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Measuring Social Support for Weight Loss in an Internet Weight Loss Community

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Although overweight and obese individuals are turning to Internet communities for social support for weight loss, there is no validated online instrument for measuring the subjective social support experiences of participants in these communities. The authors’ objective was to determine whether an online version of a validated paper questionnaire, the Weight Management Support Inventory, is appropriate for measuring social support among members of Internet weight loss communities. The authors administered the paper and online versions of the questionnaire in random, counterbalanced fashion to 199 members of a large Internet weight loss community. Scores for the paper and online versions were comparable in between-subjects and within-subjects comparisons. Convergent validity is suggested by the finding that participants who posted messages on Internet forums several times per day reported more social support than those who posted less frequently. However, the instrumental (tangible) support items did not load significantly on the instrumental support factor, suggesting that instrumental support is not relevant to the social support exchanged among participants in these communities. The authors conclude that the online, modified Weight Management Support Inventory, without items for instrumental support, is an appropriate instrument for measuring social support for weight loss among members of Internet weight loss communities.

The purpose of this study was to evaluate the usefulness of an existing questionnaire for measuring social support among members of a large Internet weight loss community. Social support is variably defined in the literature (Williams, Barclay, & Schmied, 2004), but is commonly considered an interpersonal transaction involving (a) emotional concern (esteem, affect, trust, concern); (b) instrumental aid (aid in kind, money, labor); (c) appraisal (affirmation, feedback); and/or (d) information (advice, suggestion; House, 1981). Cross-sectional, cohort, and intervention studies have demonstrated that social support facilitates initial weight loss and weight loss maintenance (Elfhag & Rossner, 2005; Gallagher, Jakicic, Napolitano, & Marcus, 2006; National Heart, Lung and Blood Institute, 1998; Verheijden, Bakx, van Weel, Koelen, & van Staveren, 2005; Wing & Jeffery, 1999).

Participants in Internet health communities exchange social support by communicating primarily via discussion forums, as well as blogs and e-mails (Hwang et al., 2007; Sarasohn-Kahn, 2008). The unique process of communicating via online forums appears to shape how participants experience social support (Tanis, 2008; White & Dorman, 2001). Because the forums are text-based, participants value each other on the basis of written contributions rather than physical appearance and they can carefully formulate messages for discussing emotional issues. The option to post anonymous messages facilitates discussion of sensitive topics. Last, the wide reach of forums provides access to an expanded network of peers who communicate across barriers of time and location. The expansion of one’s personal network may be particularly useful for individuals who are stigmatized by their health condition or those with restricted mobility.

A comprehensive evaluation of social support would consider structural support (e.g., availability of support givers) and the perception of received support (Hupcey, 1998; Verheijden et al., 2005). However, previous trials involving online support for weight loss either did not address perceived support (Bennett et al., 2009; Tate,
Jackvony, & Wing, 2006; Tate, Wing, & Winett, 2001; Womble et al., 2004) or used a measure of perceived support that was not specific to weight loss (Gold, Burke, Pintauro, Buzzell, & Harvey-Berino, 2007; Micco et al., 2007). Therefore, an instrument for measuring perceived support for weight loss would improve our capacity to evaluate the effect of online support on weight loss.

The Weight Management Support Inventory (WMSI) was recently developed to assess perceived support for weight management (Rieder & Ruderman, 2007). However, because the WMSI was developed for the context of face-to-face support, it is not known whether it is an appropriate instrument for members of online weight loss communities. It may be that new measures are needed to account for the unique elements of online communication. The development of new measures or adaptation of existing measures to ensure their appropriate use in Web-based research provides a much needed foundation in this nascent field.

Therefore, the goal of the present study was to examine the psychometric properties of the only available measure for weight management social support—the WMSI (Rieder & Ruderman, 2007)—to determine whether its use in Web-based studies is appropriate. Several factors may affect the utility of the WMSI for members of Internet weight loss communities. First, it is not known whether the psychometric characteristics of the validated paper version are retained in an online version. Second, the WMSI was developed and validated among university students and employees but has not been administered to members of an Internet weight loss community. Third, because the questionnaire items are not specific to social support mediated by online communication, it is unknown whether they are relevant to individuals who experience at least part of their social support in an online environment. To address these concerns, we administered paper and online versions of the WMSI in randomized, counterbalanced fashion to members of a large Internet weight loss community.

