Computers in Human Behavior 78 (2018) 261-272

ELSEVIER

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh



Full length article

Predicting changes in giving and receiving emotional support within a smartphone-based alcoholism support group



Woohyun Yoo^{a,*}, Dhavan V. Shah^{b, c}, Ming-Yuan Chih^d, David H. Gustafson^c

^a Department of Mass Communication & Institute of Social Sciences, Incheon National University, 119 Academy-ro, Yeonsu-gu, Incheon, 22012, South Korea ^b School of Journalism and Mass Communication, University of Wisconsin-Madison, 5115 Vilas Hall, 821 University Avenue, Madison, WI, 53706, USA ^c Center for Health Enhancement Systems Studies, University of Wisconsin-Madison, Mechanical Engineering Building, 1513 University Avenue, Madison, WI, 53706, USA

^d College of Health Sciences, University of Kentucky, Wethington Building, 900 South Limestone Street, Lexington, KY, 40536-0200, USA

ARTICLE INFO

Article history: Received 17 January 2017 Received in revised form 22 May 2017 Accepted 7 October 2017 Available online 7 October 2017

Keywords: Online social support Emotional support Smartphone-based support group mHealth Alcoholism Addiction

ABSTRACT

This study examined how giving and receiving emotional support in a smartphone-based alcoholism support group changed over time, and what factors predicted the changing patterns. Data were collected as part of a randomized clinical trial of testing a smartphone-based relapse prevention system for alcoholics. Findings suggested that giving and receiving emotional support in a smartphone-based alcoholism support group tended to decline over time. The initial value and growth rate of giving and receiving emotional support varied depending on the group participants' characteristics. These features should be considered in building strategies for the design and implementation of smartphone-based addiction support groups.

© 2017 Elsevier Ltd. All rights reserved.

1. Introduction

Alcohol use disorder are linked to a wide range of health and safety problems (Berglund & Ojehagen, 2006; Kushner, Abrams, & Borchardt, 2000; Morris, Stewart, & Ham, 2005). To address the problem of alcoholism, health care professionals offer a number of treatment options, including medications, behavioral therapies, screening, and mutual-help groups. Despite these offerings, most alcoholics still fail to receive appropriate treatment (Substance Abuse and Mental Health Services Administration, 2013). More alarming is the lack of extended continuing care in spite of the potentially chronic and relapsing nature of alcoholism (McTavish, Chih, Shah, & Gustafson, 2012).

To overcome these limitations, researchers are paying a great deal of attention to emerging mobile communication and network technologies (Gustafson et al., 2014; McTavish et al., 2012). In

* Corresponding author. E-mail address: woohyunyoo@gmail.com (W. Yoo). particular, smartphone technology can assist those with alcohol use disorders in accessing online support groups in cost-effective, flexible, and efficient ways (McTavish et al., 2012). Online support groups are virtual meeting places for individuals with addiction or related problems to exchange social support (vanLear, Sheehan, Withers, & Walker, 2005). In such support groups, emotional support is frequently enacted through mutual communication actions (Coulson, 2014; vanLear et al., 2005).

Nevertheless, little is known about how emotional support is exchanged within smartphone-based support groups that utilize a different media platform distinct from desktop-based virtual communities. In particular, the exchange of emotional support may be likely to change over time because social interactions are dynamic, not static, in online support groups (Yoo et al., 2013). Given the dynamic and interactive features of online supportive communication, this study explores how giving and receiving emotional support in a smartphone-based alcoholism support group change over time, and what factors predict the changing patterns of giving and receiving emotional support over the course of support group engagement.

2. Theoretical background

2.1. Exchanging emotional support in smartphone-based addiction support groups

Emotional support is defined as the provision of love, empathy, caring, and trust (House, 1981). It is rendered through information that leads individuals to believe they are cared for and loved, esteemed, and valued and that they belong to a network of communication and mutual obligation (Cobb, 1976). In recent years, emotional support has been exchanged through online communication using smartphones (McTavish et al., 2012). Smartphones are drawing particular attention in that their portability, affordability, availability, and feasibility are effective at developing social networks for exchanging emotional support among chronically ill patients. Thus, social networking via smartphones can be used to give and receive emotional support among members of a community.

Previous research has shown that alcoholic patients exchange emotionally supportive messages in online support groups (Chuang & Yang, 2012; Cunningham, van Mierlo, & Fournier, 2008; Finfgeld-Connett, 2009). Given the growing popularity and advantages of smartphones, it is plausible that smartphone-based support groups create a virtual environment open to sharing emotional support among people with alcohol problems. Individuals with chronic diseases tend to regard smartphone-based support groups as peerto-peer online communities (Fukuoka, Kamitani, Bonnet, & Lindgren, 2011). In addition, they use smartphone-based support groups to connect with other patients (Muessig et al., 2013). A recent intervention study found that smartphone-based support groups provided participants with emotional and informational support, and such support was particularly effective at fulfilling the needs going unmet in face-to-face settings (McLaughlin et al., 2012).

2.2. Changing patterns in giving and receiving emotional support

Albrecht and Adelman (1987) argued that "social support refers to verbal and nonverbal communication between recipients and providers that helps manage uncertainty about the situation, the self, the other, or the relationship and functions to enhance a perception of personal control in one's life experience" (p. 19). Thus, researching social support as a communication situation entails studying the dynamic interactions in which people provide and receive social support messages.

Given that emotional support is mainly exchanged through conversational interactions, emotionally supportive communication can be classified into two major types of behaviors. One type is the giving of emotional support, which refers to the actual offering or conveying of emotionally supportive actions that match the type of support sought by a person facing life strain and stress (Nurullah, 2012). The other type is the receiving of emotional support, which refers to the reception of emotional support from close confidants or others, such as family members, friends, or colleagues (Schulz & Schwarzer, 2004). More specifically, Nurullah (2012) defined the reception of emotional support as "the experience of receiving actions and behavior that are considered supportive by the recipient in fostering emotional needs, which match the types of support sought by the recipient with ones that are provided by close relations and significant others in an effort to improve well-being and effectively deal with life crisis" (p. 174). Along these lines, some communication scholars have distinguished the features and effects of giving and receiving emotional support in online support groups (Han et al., 2011; Kim et al., 2012; Namkoong et al., 2013; Yoo et al., 2014).

Unlike regular clinic visits or other routine health-related behaviors, such as taking medication, patients' participation in online social support systems is not constant over time. In e-Health research, the law of attrition is used to describe the patients' decreasing engagement of such systems over a period of use (Eysenbach, 2005). Indeed, various studies have reported a decline in system use over time among patients who use interactive health communication systems to access online social support for different types of chronic or life threatening illnesses, such as addiction, asthma, diabetes, cancer, and chronic heart failure (Gustafson et al., 2012; Jimison et al., 2008; McTavish et al., 2012).

Although some researchers have attributed this type of usage attenuation to a number of possible causes, such as reduced motivation or technology inconvenience (especially for web-based systems), very few of these researchers have actually studied the reasons of this phenomena (Jimison et al., 2008). Compared to traditional, web-based support groups that often require patients to sit in front of a computer, smartphones provide a more convenient way to access online social support at any time and almost anywhere thanks to wireless broadband connections. Although smartphone technology appears to be more novel than a desktop or laptop computer, the uniqueness and convenience of smartphonebased support groups do not help resolve the issue of use attrition. McTavish et al. (2012) found the usual decreasing pattern of system use in terms of the number of pages read in three smartphonebased support systems for asthma, colon cancer and alcohol addiction.

