CJNR 2008, Vol. 40 Nº 3, 114–134

Résumé

Les femmes des milieux ruraux, la technologie et l'auto-prise en charge des maladies chroniques

Clarann Weinert, Shirley Cudney et Wade G. Hill

L'objectif de cette étude était de déterminer les différences intervenant dans l'état psychosocial de 3 groupes de femmes des milieux ruraux atteintes de maladie chronique, qui participaient à une intervention par ordinateur. Elles étaient réparties en 3 groupes : intervention intense, intervention moins intense et groupe témoin. Au départ et ensuite, on a mesuré le soutien social, l'estime de soi, l'autonomisation, l'auto-efficacité, la dépression, le stress et la solitude. Les résultats de l'analyse de covariance (ANCOVA) ont fait apparaître des différences entre les groupes pour ce qui est du soutien social et dans tout le groupe en ce qui concerne l'auto-efficacité. Les résultats étaient différents pour un sous-groupe vulnérable, des différences significatives intervenant entre les groupes en ce qui concerne le soutien social et la solitude. On en a conclu qu'une intervention effectuée par ordinateur peut améliorer le soutien social et l'auto-efficacité et réduire la solitude chez les femmes des milieux ruraux, en renforçant leur capacité d'auto-prise en charge des maladies chroniques et d'adaptation à ces dernières.

Mots-clés : rural, maladie chronique, intervention par ordinateur

CJNR 2008, Vol. 40 N° 3, 114–134

Rural Women, Technology, and Self-Management of Chronic Illness

Clarann Weinert, Shirley Cudney, and Wade G. Hill

The objective of this study was to determine the differences in the psychosocial status of 3 groups of chronically ill rural women participating in a computer intervention. The 3 groups were: intense intervention, less-intense intervention, and control. At baseline and following the intervention, measures were taken for social support, self-esteem, empowerment, self-efficacy, depression, stress, and loneliness. ANCOVA results showed group differences for social support and self-efficacy among the overall group. The findings differed for a vulnerable subgroup, with significant between-group differences for social support and loneliness. It was concluded that a computer-delivered intervention can improve social support and self-efficacy and reduce loneliness in rural women, enhancing their ability to self-manage and adapt to chronic illness.

Keywords: rural, chronic illness, computer-based intervention, psychosocial outcomes

Adapting one's life to accommodate the challenges of a chronic illness and perfecting one's self-management skills require constant effort and adjustment, especially in the psychosocial realm. The meaning of this statement is clearer if it is expressed by someone who faces the challenge on a daily basis:

> When we have an illness that continues, we have no choice but to change. [But] I like to continue to grow and change at MY pace. When you have an illness, I think it forces you to change and grow in different ways than what we would choose normally. It is not necessarily bad, but it is against our normal will. (Kralik, 2002, p. 152)

Learning to adjust, with some equanimity, to lifestyle changes imposed by long-term illness is a challenge. For rural women with chronic conditions who live in relative isolation and have limited access to support systems and health services, appropriate self-care is vital. These women often have difficulty finding the support and assistance they need in order to adapt to the alterations in physical functioning, the loss of control over life circumstance, and the attendant emotional strain (Emery, 2003).

Technology-based interventions can offer some of the health information and social support that rural women need to face the daily chal-

lenge of living with a chronic condition. Such interventions have the potential to improve the women's ability to self-manage and ultimately better adapt to their chronic condition.

Background

The growing use of telecommunication technologies to provide health services for geographically isolated individuals with chronic conditions is one of the most promising developments in health care. Since chronically ill people who live in rural areas often do not have ready access to health-care providers, telehealth interventions offer great promise (Glueckauf, Pickett, Ketterson, Loomis, & Nickelson, 2003).

In recent years the Internet has become more widely accessible. In the United States in 2003, the rate of Internet penetration in rural areas was 54.1%, similar to that in urban areas (54.8%) (Cooper & Gallaher, 2004). According to the 2006 Pew Project report (Fox, 2006), 80% of adult Internet users in the United States have sought health information online. The primary consumers of online health information are women (Fox & Fallows, 2003), particularly those aged 30 to 64 with a college degree (Fox, 2005). Some 85% of women who go online have searched for at least one health topic, compared to 75% of men (Fox & Fallows, 2003). Regardless of gender, having access to free health information online can be empowering for people with chronic illnesses, making it possible for them to investigate strategies for managing their condition (Fox, 2006).

In addition to seeking health information, individuals go online to give and receive emotional support. In the United States, more than half (54%) of all Internet users, or about 63 million people, have accessed a Web site that provides support related to a specific condition or personal situation (Fox & Fallows, 2003). Lieberman et al. (2003) found that rural women with breast cancer were willing to commit to an online support group. Sharf (1997) found that the nature of messages posted by women with breast cancer in a computer-mediated support group included shared information, social support, and personal empowerment. Klemm, Reppert, and Visich (1998) report that, for a similar group, information exchange, personal opinion, support, and personal experience accounted for almost 80% of messages posted. The opportunity to talk with other people who have a chronic illness or to hear their personal descriptions of their coping strategies can have positive effects (Gustafson et al., 1998), including better health outcomes, greater efforts to improve functioning, and increased resistance to psychosocial dysfunction.