Methods

Sample Recruitment

The study population consisted of members of SparkPeople (www.SparkPeople.com), a free Internet weight loss community supported by advertising. Social interactions among SparkPeople members are sources of encouragement, information, and validation of struggles and successes. These interactions occur through multiple avenues, including posts in discussion forums, private messages, and comments on blogs. Approximately 500,000 members log into the Web site at least every month (D. Heilmann, chief operational officer, personal communication, November 19, 2009).

Study recruitment was conducted via announcements posted on the homepage and discussion forums of the Web site. Members were eligible if they were at least 18 years of age, were trying to lose weight, lived in the United States, and had access to a fax machine (to return the paper version of the WMSI). Study enrollees had to have participated in the SparkPeople discussion forums for at least a month in order to maximize the likelihood that enrollees would provide meaningful responses to the WMSI items. Following online eligibility screening, eligible participants completed an online questionnaire about demographics, height, weight, and Internet use.

Subjects were randomized to take the paper and online versions of the WMSI in counterbalanced order of administration: either the paper version followed by the
online version (PaOn group), or the online version followed by the paper version (OnPa group). We used counterbalancing to control for order effects in the repeated measure, within-subjects comparison of the paper and online versions. Subjects were instructed to take the second version within 2 days of taking the first version. We chose this interval because the construct of interest (perceived frequency and helpfulness of supportive interactions over the previous 4 weeks) was likely to remain stable over the span of 2 days among active participants in the online community. We administered the online version with SurveyMonkey software (www.SurveyMonkey.com). We sent the paper version as an attachment via e-mail and asked the respondents to print, complete, and fax the questionnaire back to us. The honorarium was a $5 gift certificate to Amazon.com. The study was approved by the Committee for the Protection of Human Subjects of the University of Texas Health Science Center at Houston.

**Measures**

Demographic variables included age, gender, race, education, height, and weight. Questions asked how often the participants used the Internet for anything, used e-mail, posted messages on Internet forums, or participated in chat rooms. The response choices (“several times a day,” “about once a day,” “3–5 days a week,” “1–2 days a week,” “every few weeks,” and “less often”) were those that have been used in surveys of Internet use behavior by the Pew Internet & American Life Project (Pew Internet & American Life, 2008).

The WMSI is a self-administered questionnaire for social support for weight management (Rieder & Ruderman, 2007). It contains 26 items on the frequency and helpfulness of receiving four types of social support for weight management: emotional (“Others tell me that they are confident that I can lose weight”), instrumental (“Others go walking or jogging with me for exercise”), appraisal (“Others compliment me when they notice I’ve lost weight”), and informational (“Others tell me about the things that they have done to lose weight”). The directions ask respondents to rate on a 5-point scale how frequently they experienced a certain interaction with other people in the past 4 weeks, ranging from 1 (never) to 5 (daily). The WMSI does not ask respondents to specify the individual(s) providing each type of support. The items also ask how helpful that event was when it occurred, rated on a 5-point scale ranging from 1 (not helpful) to 5 (extremely helpful). The WMSI yields an overall score and 4 subscale scores for frequency and an overall score and 4 subscale scores helpfulness, for a total of 10 scores. Higher scores indicate more frequent or more helpful social support events.

Rieder and Ruderman (2007) developed and validated the paper WMSI among university students and employees who were trying to lose weight. The 26 items have acceptable internal consistency, with Cronbach’s alpha of .90. The four factor structure (emotional, instrumental, appraisal, and informational support) was verified by confirmatory factor analysis. Test–retest reliability over a span of 2 weeks was 0.75 for overall frequency score and 0.80 for overall helpfulness score. Scores were significantly correlated with general measures of social support (Inventory of Socially Supportive Behaviors and the Interpersonal Support Evaluation List-Short Form) and a measure of eating behavior (Dutch Eating Behavior Questionnaire), “although not so highly associated as to suggest that the WMSI did not provide unique assessment specific to weight management” (Rieder & Ruderman, 2007). Discriminant
validity was demonstrated by a lack of association between WMSI scores and negative affect (Positive Affect and Negative Affect Scale) or the tendency to give socially desirable responses (Short Marlowe-Crowne Social Desirability Scale).

