

Dementia Caregivers' Responses to 2 Internet-Based Intervention Programs

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Abstract

Purpose: The aim of this study was to examine the impact on dementia caregivers' experienced stress and health status of 2 Internet-based intervention programs. **Design and methods:** Ninety-one dementia caregivers were given the choice of being involved in either an Internet-based chat support group or an Internet-based video conferencing support group. Pre-post outcome measures focused on distress, health status, social support, and service utilization. **Results:** In contrast to the Chat Group, the Video Group showed significantly greater improvement in mental health status. Also, for the Video Group, improvements in self-efficacy, neuroticism, and social support were associated with lower stress response to coping with the care recipient's cognitive impairment and decline in function. **Implications:** The results show that, of 2 Internet-based intervention programs for dementia caregivers, the video conferencing intervention program was more effective in improving mental health status and improvement in personal characteristics were associated with lower caregiver stress response.

Keywords

caregiving, caregiver stress, dementia, service needs

Introduction

The primary objective of this study was to examine dementia caregivers' responses to using technology to access 1 of 2 Internet-based clinical support programs. Would their participation in either program show improvements in experienced stress and overall health status? A second objective was to demonstrate the feasibility of using the Internet for the delivery of health service programs to family caregivers in their homes. The intervention programs were supported by a Web-based platform developed and evaluated in previous studies.¹⁻³ Unique to the study was the use of Internet-based video conferencing for the provision of a psychotherapeutic support group intervention facilitated online by a health professional.

Background

Dementia prevalence will almost double every 20 years; 35.6 million people worldwide living with dementia in 2010 will increase to 65.7 million by 2030.⁴ The increased prevalence will have a significant impact on families, health care resources, and overall costs of insuring a satisfactory quality of life for persons with dementia. It has been estimated that the imputed economic value of unpaid care, defined as the cost to replace the services provided by unpaid caregivers at rates for paid care providers, makes a contribution to the Canadian economy of between \$25 and \$26 billion annually.⁵ Similar estimates for imputed annual costs of informal caregiving in the United States is \$354 billion⁶ and in Britain £81.7 billion.⁷

Dementia caregivers provide physical assistance with activities of daily living, manage instrumental activities of daily living (IADL), cope with challenging behavior problems as the disease progresses, navigate the complex health care and social services networks to obtain the services needed by the care recipient, and deal with their own feelings of loss, anger, guilt—emotions that are frequently evoked during the caregiving journey. The negative impact on family caregivers' personal lives, careers, and physical and mental health is enormous⁸ and typically lasts from 8 to 10 years. According to the recent World Alzheimer Report,⁴ 40% to 75% of caregivers succumb to significant psychological illness and 15% to 32% have clinical depression. Caregivers suffer from sleeplessness, fatigue, anxiety, depression, and impaired immunological responses.^{9,10} To sustain their caregiving responsibilities over time, family caregivers need the support of health and social services systems because caregivers assume caring roles not by choice but by default, reinforced by the obligatory nature of family relationships.

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Benefits of Intervention Programs for Caregivers

Reviews of studies of various models of intervention that target the needs of dementia caregivers have been consistent in showing moderate, short-term outcome benefits of single component intervention programs, and more robust physical and mental health benefits of multicomponent programs.¹¹⁻¹⁵ For example, 1 multicomponent program of longer duration has shown improvement in caregiver distress, depression, and delay in institutionalization of the care recipient.¹⁶

Technology-Based Intervention Programs for Dementia Caregivers

Various technologies have been used to support intervention programs for dementia caregivers.

Telephones and video phones are the forms of technology most frequently used.¹⁷⁻²³ Telephone-supported intervention programs have been provided in individual and group formats and have addressed caregiver mood, family functioning, physical and mental health, skills training, and social support with moderate effects in terms of reducing experienced burden, lowering depression, and increasing caregiver knowledge and skills. While there is an abundance of information on designated Web sites²⁴⁻²⁶ about caring for a family member with dementia, the Internet has not been used extensively to deliver interactive intervention programs for caregivers. However, more evidence is needed to support more universal use of Web-based interactive programs for dementia caregivers.²⁷

