Using Facebook after Losing a Job: Differential Benefits of Strong and Weak Ties

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ABSTRACT
Among those who have recently lost a job, social networks in general and online ones in particular may be useful to cope with stress and find new employment. This study focuses on the psychological and practical consequences of Facebook use following job loss. By pairing longitudinal surveys of Facebook users with logs of their online behavior, we examine how communication with different kinds of ties predicts improvements in stress, social support, bridging social capital, and whether they find new jobs. Losing a job is associated with increases in stress, while talking with strong ties is generally associated with improvements in stress and social support. Weak ties do not provide these benefits. Bridging social capital comes from both strong and weak ties. Surprisingly, individuals who have lost a job feel greater stress after talking with strong ties. Contrary to the "strength of weak ties" hypothesis, communication with strong ties is more predictive of finding employment within three months.

Author Keywords
Social network sites; tie strength; social capital; social support; job loss; stress; unemployment.

ACM Classification Keywords
H.5.3. Information interfaces and presentation [Information Interfaces]: Group and Organization Interfaces - Collaborative computing, Web-based interaction, Computer-supported cooperative work

INTRODUCTION

Unemployment is at very high levels, reaching 8.1% in the United States in early 2012 and 10.8% across the EU [8,19]. Job loss leads to a multitude of psychological and physical problems, including headaches, stress, depression, and suicide [47]. Beyond the financial hardship imposed by losing a job, individuals also lose daily structure, social contact, and shared goals with coworkers [31]. These changes make job loss an acute stressor that can lead to psychological distress [45].

When individuals form relationships with others, they build networks of mutual trust and reciprocity that provide them benefits they would not otherwise have, a phenomenon known as social capital [6,16,36,44]. Social capital derives from one's position in a social network and the number and character of the ties one maintains [12,48]. One's connections differ in tie strength or closeness, from lovers to near-strangers. Granovetter defined tie strength as a "combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie" [23].

There is strong theoretical rationale and empirical evidence that social networks can buffer people from stress, with positive consequences for their health and well-being [29]. Social networks also play a key role in coping with job loss and finding new employment [23,47]. Therefore, technology that facilitates social networking may be especially important for those who have recently lost a job.

This work examines the psychological and practical implications of social network site use following the loss of a job, particularly communication with strong ties—close friends likely to provide emotional support—and weak ties—diverse connections who may know about new job opportunities. The focus of the present study is recent job loss rather than long-term unemployment, when the shock is still fresh and individuals are struggling to accommodate the change. The research pairs longitudinal surveys measuring social support, social capital, stress, and employment status of approximately 3000 Facebook users with three months' behavioral data from the site's servers. Drawing from theories of tie strength and social capital, we examine how communication online with strong and weak ties moderates the impact of job loss on stress, and how communication with these ties is linked to changes in social support, bridging social capital, and actually finding a new job.

Tie Strength and Finding New Employment

Empirical research has demonstrated that both weak and strong ties can be helpful when people are looking for jobs. Having a large network of diverse, weakly connected ties provides access to novel information about jobs and other topics [23]. People tend to have strong ties who are similar to themselves and each other, and get their news from the same sources. As a result, strong ties tend to produce redundant information [39].

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CSCW'13, February 23-27, 2013, San Antonio, Texas, USA.
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In contrast, having weak ties who travel in different social circles exposes people to new ideas and opportunities. Putnam [44] refers to this dimension of relationships as "bridging social capital." In the context of job loss, weak ties traveling in diverse social circles are likely to know of new job opportunities [23]. They also provide greater access to external resources, such as an "in" with a human resources department at a company that's hiring, and when individuals are connected to multiple disparate clusters, they are especially likely to gain from those connections [12,36]. Motivated job seekers who put more time and effort into the networking aspect of their job search—tapping their informal connections for information—are more likely to find a job and receive more offers [47]. Many job leads arise from "serendipity," simply talking to the right acquaintance at the right time [40].

However, in some circumstances, strong ties may be more beneficial for job-seekers. Granovetter [23] distinguishes between *information* and *influence* flowing through one's social network. While weak ties may provide more novel information about job openings, strong ties may be more willing to wield their influence on behalf of a close friend or relative. For example, in China, people tap their social connections to influence authorities who then assign jobs as favors, an act that requires the mutual trust inherent in strong-tie relationships [4]. In a time of recession, when there are more layoffs than openings, job-seekers may need to rely on their strong ties to create openings for them in the first place. Strong ties may also be more likely to transmit information about a job opening simply by being more frequent communication partners; weak ties with relevant information are useless if they never talk to each other [1].

Social Network Site Use and Social Capital

Social network sites (SNS) such as Facebook, Google+, and LinkedIn facilitate connections, potentially surfacing the bridging benefits of weak ties and providing a channel for social support from strong ties.

The Pew Internet and American Life Project documents the rapid growth of SNS from 8% of American internet users in 2005 to 65% in 2011 [37]. Facebook is not just for weak ties, either; Pew reports that 40% of SNS users have "friended" all of their close confidants, up from 29% in 2008 [24]. More than one billion people actively use Facebook, half of whom log on to the site on any given day [20]. While the widespread use may be reason enough to better understand the consequences of SNS use, the sites also have features that set them apart from earlier communication technology, and there is both theoretical and empirical evidence to suggest these features affect interpersonal relationships and social capital following the loss of a job.

Most social network sites provide an aggregated stream of social news about all of one's ties; this is known as the "News Feed" on Facebook. The feed contains a frequently updated stream of ties' recent activity, including their photos, favorite links, and conversations with other friends. These short updates allow individuals to keep tabs on many ties at once, without the purposeful effort of an email or phone call. Facebook users take advantage of the News Feed to observe much larger numbers of ties than the small cluster they actively communicate with [2,34]. Facebook's feed differs from similar "social awareness feeds" [41] elsewhere on the web in that it comes from ties with whom a relationship has been mutually agreed upon. In addition, Facebook is unique in its scale, with ties coming from a enormous user base, likely to contain one's closest friends and family [24].