The paper version has four single-sided pages. The online version had the same questions, answer choices, and scoring algorithm as the paper version. Consistent with national usability guidelines (www.usability.gov), the online version was displayed as 26 consecutive screens (1 screen for each question) with all text presented above the fold and feedback about progress provided to participants throughout the survey.

Statistical Analysis
Continuous variables are summarized as mean ± standard deviation and dichotomous variables as percentages. Body mass index, calculated from self-reported height and weight, is described as a continuous variable and also as a categorical variable, with normal (body mass index < 25), overweight (25–29.99), obese (30–34.99), and extremely obese (≥ 35) categories.

We conducted a confirmatory factor analysis with AMOS 4.0 to determine whether the original four-factor structure of the WMSI (Rieder & Ruderman, 2007) was replicated in our sample, using the frequency items for the first administration of the online and paper groups separately. In the context of this study, the first administration of the WMSI refers to the version completed first in either of the two groups, that is, the paper version in the PaOn group and online version in the OnPa group. In accordance with the original description of the WMSI, we compared the four-factor model (emotional, appraisal, informational, and instrumental) with three- (emotional/appraisal, informational, and instrumental) and two- (emotional/appraisal and informational/instrumental) factor models. For the confirmatory factor analysis, we calculated the normed fit index, the Tucker-Lewis index, the comparative fit index, and the root mean square error of approximation.

We calculated internal consistency as Cronbach’s $\alpha$ for overall frequency scores and overall helpfulness scores, using the first administration of the WMSI. For between-subjects comparison of the paper version versus the online version, we compared the first administrations of the WMSI with independent $t$ tests. For within-subjects comparison of the paper version versus the online version, regardless of order of administration, we used Pearson $r$ correlations and paired $t$ tests. Using the first administration of the WMSI, we calculated the Pearson $r$ correlation between the overall frequency score and overall helpfulness score within the PaOn group and the OnPa group.

We also examined the frequency of posting messages on discussion forums (one aspect of social support) as an indicator of the convergent validity of the online WMSI. We conducted two linear regression analyses, with overall frequency WMSI score as the dependent variable in the first linear regression, and overall helpfulness WMSI score as the dependent variable in the second. The main predictor variable was frequency of posting messages on discussion forums. The original categories were collapsed to create a dichotomized variable: several times per day versus less often (about once per day, 3–5 days per week, 1–2 days per week, every few weeks, or less often). Other predictor variables were age, gender, race (White versus non-White), education (high school or less vs. college or more), frequency of chat room use (at least every few weeks vs. less often), body mass index (continuous), and group assignment...
(PaOn versus OnPa). Some variables related to use of the Internet could not be used as predictor variables given that there was little variability. For example, the majority of participants were in the highest categories of length of Internet use (94.0%), frequency of Internet use (98.0%), and frequency of e-mail use (96.5%). To evaluate the relationship between significant predictor variables identified in the linear regression and the eight WMSI subscales (dependent variables), we conducted a multivariate analysis of variance adjusted for group assignment. Level of significance was set at two-tailed \( \alpha = .05 \). Statistical analyses were performed with SPSS (Version 16.0).

**Results**

**Demographics**

Of 1535 individuals who underwent screening, 798 were not eligible and 226 refused to participate (Figure 1). The remaining 511 were randomized. The sample for analysis included 199 individuals who returned both versions of the WMSI with complete answers. Response rates were similar by order of administration (PaOn = 37.8% with complete responses; OnPa = 40% with complete responses). The 199 completers were more likely to use e-mail several times per day than were noncompleters (96.5% vs. 91.9%, \( \chi^2 = 4.36, p = .04 \)). Otherwise, there were no differences between the completers and noncompleters in terms of age, gender, race, body mass index, education, length of Internet use, or frequency of use of other Internet features.