Conceptual Framework

Studies of intervention programs for dementia caregivers have relied on a stress-coping paradigm for understanding caregiver reactivity (stress) to managing caregiving tasks (coping).^{28,29} We expand on this conceptual framework by assuming a life span perspective for understanding variations in caregiver stress response to caring for a relative with a neurodegenerative disease. Our purpose is to understand how caregiver characteristics have historically contributed to adaptive/maladaptive responses to life stressors.³⁰ Our theoretical framework is aligned with Skinner's³¹ view that coping with stress includes both volitional and automatic (trait-based) responses that focus on basic human needs for competence, autonomy and relatedness, and with Vitaliano's¹⁰ view that caregiver health outcomes result from the interaction between individual caregiver characteristics and environmental factors, such as psychiatric history, personality, ethnicity, comorbidities, social support, and socioeconomic status. This more comprehensive view of how the personal characteristics of the caregiver have historically contributed to adaptive/maladaptive responses to life stressors informs a model of intervention that addresses the impact of the current stressor through reflection on personal traits that limit optimal response behaviors coupled with highlighting processing information about dementia care, that in

combination promote in the caregiver "health engagement control strategies"³² that can be sustained over time.

Methods

The aim of this quasi experimental study was to examine dementia caregivers' responses to using technology to access 1 of 2 Internet-based clinical support intervention programs: (1) a text-based Chat Group intervention (Chat Group) that included access to a caregiver information handbook and 6 videos on managing caregiving tasks; (2) an online video conferencing psychotherapeutic support group intervention (Video Group) facilitated by a clinician plus access to a caregiver information handbook. The aim of both intervention programs was to provide dementia caregivers with opportunities to share their caregiving stresses, concerns, anxieties, negative emotions, problem-solving strategies, and successes. Our assessment of intervention outcomes addresses a model where changes in caregiver characteristics (neuroticism, self-efficacy) moderated by social support are associated with experienced distress and predict physical/ mental health status and service utilization. Due to considerable evidence of the negative impact of caregiving (40% to 75% of caregivers succumb to significant psychological illness and 15% to 32% have clinical depression⁴), we hypothesized that the online video conferencing psychotherapeutic support group intervention would be more effective in terms of improvements in caregiver mental health status. Note: A randomized controlled study design was not used as we anticipated different levels of comfort and commitment to using technology among dementia caregivers; for example, engaging in the video conferencing group required commitment to log onto the Web site weekly for a period of 1 hour over a period of 20 weeks.

This was a multisite (3 cities), bilingual (English and French) Canadian study. At each site, dementia caregivers, spousal, or adult children who lived with the care recipient were recruited from clinics and community service agencies that provided assessment and follow-up services to the care recipient. At each site, recruited participants were offered the option of participating in either the Chat Group or the Video Group. Ninety-one dementia caregivers agreed to participate (Chat Group N = 40; Video Group N = 51). All participants provided informed signed consent.

Technology: Caring for Me (CFO) Web Site and Training Manuals

A unique, easy-to-use password-protected Web site was developed with the following features: (a) an online Dementia Caregiver Information Handbook that provided information about dementia, its course, management, and self-care strategies for the caregiver; (b) an e-mail link with pull-down list of e-mail addresses for peer group members; (c) text-based chat forum; (d) a video conferencing link for group meetings; and (e) a library of educational videos. Two training manuals were used to insure reliability of the program implementation; (a) an Intervention Training Manual used to train the group facilitators in the video conferencing intervention arm of the study and

(b) a Computer Training Manual that presents simplified instructions for using a computer to access the Internet and negotiate the CFO Web site. The design of the CFO Web site was based on design criteria for older users^{33,34} and yielded an intuitive, user-friendly Web site with large icon images, uncluttered pages, and subtle color contrasts. Web site security is insured through the use of password access for all users. All e-mail messages, chat exchanges, and video conference sessions are encrypted and stored on the server for subsequent analysis.

Online Chat Group Intervention

The Chat Group participants had access to the Dementia Caregiver Information Handbook and could access 6 dementia care educational videos available on the Web site 24/7. At onset of the program, a clinician moderator introduced each participant to the chat forum and encouraged participants to share caregiving experiences and problem-solving approaches to providing care to a family member with dementia. The moderator visited the chat forum monthly to encourage continued participation, however did not contribute to the ongoing dialogue among participants. The expectation was that the Chat Group caregivers would engage with each other, provide mutual support, and bond as a group. The Chat Group had access to the CFO Web site for 6 months.

