment and enrollment data were recorded. Demographic and basic medical data were collected at baseline, post-intervention, and 3-month follow-up, along with 16 self-report and observational psychosocial and functional assessments, including mood, participation, relationship satisfaction/support, and quality of life (see Table 1s in Supplemental Information). Study data were collected and managed using REDCap (Research Electronic Data Capture) electronic data capture tools hosted at University of Utah (Harris et al., 2009). REDCap is a secure, web-based application designed to support data capture for research studies, providing 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources. Because this was a pilot study, we were primarily interested to see whether administration and completion of this battery was feasible. However, we provide pre-, post-intervention, and follow-up descriptive data for the following primary outcome measures:

PROMIS-Depression Short Form 8b—(Cook, Bamer, Amtmann, Molton, & Jensen, 2012). This 8-item self-assessment rates depressive symptoms over the past week on a 5-point Likert scale from “never” to “always.” These items have been validated for use in this population (Pilkonis et al., 2014). Scores rage from 8–40 with higher scores indicate more depressive symptoms. Raw scores can be converted to T-scores.

10-item Connor Davidson Resilience Scale (CD-RISC)—(Campbell-Sills & Stein, 2007). A brief, unidimensional measure of resilience on which participants rated items such as “able to adapt to change,” and “tend to bounce back after illness or hardship,” on a 5-point Likert scale from “not true at all” to “true nearly all the time.”

Stroke Impact Scale (SIS) v3.0—(Duncan, Bode, Min Lai, & Perera, 2003; Vellone et al., 2015). This 61-item measures changes in function after a stroke rated on a 5-point Likert scale. The eight domains assessed include strength, hand function, mobility, activities of daily living, emotion, cognition, communication, and participation in meaningful activities. The last item on the scale assesses self-perceived recovery from the stroke (in percent recovered).

Older People’s Quality of Life Questionnaire (OPQOL)—(Bowling, 2009). A 35-item measure that assess quality of life domains (life overall, health, social relationships, independence, control over life, freedom, area: home and neighborhood, psychological and emotional well-being, financial circumstances, and participation in leisure and activities). Although the scale was developed for use in older adults, the items are applicable to those with chronic conditions, and the scale has been validated for use in medical and rehabilitation populations.

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Social Relationships Index (SRI)—(Campo et al., 2009). A 3-item measure of positivity and negativity in a couple's relationship rated on a 6-point Likert scale from "not at all" to "extremely". Items focus on how important, helpful, and upsetting an individual's spouse/partner is.

Adherence—*Adherence* to intervention activities was assessed using weekly check-in surveys completed by telephone. Each week, participants were asked about the number of activities they completed individually and as a couple. Participants also tracked their weekly activities using a calendar we provided.

Acceptability—*Acceptability* of the intervention was assessed by having participants complete a brief feedback questionnaire and follow-up semi-structured interview post-intervention. Participants were asked to rate on a scale of 0 to 4 (*none* to *extreme*) how much they benefitted from the intervention, how dissatisfied or satisfied they were with the intervention, and whether they experienced any negative or positive effects. Participants were also asked to provide feedback about the length of the intervention, functionality of the tracking calendar, helpfulness of the activity booklet, and difficulty completing the required number of activities per week. Finally, participants were asked to rate the helpfulness of individual PPI activities (from 0, *not at all helpful*, to 4, *extremely helpful*). In addition to the Likert-scale ratings, open-ended follow-up interview questions were asked to allow participants to elaborate on questionnaire responses (e.g., if some negative effect was endorsed, participants were asked what these effects were). The interview also allowed for open-ended participant responses to questions about perceived benefits or changes they attributed to the intervention, and provide any additional comments and suggestions about the intervention.

Procedure

Dyads participated in the self-administered 8-week intervention and three in-person study sessions at a University-affiliated clinic: pre- (T1: baseline), post- (T2), and 3-months post-intervention (T3). The intervention was conducted in the 8 weeks between T1 and T2 visits.

T1 (baseline): Pre-intervention—Participants completed baseline surveys in separate rooms to allow for privacy in answering potentially sensitive questions and prevent bias in responding. A research assistant was present in each room to administer surveys.

After completing all assessments, participants in the PPI group were provided a 20-minute training session on how to complete the intervention activities and each participant received the PPI activity booklet and tracking calendar to take home.