The influence of psychosocial factors such as social support, self-esteem, empowerment, self-efficacy, depression, stress, and loneliness on

the adaptation to chronic illness has been examined from many perspectives. Finfgeld-Connett (2005) holds that access to social support results in improved mental health and an increased sense of personal competence and empowerment — ultimately leading to diminished distress and an overall perception of well-being. Gray (1998) concurs that social support can help to overcome stress. There is general agreement that self-efficacy is related to health and psychosocial well-being in a variety of circumstances, including chronic illness (Bandura, 1993). The fact that self-efficacy beliefs are modifiable (Meichenbaum, 1994) makes them an excellent target for interventions (Fry & Debats, 2002). Higher levels of self-esteem and reduced depressive symptoms related to appropriate social support have also been demonstrated in studies with people who have multiple sclerosis (Foote, Piazza, Holcombe, Paul, & Daffin, 1990). It is clear, then, that interventions providing support have the potential to increase self-esteem and decrease depression.

The lessening of depressive symptoms is important, because depression often accompanies chronic illness (Rouchelle, Pounds, & Tierney, 2002) and can affect quality of life, physical activity levels, self-efficacy for illness management and self-care, and ability to communicate effectively with health-care providers (Piette, Richardson, & Valenstein, 2004). Depression undermines confidence, concentration, energy, and motivation — essential ingredients in the effective adaptation to chronic illness (Simon, Von Korff, & Lin, 2005). Social support has been shown to have an efficacious impact on depression across a range of chronic conditions (Simon, 2001), indicating the need for interventions that provide appropriate support.

Depression can also be linked to loneliness (Adams, Sanders, & Auth, 2004), a little understood risk factor for broad-based morbidity and mortality (Cacioppo, Hawkley, & Berntson, 2003). Loneliness as a symptom is often subsumed under depression instead of being recognized as a distinct problem (Grenade & Boldy, 2005). Loneliness appraisal has validity because feelings of emotional loneliness can affect perceived self-efficacy, and vice versa (Fry & Debats, 2002).

According to Bandura (1982), self-efficacy plays a role in loneliness because it influences our perceived ability to alter our thinking and emotions in psychosocially healthy ways. Compared to men, interestingly, women are more aware of their self-efficacy or lack thereof (Smith et al., 2000), which may in turn contribute to a greater sense of loneliness and psychosocial distress in women (Fry & Debats, 2002). Conversely, women have stronger self-efficacy beliefs in the interpersonal, social, and emotional domains, which may serve to buffer loneliness and psychosocial distress (Fry & Debats, 2002). Understanding the linkages among social support, self-esteem, empowerment, self-efficacy, depression, stress, and

loneliness, and the linkages between these indicators and problem-solving in chronic disease self-management, can be useful for improving individual health outcomes.

For more than 10 years, the computer-based research project Women to Women (WTW) has been providing a virtual self-help group and health education to chronically ill women in the rural inter-mountain region of the western United States, to help the women hone their self-management skills and better adapt to their chronic conditions. In the present study, the primary concept of interest in the WTW program was psychosocial adaptation. Based on the literature and on the experience of the investigators, seven empirical indicators of psychosocial adaptation were selected for investigation — social support, self-esteem, empowerment, self-efficacy, depression, stress, and loneliness — the theory being that women who report improvement on these indicators will be in a better position to successfully manage and adapt to their chronic illness. It was expected that, immediately following the intervention, the intervention group would show more improvement than the control group on each of the indicators.

In this article we will examine the change, from pre-intervention to immediately post-intervention, for each of the seven indicators and examine the differences among groups in terms of the post-intervention scores. We will also discuss the feasibility and efficacy of computer-based interventions for bridging geographical distance and the application of such interventions to rural nursing practice.

Method

Design

Following approval by the University Institutional Review Board for the Protection of Human Subjects, rural women were recruited through newspaper solicitation, announcements in newsletters published by voluntary agencies, and word of mouth. A total of 233 women participated in the WTW project between February 2002 and February 2005. Original sample-size estimates were based on an a priori power analysis that yielded at least 60 participants for each of three groups, after accounting for attrition. This article reports on the data for those women who completed the intervention and the questionnaire that immediately followed it (n = 183), representing a 21% attrition rate.

After completing a telephone screening interview and the baseline mail questionnaire (measures of social support, self-esteem, empowerment, self-efficacy, depression, stress, and loneliness), the women were randomized into three groups: *intense intervention, less-intense intervention,* and *control*. The methods are described in detail elsewhere (Hill, Weinert,

& Cudney, 2006; Weinert, Cudney, & Winters, 2005; Winters, Cudney, Sullivan, & Thuesen, 2006).