Online Video Conferencing Support Group Intervention

The Video Group had access to all of the Web site features with the exception of the educational videos. The video conferencing group intervention was designed to replicate face-to-face psychotherapeutic support group interventions for dementia caregivers. Each homogeneous group of 6 caregivers (either spouses or adult children) met weekly online for 1 hour for 10 weeks. The sessions were facilitated by health professional interventionists. An Intervention Training Manual³⁵ was used to train the interventionists (2 nurses and 1 social worker) who were supervised weekly with the aim of insuring adherence to the specified model of treatment. Once the 10 professionally facilitated sessions were completed, the group continued to meet for an additional 10 weekly sessions in mutual self-help mode with 1 of the group members manipulating the technical aspects of the video-conferencing meetings.

Procedures

Project coordinators at each study site were involved in recruitment and implementation of the intervention programs. Participants who chose the Chat Group intervention had immediate access to the chat forum and could enter comments 24/7. For the Video Group intervention participants were recruited in groups of 6 before beginning the intervention. Computer technicians, where needed, assisted with the installation of equipment and trained participants to negotiate the CFO Web site.

Research assistants collected baseline and follow-up data. The first author was responsible for the training and supervision of the interventionists. Approximately 95% of the participants had computers and Internet access. Refurbished computers were provided for participants who did not have equipment. Webcams and audio headsets were provided for all of the Video Group participants. An Internet access subsidy was available to all participants, however only 5 participants requested the subsidy. It is to be noted that for the French-speaking participants, the clinical interventionist, research assistant, and technical support person spoke French. Also a French-speaking research assistant conducted qualitative data analysis of the French Chat Groups and video sessions.

Process and Outcome Data

Process data consisted of archived chat session entries and archived video conferencing sessions. At 6-month follow-up, all participants were interviewed and asked to comment on (a) reactions to using technology to access a health care intervention program and (b) perceived usefulness of the intervention program. All interviews were audio recorded.

Questionnaire data collected at baseline and 6-month follow-up consisted of the following: Demographic information and caregiver characteristics that included; the Eysenck Personality Questionnaire Revised (EPO-R), a brief measure of neuroticism (higher scores indicate higher neuroticism)³⁵; the Revised Scale for Caregiver Self-efficacy, a measure of dementia caregivers' beliefs about managing certain caregiving tasks (higher scores reflect great confidence in managing tasks)³⁶; moderator variable included the Multidimensional Scale of Perceived Social Support, developed and tested by Zimet et al³⁷ to measure the caregiver's perceptions of the availability of support from significant others (higher scores indicate greater satisfaction with support). Outcome variables included (a) caregiver health, measured by the Health Status Questionnaire (HSQ 12)³⁸, (score range 0-100, with higher scores reflecting better health); (b) depressive symptoms measured using the Center for Epidemiologic Studies Depression Scale (CES-D)³⁹, a well-validated self-report questionnaire (score range 0-60, with higher scores indicating more depression). The reliability and validity of the neuroticism, self-efficacy, social support, health status, and depression questionnaires are well-documented^{38,40}; and (c) caregiving distress measured in relation to care recipient levels of function in 5 domains using the Functional Autonomy Measurement System (SMAF)⁴¹, a reliable and validated measure designed to clinically evaluate disabilities and care needs of older persons in 5 functional areas; activities of daily living (7 items), mobility (6 items), communication (3 items), mental functions (5 items), and IADL (8 items). The SMAF was modified to include assessment of caregiver distress. For each item endorsed, the caregiver was asked to rate on a 5-point scale the degree of distress experienced in providing support to the patient (higher mean distress scores for each function domain indicated higher stress). Current service use was determined

by self-report to a series of questions about whether or not the participant or the care recipient was currently receiving any of a number of health and social services. Intent to continue caregiving at home versus making plans for institutionalization was measured by asking 1 question with 6 response categories; score 0 = No Plans for Institutionalization and Score 6 = Application for Institutionalization in Process.

Data Analysis

Quantitative analysis consisted of a series of group (Chat Group versus Video Group) by time analysis of covariances (ANCOVAs), with each baseline measure (caregiver characteristics and demographic variables) serving as covariates. Initial computations examined between-group differences at baseline in order to confirm absence of differences between groups on any variable. Regression analysis were computed to assess the variance explained by pre-post change in 3 independent variables (personality, self-efficacy, and social support) and pre-post change in the dependent variables (stress, physical health, mental health). Pre-post effect size was computed for the whole sample ($N = 91$).