Intervention—Participants were instructed to engage in the 8-week self-administered intervention, completing at least two PPI activities alone and two together each week based on existing research suggesting that practicing a variety of self-selected PPI activities produces more sustained increases in well-being (Lyubomirsky, & Layous, 2013). Specific PPI activities for this intervention were selected based on empirically-supported evidence for efficacy in improving depressive symptoms and/or increasing well-being (Bolier et al., 2013; Sin & Lyubomirsky, 2009)., Activities include: Expressing gratitude, practicing acts of

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kindness, fostering relationships, focusing on the positive, working toward a goal, savoring, and spirituality. Intervention materials included a booklet containing descriptions and examples of positive psychology activities to be completed individually and as a couple. An activity tracking calendar was also provided for participants to indicate which activities they engaged in alone or with their partner every week. Research assistants administered weekly check-in calls to both survivor and caregiver participants to (1) collect data on total number of activities completed individually and as a couple that week to monitor adherence and (2) administer brief mood assessments (asking participants to rate their average positive mood over the past week from 1–10, and their negative mood from 1–10) to track progress. Participants were also asked about any other observed changes in mood or behavior.

T2: Post-intervention—Participant couples returned to the clinic and completed assessments as in T1, as well as the feedback questionnaire and interview. Trained research assistants administered the assessments and conducted the interview. Participants completed surveys and were interviewed individually in separate rooms to prevent potential bias in responding.

T3: 3-month follow-up—Participant couples again returned to the clinic to complete a final set of assessments. No intervention was conducted between T2 and T3 (although participants were encouraged to continue practicing activities they found helpful). Another brief semi-structured interview was conducted by trained research assistants to determine whether participants had continued to engage in PPI activities on their own and to assess any barriers and/or facilitators to completing activities after the intervention was completed.

Data Analysis

For this small pilot study, only descriptive statistics were used without methods of inference. All quantitative data were analyzed by an investigator who did not conduct assessments or administer weekly check-in calls. The responses to open-ended interview feedback questions were transcribed and any potential identifiers removed. These questions were primarily used to support the quantitative data collected and offer participants an opportunity to give feedback or add something not represented in the survey. We were particularly interested in perceptions of each PPI activity type. As such, the transcribed interview responses were coded using directed content analysis (Hsieh & Shannon, 2005) to identify areas of concern, suggestions, and strengths of the intervention. To achieve consensus and ensure validity of the coding, three trained coders worked independently and meetings were held to review coding decisions. Disagreements were discussed until consensus was achieved.

Results

Rather than establishing the effect of the intervention, the data collected in this study were used to identify the feasibility of the process and those areas that require improvement prior to a large scale study. This section reports on several vital study characteristics that were assessed by the research team using supporting data to determine feasibility.

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Recruitment and Retention

Recruitment was completed in 1 month for the first five couples and 2 months for last six couples, with 6 months in-between recruitment periods. Overall, 20 individuals responded to 239 recruitment letters (8%). Eleven of these respondents (55%) met eligibility criteria and were enrolled with their partners for a total of 22 participants. Six of those who were not enrolled did not meet inclusion/exclusion criteria, the other three did not enroll due to conflicting scheduling and other time commitments. Ten of the 11 enrolled dyads completed the program; one dyad withdrew due to changes in health of the caregiver prior to starting any part of the intervention (90% retention).

Participant Characteristics

Individual participant characteristics are shown in Table 1. Each of the 11 dyads consisted of heterosexual married couples, and were predominantly White and well-educated. Five couples consisted of male stroke survivors and female caregivers. In four of the couples both partners were under 45 years old. The duration of couples' relationships ranged from 3 to 65 years (mean 28.5 years). Although the type of stroke and sequelae were similar among most of the survivors, the affected hemisphere was evenly split between left and right.

Baseline PHQ-9 depression scores for the sample ranged from 0 to 17 (M = 5.65, SD = 4.73). Stroke survivors had higher but more variable (mild to severe) depression scores, on average, than caregivers (M = 7.30 SD = 5.25 vs. 4.00 SD = 3.68). In these dyads, which included at least one individual with depression rated mild or higher, 63% of survivors had mild-to-severe depression compared to 45% of caregivers.

Assessments

Participants were able to complete all baseline assessments within 3 to 4.5 hours with minimal to no assistance from the research assistant. Participants were provided short breaks as needed; however, many participants, in particular the stroke survivors, were fatigued by the time the research assistant engaged them in the 20 minute PPI training session. Consequently, after the first five couples, we sent participants a packet of self-report surveys to complete ahead of time in order to shorten the time spent and reduce fatigue. Post-intervention and 3-month follow-up sessions were shorter in duration (1–2 hours), and fatigue was not an issue. Table 2 shows the means and standard deviations for key pre- and post- outcome measures to demonstrate variability in scores.