During the 22-week intervention, the *intense intervention* group participated in an online, asynchronous (any time of the day or night), peer-led support group (Koffee Klatch). This forum was *for* and *by* the women, and although it was monitored by a research team member who was an advanced practice nurse, the monitor did not take part in the conversations. In addition, approximately every 2 weeks the research team posted an independent-study online health-teaching unit on five selected topics: Web Skills, Living with Chronic Illness, Nutrition, Women's Health, and Family Finance. These units, prepared by the research team, were supplemented by asynchronous, expert-facilitated discussions (Health Roundtable). For example, the leader for the unit on Women's Health used the following discussion starters: *What problems do you have that are specifically related to women's health? What strategies and solutions have you used to address these problems?* Throughout the process, the women's health practitioner on the research team was available daily to interact online with the participants regarding their health issues. A similar format was followed for the other four units, with the appropriate research team expert participating.

The *less-intense intervention* group also participated for 22 weeks. These women completed the self-study health-teaching units but did not have access to the supportive discussion forums (Koffee Klatch and Health Roundtable). The sole task of the *control* group was to complete the mail questionnaire.

Data Generation

Multiple types of data were generated over the 2 years that each participant was engaged in the larger WTW study. The data analyzed in this report are from the questionnaire administered at baseline and week 23 and from the women's online exchanges during the 22-week intervention. The quantitative data were displayed using SPSS for Windows Version 11.0.1 and analyzed for item frequencies and measures of central tendency using descriptive statistics and ANCOVA for the inferential aims. The qualitative data embedded in the women's messages were coded, cleansed of identifying information, stored verbatim in the end-user database, and downloaded into NUD*IST software. The messages were analyzed using techniques that blended deductive, inductive, and integrative analytic processes. In the deductive phase, data were coded and sorted into categories. In the inductive phase, data were examined for emerging themes, patterns, or recurring regularities. In the integrative phase, relationships between and among themes were sought and the

pieces were woven into a meaningful conceptual pattern related to the experience of women living with a chronic illness in a rural setting.

Empirical Indicators of Psychosocial Adaptation

Chronic illness may co-exist with health in a given individual. Therefore, successful adaptation to the illness and planned health maintenance are critical factors in improving the quality of life of a chronically ill person. People with chronic conditions should be encouraged to pursue activities that educate, guide, and motivate them to make health-enhancing choices (Fries, 1997) that will lead to optimal self-management. Social support, self-esteem, empowerment, self-efficacy, depression, stress, and loneliness can influence the success of health-enhancing activities and can thus be viewed as indicators of the potential for better self-management of chronic illness.

For this study, the empirical indicators of psychosocial adaptation were defined as follows. Social support is the provision of intimacy, facilitation of social integration, opportunity for nurturing behaviour, reassurance of self-worth, and availability of assistance (Weiss, 1969). Self-esteem is the extent to which one values, approves of, or likes oneself (Baumeister, Campbell, Krueger, & Vohs, 2003). Empowerment is the ability to understand and control personal, social, economic, and political forces so as to take action to improve one's life situation (Wallerstein, 2002). Self-efficacy is the belief that one can affect one's health through personal behaviour (Fries, Koop, Sokolov, Beadle, & Wright, 1998). Stress is mental, emotional, or physical tension or strain that adversely affects one's sense of well-being (Pollachek, 2001). Depression is characterized by depressed mood, negative self-concept, disturbed, vegetative functioning, agitation, slowed activity levels, distractibility, and indecisiveness (Radloff, 1977). Loneliness is characterized by the absence of human intimacy and dissatisfaction with being alone (Hall & Havens, 1999).

Measures

The instruments selected as measures of the empirical indicators are not rural-specific but have been used with a variety of populations and in research on chronic illness. They were chosen based on the strength of their psychometric properties, conceptual fit, and prior use by the research team, and also because there is evidence in the literature that they are amenable to change based on a support/education intervention. The measures were as follows: (for social support) Personal Resource Questionnaire 2000 (Weinert, 2003); Rosenberg Self-Esteem Scale (Robinson, Shaver, & Wrightsman, 1991); Diabetes [Chronic Illness] Empowerment Scale (Anderson, Funnell, Fitzgerald, & Marrero, 2000); Self-Efficacy Scale (Sherer, Maddix, Mercandante, Prentice-Dunn, Jacobs,

et al., 1982); (for depression) CES-D (Devine & Orme, 1985); Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983); and UCLA Loneliness Scale (Robinson et al., 1991). Table 1 provides psychometric information for each instrument.

All the scales in the questionnaire were Likert-type scales in which the respondent circles a number. The following examples reflect the nature of the items: Chronic Illness Empowerment Scale — "In general, I believe that I know which of my chronic illness goals are most important to me" (1 = strongly agree; 5 = strongly disagree); UCLA Loneliness Scale — "How often do you feel isolated from others?" (1 = never; 4 = always); Personal Resource Questionnaire — "I have people to share social events and fun activities with" (1 = strongly disagree; 7 = strongly agree).