Qualitative analysis was conducted on the archived video conferencing group sessions, text-based chat forum exchanges, and the follow-up interviews. For the video conferencing sessions, qualitative analysis was conducted on a random selection of early, middle, and late-phase video conferencing group sessions for 2 spousal groups and 2 adult children groups including both professionally facilitated sessions and sessions in mutual self-help mode. Standard open and axial coding strategies were applied for extracting consistent themes as they evolved across all 3 sets of data used.^{42,43} Codes were developed, and initial themes recorded, noting similarities and differences across responses. Researcher notes provided careful documentation for selection and development of codes and themes across responses. Codes that represented operational definitions of prespecified intervention strategies were applied to therapist dialogue in order to assess reliable adherence to the intervention protocol for the Video Groups. To ensure reliability of coding and interpretation of the qualitative analysis, a second researcher independently coded and analyzed the transcripts. Between-coder consistencies and discrepancies as to codes, categories, and themes were discussed to achieve consensus.

Results

Demographic Information

Seventy-two percent of the caregivers were female and half of the care recipients were female. Seventy-four percent of the caregivers were spouses. The remainder were adult children—mostly daughters. The caregiver mean age was 65.51. Sixty percent of the caregivers had college or university education and most of the others had completed high school. The mean annual income was 40 thousand dollars. The caregivers spent on average 14.68 hours a day caregiving and had been caregivers on average for 4.55 years.

Table 1. Effect Size—Sample $N = 91$

Variables	Baseline Mean	Follow up Mean	Effect Size
IADL Distress	.98 (.86)	.75 (.67)	.3
Self-Efficacy	69.69 (16.70)	75.18 (17.36)	-.3 ^a
Physical Health	61.11 (18.79)	79.27 (27.54)	-.8 ^a
Social Support	37.44 (8.66)	39.44 (6.20)	-.3 ^a

Abbreviation: IADL, instrumental activities of daily living.

^a Negative sign has to do with direction of scale (higher follow-up scores = improvement).

Questionnaire Results

Descriptive analysis on responses to each questionnaire completed at baseline showed normal distribution. Despite not using a randomized, controlled study design, the 2 intervention groups' responses on each measure, compared at baseline, showed differences on only 2 variables—distress related to managing IADLS and social support. These variables were controlled in all subsequent analysis of group differences. Within and between and group by time analysis yielded the following: both the Chat Group and Video Group showed significant pre-post improvement in self-efficacy (Revised Scale for Caregiver Self Efficacy; mean/SD Chat Group [baseline 69.89 (17.45); follow-up 74.55 (19.10)]; mean/SD Video Group [baseline 69.52 (16.24); follow-up 75.69 (15.97)], $F 4.3, P \leq .04$). For both groups, there were no pre-post intervention changes in utilization of health and social services for either the care recipient or caregiver. Similarly, there was no significant increase in plans to institutionalize the care recipient.

The between-group analysis showed significant differences in improvement on 3 variables. Compared with the Chat Group, the Video Group showed (a) significantly greater improvement in mental health (HSQ mental health subscale; mean/SD Video Group baseline 60.84 [22.19]; follow-up 64.67 [19.88]; mean/SD Chat Group baseline 59.92 [23.38]; follow-up 57.10 [22.01], $F 5.69, P \leq .02$) and (b) lower distress scores associated with managing the care recipient's deterioration in mental (cognitive) function (SMAF distress score; mean/SD Video Group baseline 1.61 [0.89]; follow-up 1.43 [0.82]; mean/SD Chat Group baseline 1.61 [1.08]; follow-up 1.58 [0.94], $F 5.65, P \leq .02$). In contrast, the Chat Group compared with the Video Group had lower distress scores associated with managing IADL (SMAF distress score; mean/SD Chat Group baseline 1.22 [1.0]; follow-up .74 [0.56]; mean/SD Video Group baseline .78 [0.67]; follow-up .76 [0.74], $F 5.79, P \leq .02$).

Effect size (Cohen d) for pre-post differences are reported for the entire sample ($N = 91$) on variables where the coefficient was .2 (small) or above (Table 1).

For the regression analysis, we examined for each group the contribution of 3 independent variables (change in personality, self-efficacy, and social support) to change in the dependent variables (5 caregiver distress scores, caregiver physical, and mental health). For the Chat Group, there were no significant associations between pre-post change in the independent and dependent variables. In contrast, for the Video Group, pre-

Table 2. Video Group Regression Analysis Caregiver Characteristics and Distress Response

Pre-post Mean Difference	Mental Function Distress				ADL Distress			
	Beta coefficient	R ²	t	P	β Coefficient	R ²	T	P
Personality	0.95	.076	2.26	.030	.90	0.112	2.54	.016
Self-efficacy	−0.03	.214	−3.77	.001	.01	0.018	1.03	.311
Social support	0.56	.115	2.78	.008	.61	0.226	3.61	.001

post change in personality, self-efficacy, and social support contributed to variance explained in pre-post change in 2 of the caregiver distress response domains: distress related to coping with the care recipient's decline in mental (cognitive) function and distress related to helping the care recipient manage activities of daily living (Table 2).