Users of social network sites also maintain profiles listing their recent activity, current city, friend network, interests, and often, their employment history. Both the profile and News Feed facilitate lightweight interaction, allowing ties to "Like" or comment on each other's content with little effort. Site users can broadcast their own news through status updates and photo posts, reaching a wide audience of ties with little effort per audience member. In theory, contributing to and consuming from the News Feed may promote the serendipity and bridging social capital that facilitate reemployment.

Many studies have explored the connection between SNS use and social capital. Social network site users generally have higher levels of bridging social capital than non-users [17,25]. However, social capital on these sites is most strongly associated with active, one-on-one communication with ties—known as *directed communication* in this work—rather than more voyeuristic reading of ties' news—known as *passive consumption* [10,11] or one-to-many *broadcasts* to wider circles of ties. Though social network sites decrease the costs of keeping up with many ties at once, research suggests that you need to talk to your ties, not simply read their news or have them read yours, to extract resources from them. An important reason why passive consumption and broadcasting do not seem to generate social capital is that they do not provide what Ellison and colleagues refer as "signals of relational investment" [17]. People are never sure who has seen what. Explicit communication, such as commenting on a tie's news or writing on her wall, is required to notify a tie that her news was seen and mattered.

Therefore, the present work emphasizes the effect of directed communication with ties, rather than passive consumption or broadcasting. And while much of the computer-mediated communication literature examines the different effects of communicating with strong versus weak ties, the distinction has not been examined on social network sites, where profiles and dissemination of news may affect both feelings of tie strength and the likelihood of communicating with a given tie. Communication type and partner are often intertwined; the exchange of frequent, personalized messages is a characteristic of close-tie relationships [21], while generic broadcasts are a way to keep up with a large network of acquaintances [18].

However, with a large enough sample, communication type and partner can be examined separately. In particular, this work describes the different effects of one-on-one communication with strong ties—who may provide needed support and sympathy—and with weak ties—who may provide a bridge to new job.

Communicating online with strong ties can lead to improvements in well-being typically associated with emotional support (e.g., declines in depression symptoms), while communicating with strangers online does not deliver this benefit [3]. Adolescents who communicate with strong ties online are much happier than those who communicate with strangers [46]. Strong ties provide significantly more emotional aid, minor services, and companionship, as well as a broader array of social support than do weak ties [48], and so interacting with strong ties should be associated with greater increases in social support and reductions in stress than talking with weak ties.

H1. Directed communication with strong ties will be associated with reductions in stress, while directed communication with weak ties will not.

H2. Directed communication with strong ties will be associated with increases in social support, while directed communication with weak ties will not.

Tie Strength and Psychological Distress After Job Loss

Those who have recently lost a job feel greater levels of deprivation and anxiety about "getting by," and social support alleviates many of the psychological and physical responses to unemployment [22,47]. This form of emotional support typically comes from one's strong ties, including family and spouses, rather than weak ties, who are less invested in one's well-being [48]. Strong ties provide financial support, assist with moving, and lend a shoulder to cry on. The social support and companionship of strong ties is often a buffer, allowing an individual to cope with stress [30]. Moreover, the mere perception that others—even a single close tie—will provide aid when needed may have benefit in its own right. Perceived support is associated with lower levels of anxiety, distress, and depression [13].

However, strong ties can be inept at providing the right kind of support in a personal crisis, such as losing a job. Family members who haven't been directly affected by the crisis may make unhelpful statements, by pushing for recovery too quickly or aggressively offering unwanted advice, which elicits resentment from the receiver [35,50]. Gender differences in coping strategies cause mismatches in spouses, where husbands tend to hide problems, give unwanted advice, and be bothered by their wives' emotional expressivity [45]. Furthermore, strong ties may push a person to move on too quickly because they themselves are uncomfortable with their friend's distress [35]. Though strong ties are typically the providers of emotional support, it is unclear how they will affect individuals who recently lost a job.

Thus, while online communication with strong ties generally provides social capital benefits, it is not clear whether doing so provides the same benefits to individuals who have recently lost a job. Those strong ties may provide much-needed emotional support in a time of crisis, or may pressure an individual to find a new job quickly.

RQ1. How does job loss moderate the effect of strong-tie communication on stress and social support?

Although strong ties are associated with emotional support, weak ties on the internet seem to be especially valuable for getting informational support, such as finding resources before moving to a new location [27]. Weak ties provide novel information, connections to more diverse perspectives, and reminders of connections to a wider community [23]. Interacting with them should be linked with increases in bridging social capital [44]. Strong ties, with their redundant information and mutual, closed friendships, should not provide as great a bridging benefit.

H3. Directed communication with weak ties will be associated with greater increases in bridging social capital than will directed communication with strong ties.

However, when it comes to actually finding a new job in a recession, do the information benefits of weak ties trump the potential influence of strong ties? The reduced communication frequency inherent in weak-tie relationships may also result in a weak tie knowing of a relevant job opening, but not conveying it to a job-seeker. Strong ties may have less diverse information, but may be better able to transfer knowledge through their greater relational "bandwidth" [1]. For those who have lost a job, will talking with strong ties or weak ties be associated with a greater likelihood of finding a new job?

RQ2. Is directed communication on social network sites with strong or weak ties more predictive of finding a new job?

METHOD

To analyze the relationship between online communication, job loss, and stress, support, and social capital, we conducted a three-wave panel survey of Facebook users beginning in early June 2011, with follow-up waves in early July and August 2011. The survey contained measures of stress, social support, and bridging social capital, and questions about tie strength with a subset of respondents' Facebook friends. Survey responses were matched to the server logs of the participants' activity on Facebook beginning one month prior to the first survey and concluding on the date of the last survey.