Results

The participants were chronically ill, rural, mostly Caucasian women with a mean age of 51.8 years (*SD* = 2.17) and an average of 14.5 years of education. Of the women, 82.5% were married and 61.9% were employed outside the home. They lived in rural areas of Montana, Idaho, North Dakota, South Dakota, or Wyoming (at least 25 miles from a town/city of 12,500 people), on farms or ranches or in small towns. An indicator of their geographic dispersion is the distance travelled for health care. The median distance (one way) was 8 miles for emergency care and 32 miles for routine/specialist care. Demographic details are presented in Table 2.

To evaluate the effect of the intervention on the seven indicators for the total sample, ANCOVA was conducted. The independent variable, group membership, had three levels: *intense intervention, less-intense intervention,* and *control*. Means for each psychosocial variable were compared at the 23-week measurement, controlling for scores at baseline. ANCOVA results (see Table 3) were significant only for social support $F(2, 185) = 3.38$, $MSE = 454.0$, $p = 0.03$ and self-efficacy $F(2, 185) = 3.19$, $MSE = 500.9$, $p = 0.04$, indicating that some differences were observed among the three groups following the intervention. For social support, the adjusted mean was highest (84.6) for those in the *intense intervention* group, followed by the *less-intense* (82.9) and *control* (79.3) groups. Similarly, for self-efficacy, adjusted means were highest for the *intense intervention* group (114.1), followed by the *less-intense* (112.2) and *control* (109.0) groups. Follow-up tests were conducted to evaluate pairwise differences among these adjusted means. Holm's sequential Bonferroni procedure was used to control for type I error across the three pairwise comparisons. The findings indicate that for both social

Table 1 *Psychosocial Concepts, Indicators, Items, Reliability, Validity (Hill, Weinert, & Cudney, 2006)*

Concepts	Indicators	No. of Items	Reported α	Study α	Validity
Social support	PRQ2000 (Weinert, 2003)	15	.87–.92	.90	Construct divergent
Self-esteem	Self-Esteem Scale (Robinson et al., 1991)	10	.77–.88	.87	Convergent discriminant
Empowerment	Diabetes Empowerment Scale (Anderson et al., 2000)	10	.91	.96	Concurrent
Self-efficacy	Self-Efficacy Scale (Sherer et al., 1982)	23	.71–.86	.88	Construct criterion
Depression	CES-D (Devine & Orme, 1985)	20	.84–.90	.90	Convergent discriminant
Stress	Perceived Stress Scale (Cohen et al., 1983)	14	.84–.86	.90	Convergent discriminant
Loneliness	UCLA Loneliness Scale (Robinson et al., 1991)	20	.94	.94	Convergent discriminant

Table 2 ***Group Characteristics***

	Participants (n = 189)	**Group %**
Age		
30–39	16	8.5
40–49	52	27.5
50–59	88	46.6
60–69	33	17.5
Ethnicity		
Caucasian	178	94.2
Hispanic or Latino	1	0.5
American Indian or Alaskan Native	6	3.2
Other	4	2.1
Marital Status		
Married	156	82.5
Divorced	19	10.1
Separated	1	0.5
Widowed/never married	12	6.3
Living together	1	0.5
Education (number of years of school completed)		
12 or less	48	25.4
13–15	76	40.2
16–18	60	31.7
19 or more	5	2.6
Income		
Less than $15,000	30	15.8
$15,000–$24,999	30	15.8
$25,000–34,999	34	18.0
$35,000–44,999	26	13.8
$45,000–54,999	30	15.8
$55,000–64,999	18	9.5
$65,000–74,999	10	5.3
$75,000–84,999	6	3.2
$85,000 or more	5	2.6
Employment (outside home)		
Yes	117	61.9
No	72	38.1

Table 3 *ANCOVA Results for Psychosocial Variables — Total Group and Vulnerable Subgroup*

	Total Group				Vulnerable Subgroup			
Psychosocial construct/ group	***Adj. mean***	***F***	***MSE***	***p***	***Adj. mean***	***F***	***MSE***	***p***
Social support								
Intense	84.6	3.38	454.0	0.03	77.9	5.34	725.9	0.01
Less-intense	82.9				77.9			
Control	79.3				68.0			
Self-esteem								
Intense	32.5	2.28	38.7	0.10	28.1	0.38	4.54	0.68
Less-intense	31.0				28.0			
Control	31.0				27.3			
Empowerment								
Intense	29.4	0.111	10.79	0.89	27.3	0.78	58.5	0.47
Less-intense	29.6				27.2			
Control	28.8				30.1			

Self-Efficacy								
Intense	114.1	3.19	500.9	0.04	102.5	1.87	347.0	0.16
Less-intense	112.2				101.8			
Control	109.0				95.3			
Depression								
Intense	14.8	0.78	58.5	0.46	22.8	0.27	29.1	.768
Less-intense	15.2				21.2			
Control	16.6				23.7			
Stress								
Intense	23.1	1.35	48.4	0.26	29.0	0.84	33.6	0.44
Less-intense	23.7				29.0			
Control	24.8				31.1			
Loneliness								
Intense	41.8	1.53	67.2	0.22	47.5	4.12	190.2	.021
Less-intense	41.1				45.4			
Control	43.1				51.5			

support and self-efficacy the only significant group difference was that between the *intense intervention* and *control* groups and no differences were found for the other comparisons.