Adherence to Intervention

One of the dyads dropped out of the study prior to completing any of the intervention activities or weekly check-ins. The ten remaining couples each engaged in a mean of 4.08 (SD = 1.99) individual and 3.62 (SD = 1.74) couple activities per week, exceeding, as a group, the prescribed minimum of two individual and two couple activities per week. However, adherence ranged widely among participants (range per week: 1 to 20 individual and 1 to 12 couple activities per week). The most frequent activities engaged in included fostering relationships and working towards a goal; these, along with savoring were also the activities more commonly done as a couple. Working towards a goal, and spirituality were done individually most of the time. See Table 3 for activity descriptions and frequencies.

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Acceptability of the Intervention

Table 4 shows results of the feedback questionnaire, including high perceived benefit, positive effects, and satisfaction with the intervention across all participants. In responses to open-ended questions, participants reported similar satisfaction with the intervention, including that it was of adequate length and that the activity booklet was helpful for completing the activities at home. Eleven participants reported some difficulties remembering to write activities down and not having enough space to write on the tracking calendar. Fourteen participants suggested a technology-based tracking system would be useful, or even preferable. Participants indicated that the weekly check-in calls were of adequate frequency and “very helpful”. One couple preferred receiving check-ins by email, and two couples indicated that this would be acceptable but not preferable to a phone call.

Eighty percent of participants tried activities from all seven categories; of the four participants that did not try all activity-types, two were from the same couple. On average, activities in all categories were rated as being “moderately helpful” to stroke survivors and caregivers (see Table 4). Fostering relationships and working towards goals were by far the most common activities completed; however, survivors and caregivers evaluated them differently in terms of helpfulness. All participants indicated that completing the activities together provided benefit over and above doing them individually. In addition, several participants noted that although many of the activities were not new to them, they had stopped engaging in these activities after the stroke. The intervention reminded and prompted them to take time to re-engage in these activities both on their own and as a couple. As one caregiver noted, “Get us out of our own little shell so we can kinda see that there is daylight outside of our own little cocoon.”

Participant-reported negative effects of the intervention focused on discomfort with self-reflection and difficulties in changing their behaviors. One participant (stroke survivor) observed that introspection was difficult but necessary in order to bring about the change that he wanted in his and his partner’s lives. Another noted:

> …it was hard for me to show gratitude, to look towards the future. But it’s […] good to understand what’s important to me. It’s hard to look at what’s eating at you, and then to try to change that, because it’s easier just to sit and do nothing, than to show gratitude, to help people out, to savor things, to do all those things on [the activities] list.

At the 3-month follow-up interview, eight of ten participant couples had continued to engage in PPI activities. However, all participants indicated that they had decreased engagement in PPI activities and attributed this primarily to time constraints and not having a structured program to follow. Based on participant feedback, PPI activities were more sustainable when kept simple and brief, and when incorporated into daily life.

Discussion

Although an emerging body of literature suggests that dyadic interventions aimed at both survivors and caregivers post-stroke could be beneficial, empirical research, particularly in the form of clinical trials, is limited. Further, recruiting and retaining couples is a known

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challenge in dyadic research (Wittenborn, Dolbin-Macab, & Keiley, 2013). This study aimed to test the feasibility of administering a dyadic PPI to couples who are experiencing depressive symptoms post-stroke. This process allowed us to identify areas of strength and processes that need adjustment prior to moving towards a large scale intervention study. The results of this study maybe be helpful to other researchers and clinicians pursuing similar interventions.

Our results indicate that dyadic PPIs in couples post-stroke are feasible and acceptable. Recruitment and enrollment for the pilot study was adequate given our minimal dedicated resources and brief time frame. Further, recruiting couples did not seem to be a major barrier to enrollment. To increase response rate in a larger trial, enhanced recruitment strategies, such as in-person introductions, may be more effective, as well as financial incentives. Retention was excellent and the participant-reported negative effects of the intervention were not atypical to those reported in the literature by others receiving psychotherapeutic interventions (Barlow, 2010). Overall, participants were satisfied with the intervention, and noted positive effects and benefits. Participants found that having a choice of activities was valuable. They enjoyed trying the activities, and noted that a strength of the intervention was the ability to do activities both individually and as a couple. Fostering relationships (both with the partner and outside of the dyad) and working toward a goal were by far the most popular activities. However, whereas caregivers found these activities to be the most helpful of the seven activity types, stroke survivors rated savoring, practicing acts of kindness, and expressing gratitude as being more helpful. It is unclear why these differences occurred. It might be that caregivers found these activities particularly helpful as they allowed them to reconnect with social circles or focus on personal goals that had been set aside since their partner’s stroke, which are concerns identified by stroke caregivers across the literature (e.g., Grant, Hunt, & Steadman, 2014; Greenwood, 2009). This also corresponds with an observation from interviews that doing activities individually was thought to be of particular value to the caregiver, whereas doing activities together was thought to be of particular value to the stroke survivor.