Chat Group Text Analysis

Participation by caregivers in the text-based chat forum was sparse overall. On average, participants in this arm of the study accessed the chat forum once over the 6-month duration of the intervention. Compared with the spousal caregivers, adult child caregivers posted comments more frequently, 3 on average. Extracted themes focused on the management of specific caregiving tasks, information sharing with regard to accessing support services, and provision of emotional support especially in relation to making decisions as to when to admit the care recipient to institutional care.

Video Group Session Analysis

All Video Group participants attended, on average, 7 of the facilitated sessions and 5 of the self-help sessions. The session analysis yielded participant discussion themes that paralleled those identified in our previous video conferencing intervention programs for family caregivers of older adults with chronic disease (including dementia).² The themes included (a) sadness associated with observations of changes in the care recipient due to progression of the disease, (b) the psychological and physical impact of caregiving, (c) coping strategies used, and (d) approaches to caregiver self-care. The analysis of the therapists' intervention strategies showed consistent adherence to the treatment manual protocol, as for example encouragement of open sharing of caregiving experiences, empathic response to guilt associated with negative emotions, and clarification of confused information processing.

Postintervention Follow-Up Interviews

The qualitative analysis of the interviews with each group of participants (Chat Group versus Video Group) identified 3 relevant themes that are reported separately for each group.

Chat Group

Mutual help and support. Chat Group participants' comments varied; "I didn't participate much but got a lot of good information." "You found out that others had similar problems—you are not alone in the situation." "It helped to understand what people go through with a disease like dementia." "I got very little help because when I went on the computer I saw that people were talking about the weather or shopping—that wasn't what I expected—I thought they would be talking about caring." "Not very helpful." "Has not meant very much, not very helpful"—"very few were communicating—only two or three people rather than the whole group."

New knowledge and skills. "Exchanging tips on certain aspects of caregiving was good." "Didn't learn new skills but I noticed that we all had the same problems—similar issues, so it was good to share and validate some strategies for some situations." "I did not use the chat service many times. I thought I could contribute some advice and open up to share my situation, but it was difficult as it stirred up too much emotion, so I really did not participate and benefit from it as I was kind of holding back."

Using technology. Overall, the Chat Group participants had no difficulty with accessing the Web site links. In response to questions regarding the usefulness of the information provided (handbook and educational videos), the majority stated that they accessed the handbook and found the information useful. Many did not access the educational videos for reasons that were unclear. Feedback comments included, "the videos were good—I enjoyed observing the behavior problem management and learned what to anticipate." "no, we did not watch the videos." "Yes the videos were good and you could watch them when you had time." "Very informative—they were helpful." "I started to watch the videos but I stopped—didn't want to see any more because I have enough problems—too upsetting."

Video Group

Mutual help and support. "Enabled me to realize I'm not the only one going through this experience." "The most helpful was talking about each others' problems and to "bounce things off" each other—you realize that you have similar problems." "Emotional support from the group and the facilitator helped me feel that I'm not alone." "Helped me get through tough

times.” “The group was helpful—it encouraged me to attend all sessions despite my busy schedule.”

New knowledge and skills. “Lots of advice was shared—suggestions for caring and different strategies—these were helpful.” I learned a different kind of patience and not to be embarrassed about caring for someone with Alzheimer’s.” “I learned to wait and think before reacting when situations are delicate—learned strategies about helping with eating.”

Using Technology. Despite the fact that there were often problems with accessing the video conferencing software, the caregivers, with the help of technicians, persisted in solving technical problems. Their comments included “It was easy for me to use the computer—it is better to be using the computer than to be on the phone.” “It’s a great thing really (referring to video conferencing) have people get together from your home and talk to them.” “You are meeting a person face-to-face on the computer—you are seeing them, listening to them—so I think it’s good. You don’t have to leave your home to meet these people.” “Video conferencing was great—you are not shy or withdrawn—you are more apt to open up—you are in your own home.”