Identical procedures were used to evaluate the effect of the intervention on the vulnerable subgroup, which was constructed by using scores for the women in the highest 50th percentile for depression, stress, and loneliness ($n = 64$). ANCOVA results (see Table 3) were again significant for social support $F(2, 60) = 5.34$, $MSE = 725.9$, $p = 0.01$; however, self-efficacy did not appear to be different for this subgroup $F(2, 60) = 1.87$, $MSE = 347.0$, $p = 0.16$. For self-efficacy, the means appear to have even greater descriptive differences than for the overall group, suggesting that this loss of statistical significance is related more to a loss of statistical power with the smaller group than an actual null finding. Differences were also observed for loneliness $F(2, 60) = 4.12$, $MSE = 190.2$, $p = 0.02$ in this vulnerable subgroup, while this was not the case for the overall sample. For social support, the adjusted mean was highest but identical (77.9) for the intervention groups, followed by the *control* group (68.0). For loneliness, adjusted means were lowest for the *less-intense* group (45.4), followed by the *intense* (47.5) and *control* (51.5) groups. Follow-up tests were conducted to evaluate pairwise differences among these adjusted means, and again Holm's sequential Bonferroni procedure was used to control for type I error across the three pairwise comparisons. For social support and loneliness, both intervention groups were significantly different from the *control* group.

Discussion

The WTW computer-based research intervention is intended to offer a program of support and health education to rural women as a means of facilitating their ability to self-manage and adapt to chronic illness. Psychosocial adaptation was considered an indicator of healthy adaptation to chronic illness, and the seven indicators of psychosocial adaptation (social support, self-esteem, empowerment, self-efficacy, depression, stress, and loneliness) were of interest.

Social Support

The women in the *intense intervention* group participated for 22 weeks in a peer-led support group. They had an opportunity to exchange ideas about various health topics in a forum that included health-care experts. Thus it was expected that these women's sense of social support would increase significantly, compared with the *less-intense intervention* and *control* groups. This expectation was fulfilled, even for more vulnerable women, whose social support scores were significantly higher than those of

women in the *control* group. This result indicates that social support can be provided effectively through a virtual support group whose members may be located great distances from one another in rural areas.

The following comment by a participant indicates that social support is an important factor in rural women's ability to adapt to their illness:

> *There is no outside support. All we can do, since I think we're in WTW because we are isolated, is support each other… and I think we do a fantastic job of that!…and try to remain strong and focused, personally.*

Another woman echoed this sentiment: "Our mutual support may be the greatest gift we have or can give." Effective social support has long been recognized as a buffer against the emotional problems that can develop due to the rigours of dealing with a chronic condition, culminating in the promotion of overall psychosocial adaptation (Earl, Johnson, & Mitchell, 1993).

Self-Efficacy

The *intense intervention* group also significantly increased their perceived self-efficacy — that is, their confidence in their own ability to achieve goals. As one woman so aptly put it:

> *I am pleased this week to become an active self-manager by setting goals for myself, listing ways to reach them, and making action plans. I find that these activities give me power over my illness, and at least I feel like I am doing what I can do to divide and conquer.*

This was a rewarding outcome because individuals with a strong sense of self-efficacy are generally better poised to manage their health condition and to adapt creatively to the many demands of living with a chronic illness.

Self-efficacy among rural women with a chronic illness can take on special meaning:

> *Many women in rural [states] live with chronic illnesses day after day. The program has taught me much about coping with my own chronic condition, but it has also opened my eyes to the obstacles we all must deal with as we find ourselves having to rely on others for a little help now and then. You've asked questions that really made me stop and think about myself and that was tough to do.*

The emergence of self-efficacy as an indicator of psychosocial adaptation is also consistent with the literature. According to Lorig and Holman (2000), changes in self-efficacy are associated with positive changes in health status and lead to improved emotional well-being. This observa-

tion is particularly important because self-efficacy is amenable to enhancement through well-designed self-management programs.

The apparent null findings for self-efficacy among the more vulnerable subgroup were not surprising, as the sample size and resulting statistical power dropped significantly. However, descriptive mean differences are consistent with findings for the overall sample, suggesting that self-efficacy was in fact different for the vulnerable group as well. This consistency suggests that the intervention was effective in helping the women gain confidence in their ability to carry out the tasks associated with the management of their illness, even in rural settings that are devoid of resources. One woman gave voice to this conclusion:

> *The WTW project is so important to the health and well-being of all women living in rural…states. Very few of us are able to travel to…larger specialty clinics to ask the questions that I have found answers to on the web sites suggested by you and other members of this great team…. It's programs like this that…have made all of us more informed and a lot wiser. Thanks again.*

The fact that loneliness decreased in the most vulnerable women, who initially scored high for depression, stress, and loneliness, was another benefit of the intervention — as is evident in one woman's expression of reassurance: "You are not alone!" However, the reduction in loneliness was coupled with apparent changes in self-efficacy. This is particularly interesting, because strong self-efficacy beliefs are thought to be linked to psychosocial well-being, and feelings of emotional loneliness may serve to decrease one's perceived self-efficacy (and vice versa) (Fry & Debats, 2002).