From these findings, we would expect to see decreasing trends of both message expression and reception activities in smartphonebased support groups. However, a decreasing number of messages posted or read may not necessarily lead to the conclusion that patients provide or receive a reduced amount of support over time. This is because the potential variability of support content in each of the messages. For example, a small number of messages could contain robust support, while many messages may yield only a limited amount of support. Therefore, it is imperative to examine the changing patterns of emotional support provision and reception via this smartphone-based social support system in more systematic and nuanced ways. In line with this objective, the following research questions are proposed.

RQ1: How does giving emotional support change in a smartphone-based alcoholism support group over time? RQ2: How does receiving emotional support change in a smartphone-based alcoholism support group over time?

2.3. Potential predictors of changes in giving and receiving emotional support

2.3.1. Sociodemographic backgrounds

In past research, a strong predictor of participation in online support groups is young age. Younger patients tend to report unmet needs with regard to information and psychological support (Zebrack, 2008; Zebrack et al., 2013). In addition, younger patients are more trusting of the Internet than older patients. Previous research has found that younger patients are more likely to participate in online patient support groups (Dutta & Feng, 2007; Han et al., 2010; Mo & Coulson, 2010; van Uden-Kraan et al., 2011). Given the high levels of motivation and participation in online support groups, younger patients may be more inclined to give and receive emotional support in smartphone-based support groups over time.

Gender is also an important factor in predicting the communication of social help in online support groups. In general, women are more likely than men to provide support (House, Umberson, & Landis, 1988). In particular, they are more likely to be involved in the exchange of emotional support outside their family than are men (Barbee et al., 1993; Liebler & Sandefur, 2002). For these reasons, female patients have been found to outnumber male patients in many patient support groups (van Uden-Kraan, Drossaert, Taal, Seydel, & van de Laar, 2009; van Uden-Kraan et al., 2011). As times go by, female patients thus would be more likely than male patients to communicate emotional support in smartphone-based support groups.

Race and education level influence the communication of social support. For example, African Americans have more collectivistic belief systems than White Americans (Pyke & Bengtson, 1996; Triandis, 2001). Accordingly, African Americans may be hesitant to seek social support with people outside the family. Previous studies have found that African American patients participate less in online support groups than White patients (Han et al., 2010; Kim et al., 2011; Shaw et al., 2006). As for education level, patients with higher levels of education are more likely to attend support groups (Deans, Bennett-Emslie, Weir, Smith, & Kaye, 1988) and have greater interest in support group participation (Bui et al., 2002). Similarly, the majority of participants in online support groups have a medium to high level of education (van Uden-Kraan et al., 2009). Thus, patients with higher levels of education may be more likely to exchange emotional support in smartphone-based support groups over time.

According to the convoy model of social support (Kahn & Antonucci, 1980), each individual is surrounded by a convoy, a set of people with whom the individual exchanges emotional and instrumental support. When such a social network is absent from an individual's life, that absence could lead the person to participate in support groups compensatory communication. Absence of social ties, social dislocation, and unemployment may move patients to participate in online support groups because they lack a social network and thus have a high need for interaction (Sautier, Mehnert, Höcker, & Schilling, 2014). Therefore, factors such as employment status could be seen as an important determinant of changes in giving and receiving emotional support in smartphone-based support groups.

2.3.2. Treatment and disease-related information

Patients with chronic illnesses, including alcohol use disorders, may encounter different needs for social support before, during, and after treatment. For example, in preparing for treatment, patients may prefer information about the nature of their illnesses or treatment options; information about managing side effects during treatment; and information about self-management, follow-up care, and long-term adverse effects after treatment (Raupach & Hiller, 2002; Rutten, Arora, Bakos, Aziz, & Rowland, 2005). For these reasons, patients undergoing treatment are significantly more likely to have support needs than patients who have completed treatment (Cockle-Hearne et al., 2013). Therefore, it is likely that giving and receiving emotional support may appear to be its highest and most varied during active treatment periods.

In addition, the disease state can play an important role in predicting the exchange of social support in smartphone-based communities. Building on the elaboration likelihood model (ELM), the motivation-driven framework suggests that extrinsic health motivation drives online health community use (Dutta & Feng, 2007). This motivation is not only dispositional, but may be triggered by external factors (Petty & Cacioppo, 1984). In the realm of patient support groups, disease-related factors may influence the motivation to participate in the groups. For example, patients with chronic diseases are more likely to use online patient communities

than individuals not diagnosed with chronic diseases (Dutta & Feng, 2007; Mo & Coulson, 2010). Moreover, the incidence or severity of illness triggers active engagement in online patient support groups (Han et al., 2010). Given that the stage of disease affects needs for social support (Shaw et al., 2008), patients with a long-term and severe disease may be more likely to give and receive emotional support within smartphone-based support groups to secure social support related to the disease.

2.3.3. Psychosocial factors and coping strategies

Social support networks have a powerful impact on how patients cope with their diseases, as networks serve as resources for exchanging social support. Patients who lack social networks may need to seek alternative support resources, such as smartphonebased support groups. In other words, patients who perceive themselves as having low levels of social support may turn to smartphone-based support communities and engage more in order to compensate for the lack of those resources (Shaw et al., 2008). Similarly, patients who perceive a lack of available social support are more likely to post and/or read messages in online cancer support groups (Han et al., 2012; Kim et al., 2011). Thus, it is reasonable to assume that patients with perceptions of lower support availability may be more likely to give and receive emotional support over time.

Emotional distress may discourage patients from participating in the exchange of emotional help within smartphone-based support groups. People experiencing negative emotions and related emotional distress (i.e., anxiety, depression, and anger) tend to be self-focused, passive, and lack the energy to act effectively (Iwamitsu et al., 2005). In addition, patients who are more worried about their disease write and/or read less because they feel emotionally overwhelmed by their diagnosis, treatments, side effects, and fears related to their illness (Shaw et al., 2006). Conversely, emotional distress may lead to active communication of emotional support. Previous studies have found that psychological distress predicts active participation in support groups for people with alcohol problems (Humphreys, Mavis, & Stofflemayr, 1991; McKay et al., 1998). That is, patients may be likely to seek and receive adequate help in smartphone-based support groups when their emotional needs emerge or remain unresolved.

Coping strategies have the potential to predict supportive communication in mobile settings. Coping refers to "cognitive and behavioral efforts made to master, tolerate, or reduce external and internal demands and conflict" (Folkman & Lazarus, 1980, p. 223). According to the cognitive behavior model of alcohol and drug relapse (Larimer, Palmer, & Marlatt, 1999), coping strategies can contribute to the prevention of relapse in addiction by enhancing an individual's self-efficacy. For instance, patients using approach coping exhibit high self-esteem and therefore have more control in dealing with their illness (Grande, Myers, & Sutton, 2006). Thus, they may be likely to help others with a similar health problem online. Consistent with this, coping strategies have been linked with the provision of emotional support in online support groups within the context of cancer communication (Kim et al., 2012; Yoo et al., 2013).

Drawing upon the above discussion about potential predictors of communicating emotional support, this study poses three groups of determinants related to changes in giving and receiving emotional support: (1) sociodemographic backgrounds, (2) treatment and addiction-related information, and (3) psychosocial factors and coping strategies. Although there is clearly extensive research that has recognized the effects of these factors on the exchange of online social support, the direction of each influence is unclear and inconsistent. Therefore, the following research questions are posed. RQ3: What factors predict the changing pattern of giving emotional support in a smartphone-based alcoholism support group?