Discussion

In most respects, the sample of caregivers matched demographic profiles of informal dementia caregivers.²⁶ Of note was the amount of time spent daily caregiving that exceeded time dedicated to full-time employment. Overall, the study findings (quantitative and qualitative) replicate the results of a previous feasibility study of the Web-based video conferencing intervention¹ and parallel those reported for other technology-supported intervention programs for dementia caregivers.^{22,44,45} While the qualitative analysis of follow-up interviews showed less-favorable responses to the intervention programs by the Chat Group participants, the questionnaire data analysis showed that both groups experienced pre-post improvement in self-efficacy and decline in distress related to specific caregiving tasks.

Caregiver Characteristics and Intervention Outcomes

Pre-post intervention improvement in self-efficacy as measured by Revised Scale for Caregiver Self-Efficacy is of particular importance because the scale focuses on specific tasks relevant to taking care of a person with dementia (physical strength, obtaining respite, responding to disruptive behaviors, and controlling upsetting thoughts). The regression analysis showed that improvement in pre-post intervention self-efficacy scores for the Video Group was significantly associated with reduced caregiver stress associated with the care recipient’s cognitive decline and limitations in managing activities of daily living. Similarly, for the Video Group, improvement in personality dimensions as measured by the Eysenck neuroticism scale and increased social support contributed to lower

stress response to the same care recipient functions (cognitive function and ADLs).

Group Therapy and Outcome

The improvement in mental health status for the Video Group but not for the Chat Group is not surprising since the focus of the video conferencing intervention program is on acknowledging and processing negative emotions that contribute to the stress and burden associated with caring for a family member with dementia. The qualitative analysis of the videos sessions showed that participants experienced relief in being able to express openly negative feelings that were perceived as unacceptable in a family caregiving situation. Of interest, as well, was the pre-post intervention reduction in the Video Group’s stress associated with the care recipient’s cognitive decline. Understandably, for caregivers, the most challenging behavioral change in a person with dementia is decline in cognitive function. In this regard, the stress experienced by the caregiver can be expressed emotionally in the form of sadness, mourning, and depression due to the perceived loss of the care recipient. The qualitative analysis of the video conferencing sessions showed that these emotions were acknowledged and discussed. However, of note is the fact that caregivers in this study were not clinically depressed as measured by the CES-D scale at baseline or follow up. Rather, change in caregiver emotional distress (anxiety/depression) in response to the care recipient’s cognitive decline appears to be mediated by change in self-efficacy beliefs, personality issues, and social support as illustrated in the regression analysis.

Efficacy of a Technology-Supported Therapy Group for Dementia Caregivers

These findings support the congruence between the aim and process of the video conferencing intervention and the targeted benefits for dementia caregivers. Our manual-guided, evidence-based model of intervention validated in previous studies integrates 3 component strategies: (a) education, (b) self-reflection for understanding the interplay between emotions and problem solving in the context of relationships with the care recipient, family members, and friends, and (c) self-care strategies for managing the physical and mental health demands of caregiving. In contrast, analysis of the associations between changes in neuroticism, self-efficacy, and social supports were not associated with change in distress for the Chat Group participants. It would appear that the Web-based Chat Group intervention was lacking in those ingredients that impact caregiver psychosocial issues and conflicts. This was further supported by the subjective comments received during the follow-up interviews. Participants in the Chat Group acknowledged the importance of the information received, while the Video Group participants reflected on the meaningfulness of the emotional support they received from each other. Overall, with regard to the participants’ responses to the intervention programs, the qualitative data analysis may capture more

realistically the participants' subjective reactions to using technology to receive a health support program, clearly showing more positive engagement in and benefits from the video conferencing intervention program. These findings suggest that the power of therapy groups in promoting psychological change in participant members was replicated in an Internet-based group video conferencing environment. To our knowledge, there are no reports in the literature on the implementation and evaluation of video conferencing therapy groups; our Internet-based video conferencing group intervention program for dementia caregivers is unique and yields results similar to those of face-to-face support groups. Furthermore, as shown in our study, caregivers can continue to meet online and benefit from a mutual self-help group format at no cost to the health care service provider.

The study limitations include selection of a sample of caregivers with higher education and annual income, Caucasian, and nondiverse ethnically, racially, and culturally despite including a small sub group of French Canadians. The follow-up period (6 months from entry into the program) was short; thus, there is no way of estimating to what degree the benefits gained from the interventions were sustained over time, nor whether they were associated with reduction in the use of health services and/or delay in institutionalization of the care recipient.