As shown in Table 1, study completers were predominantly White women with mean age 36.6 ± 9.7 years. The mean body mass index was 31.6 ± 7.4: 18.1% had

**Figure 1.** Study Flow. aThe total is greater than 798 because some individuals had multiple reasons for ineligibility. PaOn = group that took paper version followed by online version of the Weight Management Support Inventory; OnPa = group that took online version followed by paper version of the Weight Management Support Inventory.
normal body mass index, 32.7% were overweight, 20.6% were obese, and 28.1% were extremely obese. Most participants were experienced and frequent users of the Internet.

**Confirmatory Factor Analysis**

Consistent with the original description of the WMSI (Rieder & Ruderman, 2007), the four-factor model fit better than did the three- and two-factor models for both paper and online versions because each of the factors are better represented as individual factors as opposed to being collapsed with each other, as occurred in the three- and two-factor models (Table 2). Although chi-square

**Table 1.** Demographics and Internet use for 199 study completers

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>PaOn</th>
<th>OnPa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n = 199$</td>
<td>$n = 93$</td>
<td>$n = 106$</td>
</tr>
<tr>
<td>Age, years, $M \pm SD$</td>
<td>36.6 ± 9.7</td>
<td>37 ± 10</td>
<td>36 ± 10</td>
</tr>
<tr>
<td>Female, %</td>
<td>92.5</td>
<td>91</td>
<td>93</td>
</tr>
<tr>
<td>Race = White, %</td>
<td>86.4</td>
<td>86</td>
<td>87</td>
</tr>
<tr>
<td>Education = college or more, %</td>
<td>78.4</td>
<td>72</td>
<td>84</td>
</tr>
<tr>
<td>Body mass index, $M \pm SD$</td>
<td>31.6 ± 7.4</td>
<td>31 ± 8</td>
<td>32 ± 7</td>
</tr>
<tr>
<td>Internet use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use Internet &gt;5 years, %</td>
<td>94.0</td>
<td>93</td>
<td>95</td>
</tr>
<tr>
<td>Use Internet several times per day, %</td>
<td>98.0</td>
<td>97</td>
<td>99</td>
</tr>
<tr>
<td>Use e-mail several times per day, %</td>
<td>96.5</td>
<td>97</td>
<td>96</td>
</tr>
<tr>
<td>Post messages on Internet forums several times per day, %</td>
<td>69.3</td>
<td>77</td>
<td>62</td>
</tr>
<tr>
<td>Participate in Internet chat rooms every few weeks or more, %</td>
<td>41.0</td>
<td>52</td>
<td>32</td>
</tr>
</tbody>
</table>

*Note. PaOn = group that took the paper version then the online version of the Weight Management Support Inventory; OnPa = group that took the online version then the paper version of the Weight Management Support Inventory.*

**Table 2.** Confirmatory factor analysis

<table>
<thead>
<tr>
<th>Group and model type</th>
<th>$\chi^2$</th>
<th>df</th>
<th>Normed fit index</th>
<th>Tucker-Lewis index</th>
<th>Comparative fit index</th>
<th>Root mean square error of approximation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four factor</td>
<td>588.728</td>
<td>293</td>
<td>.560</td>
<td>.676</td>
<td>.708</td>
<td>.105</td>
</tr>
<tr>
<td>Three factor</td>
<td>720.865</td>
<td>296</td>
<td>.461</td>
<td>.539</td>
<td>.581</td>
<td>.125</td>
</tr>
<tr>
<td>Two factor</td>
<td>834.659</td>
<td>298</td>
<td>.376</td>
<td>.422</td>
<td>.470</td>
<td>.140</td>
</tr>
<tr>
<td>Online</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four factor</td>
<td>566.607</td>
<td>293</td>
<td>.617</td>
<td>.737</td>
<td>.763</td>
<td>.094</td>
</tr>
<tr>
<td>Three factor</td>
<td>738.652</td>
<td>296</td>
<td>.501</td>
<td>.580</td>
<td>.617</td>
<td>.119</td>
</tr>
<tr>
<td>Two factor</td>
<td>792.133</td>
<td>298</td>
<td>.465</td>
<td>.534</td>
<td>.572</td>
<td>.126</td>
</tr>
</tbody>
</table>

*Note. For all models, $p = .001$.*
was significant, the root mean square error of approximation was not less than .05, and the normed fit index, the Tucker-Lewis index, and the comparative fit index did not surpass 0.95 for any of the models, the fit indices are better for the four-factor model than the other models tested. In addition, none of the instrumental support items loaded significantly on the instrumental support factor, indicating that the items did not measure a common theme (i.e., instrumental support) and/or that the items measured multiple factors. Therefore, we present data on the between-subjects and within-subjects comparisons both with and without the instrumental items.