RQ4: What factors predict the changing pattern of receiving emotional support in a smartphone-based alcoholism support group?

3. Method

3.1. A-CHESS discussion group and study sample

The University of Wisconsin's Center for Health Enhancement Systems Studies launched a smartphone-based, relapse-prevention program called Addiction-Comprehensive Health Enhancement Support System (A-CHESS). A-CHESS was designed to improve the management and continuing care of individuals struggling with alcohol use disorders by offering various services at almost any time and place (Gustafson et al., 2011). The smartphone-based support group examined in this research was an online bulletinboard-style discussion group within A-CHESS (see Fig. 1). Alcoholic patients could participate in the support groups via the A-CHESS application on their smartphones.

For this study, subjects were originally recruited as part of a randomized clinical trial of testing A-CHESS. Patients had to meet the criteria for Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV alcohol dependence when they entered three residential treatment programs operated by a nonprofit treatment organization in the Midwestern U.S., and two programs operated by another nonprofit organization in the Northeastern U.S. Of the 349 patients recruited February 2010 through June 2011, 170 patients could access the A-CHESS discussion group. The final sample for this study was limited to the 153 patients who either wrote or read at least one message in the A-CHESS discussion group during the 12-month study period. Table 1 shows the descriptive characteristics of the sample patients.

3.2. Data construction

The final data for this study were created by merging (1) computer-aided content analysis of discussion posts, (2) action log data analysis of group usage, and (3) multiple waves of survey data.

Table 1

Demographic, clinical, and psychosocial characteristics of the study sample.

Characteristics	Participants ($N = 153$)
Age	
Mean (SD)	38.40 (9.63)
Gender	
Male	88 (57.5%)
Female	65 (42.5%)
Ethnicity	
Caucasian	127 (83.0%)
African American	20 (13.1%)
Other	6 (3.9%)
Education	
Never attended high school	7 (4.6%)
Some high school	30 (19.6%)
High school diploma or GED	53 (34.6%)
Some college courses	41 (26.8%)
2-year college degree	9 (5.9%)
4-year college degree	12 (7.8%)
Graduate degree	1 (0.7%)
Current employment	
Yes	30 (19.6%)
No	123 (80.4%)
Number of treatment	
Mean (SD)	4.04 (7.05)
Duration of drinking problems (Years)	
Mean (SD)	16.59 (10.01)
Number of attempt to quit drinking	
Mean (SD)	10.32 (31.41)
Perceived availability of support	
Yes	147 (96.1%)
No	6 (3.9%)

3.2.1. Computer-aided content analysis

To explore emotional support, this research analyzed the entire body of each subject's discussion messages within the A-CHESS discussion group. Using Provalis Research's QDA Miner 4.1 and WordStat 6.1, we analyzed the 2746 messages posted by the participants during the study period. In the computer-aided content analysis, detecting emotional support in A-CHESS discussion messages took a couple of steps. First, an extensive review of the relevant literature was performed to establish the coding categories of emotional support and their definitions (Bambina, 2007; Braithwaite, Waldron, & Finn, 1999; Coursaris & Liu, 2009). In doing so, this study created six coding categories, we created dictionaries of keywords associated with each category. The keywords of each



Fig. 1. A-CHESS discussion group.

coding category were derived from a quantitative keyword analysis and a review of extant literature. For example, "sorry" served as a starting point for the empathy/sympathy category and "hope" served as a good indicator for the encouragement/reassurance category (see Table 2).

Using the keyword dictionaries, coding rules were created by establishing a relationship between multiple terms, phrases, or concepts. The WordStat rules editor was used to define complex coding rules to specify under which conditions a particular idea or category of ideas should be coded. An idea category consisted of a single term or several words. After the idea categories had been defined, coding schemes were developed to code only certain combinations of those idea categories.

Lastly, reliability estimates were conducted on a random subset of 200 discussion posts from the A-CHESS discussion group. In order to compare results between human coding and computer coding, two human coders coded the same set of discussion posts by using the same coding schemes. Reliability between human coding and computer coding was assessed with Krippendorff's alpha, which was on average 0.87, an acceptable degree of reliability (Hayes & Krippendorff, 2007). The reliability in the coding categories ranged from a high of 0.95 for care/physical affection to a low of 0.72 for empathy/sympathy.

3.2.2. Action log data analysis

This study integrated the results of content analysis of emotional support in A-CHESS discussion group messages with action log data gathered by the A-CHESS database management system. The action log data enabled us to track a variety of individual participants' usage statistics. These data provided information on which participant wrote and/or read each message. Such data contained records not only the content of messages that participants read but also the content of the messages they wrote.

3.2.3. Multiple waves of survey data

The action-level, content-coded data were combined with the multi-wave survey data. When patients agreed to participate in the A-CHESS study, they completed a pre-test survey on demographic backgrounds, psychosocial characteristics, and clinical information. The A-CHESS research team called the patients to request the outcome survey at 4, 8, and 12 months after the intervention began. The post-survey asked about risky drinking days, quality of life, emotional distress, and coping strategies.

3.3. Measures

3.3.1. Giving and receiving emotional support

To construct these variables, we used a measure of proportion, indicating that each variable was measured by the total count of each coding category divided by the total number of messages written or read within the time periods. Accordingly, giving emotional support was measured by the total count in the giving emotional support category divided by the total number of messages written (M = 0.62, SD = 0.73 at 0-4 months; M = 0.64,

SD = 0.72 at 4–8 months; and $M = 0.64$, $SD = 0.73$ at 8–12 months).
Receiving emotional support was measured by the total count in
the receiving emotional support category provided by peer patients
divided by the total number of messages read ($M = 0.76$,
SD = 0.46 at 0–4 months; $M = 0.79$, $SD = 0.46$ at 4–8 months; and
M = 0.79, $SD = 0.45$ at 8–12 months).

3.3.2. Emotional distress

It was measured by modifying the negative affect (NA) subscale of an International Positive and Negative Affect Schedule Short Form (I-PANAS-SF) (Thompson, 2007). The NA scale consisted of 13 items that described negative feelings and emotions. Patients were asked to rate the extent to which they had experienced each particular feeling and emotion during the last month. Responses to each item were recorded on a 5-point scale ranging from 1 (almost never) to 5 (almost always) and all scores were averaged to create an index for emotional distress (M = 2.50, SD = 0.87, $\alpha = 0.92$ at 0-4 months; M = 2.32, SD = 0.78, $\alpha = 0.91$ at 4-8 months; and M = 2.35, SD = 0.90, $\alpha = 0.94$ at 8-12 months).

3.3.3. Coping strategies

Coping strategies were measured with an 8-item, self-report questionnaire of Coping Behaviors Inventory (CBI) (Litman, Stapleton, Oppenheim, & Peleg, 1983). Patients were asked to indicate on a 5-point scale ranging from 1 (almost never) to 5 (almost always) how often they used coping methods to stop themselves from drinking. Responses to all items were averaged to form an index of coping strategies (M = 4.29, SD = 0.71, $\alpha = 0.83$ at 0–4 months; M = 4.30, SD = 0.72, $\alpha = 0.85$ at 4–8 months; and M = 4.33, SD = 0.77, $\alpha = 0.89$ at 8–12 months).