Participants

Participants (N = 10,557, 54% female) were recruited through a combination of Facebook ads and email invitations. Recruiting was targeted at a random sample of English-speaking users around the world, aged 18 or older, who had been active on the site in the previous 30 days, stratified by gender and Facebook use (number of login

days in the past month). After clicking on the survey link, respondents completed an online consent form, which invited them to participate and informed them about the nature of the research and that their questionnaires would be anonymously matched with their online behavior on Facebook in aggregate with the other participants.

A subset of participants, (n = 3,358, 59% female), who completed at least two consecutive waves, is included in the analysis. Compared to a random sample of Facebook users, survey respondents were older (M = 45.2 vs. 29.9, $p < 0.001$), and 11% more likely to be female (χ^2= 108.1, $p < 0.001$). They were heavier Facebook users, with approximately 70 more friends than the average user, about twice the likelihood of logging in during the week prior to the survey. Dropouts were younger than returnees (M = 40.7 and 45.2 years, respectively, $p < 0.001$), had fewer online friends (M = 196 and 203, respectively, $p = 0.04$), and were 8% less likely to be female, (χ^2 =51.6, $p < 0.001$). There are no differences in communication volume with strong or weak ties or job status at Time 1. Survey participants came from 91 countries (48% from the US). Approximately 5% (183) reported losing a job during the three months of the study, and 13% (449) started a new job.

Behavioral Log Data: Independent Variables

Site activity was collected for the participants beginning one month prior to the first survey through the date of the final survey, three months later. All variables were aggregated from server logs and anonymized. All behavioral variables follow heavy-tailed distributions and have variances larger than their means (see Table 1). To control for skew, they were log-transformed (base 2, after adding 1) and then standardized by centering at the mean and dividing by the standard deviation. Activity variables were divided into three conceptual categories based on the nature of the interaction, described below. Within each category variables are highly correlated with each other and so are collapsed into a single composite scale representing the entire category.

Directed communication consists of targeted, one-on-one exchanges between a user and a friend, such as a private message, a wall post, or a comment (see Table 1 for complete list). The exchange may be visible by other people (e.g., a wall post), but is directed from one person to another, and the target receives a notification. Inbound and outbound directed communication are highly correlated (r = 0.89), and results are qualitatively similar using a measure combining inbound and outbound communication. Since the goal of this work is to understand the impact of one's network *on* a job seeker, inbound communication is used in the present analyses. Directed communication is further divided into communication with strong ties and communication with weak ties, to be described shortly.

Passive consumption is viewing and reading other friends' content, and includes counts of News Feed stories clicked

Facebook activity scales and items	Median	Mean	Std. Dev.	Correlation with scale
Directed communication from strong ties (scale alpha = 0.87)				
Comments received	2.0	14.1	34.6	0.87
Likes received	3.0	16.8	44.9	0.87
Messages received	2.0	9.5	36.0	0.79
Pokes received	0.0	4.3	28.3	0.49
Content friends saved on wall	0.0	0.4	1.8	0.57
Wall posts received	0.0	1.9	4.6	0.72
Photos tagged in	0.0	3.1	20.9	0.61
Distinct people user received direct communication from	4.0	8.1	10.6	0.88
Directed communication from weak ties (scale alpha = 0.86)				
Comments received	7.0	31.6	74.2	0.87
Likes received	7.0	33.8	94.5	0.86
Messages received	3.0	12.8	40.4	0.78
Pokes received	0.0	3.5	28.3	0.52
Content friends saved on wall	0.0	0.4	1.3	0.56
Wall posts received	0.0	3.3	13.3	0.65
Photos tagged in	0.0	9.7	34.8	0.66
Distinct people user received direct communication from	16.0	30.7	48.5	0.85
Passive consumption (scale alpha = 0.58)				
Profiles viewed	130.0	333.9	657.6	0.91
News feed stories clicked on	22.0	75.9	284.6	0.53
Photos viewed	0.0	73.4	302.8	0.55
Distinct people whose content user consumed	58.0	112.8	168.2	0.83
Broadcasting (scale alpha = 0.51)				
Photos posted	0.0	2.0	4.5	0.49
Content posted to own wall	1.0	6.6	21.3	0.83
Status updates	2.0	7.8	20.0	0.83

Table 1. Descriptive statistics for participant activities across one month. Composite scales were created for each section (e.g., "passive consumption") using log-transformed, standardized versions of these variables.

on, profiles visited, and photos viewed. This scale measures the extent to which a user consumes content, but does not communicate with the friend about it.

Broadcasting is the posting a user performs to a wider audience, including photo uploads and status updates. This scale includes anything that is not targeted at a single friend. While some users have privacy settings enabled so that their broadcasts go to a limited number of Facebook friends, these actions are still counted as broadcasting to distinguish them from the single-friend focus of directed communication.

Survey Content

Participants completed an online survey of validated scales described below. All measures were scored using the mean of 5-pt Likert scales.

Stress (10 items, scale alpha = 0.87) measures the degree to which situations in one's life are perceived as stressful [14]. Participants report how often they felt in the last month "Unable to control the important things in my life" and "Difficulties were piling up so high that I could not overcome them."

Social support (12 items, scale alpha = 0.88) is measured with the Interpersonal Support Evaluation List, assessing the functional components of social support [15]. The scale includes items such as "When I need suggestions on how to deal with a personal problem, I know someone I can turn to" and "If I needed some help in moving to a new house or apartment, I would have a hard time finding someone to help me." This scale is comparable to Putnam's concept of "bonding social capital" [44], and has been called that in previous work [10,11,18,49]. Social support is inversely correlated with stress (r = -0.49).

Bridging social capital (10 items, scale alpha = 0.87) measures the extent to which an individual is connected to a wide variety of people and feels part of a greater community [49]. Sample items include "Based on the people I interact with, it is easy for me to hear about new job opportunities" and "Interacting with people makes me interested in what people unlike me are thinking." Bridging social capital is moderately correlated with social support, r = 0.41, and inversely correlated with stress, r = -0.25.