**Internal Consistency**

Cronbach’s $\alpha$ for the first administration of the WMSI was .85 and .88 for overall frequency and helpfulness scores, respectively, for the paper version, and .89 and .91 for overall frequency and helpfulness scores, respectively, for the online version.

### Table 3. Between-subjects comparison of first administration

<table>
<thead>
<tr>
<th></th>
<th>Paper scores in PaOn ($n = 93$)</th>
<th>Online scores in OnPa ($n = 106$)</th>
<th>95% confidence interval of difference</th>
<th>Lower</th>
<th>Upper</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency, overall</strong></td>
<td>2.39 ± 0.55 M ± SD</td>
<td>2.42 ± 0.65 M ± SD</td>
<td>-0.02</td>
<td>-0.19</td>
<td>0.14</td>
<td>.78</td>
</tr>
<tr>
<td>Overall without instrumental items</td>
<td>2.43 ± 0.59 M ± SD</td>
<td>2.49 ± 0.71 M ± SD</td>
<td>-0.07</td>
<td>-0.25</td>
<td>0.12</td>
<td>.47</td>
</tr>
<tr>
<td>Emotional</td>
<td>2.38 ± 0.76 M ± SD</td>
<td>2.65 ± 0.87 M ± SD</td>
<td>-0.27</td>
<td>-0.50</td>
<td>-0.04</td>
<td>.02</td>
</tr>
<tr>
<td>Instrumental</td>
<td>2.30 ± 0.83 M ± SD</td>
<td>2.21 ± 0.75 M ± SD</td>
<td>0.09</td>
<td>-0.13</td>
<td>0.31</td>
<td>.42</td>
</tr>
<tr>
<td>Informational</td>
<td>2.31 ± 0.80 M ± SD</td>
<td>2.45 ± 0.89 M ± SD</td>
<td>-0.14</td>
<td>-0.38</td>
<td>0.10</td>
<td>.25</td>
</tr>
<tr>
<td>Appraisal</td>
<td>2.62 ± 0.84 M ± SD</td>
<td>2.39 ± 0.87 M ± SD</td>
<td>0.22</td>
<td>-0.02</td>
<td>0.46</td>
<td>.07</td>
</tr>
<tr>
<td><strong>Helpfulness, overall</strong></td>
<td>3.08 ± 0.73 M ± SD</td>
<td>2.95 ± 0.82 M ± SD</td>
<td>0.14</td>
<td>-0.08</td>
<td>0.35</td>
<td>.22</td>
</tr>
<tr>
<td>Overall without instrumental items</td>
<td>3.15 ± 0.76 M ± SD</td>
<td>2.98 ± 0.85 M ± SD</td>
<td>0.17</td>
<td>-0.06</td>
<td>0.40</td>
<td>.15</td>
</tr>
<tr>
<td>Emotional</td>
<td>2.94 ± 0.89 M ± SD</td>
<td>2.88 ± 0.94 M ± SD</td>
<td>0.05</td>
<td>-0.20</td>
<td>0.31</td>
<td>.68</td>
</tr>
<tr>
<td>Instrumental</td>
<td>2.91 ± 1.05 M ± SD</td>
<td>2.85 ± 1.05 M ± SD</td>
<td>0.05</td>
<td>-0.24</td>
<td>0.35</td>
<td>.73</td>
</tr>
<tr>
<td>Informational</td>
<td>2.93 ± 1.08 M ± SD</td>
<td>2.81 ± 1.01 M ± SD</td>
<td>0.13</td>
<td>-0.17</td>
<td>0.42</td>
<td>.40</td>
</tr>
<tr>
<td>Appraisal</td>
<td>3.61 ± 0.95 M ± SD</td>
<td>3.28 ± 1.08 M ± SD</td>
<td>0.33</td>
<td>0.04</td>
<td>0.62</td>
<td>.02</td>
</tr>
</tbody>
</table>

*Note.* PaOn = group that took the paper version then the online version of the Weight Management Support Inventory; OnPa = group that took the online version then the paper version of the Weight Management Support Inventory.
Between-Subjects Comparison

Between-subjects comparison of the paper version versus the online version (first administration) revealed significant differences only in the emotional frequency and appraisal helpfulness scores (Table 3). Scores for overall frequency and overall helpfulness of social support and the other subscales were similar between groups. When instrumental items were removed, there were still no significant differences in overall frequency scores or overall helpfulness scores between groups.