It was anticipated that there would be a positive change in all of the psychosocial scores for the *intense intervention* group when compared to the *control* group. Statistically significant differences were not demonstrated for all of the measures. However, there was an encouraging positive trend in the psychosocial scores for the *intense intervention* group: all scores showed improvement after the 22-week computer-based intervention.

Lessons Learned

Several key lessons derived from this phase of the WTW project serve as the foundation for future endeavours. Though effective, the current intervention and research design are complex and therefore costly in terms of time, money, and staff resources. To reduce the complexity and to enhance transferability, foster real-world application, and lower overall costs, we have proposed several changes to the next phase of the project.

A two-group rather than three-group design is adequate. The three-group design was used to evaluate the strategy of having the participants complete the online health-teaching units on their own without expert input or group discussion. Women in this group did well in self-study mode; thus women will work on the health-teaching units independently, and there will be periodic rather than sustained interface with the content experts.

Based on our work and that of Lorig, Sobel, Ritter, Laurent, and Hobbs (2001), it seems feasible and wise to shorten the intervention from 22 to 11 weeks, with similar intensity (4–5 hours per week). We have shifted our focus from more long-term effects to the immediate and short-term impact of the intervention and will administer measures at only three time points.

The women enthusiastically engaged with the program and highly valued the experience of participating in the project. Clearly, the peer-led support group component was effective and well liked, and we do not intend to change the virtual support group aspect of the intervention. However, blending two forums into one (eliminating the health-teaching unit discussions) will streamline the intervention by requiring the women to participate in just a single discussion group.

Another significant change is the plan to redesign the health-teaching units with a focus on the process of developing self-management skills. In the revised health-teaching units, instruction in self-management skills will be in the foreground, while specific health-related content will be integrated within this context.

From a technical perspective, we met few obstacles. The women generally found that learning WebCT (the online educational platform) was a simple process, and technical support can be provided effectively via the toll-free telephone line. The participants made a total of 131 telephone calls — 43% of the women called only once, 51% called from two to seven times, and 6% called more than seven times. The most common problem, accounting for 32% of all telephone calls, related to hardware, followed closely by issues with the WebCT, at 31%. Problems connecting and logging on to the Internet accounted for 18% of calls and problems accessing hyperlinks 4% of calls.

Implications

Geographic and social isolation pose challenges for rural-dwellers and their health-care providers. A sense of isolation can lead to a variety of social ills and destructive avenues of relief, such as alcohol and drug abuse, suicide, domestic upheaval, and poor lifestyle choices. Clearly, finding an efficacious modality for working with isolated rural-dwellers, such as a computer-based intervention, is critical in the face of the short-

age of rural health-care providers and the incidence rates for chronic conditions.

As we move forward to explore application of the principles of the WTW intervention to clinical practice, demonstrating its impact on social support and self-efficacy is an important prerequisite outcome. It is our belief that technology-based interventions have great potential for improving the psychosocial status of rural women with a chronic illness, enhancing their self-management skills and their ability to adapt to their illness. This belief is exemplified in the words of one of the participants:

> *As we wrap up this part of the program I can honestly say that my nutritional choices are improving. (The clerk at our little grocery store even noticed that one.) I have been given some great computer help and even told my husband last week that I'd really like to have one of my own when this project is no longer at the touch of my fingers. WTW has given us some great medical sites that I've found very informative. The sites for finance and government programs really came in handy. We are right at retirement age and have really pored over all the options available on the web. I knew this would be a worthwhile program, and it certainly has been, but what I didn't expect was to gain this wonderfully supportive extended family that has a way of making you feel so good. That's what friends do and that's what you have all become to me. "I'm so glad we had this time together."*

Interventions such as this one can counter the great distances identified as the all-pervasive factor in the limited self-management ability of rural women with chronic conditions (Winters et al., 2006).

The relationships among the factors that influence the adaptation process, including self-care, need to be more fully understood before we can provide a sound conceptual framework to guide the intervention and its applications. Building on our work (Weinert et al., 2005) and the work of others (Chen, 2005; Lorig & Holman, 2003; Pollock, 1993; Roy & Andrews, 1999; Stuifbergen, Seraphine, & Roberts, 2000), a new, more comprehensive model has been developed: the WTW Conceptual Model for Psychosocial Adaptation to Chronic Illness. The central theme of this new model is that the process of psychosocial adaptation is key to developing self-management skills and achieving an acceptable quality of life while living with a chronic illness.