Job status. Participants also reported whether any major life events had occurred in the previous month, derived from the Social Readjustment Rating Scale [28], including losing a job or getting a new one. Each was measured with a binary variable (checkbox) indicating whether the event occurred between survey waves.

Tie strength of communication partners. Responding to a prompt to identify "people you discuss important matters with, really enjoy socializing with, or anyone else you feel especially close to," participants selected up to six of their closest Facebook friends. Hampton and colleagues have demonstrated these "name generators" successfully elicit one's closest ties [38]. Participants selected a mean of 4.4 close friends. After participants selected close friends, the survey software randomly selected additional Facebook friends to bring the total to eight. For each of the eight friends, participants then evaluated "How close do you feel to [tie name]" on a 7-pt scale ranging from "Not at all close" to "Extremely close."

Participants' ratings of their eight ties were then used to train a model of tie strength across all of their ties on Facebook (see [9] for full details). Briefly, the model of tie strength is a multilevel linear regression at the dyad level, with independent variables coming from Facebook's server logs and users' profiles. For each dyad (whose members are referred to as 'ego' and 'alter'), tie strength is a linear combination of directed communication within the dyad (e.g., number of messages ego sent alter, number of comments alter left for ego), passive consumption by ego (e.g., ego's views of alter's profile or photos), static information about each person (e.g., age, gender) and static information about each dyad (e.g., number of days since the Facebook friendship was initiated, whether they live in the same city, whether they've stated that they're "in a relationship" together, number of mutual friends). In a held-out sample, predicted and self-reported tie strength were highly correlated (r = 0.66). The model was then applied to the participants in the present study, generating a tie strength rating for each of their Facebook friendships, approximately 2.4 million ties.

For the following analyses, tie strength was converted to a binary variable (strong versus weak) for each friend, with an estimate of 5 (out of the 7-point scale) as the strong-tie cutoff (inclusive). The cutoff was the average (both mean and median) estimated tie strength score for the ties participants selected as their very close friends. With this threshold, 39.4% of participants' ties were considered "strong" and the median user had 38 strong ties (M = 47). Directed communication actions were then counted separately, depending on whether they were exchanged with a strong or weak tie. Users received approximately half (52%) of their directed communication from strong ties according to this metric. This threshold may differ somewhat from Granovetter's, including more ties in the "strong" category, but is based on survey participants' empirical selections of people to whom they feel especially close. A binary threshold was used for mathematical simplicity in the regression models, and sensitivity tests with strong-tie cutoffs of 4 and 6 were also performed. They generally confirm the main analyses reported below and are discussed where appropriate.

Method of Analysis

To determine how site use relates to changes in stress, social support, and social capital, a linear multilevel model with a lagged dependent variable was used with the following form:

$$Y_t = \alpha Y_{t-30} + \beta_0 J_{(t..t-30)} + \beta_1 DCS_{(t..t-30)} + \beta_2 DCW_{(t..t-30)} + \beta_3 P_{(t..t-30)} + \beta_4 B_{(t..t-30)} [+ \beta_5 JxDCS_{(t..t-30)} + \beta_6 JxDCW_{(t..t-30)}] + \varepsilon_t$$

Where:

Y =Dependent variable (Stress, Support, or Bridging capital)

J = Lost job

DCS = Directed communication with strong ties

DCW = Directed communication with weak ties

P = Passive consumption

B = Broadcasting

Because it includes a lagged dependent variable, the model therefore measures changes in the outcome (e.g., stress) associated with the activity variables (e.g., directed communication with strong or weak ties) that took place in the month between surveys. This form of autoregressive lagged model is common in econometrics and is appropriate when the dependent variable is stationary (the mean and variance do not change over time) and model residuals are not highly autocorrelated, as is the case here. Lagged independent variables (site activity the previous month) are not included because they are highly collinear, and thus would produce biased estimates [33]. All continuous independent variables are centered at their means and standardized.

Unlike cross-sectional models common in much research in this area, which simply correlate independent and dependent variables at a single time (e.g., [21]), this model is both more sensitive and less biased, in effect controlling for an individual's previous level of the outcome variable (e.g., stress) and all of the unmeasurable factors that contribute to it. This model then reveals the relationship between activity variables in the past month and changes in the outcome. While it is impossible to truly determine a causal relationship between the independent and dependent variables without a randomized assignment of participants—e.g., randomly preventing or encouraging Facebook users' friends to communicate with them for a month—this model is appropriate for observational studies.

For each participant, there are two or three observations of stress. As observations from the same participant are not independent of each other, the model was grouped at the individual level, treating participant as a random effect (not shown in the model above). Age and gender were included as controls (not shown). Country was not a significant predictor of any outcome and was excluded.

RESULTS AND DISCUSSION

Stress. First, we examine the relationship between Facebook use and stress. Table 2a presents influence of losing a job last month on stress, controlling for age, gender and stress the previous month. The intercept value of 2.37 is the stress level (out of 5) for the average person in the sample (a 45 year-old woman who felt the mean amount of stress last month and did the mean amount of directed communication, passive consumption, and broadcasting between surveys). Coefficients are additive. So, the coefficient on the lagged stress variable ($\beta = 0.77$) indicates that an otherwise identical woman whose stress last month was one point higher than average would have a current stress level of 3.14 (2.37 + 0.77). Participants who had just lost their jobs reported substantially higher stress levels, as expected, $\beta = 0.27$, $p < 0.001$.