Within-Subjects Comparison

In within-subjects comparison of the paper version versus the online version, overall scores and subscale scores were highly correlated, with Pearson $r$ ranging from 0.82 to 0.95. Figure 2 depicts a significant difference only in the emotional frequency score (online version: $2.54 \pm 0.84$ vs. paper version: $2.45 \pm 0.85$; difference $= 0.09$, 95% confidence interval $= 0.03$ to 0.15, $p = .002$). Overall frequency of social support, overall helpfulness of social support, and the other subscales were similar. Results were comparable when instrumental items were removed, with no significant within-subjects differences in overall frequency scores or overall helpfulness scores.

Figure 2. Mean within-subject differences (95% confidence interval) in online and paper scores, regardless of order of administration.
Correlation Between Frequency and Helpfulness Scores

Overall frequency scores and overall helpfulness scores were highly correlated. Pearson’s $r$ was 0.71 for the paper version in the PaOn group and 0.85 for the online version in the OnPa group.

Convergent Validity

In the linear regression analyses, the only predictor consistently associated with overall frequency or helpfulness WMSI scores was frequency of posting messages on discussion forums. Participants who posted messages on discussion forums several times per day had higher overall frequency scores and higher overall helpfulness scores than did those who posted messages less often (WMSI frequency score: $2.49 \pm 0.60$ vs. $2.21 \pm 0.57$, difference $= 0.28$; 95% confidence interval $= 0.10$ to 0.46, $p = .002$; WMSI helpfulness score: $3.12 \pm 0.78$ vs. $2.76 \pm 0.74$, difference $= 0.36$, 95% confidence interval $= 0.13$ to 0.59, $p = .003$). Results were similar when instrumental items were omitted.

In the multivariate analysis of variance, with frequency of posting messages on forums as the predictor, eight WMSI subscale scores as dependent variables, and adjustment for group assignment (PaOn vs. OnPa), the overall Wilks’s lambda multivariate test was significant ($p = .002$). Individuals posting messages on forums several times per day had higher WMSI subscale scores than did those who posted less often, with 5 of 8 differences reaching statistical significance (Table 4). The instrumental subscale was not associated with frequency of posting messages on forums.

Discussion

The psychometric properties of the online version of the WMSI were comparable to those of the original paper version among members of a large Internet weight loss community. Convergent validity is suggested by the association between WMSI scores and the use of discussion forums. However, because the instrumental support items did not measure a coherent theme on the confirmatory factor analysis,
instrumental support may not be relevant to interactions among members of an Internet weight loss community. Studies involving Internet weight loss communities could be strengthened by the use of the online, modified WMSI (without instrumental support items) to measure social support among community members.

Out of 10 possible WMSI scores, only the emotional frequency score was significantly different in the online version compared to the paper version in both between-subjects and within-subjects comparisons. It is possible that an inherent characteristic of the online version caused a differential recall of the frequency of emotional support events. However, the magnitude of the difference between the emotional frequency online and paper scores was small and of unknown clinical significance. Our results are consistent with a number of studies which found little difference between scores for paper and online questionnaires related to psychiatric disorders overall (Vallejo, Jordan, Diaz, Comeche, & Ortega, 2007), obsessive compulsive disorder (Coles, Cook, & Blake, 2007), and stress and depression (Herrero & Meneses, 2006). Ritter, Lorig, Laurent, and Matthews (2004) randomized 397 adults from Internet communities to take paper or online versions of 16 instruments assessing health topics such as overall health, stress, disability, exercise, and health services utilization and found no differences in mean scores for any of the instruments. This body of literature and the present study suggest that, at least among Internet-savvy individuals, paper and online questionnaires tend to produce similar results.