In some cases participants especially valued the dyadic activities; this often meant returning to activities that the couple had stopped doing together since the stroke. The discontinuation of participating in valued and pleasurable activities in stroke survivors and caregivers is consistently found across the literature (e.g., Rochette, Desrosiers, Bravo, Tribble, & Bourget, 2007; Skolarus et al., 2014) and it is often difficult for individuals to re-engage in activities unless a structure is provided. By prompting couples to participate in positive psychology activities together, they are relearning and developing behaviors that may broaden their repertoire of positive interactions together. This can have important implications for relationship intimacy, disease adjustment, and well-being (Manne & Badr, 2008; Stephens, Hemphill, Rook, & Franks, 2014).

In addition to demonstrating the intervention’s feasibility, we obtained scores on our key outcomes that had adequate variability. Many demonstrated change in the expected direction from pre to post intervention; e.g., depression, resilience, select subscales on the OPQOL (life overall, health), and subscales on the SIS (emotions, meaningful activity engagement) supporting the use of these measures in future studies when samples are better powered.

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Our findings indicate that some adjustments to the PPI protocol need to be considered. First, the purpose of the weekly phone-based check-ins was understood differently among participants; some participants used these calls to ask questions and obtain feedback, which could potentially affect outcomes. Therefore, weekly check-in calls should be standardized by using structured scripts and reporting sheets. Educating participants about the purpose of the follow-up calls and providing alternative methods to ask questions and provide feedback could clarify the process. Many participants, particularly those with post-stroke handwriting and memory difficulties, found the handwritten tracking calendar difficult to use. Participants suggested utilizing an internet or app-based tracking system. A recent Cochrane review concluded that using apps to collect self-report data may be quicker, yield more complete but equivalent data when compared to paper (Belisario et al., 2015). For individuals with physical disabilities, tracking in an electronic/app-based format could also provide an alternative to handwriting (for example, point-and-click or using voice-response). Using apps for tablets or smartphones has gained in popularity for administering self-management programs for chronic conditions in general for a number of reasons, including popularity of these devices, being cost-effective, and for increasing self-efficacy skills by providing reminders, or supportive messages (de Jongh, Gurol-Urganci, Vodopivec-Jamsek, Car, & Atun, 2012). An electronic format may also facilitate couples continuing their PPI practice after completion of the research study, as it could include electronic reminders that provide the structure participants found to be lacking when using the activities on their own. Finally, several participants reported fatigue due to the long duration of the in-person sessions and researchers observed signs of decreased attention during the 20 minute PPI training session after the lengthy baseline assessment session. This leads to concerns about every participant receiving adequate –and equivalent- training. While it is important to gather background information about participants, participant burden is an important factor to consider (Bell et al., 2008). As such, for couples 6–11, non-time sensitive information (e.g., demographics) was obtained prior to the first assessment session, which reduced the length of the first session.

Dyadic Approach

Developing an intervention that is directed at the couple rather than the stroke survivor, is a novel approach to post-stroke depression treatment that may have significant benefits for both the stroke survivor and the caregiver. This approach builds upon the well-established role of social support and intimate relationships in adherence to medical regimens (DiMatteo, 2004). The caregiver is often described as the “silent patient” across the caregiving literature and lacks attention in the clinic and in research. However, as with other conditions, stroke happens within the family system; there is a high interdependence of distress in survivors and caregivers. Sustaining caregiver well-being is crucial so they can take care of themselves and continue to provide care. As such, what is needed is an approach that addresses the needs –and well-being – of both partners.

In our dyadic approach to PPIs, stroke survivors and caregivers completed PPIs each week on their own and together oriented toward bolstering positive mood within the relationship. Future research will need to assess whether completing these PPI activities together allows couples to share positive experiences, thereby increasing positive affectivity, strengthening

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social bonds, and ultimately improving disease adjustment and quality of life (Manne & Badr, 2008). By having participants also complete PPI activities on their own, we expect that individual positive emotion will increase to an even greater amount. Together, this may foster a more positive environment over time, and lead to a synergistic change in positive affect and well-being for the dyad. Couples with greater well-being may be better emotionally equipped to handle the stresses of stroke, potentially reducing depressive symptoms (Grant et al., 2013; Perrin et al., 2008). Determining efficacy and exploring potential mechanisms is an area for future research.