Nursing's quest for strategies that positively influence psychosocial adaptation to chronic illness is of particular urgency because of the broad social consequences, the aging of rural populations, the limited access to health care in rural areas, and the prevalence of chronic illness. Inadequate psychosocial adaptation at the individual level may lead to inappropriate attempts to find relief from the burdens imposed by chronic illness. On

the other hand, the use of creative, computer-based interventions can foster a sense of social connection, heighten the perception of social support and self-efficacy, provide health information, and promote health-seeking behaviour — all of which can enable individuals to better self-manage and adapt to their health conditions. The result is much like the pebble in the pond — creating far-reaching health benefits for rural populations despite the burden of living with a chronic health condition.

References

Adams, K., Sanders, S., & Auth, E. (2004). Loneliness and depression in independent-living communities: Risk and resilience factors. *Aging and Mental Health, 8*(6), 475–485.

Anderson, R. M., Funnell, M. M., Fitzgerald, J. T., & Marrero, D. G. (2000). The Diabetes Empowerment Scale: A measure of psychosocial self-efficacy. *Diabetes Care, 23*(6), 739–743.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37,* 122–147.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28,* 117–148.

Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2003). Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles? *Psychological Science in the Public Interest, 4*(1), 1–44.

Cacioppo, J., Hawkley, L., & Berntson, G. (2003). The anatomy of loneliness. *Current Directions in Psychological Science, 12*(3), 71–74.

Chen, C. (2005). A framework for studying the nutritional health of community-dwelling elders. *Nursing Research, 54*(1), 13–21.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*(4), 385–396.

Cooper, K., & Gallaher, M. (2004). *A nation online: Entering the broadband age.* Retrieved December 17, 2007, from http://www.ntia.doc.gov/reports/anol/NationOnlineBroadband04.doc.

Devine, G., & Orme, C. (1985). Center for Epidemiologic Studies Depression Scale. In D. J. Keyser & R. C. Sweetland (Eds.), *Test critiques,* Vol. 1 (pp. 144–160). Kansas City, MO: Test Corporation of America.

Earl, L., Johnson, M., & Mitchell, E. (1993). Coping with motor neuron disease: An analysis using self-regulation theory. *Palliative Medicine, 7*(2), 21–30.

Emery, C. (2003). Women living with chronic illness experienced transition that involved stages of distress and a quest for ordinariness. *Evidence Based Nursing, 6*(2), 63.

Finfgeld-Connett, D. (2005). Clarification of social support. *Journal of Nursing Scholarship, 37*(1), 4–9.

Foote, A., Piazza, D., Holcombe, J., Paul, P., & Daffin, P. (1990). Hope, self-esteem and social support in persons with multiple sclerosis. *Journal of Neuroscience Nursing, 22,* 155–159.

Fox, S. (2005). *Eight in ten Internet users have looked for health information online*. Retrieved December 5, 2007, from http://www.pewinternet.org/pdfs/PIP_Healthtopics_May05.pdf.

Fox, S. (2006). *Most Internet users start at a search engine when looking for health information online.* Retrieved December 5, 2007, from http://www.pewinternet.org/pdfs/PIP_Online_Health_2006.pdf.

Fox, S., & Fallows, D. (2003). *Internet health resources: Health searches and email have become more commonplace, but there is room for improvement in searches and overall Internet access*. Retrieved November 27, 2007, from www.pewintenet.org.

Fries, J. F. (1997). Reducing the need and demand for medical care: Implications for quality management and outcome improvement. *Quality Management in Health Care, 6*(1), 34–44.

Fries, J. F., Koop, C. E., Sokolov, J., Beadle, C. E., & Wright, D. (1998). Beyond health promotion: Reducing need and demand for medical care. *Health Affairs, 17*(2), 70–84.

Fry, P. S., & Debats, D. (2002). Self-efficacy beliefs as predictors of loneliness and psychological distress in older adults. *International Journal of Aging and Human Development, 55*(3), 233–269.

Glueckauf, R. L., Pickett, T. C., Ketterson, T. U., Loomis, J. S., & Nickelson, D. W. (2003). Telehealth and chronic illness: Emerging issues and developments in research and practice. In S. Llewelyn & P. Kennedy (Eds.), *Handbook of clinical health psychology* (pp. 519–545). New York: John Wiley.

Gray, J. (1998). Mastery of stress and health in women living with HIV infection. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 58*(8-B), 4138.

Grenade, L., & Boldy, D. (2005). Measuring loneliness in later life: A comparison of differing measures. *Reviews in Clinical Gerontology, 15*(1), 63–70.

Gustafson, D., McTavish, F., Boberg, E., Owens, B. H., Sherveck, C., Wise, M., et al. (1998). Empowering patients using computer based health support systems. *Quality in Health Care, 8,* 49–56.

Hall, M., & Havens, B. (1999). *The effects of social isolation and loneliness on the health of older women*. Winnipeg: Prairie Women's Health Centre of Excellence.

Hill, W., Weinert, C., & Cudney, S. (2006). Influence of a computer intervention on the psychological status of chronically ill rural women: Preliminary results. *Nursing Research, 55*(1), 34–42.