In conclusion, the implementation and results of 2 computer Web-based support programs for caregivers suggest that the delivery of services to dementia caregivers can be facilitated by using technology. The data show that technology can be used effectively to transmit information and also to help build human social ties that support caregivers of persons who live with the consequences of a chronic disease such as dementia. Access to services is made possible for families living in remote areas and is especially relevant for dementia caregivers who frequently are unable to leave the care recipient unattended. In terms of costs, the professional time allocated to providing video conferencing interventions online does not differ from time allocated to clinic-based services.

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References

- Marziali E, Donahue P. Caring for Others: Internet, video-conferencing group intervention for family caregivers of older adults with neurodegenerative disease. *Gerontologist*. 2006; 46(3):398-403.
- Marziali E, Damianakis T, Donahue P. Virtual support for family caregivers: theoretical framework, intervention model and outcome. *J Technol Hum Serv*. 2006;24(2-3):39-54.
- Marziali E. The design and evaluation of e-health intervention programs for older adults. *eHealth Int*. 2008;4(1):6-13.
- Alzheimer's Disease International. World Alzheimer's Report; 2009. <http://alz.co.uk/research/worldreport/>. Accessed January 2010.
- Hollander MJ, Liu G, Chappell NL. Who cares and how much? The imputed economic contribution to the Canadian healthcare system of middle-aged and older unpaid caregivers providing care to the elderly. *Healthcare Q*. 2009;12(2):42-49.
- Gibson MJ, Houser A. *AARP Issue Brief. Valuing the Invaluable: A New Look at the Economic Value of Family Caregiving*. Washington, DC: American Association of Retired Persons; 2007.
- Buckner L, Yeandle S. *Valuing Carers: Calculating the Value of Unpaid Care*. London, England: Carers UK; 2007.
- Pinquart M, Sorensen S. Differences between caregivers and non-caregivers in psychological health and physical health: a meta-analysis. *Psychol Aging*. 2003;18(2):250-267.
- Martire LM, Schulz R. Informal caregiving to older adults: health effects of providing and receiving care. In: Baum A, Revenson T, Singer J, eds. *Handbook of Health Psychology*. Mahwah, NJ: Lawrence Erlbaum; 2000:477-493.
- Vitaliano PP, Zhang J, Scanlan JM. Is caregiving hazardous to one's physical health? A meta-analysis. *Psychol Bull*. 2003; 129(6):946-972.
- Pinquart M, Sorensen S. Helping caregivers of persons with dementia: which interventions work and how large are their effects? *Int Psychogeriatr*. 2006;18(4):577-595.
- Gallagher-Thompson D, Coon DW. Evidence based psychological treatments for distress in family caregivers of older adults. *Psychol Aging*. 2007;22(1):37-51.
- Thompson CA, Spilsbury K, Hall J, Birks Y, Barnes C, Adamson J. Systematic review of information and support interventions for caregivers of people with dementia. *BMC Geriatr*. 2007;27:7-18.
- Parker D, Mills S, Abbey J. Effectiveness of interventions that assist caregivers to support people with dementia living in the community: a systematic review. *Int J Evid Based Healthcare*. 2008;6(2):137-172.
- Spijker A, Vernooij-Dassen MA, Vasse E, et al. Effectiveness of Non-pharmacological Interventions in Delaying the Institutionalization of Patients with Dementia: a Meta-Analysis. *J Am Geriatr Soc*. 2008;56(6):1116-1128.
- Mittelman M, Hayley WE, Clay OJ, Roth D. Improving caregiver well-being delays nursing home placement of patients with Alzheimer disease. *Neurology*. 2006;67(9): 1592-1599.
- Mahoney DF, Tarlow DJ, Jones RN. Effects of an automated telephone support system on caregiver burden and anxiety: findings from the REACH for TLC intervention study. *Gerontologist*. 2003;43(4):556-567.