3.4. Analytic framework

To answer the above research questions, we conducted latent growth curve (LGC) modeling within the framework of structural equation modeling (SEM). LGC modeling enables researchers to study individual differences in the change of outcome variables over time and to determine the effects of potential predictors on the change of outcome across time (Duncan & Duncan, 2004). Thus, this methodological approach allowed us to examine not only the growth parameters of giving and receiving emotional support but also the effects of time-invariant and time-variant predictors on the growth parameters. Mplus 6.1 was used to estimate several types of LGC models. The robust maximum likelihood (MLR) estimator was used to handle missingness and nonnormality, both of which were based on continuous data.

4. Results

4.1. Changes in giving and receiving emotional support

Table 3 presents the results of the unconditional LGC models (i.e., latent growth curve models with no predictors) of giving and receiving emotional support in the A-CHESS discussion group.

Та	bl	e	2

Coding categories and keywords.

Emotional support	Keywords
Empathy/Sympathy	Empathy, sympathy, understand, sorry, worry, concern, etc.
Encouragement/Reassurance	Hope, wish, trust, congratulation, proud, cheer, hang in there, good jobs, way to go, here for you, etc.
Care/Physical affection	Take care, hugs, kisses, touch, love, miss, welcome, thank, etc.
Universality/Relationship	Common, isolated, team, not alone, together, look forward, etc.
Christian beliefs/Prayer	God support, God with you, pray for you, my prayers, bless, etc.
General religious/Spiritual views	God, Lord, Holy Spirit, Jesus, angel, bible, church, gospel, heaven, faith, trust, etc.

Table 3		
Results of the unconditional LGC me	odels of giving and receiving emotional suppo	ort.

Effects	Giving emotional support	Receiving emotional support
	Robust Maximum Likelihood (MLR)	
Intercept	0.62***	0.76***
Slope	-0.25^{***}	-0.27^{***}
Var (Intercept)	0.35***	0.20**
Var (Slope)	0.08**	0.07**
r (Intercept and Slope)	-0.14^{**}	-0.08^{*}

 $p^* < 0.05, p^* < 0.01, p^* < 0.001.$

The initial status was set in the first 4 months after the start of the group and two later time periods were 4–8 months and 8–12 months. These models fit the data very well ($\chi^2 = 0.11(1)$, p = 0.74, RMSEA = 0.00, SRMR = 0.01, and CFI = 1.00 for the LGC model of

giving emotional support; $\chi^2 = 0.24(1)$, p = 0.63, RMSEA = 0.00, SRMR = 0.01, and CFI = 1.00 for the LGC model of receiving emotional support). The intercept of giving emotional support was 0.62 (p < 0.001) and the linear slope was -0.25 (p < 0.001), indicating that the mean value of giving emotional support at the first time period (0-4 months) was 0.62, decreasing to an average of 0.25 at each follow-up time period. With respect to receiving emotional support, the mean value at the first time period was 0.76 (p < 0.001) and declined to an average of 0.27 (p < 0.001) at each follow-up time point. That is, both giving and receiving emotional support showed linearly decreasing trends (see Fig. 2).

4.2. Effects of time-invariant predictors

Two LGC models with time-invariant predictors were employed to explore how these predictors influence changes in giving and receiving emotional support. Fig. 3 presents the LGC model of



Fig. 2. Changing patterns in giving and receiving emotional support.



Note: This figure shows only statistically significant paths with standardized coefficients $x^2 = 12.44(12)$, p = .41, RMSEA = .02, SRMR = .02, and CFI = .99 * p < .05

Fig. 3. LGC model of giving emotional support with time-invariant predictors.

giving emotional support with gender, race, and previous treatment experiences as significant time-invariant predictors ($\chi^2 = 12.44(12)$, p = 0.41, RMSEA = 0.02, SRMR = 0.02, and CFI = 0.99).

As shown in Table 4, the female gender was positively related to the intercept (0.20, p < 0.05), indicating that female patients provided more emotional support at the first time period compared to male patients. Previous treatment was negatively associated with the intercept (-0.13, p < 0.05), indicating that patients with higher levels of previous alcoholism treatment were less likely to give emotional support during the first time period. However, previous treatment was positively related to the slope (0.14, p < 0.05). For patients with more previous treatment experiences, the usual decreasing patterns of giving emotional support changed to less decreasing and even increasing patterns over time. In addition, the Caucasian race was negatively associated with the slope (-0.24, p < 0.05). For Caucasian patients, giving emotional support declined more sharply over time than for non-Caucasian patients.

Fig. 4 presents the LGC model of receiving emotional support with gender and previous treatment experiences as significant time-invariant predictors ($\chi^2 = 9.37(12)$, p = 0.67, RMSEA = 0.00, SRMR = 0.02, and CFI = 1.00).

As shown in Table 5, the female gender was positively related to the intercept (0.38, p < 0.001), indicating that female patients were more likely to read emotionally supportive messages during the

Table 4Effects of time-invariant predictors on the change in giving emotional support.

Time-invariant predictors	Giving emotional support	
	Intercept	Slope
Age	-0.03	0.13
Gender (Male $= 0$, Female $= 1$)	0.20*	-0.03
Education	-0.09	0.01
Caucasian (No $= 0$, Yes $= 1$)	0.21	-0.24^{*}
African American (No $= 0$, Yes $= 1$)	0.10	-0.08
Employment (No $= 0$, Yes $= 1$)	0.05	0.00
Income	-0.11	0.15
Previous treatment	- 0.13 [*]	0.14*
Years of drinking problems	-0.09	0.05
Attempt to quit drinking	-0.06	0.06
Perceived availability of support	0.08	-0.09

*p < 0.05.

first time period than male patients. Previous treatment was negatively associated with the intercept (-0.15, p < 0.05), indicating that patients with more previous alcoholism treatments were less likely to receive emotional support during the first time period.

4.3. Effects of time-variant predictors

This study examined the effects of emotional distress and coping strategies as time-variant predictors on the changes in giving and receiving emotional support. We assumed that emotional distress and coping strategies measured at the previous time points would predict giving and receiving emotional support at the later time points. Because emotional distress and coping strategies were not measured at pre-test, we did not test their effects on giving and receiving emotional support during the first time period.

Fig. 5 presents the LGC model of giving emotional support with time-invariant and time-variant predictors ($\chi^2 = 25.71(20)$, p = 0.85, RMSEA = 0.04, SRMR = 0.03, and CFI = 0.91). With respect to time-invariant predictors, emotional distress at 0–4 months was negatively related to giving emotional support at 4–8 months (–0.14, p < 0.01), indicating that alcoholic patients with higher levels of emotional distress were less likely to provide emotional support. In addition, previous coping strategies were positively

Table 5	
---------	--

Effects of time-invariant predictors on the change in receiving emotional support.