The sample consisted of a range of age groups, with over half of the couples under the age of 65, demonstrating the acceptability of the intervention across the adult life span. Though stroke is less prevalent in middle-age, this age group is experiencing an increase in stroke incidence (Krishnamurthi et al., 2015) and, importantly, emerging literature indicates that younger stroke survivors and partners may be more vulnerable to difficulties with psychosocial adjustment. Viewed from a life course perspective, middle-age is a period of peak job and family responsibilities for most, and these typical midlife stressors may intersect with new stroke-related stressors to create a more profound impact on the couple. Younger couples tend to feel more traumatized by the unforeseen nature of the stroke, feel more isolated from peers and distressed by compromised physical intimacy, and potentially more overwhelmed or devalued by their new role as “patient” or “caregiver” (Buschenfeld, Morris, & Lockwood, 2009; Lawrence, 2010). Notably, even though over half our stroke survivors were considered “working age,” only one was employed (part-time). Although stroke certainly can have profound effects on couples of all ages, younger couples coping with stroke may be a specific target group for dyadic interventions and may need different approaches than older patients, such as flexible schedules to accommodate work schedules and increased technology interfaces.

Limitations

The results of the study should be interpreted cautiously. The primary limitation of this study is the small, relatively homogeneous (i.e., white, well-educated, heterosexual) participant sample, which limits generalizability and our ability to draw definitive conclusions beyond feasibility of administering the PPI protocol in this population. In addition, we restricted inclusion criteria to those individuals who were able to read and understand printed English instructions, and had no more than mild cognitive impairment because the nature of the intervention required being able to read/follow instructions, and to track activities. We also did not formally measure aphasia, which may influence depression assessment. Because stroke sequelae can include a range of language, visual, physical, and cognitive impairment, it is yet to be determined if the PPI protocol would be feasible in a larger stroke population who may have more significant impairment. As noted in the discussion above, there was some variability in terms of time spent with research assistants on weekly check-ins; potentially this could affect outcomes, including satisfaction with the intervention. Significant variability in adherence was also observed among some participants who completed significantly more activities per week than average possibly impacting associated intervention benefits. However, this study represents an important step forward in providing tools for couples to cope with depression associated with stroke.

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Conclusions

We have developed a novel intervention based in positive psychology for English-speaking community-dwelling couples coping with stroke sequelae, but without major language or cognitive impairment. The dyadic nature of this intervention is a unique strength that capitalizes on the existing interdependence and needs of these couples. However, there is currently a lack of studies utilizing the dyadic design despite evidence supporting the potential benefits of using a dyadic approach in this population. This is in part because interventions addressing both survivor and caregiver needs are challenging to implement. For example, recruiting couples (vs. individuals), administering rigorous and lengthy assessments to individuals who may have physical and cognitive impairment, and having participants adhere to intervention instructions while completing activities on their own at home can all pose significant challenges. Findings from this pilot study could potentially be useful to other researchers interested in implementing this type of study design.

Based on the current study, the PPI protocol appears feasible for implementation in this population, and findings will be used to inform the larger, planned pilot efficacy trial. If found effective, couples in this population may have tools to enhance their well-being, and in turn, be better emotionally equipped to cope with the sequelae of stroke, reducing stress, depressive symptoms, and increasing quality of life. Future studies will need to examine the ability of couples with more severe stroke impairments to utilize PPI effectively, the impact of the match between participant characteristics and strategy use, and cultural influences on the effectiveness of this intervention.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Impact and Implications

- There is a need for interventions targeting both survivor and caregiver depressive symptoms and well-being post-stroke as current interventions are insufficiently effective.
- This study focuses on developing a dyadic positive psychology-based intervention targeting both stroke survivors and caregivers. The unique needs of caregivers are typically neglected by other dyadic approaches; yet sustaining well-being in caregivers is crucial so they can continue to provide care for their partner and also take care of themselves.
- Potential impact is significant as the positive psychology intervention (PPI) requires relatively few resources compared to traditional psychotherapy and can be adapted to reach geographically or situationally isolated individuals. If found effective, couples with greater well-being may be better emotionally equipped to cope with the sequelae of stroke, reducing stress, depressive symptoms, and increasing quality of life.