Table 2b shows changes in stress associated with increases in the three classes of Facebook activities: directed communication with strong and weak ties, passive consumption, and broadcasting. Talking one-on-one with strong ties on Facebook is associated with reductions in stress, while talking with weak ties is not. Hypothesis 1 is supported. For every one-unit increase in directed communication with strong ties people participate in

	Table 2a. Stress		Table 2b. Stress		Table 2c. Stress	
	Beta	SE	Beta	SE	Beta	SE
Intercept	2.37 ***	0.01	2.37 ***	0.01	2.37 ***	0.01
Stress last month	0.77 ***	0.01	0.77 ***	0.01	0.77 ***	0.01
Lost job last month	0.27 ***	0.05	0.27 ***	0.05	0.26 ***	0.05
Facebook activity						
Directed communication from strong ties			-0.03 *	0.01	-0.03 *	0.01
Directed communication from weak ties			-0.02	0.02	-0.02	0.02
Passive consumption			0.02	0.01	0.02	0.01
Broadcasting			0.02	0.01	0.02	0.01
Interactions with job loss						
Lost job x Dir. communication with strong ties					0.20 *	0.09
Lost job x Dir. communication with weak ties					-0.02	0.08
*** $p < 0.001$ ** $p < 0.01$ * $p < 0.05$	$R^2 = 0.57$		$R^2 = 0.57$		$R^2 = 0.57$	

Number of observations: 5,285 Number of groups: 3,358 Age and gender included as controls (not shown).

Tables 2a-c. Changes in stress levels associated with losing a job and Facebook use. Directed communication with strong ties is associated with reductions in stress, but those who have recently lost a job feel increases in stress with strong-tie communication.

(approximately 40 additional comments and/or likes in the past month), their stress level declines by β = -0.03 points (p = 0.04). The effect does not come from talking generally, since it is not seen with directed conversation with weak ties (p = .27). Indeed passive communication and broadcast communication are associated with marginal increases in stress (p = .06 and .10 respectively).

Table 2c examines whether Facebook communication moderates the impact of job loss on stress. The interaction between losing a job and directed communication with strong ties shows that stress increases more with strong tie communication for those who have lost a job (β = 0.20, p = 0.02). Average people who lose a job and have one unit more directed communication with strong ties end up with more stress (2.37 + .77 +. 27 -.03 +. .20 = 3.31) than do comparable people with average communication with close ties (2.37 + .77 +. 27 = 3.14). In fact, the magnitude of this increase is about the same size as the stress incurred from losing a job in the first place (β = 0.26).

Why is communicating with strong ties so bad in this case? Strong ties often make the psychological distress of job loss worse by offering unhelpful advice and pushing for recovery too quickly [50]. Individuals may feel greater embarrassment or imposition from their strong ties (who know of the job loss and may be providing financial support offline) than weak ties (who are more peripheral, so are less likely to know), and so perhaps receiving contact from strong ties heightens that embarrassment and pressure to get a new job. They may feel their independence threatened, increasing resentment rather than relief [5]. Strong ties also experience anxiety about doing anything upsetting, which may cause them to switch to more "automatic" or "casual" modes of help-giving, making them less encouraging [35]. When prompted to describe whether Facebook made them feel better or worse about their lives, participants who had lost their jobs remarked,

"Worse . . . Everyone wants to know if I got a job already!"

"I feel worse about losing my job when using Facebook. I find it really hard to connect with people who care about me/my life. I get a lot of pity comments on Facebook"

Note that individuals who recently lost a job did not use Facebook differently than those who did not lose a job. There are no significant differences between the two groups on inbound or outbound directed communication with strong or weak ties, passive consumption, or broadcasting (p > 0.28 in all cases). Therefore, individuals who lost a job were not changing their communication habits online; rather, they are experiencing different outcomes from the same kinds of communication.

Social support. Table 3 shows that perceived social support improves with strong-tie communication, but does not change significantly with weak-tie communication. Hypothesis 2 is supported. Each one-unit increase in communication with strong ties is associated with a β = 0.05 point increase in social support (p < 0.001). Weak-tie communication is associated with a non-significant increase in social support, β = 0.03, p = 0.06. This trend suggests that some support may come from ties at the higher end of the "weak tie" cutoff, and so we performed a sensitivity test (not shown) in which the cutoff to define a strong tie was lowered to 4. In this case, the distinction between strong- and weak-tie communication is magnified: communication with strong ties (those 4 or higher) is associated with a β = 0.06 increase in support (p < 0.001), while communication with weak ties is not (β = 0.00, p = 0.77). These results indicate that communicating with closer friends on Facebook activates feelings of support, a benefit not derived from weaker acquaintances. Furthermore, Table 3 also shows that, holding constant directed communication, passive consumption is associated with decreases in social support, (β = -0.02, p = 0.04). This finding is consistent with previous results suggesting that to benefit from ties, one must actively engage them, rather than simply read about their lives [10,17].

	Social support	
	Beta	SE
Intercept	3.79 ***	0.01
Support last month	0.72 ***	0.01
Lost job last month	-0.07 ***	0.04
Facebook activity		
Directed communication from strong ties	0.05 ***	0.01
Directed communication from weak ties	0.03	0.01
Passive consumption	-0.02 *	0.01
Broadcasting	-0.02	0.01
Interactions with job loss		
Lost job x Dir. communication with strong ties	-0.09	0.09
Lost job x Dir. communication with weak ties	0.04	0.08
*** p < 0.001 ** p < 0.01 * p < 0.05	R^2 = 0.56	

Number of observations: 5,285 Number of groups: 3,358
Age and gender included as controls (not shown).

Table 3. Social support increases with directed communication from strong ties but not from weak ties. Passive consumption is associated with decreases in support.

No significant interaction effect was found between job loss and strong- or weak-tie communication on perceived social support (p = 0.28 and p = 0.62, respectively). Combined, these results suggest that strong ties provide support generally, but that in the case of job loss, their presence may exacerbate feelings of embarrassment or distress, heightening stress levels. Weak ties, on the other hand, don't provide support, but neither do they aggravate the stress of unemployment.