We found a positive association between posting messages on forums and several WMSI scores. Although the direction of causality cannot be ascertained in this cross-sectional study, it is likely that the WMSI measures social support as exchanged via online discussion forums. The relationship between social support and use of online health discussion forums may vary according to the underlying health condition and the method of measuring social support. In a study of members of online depression-related forums, social support was not related to use of discussion forums (Houston, Cooper, & Ford, 2002). However, social support in that study was measured with the Medical Outcomes Study Social Support Survey, which is not specific for depression or Internet communication.

A prior survey generated a model of why people participate in 25 health-related forums, based on characteristics of participants and forums (Tanis, 2008). Participants who felt stigmatized by their health condition appreciated the text-based and anonymous nature of the forums. Those with restricted mobility appreciated the text-based and network-expanding nature of the forums. In turn, the text-based and network-expanding character of the forums had a positive effect on coping with the health condition. Given that obesity can cause stigma and restrict mobility, our study participants likely appreciate the text-based, anonymous, and network-expanding benefits of the SparkPeople forums, which is reflected in the direct association between forum use and WMSI scores. Three types of support (emotional, informational, and appraisal) measured by the WMSI are amenable to delivery via online communication venues.

However, the instrumental support scale did not measure a coherent theme and was not correlated with use of online discussion forums. This is not surprising, given that instrumental support is tangible assistance (e.g., going jogging with someone) exchanged via face-to-face interaction rather than online communication. Some individuals may seek online support because they lack instrumental support from other acquaintances or they may not perceive such support to be helpful.
A strength of the study was the randomized counterbalanced design, which allowed us to perform both between-subjects and within-subjects comparisons. To our knowledge, this is the first formal application of a weight management social support questionnaire among members of an Internet weight loss community.

A limitation of the study was the follow-up rate. However, completers and noncompleters did not differ in demographic variables, and they differed only slightly in the proportion of those who used e-mail several times per day. It is possible that because barriers to enrolling in this study were low (requiring only the completion of an online form), many individuals may have enrolled without a serious commitment to complete the study. Some individuals enrolled with invalid e-mail addresses, and so we had no way of sending them the WMSI to complete. Procedures to validate e-mail addresses and confirm interest before enrollment would improve follow-up rates in future studies. Another limitation is that because there are no data on a clinically significant difference in WMSI scores, we could not design this as a formal equivalence study comparing online and paper scores. Last, our sample consisted mostly of female White members of an online weight loss community who were frequent Internet users. Results may not be applicable to other populations.

The WMSI may have useful applications for measuring social support for weight loss in Internet weight loss communities with primarily female Caucasian members. Our primary recommendation is to remove the instrumental items because these items did not measure a coherent theme and were not associated with use of discussion forums. This would produce a modified WMSI with 19 (instead of 26) items, with subscales for emotional, appraisal, and informational support. Interventions featuring online social support could use the modified WMSI to assess perceived support for weight loss at baseline and during follow-up. The change in WMSI score could be tested as a mediator of the effect of the independent variable (e.g., frequency of use of discussion forums) on the outcome (e.g., weight loss). If mediation is confirmed, then one would conclude that participating in discussion forums leads to weight loss, at least in part, by producing the support measured by the WMSI (Baron & Kenny, 1986).

Some investigators may wish to develop a specific instrument for Internet-mediated social support for weight loss. Social support for weight loss as exchanged within Internet communities may be qualitatively different than support in other environments (Tanis, 2008; White & Dorman, 2001). One approach would be to develop a questionnaire on the basis of qualitative studies (e.g., interviews, focus groups, and observation) that explore social support in the context of the intended study population (Williams et al., 2004).

More research is needed to confirm and extend the findings of this cross-sectional study. Future studies should prospectively evaluate the relationships between use of Internet social support features, perceived social support for weight loss, and change in weight over time. When possible, randomized designs should be used and use of Internet social support features should be measured objectively.

We conclude that an online, modified WMSI, without the instrumental support items, is a psychometrically sound instrument for gauging self-reported social support for weight loss among members of Internet weight loss communities. As overweight and obese individuals increasingly turn to Internet communities for social support for weight loss, tools to measure this support will play a critical role in evaluating the impact of these communities and will lay the foundation for future interventions.
References