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Table 1

Participant Characteristics

	Stroke Survivor (*n* = 11)	**Partner Caregiver (*n* = 11)**
Individual Characteristics		
Female (n, %)	6 (55)	5 (45)
Age, mean years (SD), range	56.0 (18.1), 27–84	55.9 (16.6), 28–81
>12 years of education, n (%)	10 (91)	10 (91)
Employed, n (%)	1 (9)	6 (55)
Length of relationship, mean years (SD), range	28.5 (20.3), 3–65	
PHQ-9 Depression score, mean (SD), range	7.3 (5.3), 0–17	4.0 (3.7), 0–11
Minimal depression (PHQ-9 0–4), n (%)	3 (27)	5 (45)
Mild depression (PHQ-9 5–9), n (%)	5 (45)	4 (36)
Moderate depression (PHQ-9 10–14), n (%)	0 (0)	1 (9)
Moderately-severe depression (PHQ-9 15–19), n (%)	2 (18)	0 (0)
Stroke Characteristics		
Time since stroke, mean years (range)	2.9 (0.6–5)	
Stroke type, n (%)		
Ischemic stroke	8 (73)	
Intracerebral Hemorrhage	1 (9)	
Unknown	2 (18)	
Hemisphere affected, n (%)		
Left	4 (36)	
Right	4 (36)	
Brainstem	1 (9)	
Unknown	2 (18)	
Stroke Sequelae		
Permanent hemiparesis, n (%)	7 (64)	
Lawton Instrumental Activities of Daily Living Scale, mean (SD, range)	11.1 (4.0), 4–16	

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Table 2

Descriptives for Key Pre- and Post-Intervention Outcome Measures

Measures	Stroke Survivor (n = 11)		Partner Caregiver (n = 11)		All Participants (n = 22)	
	Pre-PPI M (SD)	Post-PPI M (SD)	Pre-PPI M (SD)	Post-PPI M (SD)	Pre-PPI M (SD)	Post-PPI M (SD)
PROMIS-Depression[a]						
Total score	19.36 (9.66)	15.30 (7.17)	12.64 (3.67)	10.00 (2.05)	16.00 (7.92)	12.65 (5.81)
T-score	56.77 (10.40)	51.18 (9.67)	49.55 (4.91)	44.22 (5.67)	53.16 (8.76)	47.70 (8.50)
Connor Davidson Resilience Scale[b]						
Total score	26.64 (7.84)	27.20 (6.46)	32.36 (4.12)	34.00 (4.57)	29.50 (6.78)	30.60 (6.47)
Older People’s Quality of Life Questionnaire[c]						
General	3.55 (1.04)	4.00 (0.82)	4.27 (0.79)	4.40 (0.70)	3.91 (0.97)	4.20 (0.77)
Life overall	14.18 (3.25)	15.30 (3.40)	16.36 (1.91)	17.70 (1.34)	15.27 (2.83)	16.50 (2.80)
Health	13.09 (3.59)	13.40 (3.44)	15.50 (3.24)	16.70 (2.21)	14.24 (3.56)	15.05 (3.28)
Social	18.90 (2.47)	17.44 (3.71)	16.56 (4.48)	17.67 (3.14)	17.79 (3.66)	17.53 (3.38)
Independence	13.82 (3.94)	13.44 (3.20)	17.20 (1.75)	17.10 (1.66)	15.43 (3.49)	15.37 (3.08)
Home	16.55 (2.54)	16.50 (3.66)	17.09 (2.66)	17.00 (2.00)	16.82 (2.56)	16.75 (2.88)
Psychological	15.11 (2.15)	16.22 (3.49)	17.20 (2.15)	17.00 (1.94)	16.21 (2.35)	16.63 (2.73)
Finances	13.22 (4.41)	14.67 (2.55)	16.10 (3.18)	16.70 (1.83)	14.74 (3.98)	15.74 (2.38)
Leisure	22.10 (3.96)	21.25 (5.34)	23.20 (1.69)	23.90 (2.28)	22.65 (3.01)	22.72 (4.04)
Stroke Impact Scale 3.0[d]						
Strength	13.64 (4.88)	12.44 (4.95)	–	–	13.64 (4.88)	12.44 (4.59)
Cognition	28.00 (6.15)	28.80 (5.83)	–	–	14.00 (6.15)	13.20 (5.82)
Emotions	35.73 (6.51)	37.30 (5.76)	–	–	18.27 (6.51)	16.70 (5.76)
Communication	30.36 (5.07)	30.40 (5.25)	–	–	11.64 (5.07)	11.60 (5.25)
Daily Activities	38.20 (8.59)	38.70 (7.99)	–	–	21.80 (8.59)	22.44 (7.55)
Mobility	40.36 (8.76)	40.60 (9.71)	–	–	19.64 (8.76)	19.40 (9.71)
Hand	13.55 (8.05)	12.70 (8.67)	–	–	16.45 (8.05)	18.67 (7.97)
Meaningful Activities	30.00 (6.84)	32.10 (7.16)	–	–	19.00 (6.31)	17.11 (7.03)