Time-invariant predictors	Receiving emotional support	
	Intercept	Slope
Age	-0.02	0.06
Gender (Male = 0, Female = 1)	0.38***	0.00
Education	-0.05	0.06
Caucasian (No $= 1$, Yes $= 1$)	-0.08	0.12
African American (No $= 1$, Yes $= 1$)	-0.02	0.05
Employment (No $= 1$, Yes $= 1$)	0.11	0.01
Income	-0.07	0.09
Previous treatment	- 0.15 *	0.09
Years of drinking problems	0.00	-0.08
Attempt to quit drinking	0.09#	-0.10#
Perceived availability of support	0.04	-0.10

 $\#p < 0.10, \ ^*p < 0.05, \ ^{***}p < 0.001.$



Note: This figure shows only statistically significant paths with standardized coefficients. $x^2 = 9.37(12)$, p = .67, RMSEA = .00, SRMR = .02, and CFI = 1.00 # p < .10, *p < .05, ***p < .001

Fig. 4. LGC model of receiving emotional support with time-invariant predictors.

related to giving emotional support at 4-8 months (0.16, p < 0.01) and at 8-12 months (0.23, p < 0.001). This means that alcoholic patients who engaged in more coping activities were more likely to post emotionally supportive messages in the A-CHESS discussion group.

Fig. 6 presents the LGC model of receiving emotional support with time-invariant and time-variant predictors ($\chi^2 = 27.47(20)$, p = 0.88, RMSEA = 0.05, SRMR = 0.03, and CFI = 0.93). Similar to giving emotional support, previous coping strategies were positively related to receiving emotional support at 4–8 months (0.14, p < 0.05) and at 8–12 months (0.25, p < 0.01), respectively. This means that alcoholic patients who engaged in greater coping behaviors were more likely to receive emotional support.

5. Discussion

5.1. Summary of findings

The goal of this research is to examine how giving and receiving emotional support change, over time, in a smartphone-based alcoholism support group, and what individual factors predict the changing patterns. There is growing evidence of the effectiveness of new communication technologies, including smartphones and laptops, in facilitating individuals' recovery from alcohol addiction. According to recent reviews of randomized controlled trials for people with alcohol-related problems (Khadjesari, Murray, Hewitt, Hartley, & Godfrey, 2011; White et al., 2010), online social support interventions have contributed to small but meaningful differential



Note: This figure shows only statistically significant paths with standardized coefficients. $x^2 = 25.71(20)$, p = .85, RMSEA = .04, SRMR = .03, and CFI = .91 # p < .10, * p < .05, ** p < .01, ** p < .001

Fig. 5. LGC model of giving emotional support with time-invariant and time-variant predictors.



Note: This figure shows only statistically significant paths with standardized coefficients. $x^2 = 27.47(20), p = .88, \text{RMSEA} = .05, \text{SRMR} = .03, \text{ and CFI} = .93$ # p < .10, # p < .05, # p < .01, # * p < .001



reductions in alcohol consumption, blood alcohol concentration, and a range of other alcohol-related measures. As a pivotal component of the interventions, online support groups have been well suited for social support for people suffering from alcohol use disorders (Cunningham, 2012).

Although participating in smartphone-based alcoholism support groups has the potential to help people recover from alcoholism, our results suggest that such support could be difficult to maintain over time group participation (i.e., giving and receiving emotional support). As time goes on, the exchange of emotional support among the group members declines, eventually becoming sparse. Given that the percentage of participants using the A-CHESS services, including support groups, tends to decrease over time (McTavish et al., 2012), these are probable consequences.

Thus, it is important to better understand the predictors associated with the decreasing patterns in giving and receiving emotional support when developing and implementing smartphone-based alcoholism support groups. In this regard, our findings clearly show that female alcoholics are more likely than male alcoholics to give and receive emotional support at the beginning of a group intervention. This is in line with previous findings that female patients are more likely than male patients to communicate emotional support in online support communities (Ginossar, 2008). One possible explanation is that there are gender differences in how men and women communicate support. According to a review of relevant literature (Burleson, 2002), women prefer to talk about emotion-focused support while men tend to communicate task-focused support.

Moreover, patients experiencing higher levels of alcoholism treatment were less likely to give and receive emotional support at the beginning of the intervention. Previous treatment experiences can discourage patients from communicating emotional support in smartphone-based alcoholism support groups (Emrick, 1989). One possible explanation is that alcoholics who have received many treatments are disinclined to talk about emotional issues any further because they already feel emotionally overwhelmed by their treatments. Additionally, treatmentexperienced patients are more severe alcoholics with lower levels of psychosocial functioning and quality of life than treatment-naïve patients (LoCastro, Potter, Donovan, Couper, & Pope, 2008; Ray, Hart, Chelminski, Young, & Zimmerman, 2011). The severity of patients' illnesses may inhibit them from participating in supportive communication because they spend so much time and energy dealing with the emotional and physical challenges of their diseases.

More interestingly, the treatment-experienced alcoholics who were less likely to exchange emotional support at the beginning of the intervention began giving emotional support as time passed. That is, the amount of emotional support provided by patients with many previous treatments either dropped slowly or increased over time. Alcoholics with previous treatments were more likely to experience several serious problems related to the treatment of alcoholism. Thus, they might have an intrinsic understanding of the problems that motivate them to help fellow alcoholics, especially treatment-naïve alcoholics. Unlike with previous treatment experiences, Caucasian backgrounds contributed to the downward trend of giving emotional support. As time went by, the messages of emotional support provided by Caucasian patients decreased more sharply than those of non-Caucasian patients.

In addition to exploring the roles of time-invariant predictors, this research examined the effects of time-variant predictors on giving and receiving emotional support. Similar to previous findings (Kim et al., 2011; Yoo et al., 2013), coping strategies led to active provision and reception of emotional support from the middle of the intervention period. However, emotional distress was a negative predictor of giving emotional support in the middle of the intervention period. In sum, coping strategies can promote the exchange of emotional support, but emotional distress can impede the provision of emotional support. In other words, the participation in support group is likely to depend on the group participants' coping strategies and psychological status.

5.2. Implications

This study contributes to the health communication literature of supportive communication and mobile communication, by exploring understudied areas of mobile support networks for alcohol use disorders. The findings demonstrate how changes can occur over time in the giving and receiving of emotional support via mobile social networks, and what factors predict the changes. By incorporating relevant ideas from previous research (Han et al., 2010, 2012; Kim et al., 2011; Shaw et al., 2006, 2008; Yoo et al., 2013), this study helps advance theorizing about the predictive model of changes in exchanging support in mobile communication contexts that have received little attention.

In a methodological sense, this study utilizes a computational and conventional social science approach. Specifically, we objectively measure and distinguish message reception as well as expression by analyzing the use of hyperlinks and keystrokes, which called for a sophisticated methodological approach. This methodology is demonstrated by combining the following three data sets: (1) messages of emotional support, (2) action log data, and (3) multiple waves of survey data.

The present study also provides practical implications. As we gain a better understanding of changing patterns in giving and receiving emotional support and significant predictors, we can provide insights into the procedures that health care providers or mHealth researchers can use to foster these communicative behaviors. Supportive communication such as posting and reading emotional support messages in a smartphone-based support group tends to decline over time, but the degree of decline varies depending on the group participants' characteristics. For example, over time, supportive communication in a mobile interface can become a relatively appealing behavior for Non-Caucasian alcoholics with extensive experience being treated for alcoholism. In addition, treatment-experienced alcoholics can be reluctant to communicate social support within smartphone-based support groups at the beginning of the group intervention. Therefore, these aspects should be considered in building strategies for the design and implementation of smartphone-based support groups for people with alcohol use disorders.

5.3. Limitations and future research

The current research has some limitations that could help shape future research. First, the study focused on emotional support only in several types of social support that may be more or less prevalent under certain circumstances. While research has typically focused on the potential for functional support or overall levels of support that prevent alcohol and substance abuse (Dobkin, Civita, Paraherakis, & Gill, 2002), recent research has found the differential roles of types of social support such as informational support, emotional support, and concrete support in substance abuse treatment (Tracy, Munson, Peterson, & Floersch, 2010). Future research is required to examine the predictive models for other types of social support that can be exchanged in smartphone-based alcoholism support groups.