Klemm, P., Reppert, K., & Visich, L. (1998). A nontraditional cancer support group: The Internet. *Computers in Nursing, 16*(1), 31–36.

Kralik, D. (2002). The quest for ordinariness: Transition experienced by midlife women living with chronic illness. *Journal of Advanced Nursing, 39*(2), 146–154.

Lieberman, M. A., Golant, M., Giese-Davis, J., Winzlenberg, A., Benjamin, H., Humphreys, K., et al. (2003). Electronic support groups for breast carcinoma: A clinical trial of effectiveness. *Cancer, 97*(4), 920–925.

Lorig, K., & Holman, H. (2003). Self-management education: History, definition, outcomes, and mechanisms. *Annals of Behavioral Medicine, 26*(1), 1–7.

Lorig, K., Sobel, D., Ritter, P., Laurent, D., & Hobbs, M. (2001). Effect of a self-management program on patients with chronic disease. *Effective Clinical Practice, 4*(6), 256–262.

Meichenbaum, D. (1994). *A clinical handbook/practical therapist manual for assessing and treating adults with PTSD.* Waterloo, ON: Institute Press.

Piette, J. D., Richardson, C., & Valenstein, M. (2004). Addressing the needs of patients with multiple chronic illnesses: The case of diabetes and depression. *American Journal of Managed Care, 10*(2 Pt 2), 152–162.

Pollachek, J. B. (2001). *The relationship of hardiness, social support, and health promoting behaviours to well-being in chronic illness.* Newark: Rutgers and State University of New Jersey.

Pollock, S. (1993). Adaptation to chronic illness: A program of research for testing nursing theory. *Nursing Science Quarterly, 6*(2), 86–92.

Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1,* 385–401.

Robinson, J., Shaver, P., & Wrightsman, L. (1991). *Measures of personality and social psychological attitudes*. New York: Academic Press.

Rouchelle, A., Pounds, R., & Tierney, J. (2002). Depression. In M. Wise & J. Rundell (Eds.), *Textbook of consultation-liaison psychiatry,* 2nd ed. (pp. 307–338). Washington: American Psychiatric Publishing.

Roy, C., & Andrews, H. (1999). *The Roy Adaptation Model,* 2nd ed. Stamford, CT: Appleton & Lange.

Sharf, B. F. (1997). Communicating breast cancer on-line: Support and empowerment on the Internet. *Women's Health, 26*(1), 65–84.

Sherer, M., Maddix, J., Mercandante, B., Prentice-Dunn, S., Jacobs, B., & Rogers, R. (1982). The Self-Efficacy Scale: Construction and validation. *Psychological Reports, 51,* 663–671.

Simon, G. E. (2001). Treating depression in patients with chronic disease: Recognition and treatment are crucial; depression worsens the course of a chronic illness. *Western Journal of Medicine, 175*(5), 292–293.

Simon, G. E., Von Korff, M., & Lin, E. (2005). Clinical and functional outcomes of depression treatment in patients with and without chronic medical illness. *Psychological Medicine, 35*(2), 271–279.

Smith, G., Kohn, S., Savage-Stevens, S., Finch, J., Ingate, R., & Lim, Y. (2000). The effects of interpersonal and personal agency on perceived control and psychological well-being in adulthood. *Gerontologist, 40*(4), 458–468.

Stuifbergen, A., Seraphine, A., & Roberts, G. (2000). An explanatory model of health promotion and quality of life in chronic disabling conditions. *Nursing Research, 49*(3), 122–129.

Wallerstein, N. (2002). Empowerment to reduce health disparities. *Scandinavian Journal of Public Health, 30*(Suppl 59), 72–77.

Weinert, C. (2003). Measuring social support: PRQ2000. In O. Strickland & C. Dilorio (Eds.), *Measurement of nursing outcomes: Self care and coping,* Vol. 3 (pp. 161–172). New York: Springer.

Weinert, C., Cudney, S., & Winters, C. (2005). Social support in cyberspace: The next generation. *Computers, Informatics, Nursing, 23*(1), 7–15.

Weiss, R. (1969). The fund of sociability. *Transaction, 6,* 36–43.
Winters, C., Cudney, S., Sullivan, T., & Thuesen, A. (2006). The rural context and women's self-management of chronic health conditions. *Chronic Illness, 2,* 273–289.

Authors' Note

This study was funded by the NIH/National Institute of Nursing Research (1RO1NR007908-01), the SC Ministry Foundation, and the Arthritis Foundation.

No conflict of interest or financial disclosure statements are required.

Comments or queries may be directed to Clarann Weinert, College of Nursing, Montana State University, Bozeman, Montana 59717 USA. Telephone: 406-994-6036. E-mail: weinert@montana.edu.

Clarann Weinert, SC, PhD, RN, FAAN, is Professor, College of Nursing, Montana State University, Bozeman, United States. Shirley Cudney, MA, RN, GNP, is Associate Professor (Retired), College of Nursing, Montana State University. Wade G. Hill, PhD, CNS-BC, is Assistant Professor, College of Nursing, Montana State University.