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Measures	Stroke Survivor (*n* = 11)		Partner Caregiver (*n* = 11)		All Participants (*n* = 22)	
	Pre-PPI M (SD)	**Post-PPI M (SD)**	**Pre-PPI M (SD)**	**Post-PPI M (SD)**	**Pre-PPI M (SD)**	**Post-PPI M (SD)**
% Recovered	69.82 (16.73)	71.00 (19.17)	–	–	69.82 (16.73)	71.00 (19.17)
Social Relationships Index						
Important[e]	4.73 (0.79)	4.70 (0.48)	4.64 (0.92)	4.60 (0.70)	4.68 (0.84)	4.65 (0.59)
Helpful[f]	4.55 (0.69)	4.10 (0.88)	3.09 (1.22)	3.40 (1.17)	3.82 (1.22)	3.75 (1.07)
Upsetting[g]	2.18 (1.72)	2.10 (1.29)	1.45 (1.04)	1.40 (0.84)	1.82 (1.44)	1.75 (1.12)

[a] Higher scores indicate more depressive symptoms.

[b] Higher scores indicate greater resilience.

[c] Higher scores indicate better QOL.

[d] Higher scores indicate less interference of stroke with participation

[e] Higher scores indicate spouse is more important.

[f] Higher scores indicate spouse is more helpful.

[g] Lower scores indicate spouse is less upsetting.

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Table 3

Positive Psychology Activities Descriptions, Frequencies, and Participant Feedback

Overall Activities	**Individual activities/week M (SD)**	**Couples activities/week M (SD)**
Stroke Survivor	**3.88 (1.74)**	**3.44 (1.48)**
Partner Caregiver	**4.10 (2.31)**	**3.80 (2.03)**
Activity Type	**Description**	**Frequency Used**
Expressing gratitude	Counting blessings, appreciation of life circumstances and gratitude towards persons (thanking someone) by writing or expressing gratitude directly to another person.	Total: 55 ■ Individual: 42 ■ Couple: 13
	Participant quotes: ■ Survivor “I always wanted to expressing gratitude by writing thank you notes and a short letter. And reciprocation and acknowledging how I feel about them coming to visit me.” ■ Survivor “It’s nice to fully express gratitude. I can talk okay, and most people don’t know I’ve had a stroke. But to write a thank you note, which is cumbersome to me, and takes more time and more effort, […] but to go to that level because I know it’s hard for me and to tell someone how I’m grateful for them, and to send it off in the mail, that changed me.” ■ Survivor “… I was surprised that I’m very grateful to be alive… showing gratitude for others, for my wife, for my child, for my family, you can get stuck in this hole where everything is about you, and I was, *am* sick of that hole. So, doing the activities, it helped me tremendously.”	
Practicing acts of kindness	Performing good deeds for other people, whether friends or strangers, either directly or anonymously, either spontaneously or planned.	Total: 86 ■ Individual: 68 ■ Couple: 18
	Participant quotes: ■ Caregiver “You start seeing them around, you start seeing the positive of things. Or just opening the door for that person… that was a random act of kindness. You don’t think about those things. And it’s like, drawn out to you, some of the everyday stuff. And then I would start seeing it in others around, like he just did a good deed, or they just did this, or you know? So. It was nice, it kind of made me more aware.”	
Fostering relationships	Strengthening and enjoying relationships by making time for people, expressing appreciation and affection, and being supportive.	Total: 254 ■ Individual: 76 ■ Couple: 178
	Participant quotes: ■ Caregiver commenting on completing activities together: “We didn’t just say, ok we’re at 15 minutes we’re done, we always would go on longer, and get into more in-depth discussions, or we’d stay up a little bit later to spend that extra time together. It wasn’t, ok we did our homework, back to busy life. We savored those times that we did activities together. And I know that he valued that time.”	
Focusing on the positive	Replaying positive experiences and self-monitoring instances of well-being (e.g., listing three good things that happened that day). Practicing optimism by writing about best possible future selves.	Total: 52 ■ Individual: 37 ■ Couple: 15
	Participant quotes: ■ Caregiver “Even the most uncomfortable things there is almost always a silver lining behind that if you’re willing to take the chance” ■ Survivor “…I’ve just had this little voice in the back of my head, ‘find the positive, think positive, take a deep breath…” ■ Caregiver “…that sets the tone for house life, family life, school life, so, with me being more centered and calm, and happy, because I’ve felt good and at peace, then I’ve been able to not get stressed and not get	