Now we turn to the question of whether those weak ties provide bridging social capital and new jobs for the recently unemployed. Table 4 presents a model with bridging social capital as the outcome. It shows that bridging social capital increases with both strong-tie (β =

	Bridging social capital	
	Beta	SE
Intercept	3.76 ***	0.01
Bridging social capital last month	0.65 ***	0.01
Lost job last month	0.00	0.05
Facebook activity		
Directed communication from strong ties	0.04 **	0.01
Directed communication from weak ties	0.04 **	0.01
Passive consumption	-0.03 **	0.01
Broadcasting	0.01	0.01
Interactions with job loss		
Lost job x Dir. communication with strong ties	-0.10	0.08
Lost job x Dir. communication with weak ties	0.15 *	0.08
*** $p < 0.001$ ** $p < 0.01$ * $p < 0.05$	$R^2 = 0.46$	

Number of observations: 5,285 Number of groups: 3,358
Age and gender included as controls (not shown).

Table 4. Bridging social capital increases with directed communication on Facebook with both strong and weak ties. Those who have recently lost a job feel greater increases in bridging through weak-tie communication.

	Found a new job	
	Beta	SE
Intercept	-1.68 ***	0.33
Age	-0.04 *	0.01
Male	0.58	0.39
Facebook activity		
Directed communication from strong ties	0.98 *	0.44
Directed communication from weak ties	-1.00	0.55
Passive consumption	0.32	0.37
Broadcasting	0.15	0.29
*** $p < 0.001$ ** $p < 0.01$ * $p < 0.05$	N = 169	$R^2 = 0.12$

Table 5. Directed communication with strong ties is associated with an increased likelihood of finding a new job within three months.

0.04, $p = 0.003$) and weak-tie ($\beta = 0.04$, $p = 0.006$) communication on Facebook. A sensitivity test raising the threshold for "strong tie" to 6 (not shown) provides similar results, with bridging still significantly associated with both strong and weak ties. Hypothesis 3 is partially supported. Passive consumption is again linked to decreases in bridging social capital, holding constant directed communication ($\beta = -0.03$, $p = 0.002$). Moreover the interaction effect shows that those who have recently lost a job feel greater increases in bridging social capital when talking with their weak ties ($\beta = 0.15$, $p = 0.04$). Given that those who have lost a job do not communicate in greater volumes with their weak ties, one interpretation is that job seekers approach those interactions with acquaintances with a different mindset, perceiving them as more useful in their job hunt, or that the content of their exchanges differ. That communication with weak ties is associated with increases in bridging social capital but not social support or stress reduction suggests that both strong ties and weak ties can provide bridging social capital, at least in the context of Facebook.

Getting a job. Finally, we examine whether Facebook use is associated with getting a new job, and find that it is. Table 5 presents a logistic regression on the subset of participants who reported losing a job in the first or second surveys (n = 169), with the outcome being whether they reported a new job by the third survey. The intercept of -1.68 indicates that those who lost their jobs had a 15.7% probability of finding a new one within three months. Those who spoke one unit more with their strong ties were roughly twice as likely to find a new job, with a 33.2% probability ($p = 0.03$). In contrast, weak-tie communication is marginally associated with a decline in the odds of finding a new job ($p = .07$). A post-hoc comparison confirms that the effect of talking with strong ties is greater than that of weak ties on finding a job ($p = 0.02$). Results are qualitatively similar for a regression containing all participants, not just those who reported losing a job, as some participants moved to or added new jobs without reporting losing a previous position. Talking to strong ties on Facebook is associated with an increased likelihood of finding a new job. Surprisingly, weak-tie communication is not.

General Discussion

In summary, this research demonstrates that Facebook communication predicts changes in the psychological and practical outcomes associated with losing a job. Directed communication with strong ties generally had positive effects, and was associated with overall reductions in stress, increases in perceived social support, increases in bridging social capital and the likelihood of finding a job. However, it was also associated with strong increases in stress among those who recently lost a job. Directed communication with weaker ties had weaker effects. Consistent with the idea that weak ties bring access to new information, communication with them was associated with increases in bridging social capital, and especially so among people who recently lost a job. However, inconsistent with Granovetter's strength of weak ties hypothesis, communication with weak ties was not associated with getting a new job.

By distinguishing communication partners, this work goes beyond previous studies that failed to find a connection between social network site use and improvements in social support [10]. By examining differences between strong and weak-tie partners, we see results consistent with other forms of computer-mediated communication literature, that emotional support comes from strong ties [3,46].

One limitation of this work is that we do not know exactly how participants reduced their stress, found support or found their new jobs—whether through a specific strong or

weak tie, a combination of them, or through more formal channels. We simply correlate their communication in aggregate with strong and weak ties with their success. Furthermore, we do not analyze the content of those messages, but simply count the number of exchanges. This process ensures participant privacy but means that we do not know whether certain exchanges were higher in supportive language or job-relevant links. Strong ties may communicate more offline or via other channels, as well [26], and those interactions are not captured here. However, communication on Facebook is highly correlated with talking face-to-face, on the phone, and over email [9].

Although these results are consistent with a thesis that causal effects of interpersonal communication on psychological and practical outcomes depend on one's closeness to the communication partners, they do not identify the pathways producing these effects, assuming they exist. Below we speculate on some of the causal processes that could account for the patterns of results observed in this research.

The prior research literature on the psychological effects of interpersonal communication and social support suggest multiple routes by which communication with others in one's social network can reduce stress or have other positive benefits. Communication with others in one's social network can provide informational support (e.g., information about unemployment benefits or job prospects) [23], emotional support [42] such as expressions of concern or empathy, companionship and distraction to prevent rumination, or even the opportunity to offer support to others [7]. Moreover communication with others, especially close ties, provides opportunities to express one's emotions and cognitively process problems, and this self-expression has benefits independent of responses from others [43].