Second, it should be noted that this research did not examine the changing patterns and predictors of seeking or asking for support. Given that seeking support may affect not only the likelihood of achieving recovery but also the likelihood of maintaining it (Dawson, Grant, Stinson, & Chou, 2006), future studies should explore the potential predictors of changes in seeking emotional support. Doing so can elaborate a more in-depth understanding of communicating social support by proposing more segmented components of supportive communication.

The last limitation is that this research did not reflect the unique

features of emerging smartphone technology. Although several capabilities of smartphone technology offer various channels for communicating social support online, this study focused on supportive communication only in online bulletin-board-style discussion groups accessible through patients' smartphones. This approach may exhibit the misconception that the application is a smaller version of a website. Thus, researchers should attempt to replicate the findings using different types of smartphone communication applications, such as mobile email and text messaging.

Understanding predictors of supportive communication change in smartphone-based alcoholism support groups is a critical step to develop strategies to facilitate participation in mHealth interventions for the prevention, treatment, and aftercare of addiction problems. This research contributes to an understanding of potential barriers and promoters of engagement in mHealth applications and interventions.

Acknowledgements

This study was supported by grant R01 AA017192 from the National Institute on Alcohol Abuse and Alcoholism.

References

- Albrecht, T. L., & Adelman, M. B. (1987). Rethinking the relationship between communication and social support: An introduction. In T. L. Albrecht, & M. B. Adelman (Eds.), *Communicating social support* (pp. 13–16). Newbury Park, CA: Sage.
- Bambina, A. (2007). Online social support: The interplay of social networks and computer-mediated communication. Youngstown, NY: Cambria Press.
- Barbee, A. P., Cunningham, M. R., Winstead, B. A., Derlega, V. J., Gulley, M. R., Yankeelov, P. A., et al. (1993). Effects of gender role expectations on the social support process. *Journal of Social Issues*, 49(3), 175–190. https://doi.org/10.1111/ j.1540-4560.1993.tb01175.x.
- Berglund, M., & Ojehagen, A. (2006). The influence of alcohol drinking and alcohol use disorders on psychiatric disorders and suicidal behavior. *Alcoholism: Clinical* and Experimental Research, 22(Suppl 7), 333–345. https://doi.org/10.1111/ j.1530-0277.1998.tb04388.x.
- Braithwaite, D. O., Waldron, V. R., & Finn, J. (1999). Communication of social support in computer-mediated groups for people with disabilities. *Health Communication*, 11(2), 123–151. https://doi.org/10.1207/s15327027hc1102_2.
- Bui, L. L., Last, L., Bradley, H., Law, C. H. L., Maier, B.-A., & Smith, A. J. (2002). Interest and participation in support group programs among patients with colorectal cancer. *Cancer Nursing*, 25(2), 150–157. https://doi.org/10.1097/00002820-200204000-00012.
- Burleson, B. R. (2002). Introduction to the special issue: Psychological mediators of sex differences in emotional support. *Communication Reports*, 15(1), 1–4. https://doi.org/10.1080/08934210209367747.
- Chuang, K. Y., & Yang, C. C. (2012). Interaction patterns of nurturant support exchanged in online health social networking. *Journal of Medical Internet Research*, 14(3), e54. https://doi.org/10.2196/jmir.1824.
- Cobb, S. (1976). Social support as a moderator of life stress. Psychosomatic Medicine, 38(5), 300–314.
- Cockle-Hearne, J., Charnay-Sonnek, F., Denis, L., Fairbanks, H. E., Kelly, D., Kav, S., ... Jensen, B. T. (2013). The impact of supportive nursing care on the needs of men with prostate cancer: A study across seven European countries. *British Journal of Cancer*, 109(8), 2121–2130. https://doi.org/10.1038/ bjc.2013.568.
- Coulson, N. S. (2014). Sharing, supporting and sobriety: A qualitative analysis of messages posted to alcohol-related online discussion forums in the United Kingdom. Journal of Substance Use, 19, 176–180. https://doi.org/10.3109/ 14659891.2013.765516.
- Coursaris, C. K., & Liu, M. (2009). An analysis of social support exchanges in online HIV/AIDS self-help groups. *Computers in Human Behavior*, 25(4), 911–918. https://doi.org/10.1016/j.chb.2009.03.006.
- Cunningham, J. A. (2012). Comparison of two internet-based interventions for problem drinkers: Randomized controlled trial. *Journal of Medical Internet Research*, 14(4), e107. https://doi.org/10.2196/jmir.2090.
- Cunningham, J. A., van Mierlo, T., & Fournier, R. (2008). An online support group for problem drinkers: AlcoholHelpCenter.net. *Patient Education and Counseling*, 70(2), 193–198. https://doi.org/10.1016/j.pec.2007.10.003.
- Dawson, D. A., Grant, B. F., Stinson, F. S., & Chou, P. S. (2006). Estimating the effect of help-seeking on achieving recovery from alcohol dependence. Addiction, 101(6), 824–834. https://doi.org/10.1111/j.1360–0443.2006.01433.x.
- Deans, G., Bennett-Emslie, G. B., Weir, J., Smith, D. C., & Kaye, S. B. (1988). Cancer support groups-who joins and why? British Journal of Cancer, 58(5), 670–674.