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Overall Activities	**Individual activities/week**	**Couples activities/week**
	M (SD)	**M (SD)**
Stroke Survivor	**3.88 (1.74)**	**3.44 (1.48)**
Partner Caregiver	**4.10 (2.31)**	**3.80 (2.03)**
	angry. Not saying that I never did over the last 8 weeks, but not as much. And it was easier to just overlook certain things that would normally kind of bother me… I'm like, eh, not that big of a deal, I've already mentally prepared for that."	
Savoring	Taking delight, and replaying life's momentary pleasures and wonders. Being open to finding beauty, relishing ordinary experiences, and savoring those experiences with others. At home or in a park, use all five senses to take in your surroundings.	Total: 134 ■ Individual: 64 ■ Couple: 70
	Participant quotes: ■ Caregiver "Playing a game with my kids… my job here isn't what I need to do like mow the lawn but my job here is actually to think about enjoying being with my kids. That was actually harder than I expected but it was really… huge." ■ Caregiver "I think just how easy it was to use everything in my daily life. […] I just saw a hummingbird out my window, and that just brightened my day. Just little things like that. And the savoring, I loved the savoring part. Because our world is so busy, and it's go go go all the time, finding those little moments of yay! It's just, it makes you slow down. And then you see it everywhere." ■ Survivor "But it is, having the opportunity to take in things like that. Everything is busy. The world is busy. My wife is busy. And it's made me step back and just savor things."	
Working toward goals	Picking one or two significant goals that are meaningful and devoting time and effort to pursuing them.	Total: 236 ■ Individual: 133 ■ Couple: 103
	Participant quotes: ■ Caregiver describes changes he's noticed in his relationship with his wife, "having a little more conversations and more activities together and we really started talking about specific things, not just, this is what I did today but actually working on planning what's next for us and planning activities and deciding what's next for our relationship and our family.“	
Spirituality	Seeking meaning and purpose through something that is greater than the individual self, finding the sacred in ordinary life. Find meaning in being creative, or try a guided mini-meditation (Note: this does not necessarily refer to religious practice.)	Total: 150 ■ Individual: 109 ■ Couple: 41
	Participant quotes: ■ Survivor commenting about why spirituality was her favorite type, "it helps me to focus on changing my attitude towards things… I believe in it wholeheartedly. I'll continue doing [this activity]…" ■ Survivor "We sat down and we know that we want to be in a different place in a year from now. So spiritually, physically, emotionally, and so we're taking time every night since the new year to talk about our day and pray with each other. …like I said the simple things, she's my best friend and I just want her to know that I am thinking about her. And going on a date or going to the temple. Or just going out together, that's a big deal." ■ Survivor "just taking a step back and looking at things from a different perspective and I think that that… whatever faith people have… It will help them grow."	

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Table 4

Intervention Feedback Questionnaire

	Stroke Survivor (*n* = 11)	**Partner Caregiver (*n* = 11)**	**All Participants (*n* = 22)**
Overall intervention satisfaction questions[a]	M (SD)	M (SD)	M (SD)
Overall perceived benefit of the intervention	3.10 (0.57)	2.89 (0.60)	3.00 (0.58)
Negative effects related to the intervention	0.83 (0.98)	0.67 (0.82)	0.75 (0.87)
Positive effects related to the intervention	3.33 (0.52)	3.00 (0.63)	3.17 (0.58)
Satisfaction with the intervention	3.30 (0.67)	3.00 (0.67)	3.15 (0.67)
Difficulty in completing required number of weekly activities	1.00 (1.05)	1.10 (1.20)	1.05 (1.10)
Helpfulness of intervention activities[b]	M (SD)	M (SD)	M (SD)
Expressing gratitude	3.20 (1.03)	2.80 (1.62)	3.00 (1.34)
Practicing acts of kindness	3.30 (0.95)	3.00 (1.25)	3.15 (1.09)
Fostering relationships	2.90 (1.10)	3.60 (.52)	3.25 (0.91)
Focusing on the positive	3.10 (1.28)	3.10 (1.29)	3.10 (1.25)
Savoring	3.40 (0.97)	3.40 (1.26)	3.40 (1.09)
Working towards a goal	3.00 (0.82)	3.70 (0.48)	3.35 (0.75)
Spirituality	2.70 (1.57)	3.30 (1.25)	3.00 (1.41)

[a] Item response options were: (0) not at all to (4) extreme

[b] Item responses options were: (0) not helpful at all to (4) extremely helpful