Literature on personal crises suggests that the most advantageous forms of support come from connecting people with others who are in similar circumstances and from allowing emotional expression [47,50]. Social network sites are perfect venues for that, and some users are taking advantage, such as laid-off coworkers who use Facebook to commiserate and share resumes. Wortman and colleagues [50] find that one of the most helpful responses to personal crises is providing people the ability to express their emotions. Participants reported that Facebook both hindered and helped this expression. Several participants reported that negative news does not belong in status updates—that they should be artificially cheery online:

"no one really shares sad or distressing stuff. They must have some concerns, but most of my contacts act as if they do not. So in comparison, I feel worse."

"Facebook has not made me feel better or worse about my new job. It did, however, make me feel worse when I was unemployed and I would regularly read newsfeed status updates celebrating personal successes."

And so those who have lost a job may feel constrained from sharing their true feelings. This may also account for the general reductions in well-being associated with passive consumption behavior. Consider two people, Alice and Brenda, who are identical in every way, including the amount of one-on-one conversation they have with friends on Facebook each month. Brenda, however, spends additional time looking at friends' profiles, photos, and status updates, but does not write to those friends. Despite viewing social news about a wide circle, Brenda feels less supported by and connected to them. One interpretation is that the content of the passive consumption matters, as does the relative state of the viewer—when individuals see news of their ties succeeding and they themselves do not feel successful, it aggravates feelings of distress or loneliness. These quotes are consistent with empirical work showing that people routinely assume their peers are having more fun than they are [32]. Future work should investigate the contexts under which passive consumption elicits social comparison and ways to mitigate negative consequences.

At the same time, respondents did feel support from ties on Facebook, especially when they found new jobs and posted the news:

"Felt a little better with supporting comments about losing my job. My friends gave me a better outlook on the situation."

"Better, I posted my new job (and upcoming move) on FB and I got so many nice comments"

Being able to connect with others in similar circumstances is a source of comfort after a crisis [35], and respondents frequently mentioned commiserating through the site.

"Yes, [I] am able to commiserate with other colleagues on losing our jobs (due to Bank failure) and getting prospects for new opportunities."

"Been able to share my worries, get help on Cvs, job hunting and general chit chat about whats happening to others."

"Much better it is way easier to stay connected when looking for employment t see what others found. If someone finds a lead they cannot use they pass it on in case anyone else can use it. We are finding jobs"

"It has made me feel a whole lot better - I have been able to share the ups and downs of my life with others who are in similar circumstances - and we have all been able to support each other emotionally."

Yet many of those who have recently lost a job do not know others in their network who are in the same situation, as people feel compelled to hold back negative personal news. If users had a way to discreetly identify that they were looking for work (such as a private setting in their profiles that was not visible to others), the site could automatically re-prioritize content that would be more

beneficial to them. Their news could be distributed more widely among ties who work for local companies that are hiring, increasing the likelihood of a fruitful match. The site could recommend resources such as online groups for the recently unemployed, or more targeted groups based on geographic region and educational background, so that individuals could sympathize with similar others and share job leads. Ads for local industries that are hiring could be targeted at the people who would be most likely to be a good match.

CONCLUSION

Unemployment is high across much of the United States and the European Union, and those who have recently lost a job are using social network sites just as much as their employed peers. Yet they experience different outcomes from the same kinds of actions, and the tool that can be so powerful for generating the connections they need to find a new job may also intensify stress when it provides unhelpful advice from strong ties. For those who have not recently lost a job we find that stress and support improve with communication from strong ties, while weak ties do not provide these psychological benefits. Finally, we find that passive consumption of ties' news is linked to decreases in social support and bridging social capital, and that to extract benefits from one's ties online, it is important to directly engage them. Social network sites provide great opportunities for those who have recently lost a job, but the effects depend on whom they talk to.

ACKNOWLEDGMENTS

The authors would like to thank Sara Kiesler, Justine Cassell, Sinan Aral, Cameron Marlow, Adam Kramer, and other members of the Facebook Data Science Team. This work was supported by NSF IIS-0808711, and graduate research fellowships from the NSF and Google.

REFERENCES

1. Aral, S. and Van Alstyne, M. The Diversity-Bandwidth Trade-off. *American Journal of Sociology 117*, 1 (2011), 90–171.
2. Backstrom, L., Bakshy, E., Kleinberg, J., Lento, T.M., and Rosenn, I. Center of attention: How facebook users allocate attention across friends. *Proc. 5th International Conference on Weblogs and Social Media*, (2011), 1–8.
3. Bessière, K., Kiesler, S., Kraut, R., and Boneva, B. Effects of internet use and social resources on changes in depression. *Information, Communication & Society 11*, 1 (2008), 47–70.
4. Bian, Y. Bringing strong ties back in: Indirect ties, network bridges, and job searches in China. *American Sociological Review*, (1997), 366–385.
5. Bolger, N., Zuckerman, A., and Kessler, R.C. Invisible support and adjustment to stress. *Journal of Personality and Social Psychology 79*, 6 (2000), 953.
6. Bourdieu, P. The forms of capital. *Readings in economic sociology*, (1986), 280–291.
7. Brown, S.L., Nesse, R.M., Vinokur, A.D., and Smith, D.M. Providing Social Support May Be More Beneficial Than Receiving It Results From a Prospective Study of Mortality. *Psychological Science 14*, 4 (2003), 320–327.
8. Bureau of Labor Statistics. *Employment Situation Summary*. 2011.
9. Burke, M. Reading, Writing, Relationships: The Impact of Social Network Sites on Relations and Well-Being. 2011. http://reports-archive.adm.cs.cmu.edu/anon/hcii/CMU-HCII-11-107.pdf.
10. Burke, M., Kraut, R.E., and Marlow, C. Social capital on Facebook: Differentiating uses and users. *Proceedings of the 29th international conference on human factors in computing systems (CHI '11)*, (2011), 571–580.
11. Burke, M., Marlow, C., and Lento, T. Social network activity and social well-being. *Proceedings of the 28th international conference on human factors in computing systems (CHI '10)*, (2010), 1909–1912.
12. Burt, R.S. *Structural holes: The social structure of competition*. Harvard Univ Press, 1995.
13. Cohen, S. and Wills, T.A. Stress, social support, and the buffering hypothesis. *Psychological Bulletin 98*, 2 (1985), 310.
14. Cohen, S., Kamarck, T., and Mermelstein, R. A global measure of perceived stress. *Journal of health and social behavior*, (1983), 385–396.
15. Cohen, S., Mermelstein, R., Kamarck, T., and Hoberman, H.M. Measuring the functional components of social support. In I.G. Sarason and B.R. Sarason, eds., Social Support: Theory, Research and Applications, 1985, 73–94.
16. Coleman, J.S. Social capital in the creation of human capital. *American Journal of Sociology*, (1988), 95–120.
17. Ellison, N., Vitak, J., Gray, R., Lampe, C. & Brooks, B. (2011). "Cultivating Social Resources on Facebook: Signals of Relational Investment and their Role in Social Capital Processes." Paper presented at the iCS-OII 2011 "A Decade in Internet Time" Symposium. Oxford, UK.
18. Ellison, N.B., Steinfield, C., and Lampe, C. The benefits of Facebook 'friends': Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication 12*, 4 (2007), 1143–1168.
19. Eurostat. *Employment and Unemployment*. 2012.
20. Facebook. *Registration Statement*. United States Securities and Exchange Commission, 2012.
21. Gilbert, E. and Karahalios, K. Predicting tie strength with social media. *Proc. 27th international conference on Human factors in computing systems (CHI '09)*, (2009), 211–220.
22. Gore, S. The effect of social support in moderating