- Dobkin, P. L., Civita, M. D., Paraherakis, A., & Gill, K. (2002). The role of functional social support in treatment retention and outcomes among outpatient adult substance abusers. *Addiction*, 97(3), 347–356. https://doi.org/10.1046/j.1360-0443.2002.00083.x.
- Duncan, T. E., & Duncan, S. C. (2004). An introduction to latent growth curve modeling. *Behavior Therapy*, 35(2), 333–363. https://doi.org/10.1016/S0005-7894(04)80042-X.
- Dutta, M. J., & Feng, H. (2007). Health orientation and disease state as predictors of online health support group use. *Health Communication*, 22(2), 181–189. https://doi.org/10.1080/10410230701310323.
- Emrick, C. D. (1989). Alcoholics Anonymous: Membership characteristics and effectiveness as treatment. *Recent Developments in Alcoholism*, 7, 37–53.
- Eysenbach, G. (2005). The law of attrition. Journal of Medical Internet Research, 7(1), e11. https://doi.org/10.2196/jmir.7.1.e11.
- Finfgeld-Connett, D. (2009). Web-based treatment for rural women with alcohol problems: Preliminary findings. *Computers Informatics Nursing*, 27(6), 345–353. https://doi.org/10.1097/NCN.0b013e3181bca64b.
- Folkman, S., & Lazarus, R. S. (1980). An analysis of coping in a middle-aged community sample. Journal of Health and Social Behavior, 21, 219–239.
- Fukuoka, Y., Kamitani, E., Bonnet, K., & Lindgren, T. (2011). Real-time social support through a mobile virtual community to improve healthy behavior in overweight and sedentary adults: A focus group analysis. *Journal of Medical Internet Research*, 13(3), e49. https://doi.org/10.2196/jmir.1770.
- Ginossar, T. (2008). Online participation: A content analysis of differences in utilization of two online cancer communities by men and women, patients and family members. *Health Communication*, 23(1), 1–12. https://doi.org/10.1080/ 10410230701697100.
- Grande, G. E., Myers, L. B., & Sutton, S. R. (2006). How do patients who participate in cancer support groups differ from those who do not? *Psycho-Oncology*, 15(4), 321–334. https://doi.org/10.1002/pon.956.
- Gustafson, D. H., McTavish, F. M., Chih, M.-Y., Atwood, A. K., Johnson, R. A., Boyle, M. G., ... Shah, D. V. (2014). Smartphone app helps support recovery after treatment for alcoholism. *JAMA Psychiatry*, 71(5), 566–572. https://doi.org/ 10.1001/jamapsychiatry.2013.4642.
- Gustafson, D. H., Shaw, B. R., Isham, A. J., Baker, T. B., Boyle, M. G., & Levy, M. S. (2011). Explicating an evidence-based, theoretically informed, mobile technology-based system to improve outcomes for people in recovery for alcohol dependence. *Substance Use & Misuse*, 46(1), 96–111. https://doi.org/ 10.3109/10826084.2011.521413.
- Gustafson, D. H., Wise, M., Bhattacharya, A., Pulvermacher, A., Shanovich, K., Phillips, B.,...Kim, J. S. (2012). The effects of combining web-based eHealth with telephone nurse case management for pediatric asthma control: A randomized controlled trial. *Journal of Medical Internet Research*, 14(4), e101. https://doi.org/10.2196/jmir.1964.
- Han, J. Y., Kim, J., Yoon, H. J., Shim, M., McTavish, F. M., & Gustafson, D. H. (2012). Social and psychological determinants of levels of engagement with an online breast cancer support group: Posters, lurkers, and nonusers. *Journal of Health Communication*, 17(3), 356–371. https://doi.org/10.1080/10810730.2011.585696.
- Han, J. Y., Shah, D. V., Kim, E., Namkoong, K., Lee, S. Y., Moon, T. J., ... Gustafson, D. H. (2011). Empathic exchanges in online cancer support groups: Distinguishing message expression and reception effects. *Health Communication*, 26(2), 185–197. https://doi.org/10.1080/10410236.2010.544283.
- Han, J. Y., Wise, M. E., Kim, E., Pingree, R. J., Hawkins, R. P., Pingree, S., ... Gustafson, D. H. (2010). Factors associated with use of interactive cancer communication system: An application of the comprehensive model of information seeking. *Journal of Computer-Mediated Communication*, 15(3), 367–388. https://doi.org/10.1111/j.1083–6101.2010.01508.x.
- Hayes, A. F., & Krippendorff, K. (2007). Answering the call for a standard reliability measure for coding data. *Communication Methods and Measures*, 1(1), 77–89. https://doi.org/10.1080/19312450709336664.
- House, J. S. (1981). Work stress and social support. Reading, MA: Addison-Wesley.
- House, J. S., Umberson, D., & Landis, K. R. (1988). Structures and processes of social support. Annual Review of Sociology, 14(1), 293–318.
- Humphreys, K., Mavis, B., & Stofflemayr, B. (1991). Factors predicting attendance at self-help groups after substance abuse treatment: Preliminary findings. *Journal* of Consulting and Clinical Psychology, 59(4), 591–593.
- Iwamitsu, Y., Shimoda, K., Abe, H., Tani, T., Okawa, M., & Buck, R. (2005). Anxiety, emotional suppression, and psychological distress before and after breast cancer diagnosis. *Psychosomatics*, 46(1), 19–24. https://doi.org/10.1176/ appi.psy.46.1.19.
- Jimison, H., Gorman, P., Woods, S., Nygren, P., Walker, M., Norris, S., et al. (2008). Barriers and drivers of health information technology use for the elderly, chronically ill, and underserved. Retrieved from http://www.ncbi.nlm.nih.gov/books/ NBK38653/.
- Kahn, R. L., & Antonucci, T. C. (1980). Convoys over the life course: Attachment, roles and social support. In P. B. Baltes, & O. Brim (Eds.), *Life span development and behavior* (pp. 253–286). New York, NY: Academic Press.
- Khadjesari, Z., Murray, E., Hewitt, C., Hartley, S., & Godfrey, C. (2011). Can standalone computer-based interventions reduce alcohol consumption? A systematic review. Addiction, 106(2), 267–282. https://doi.org/10.1111/j.1360-0443.2010.03214.x.
- Kim, E., Han, J. Y., Moon, T. J., Shaw, B. R., Shah, D. V., McTavish, F. M., et al. (2012). The process and effect of supportive message expression and reception in online breast cancer support groups. *Psycho-Oncology*, 21(5), 531–540. https:// doi.org/10.1002/pon.1942.