18. Belle SH, Burgio L, Burns R, et al. Enhancing the quality of life of dementia caregivers from different ethnic or racial groups: a randomized, controlled trial. *Ann Intern Med.* 2006;145(10):727-738.
19. Bank AL, Arguelles S, Rubert M, Eisdorfer C, Czaja SJ. The value of telephone support groups among ethnically diverse caregivers of persons with dementia. *Gerontologist.* 2006;46(1):134-138.
20. Smith TL, Toseland RW. The effectiveness of a telephone support program for caregivers of frail older adults. *Gerontologist.* 2006;46(5):620-629.
21. Winter L, Gitlin LN. Evaluation of a telephone-based support group intervention for female caregivers of community-dwelling individuals with dementia. *Am J Alzheimers Dis Other Demen.* 2007;21(6):391-397.
22. Finkel S, Czaja SJ, Schulz R, Matinovich Z, Harris C, Pezzuto D. E-care: a telecommunications technology intervention for family caregivers of dementia patients. *Am J Geriatr Psychiatry.* 2007;15(5):443-448.
23. Tremont G, Davis JD, Bishop DS, Fortinsky RH. Telephone-delivered psychosocial intervention reduces burden in dementia caregivers. *Dementia.* 2008;7(4):503-520.
24. Alzheimer's Association. www.alz.org. Accessed January, 2010.
25. Alzheimer Society of Canada. www.alzheimer.ca. Accessed January, 2010.
26. Rosalynn Carter Institute for Caregiving. www.rosalyncarter.org. Accessed January, 2010.
27. Wu YH, Faucounau V, de Rotrou J, Riguet M, Rigaud AS. Information and communication technology interventions supporting carers of people with Alzheimer's disease: a literature review. *Psychol Neuropsychiat Vieil.* 2009;7(3):185-192.
28. Lazarus RS, Folkman S. *Stress, Appraisal and Coping*. New York, NY: Springer; 1984.
29. Schulz R, Gallagher-Thompson D, Haley W, Czaja S. Understanding the intervention process: a theoretical/conceptual framework for intervention approaches to caregiving. In: Schulz R, ed. *Handbook on Dementia Caregiving*. New York, NY: Springer Publishing Company Inc; 2002:63-80.
30. Brandtstädter J, Rothermund K, Schmitz U. Maintaining self-integrity and efficacy through adulthood and later life: the adaptive functions of assimilative persistence and accommodative flexibility. In: Heckhausen J, Dweck C, eds. *Motivation and Self-Regulation Across the Life Span*. New York, NY: Cambridge University Press; 1998:365-388.
31. Skinner EA. *Perceived Control, Motivation, and Coping*. Thousand Oaks, CA: SAGE; 1995.
32. Wrosch C, Schulz R, Heckhausen J. Health stresses and depressive symptomatology in the elderly: the importance of health engagement control strategies. *Health Psychology.* 2002;21(4):340-348.
33. W3C. Web Content Accessibility Guidelines 1.0 W3C Recommendations. 1999. <http://www.w3.org/TR/WCAG10/>. Accessed January, 2005.
34. W3C. Web Accessibility Initiative (WAI). 2003. www.w3.org/WAI. Accessed January, 2005.
35. Eysenck SBG, Eysenck HJ, Barrett P. A revised version of the psychoticism scale. *Pers Individ Diff.* 1985;6:21-29.
36. Steffen AM, McKibbin C, Zeiss AM, Gallagher-Thompson D, Bandura A. The revised scale for caregiving self-efficacy: reliability and validity studies. *J Gerontol B Psychol Sci Soc Sci.* 2002;57(1):P74-P86.
37. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. *J Pers Assess.* 1988; 52:30-41.
38. Pettit T, Livingston G, Manela M, Kitchen G, Katona C, Bowling A. Validation and normative data of health status measures in older people: the Islington study. *Int J Geriatr Psychiatry.* 2001;16(11):1061-1070.
39. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Meas.* 1977; 1(3):385-401.
40. Bolger N, Schilling NA. Personality and the problems of everyday life: the role of neuroticism in exposure and reactivity to daily stressors. *J Pers.* 1991;59(3):355-386.
41. Hébert R, Durand PJ, Dubuc N. The functional autonomy measurement system (SMAF): description and validation of an instrument for the measurement of handicaps. *Age Ageing.* 2003; 17(5):293-302.
42. Berg BL. *Qualitative Research Methods for the Social Sciences*. Boston: Allyn ; 1995.
43. Sandelowski M. Whatever happened to qualitative description? *Res Nurs Health.* 2000;23(4):334-340.
44. Beauchamp N, Irvine AB, Seeley J, Johnson B. Worksite-based internet multimedia program for family caregivers of persons with dementia. *Gerontologist.* 2005;45(6):793-801.
45. Topo P. Technology studies to meet the needs of people with dementia and their caregivers. *J Appl Gerontol.* 2009;28(1):5-37.