the health consequences of unemployment. *Journal of health and social behavior*, (1978), 157–165.
23. Granovetter, M.S. The strength of weak ties. *American Journal of Sociology 78*, 6 (1973), 1360–1380.
24. Hampton, K., Goulet, L.S., Rainie, L., and Purcell, K. *Social networking sites and our lives*. 2011.
25. Hampton, K.N., Sessions, L.F., Her, E.J., and Rainie, L. *Social isolation and new technology: How the Internet and mobile phones impact Americans' social networks*. Pew Internet & Internet Life Project, 2009.
26. Haythornthwaite, C. Social networks and Internet connectivity effects. *Information, Community & Society 8*, 2 (2005), 125–147.
27. Hiller, H.H. and Franz, T.M. New ties, old ties and lost ties: the use of the internet in diaspora. *New Media & Society 6*, 6 (2004), 731.
28. Holmes, T. and Rahe, R. The social readjustment rating scale. *Journal of psychosomatic research*, (1967).
29. House, J. and Landis, K. Social relationships and health. *Science*, (1988).
30. House, J.S., Kahn, R.L., McLeod, J.D., and Williams, D. Measures and concepts of social support. (1985).
31. Jahoda, M. Unemployed men at work. *Unemployed people: Social and psychological perspectives*, (1938).
32. Jordan, A.H., Monin, B., Dweck, C.S., Lovett, B.J., John, O.P., and Gross, J.J. Misery Has More Company Than People Think: Underestimating the Prevalence of Others' Negative Emotions. *Personality and Social Psychology Bulletin 37*, 1 (2011), 120.
33. Keele, L. and Kelly, N.J. Dynamic models for dynamic theories: The ins and outs of lagged dependent variables. *Political Analysis 14*, 2 (2006), 186.
34. Kluth, A. Primates on Facebook. *The Economist*, 2009. http://www.economist.com/node/13176775?story_id=13176775.
35. Lehman, D.R., Ellard, J.H., and Wortman, C.B. Social support for the bereaved: Recipients" and providers" perspectives on what is helpful. *Journal of Consulting and Clinical Psychology 54*, 4 (1986), 438.
36. Lin, N. *Social capital: A theory of social structure and action*. Cambridge Univ Pr, 2002.
37. Madden, M. and Zickuhr, K. *65% of online adults use social networking sites*. Pew Internet & American Life Project, 2011.
38. Marin, A. and Hampton, K.N. Simplifying the Personal Network Name Generator. *Field Methods 19*, 2 (2007), 163–193.
39. Marsden, P.V. Core discussion networks of Americans. *American Sociological Review*, (1987), 122–131.
40. McDonald, S. Right place, right time: serendipity and informal job matching. *Socio-Economic Review 8*, 2 (2010), 307.
41. Naaman, M., Boase, J., and Lai, C.H. Is it really about me?: message content in social awareness streams. *Proceedings of the 2010 ACM conference on Computer supported cooperative work*, (2010), 189–192.
42. Owen, J.E., Klapow, J.C., Roth, D.L., and Tucker, D.C. Use of the internet for information and support: Disclosure among persons with breast and prostate cancer. *Journal of Behavioral Medicine 27*, 5 (2004), 491–505.
43. Pennebaker, J.W. and Chung, C.K. Expressive writing, emotional upheavals, and health. *Handbook of health psychology*, (2007), 263–284.
44. Putnam, R.D. *Bowling alone: The collapse and revival of American community*. Simon and Schuster, New York, 2001.
45. Thoits, P.A. Stress, coping, and social support processes: Where are we? What next? *Journal of health and social behavior*, (1995), 53–79.
46. Valkenburg, P.M. and Peter, J. Preadolescents" and adolescents" online communication and their closeness to friends. *Developmental Psychology 43*, 2 (2007), 267.
47. Wanberg, C.R. Unemployment and Well-Being. *Annual Review of Psychology 63*, 1 (2011).
48. Wellman, B. and Wortley, S. Different Strokes from Different Folks: Community Ties and Social Support. *American Journal of Sociology 96*, 3 (1990), 558–588.
49. Williams, D. On and off the 'net: Scales for social capital in an online era. *Journal of Computer-Mediated Communication 11*, 2 (2006), 593–628.
50. Wortman, C.B. and Lehman, D.R. Reactions to victims of life crises: Support attempts that fail. *Social support: Theory, research and applications*, (1985), 463–489.