- Kim, E., Han, J. Y., Shah, D. V., Shaw, B. R., McTavish, F. M., Gustafson, D. H., et al. (2011). Predictors of supportive message expression and reception in an interactive cancer communication system. *Journal of Health Communication*, 16(10), 1106–1121. https://doi.org/10.1080/10810730.2011.571337.
- Kushner, M. G., Abrams, K., & Borchardt, C. (2000). The relationship between anxiety disorders and alcohol use disorders: A review of major perspectives and findings. *Clinical Psychology Review*, 20(2), 149–171. https://doi.org/10.1016/ S0272-7358(99)00027-6.
- Larimer, M. E., Palmer, R. S., & Marlatt, G. A. (1999). Relapse prevention: An overview of Marlatt's cognitive-behavioral model. *Alcohol Research and Health*, 23(2), 151–160.
- Liebler, C. A., & Sandefur, G. D. (2002). Gender differences in the exchange of social support with friends, neighbors, and co-workers at midlife. *Social Science Research*, 31, 364–391. https://doi.org/10.1016/S0049–089X(02)00006-6.
- Litman, G. K., Stapleton, J., Oppenheim, A. N., & Peleg, M. (1983). An instrument for measuring coping behaviours inhospitalized alcoholics: Implications for relapse prevention treatment. *British Journal of Addiction*, 78(3), 269–276.
- LoCastro, J. S., Potter, J. S., Donovan, D. M., Couper, D., & Pope, K. W. (2008). Characteristics of first-time alcohol treatment seekers: The COMBINE study. *Journal* of Studies on Alcohol and Drugs, 69(6), 885–895. https://doi.org/10.15288/jsad. 2008.69.885.
- McKay, J. R., McLellan, A. T., Alterman, A. I., Cacciola, J. S., Rutherford, M. J., & O'Brien, C. P. (1998). Predictors of participation in aftercare sessions and selfhelp groups following completion of intensive outpatient treatment for substance abuse. *Journal of Studies on Alcohol and Drugs*, 59(2), 152–162. https:// doi.org/10.15288/jsa.1998.59.152.
- McLaughlin, M., Nam, Y., Gould, J., Pade, C., Meeske, K. A., Ruccione, K. S., et al. (2012). A videosharing social networking intervention for young adult cancer survivors. Computers in Human Behavior, 28(2), 631–641. https://doi.org/ 10.1016/j.chb.2011.11.009.
- McTavish, F. M., Chih, M.-Y., Shah, D. V., & Gustafson, D. H. (2012). How patients recovering from alcoholism use a smartphone intervention. *Journal of Dual Diagnosis*, 8(4), 294–304. https://doi.org/10.1080/15504263.2012.723312.
- Mo, P. K. H., & Coulson, N. S. (2010). Empowering processes in online support groups among people living with HIV/AIDS: A comparative analysis of lurkers and posters. Computers in Human Behavior, 26(5), 1183–1193. https://doi.org/ 10.1016/j.chb.2010.03.028.
- Morris, E. P., Stewart, S. H., & Ham, L. S. (2005). The relationship between social anxiety disorder and alcohol use disorders: A critical review. *Clinical Psychology Review*, 25(6), 734–760. https://doi.org/10.1016/j.cpr.2005.05.004.
- Muessig, K. E., Pike, E. C., Fowler, B., LeGrand, S., Parsons, J. T., Bull, S. S., ... Hightow-Weidman, L. B. (2013). Putting prevention in their pockets: Developing mobile phone-based HIV interventions for black men who have sex with men. *AIDS Patient Care and STDs*, 27(4), 211–222. https://doi.org/10.1089/apc.2012.0404.
- Patient Care and STDs, 27(4), 211–222. https://doi.org/10.1089/apc.2012.0404.
 Namkoong, K., McLaughlin, B., Yoo, W., Hull, S., Shah, D. V., Kim, S. C., ... Gustafson, D. H. (2013). The effects of expression: How providing emotional support online improves cancer patients coping strategies. *Journal of the National Cancer Institute Monogrpahs*, 47, 169–174. https://doi.org/10.1093/ jncimonographs/lgt033.
- Nurullah, A. S. (2012). Received and provided social support: A review of current evidence and future directions. *American Journal of Health Studies*, 27(3), 173–188.
- Petty, R. E., & Cacioppo, J. T. (1984). The effects of involvement on responses to argument quantity and quality: Central and peripheral routes to persuasion. *Journal of Personality and Social Psychology*, 46(1), 69–81.
- Pyke, K. D., & Bengtson, V. L. (1996). Caring more or less: Individualistic and collectivist systems of family eldercare. *Journal of Marriage and the Family*, 58, 379–392.
- Raupach, J. C. A., & Hiller, J. E. (2002). Information and support for women following the primary treatment of breast cancer. *Health Expectations*, 5(4), 289–301. https://doi.org/10.1046/j.1369–6513.2002.00191.x.
- Ray, L. A., Hart, E., Chelminski, I., Young, D., & Zimmerman, M. (2011). Clinical correlates of desire for treatment for current alcohol dependence among patients with a primary psychiatric disorder. *The American Journal of Drug and Alcohol Abuse*, 37(2), 105–110. https://doi.org/10.3109/00952990.2010.540284.
- Rutten, L. J. F., Arora, N. K., Bakos, A. D., Aziz, N., & Rowland, J. (2005). Information needs and sources of information among cancer patients: A systematic review of research (1980–2003). Patient Education and Counseling, 57(3), 250–261. https://doi.org/10.1016/j.pec.2004.06.006.
- Sautier, L., Mehnert, A., Höcker, A., & Schilling, G. (2014). Participation in patient support groups among cancer survivors: Do psychosocial and medical factors have an impact? *European Journal of Cancer Care*, 23(1), 140–148. https:// doi.org/10.1111/ecc.12122.
- Schulz, U., & Schwarzer, R. (2004). Long-term effects of spousal support on coping with cancer after surgery. *Journal of Social and Clinical Psychology*, 23(5), 716–732.
- Shaw, B. R., DuBenske, L. L., Han, J. Y., Cofta-Woerpel, L., Bush, N., Gustafson, D. H., et al. (2008). Antecedent characteristics of online cancer information seeking among rural breast cancer patients: An application of the Cognitive-Social Health Information Processing (C-SHIP) model. *Journal of Health Communication*, 13(4), 389–408. https://doi.org/10.1080/10810730802063546.
- Shaw, B. R., Hawkins, R. P., Arora, N. K., McTavish, F. M., Pingree, S., & Gustafson, D. H. (2006). An exploratory study of predictors of participation in a computer support group for women with breast cancer. *Computers Informatics Nursing*, 24(1), 18–27.

- vanLear, C. A., Sheehan, M., Withers, L. A., & Walker, R. A. (2005). AA online: The enactment of supportive computer mediated communication. *Western Journal* of Communication, 69(1), 5–26. https://doi.org/10.1080/10570310500033941.
- Substance Abuse and Mental Health Services Administration. (2013). Results from the 2012 national survey on drug use and health: Summary of national findings. Retrieved from: https://www.samhsa.gov/data/sites/default/files/NSDUHresu lts2012/NSDUHresults2012.pdf.
- Thompson, E. R. (2007). Development and validation of an internationally reliable short-form of the positive and negative affect schedule (PANAS). Journal of Cross-Cultural Psychology, 38(2), 227–242. https://doi.org/10.1177/ 0022022106297301.
- Tracy, E. M., Munson, M. R., Peterson, L. T., & Floersch, J. E. (2010). Social support: A mixed blessing for women in substance abuse treatment. *Journal of Social Work Practice in the Addictions*, 10(3), 257–282. https://doi.org/10.1080/ 1533256X.2010.500970.
- Triandis, H. C. (2001). Individualism-collectivism and personality. Journal of Personality, 69(6), 907–924. https://doi.org/10.1111/1467-6494.696169.
 van Uden-Kraan, C. F., Drossaert, C. H. C., Taal, E., Seydel, E. R., & van de
- van Uden-Kraan, C. F., Drossaert, C. H. C., Taal, E., Seydel, E. R., & van de Laar, M. A. F. J. (2009). Participation in online patient support groups endorses patients' empowerment. *Patient Education and Counseling*, 74(1), 61–69. https:// doi.org/10.1016/j.pec.2008.07.044.
- van Uden-Kraan, C. F. Drossaert, C. H. C., Taal, E., Smit, W. M., Moens, H. J. B., & van de Laar, M. A. F. J. (2011). Determinants of engagement in face-to-face and

online patient support groups. Journal of Medical Internet Research, 13(4), e106. https://doi.org/10.2196/jmir.1718.

- White, A., Kavanagh, D., Stallman, H., Klein, B., Kay-Lambkin, F., Proudfoot, J., ... Young, R. (2010). Online alcohol interventions: A systematic review. Journal of Medical Internet Research, 12(5), e62. https://doi.org/10.2196/ jmir.1479.
- Yoo, W., Chih, M.-Y., Kwon, M.-W., Yang, J., Cho, E., McLaughlin, B., ... Gustafson, D. H. (2013). Predictors of the change in the expression of emotional support within an online breast cancer support group: A longitudinal study. *Patient Education and Counseling*, 90, 88–95. https://doi.org/10.1016/j.pec.2012.10.001.
- Yoo, W., Namkoong, K., Choi, M., Shah, D. V., Tsang, S., Hong, Y., ... Gustafson, D. H. (2014). Giving and receiving emotional support online: Communication competence as a moderator of psychosocial benefits for women with breast cancer. *Computers in Human Behavior*, 30, 13–22. https://doi.org/10.1016/ j.chb.2013.07.024.
- Zebrack, B. J. (2008). Information and service needs for young adult cancer patients. Supportive Care in Cancer, 16(12), 1353–1360. https://doi.org/10.1007/s00520-008-0435-z.
- Zebrack, B. J., Block, R., Hayes-Lattin, B., Embry, L., Aguilar, C., Meeske, K. A., ... Cole, S. (2013). Psychosocial service use and unmet need among recently diagnosed adolescent and young adult cancer patients. *Cancer*, 119(1), 201–214. https://doi.org/10.1002/cncr.27713.