Published in final edited form as:

J Community Psychol. 2008 April ; 36(3): 271–288. doi:10.1002/jcop.20193.

SCALE DEVELOPMENT OF A MEASURE TO ASSESS COMMUNITY-BASED AND CLINICAL INTERVENTION GROUP ENVIRONMENTS

Patrick A. Wilson,

Mailman School of Public Health, Columbia University

Nathan B. Hansen,

Department of Psychiatry, Yale University School of Medicine

Nalini Tarakeshwar,

Department of Psychiatry, Yale University School of Medicine

Sharon Neufeld,

Department of Epidemiology and Public Health, Yale University School of Medicine

Arlene Kochman, and

Department of Epidemiology and Public Health, Yale University School of Medicine

Kathleen J. Sikkema

Department of Psychiatry, Yale University School of Medicine; Department of Epidemiology and Public Health, Yale University School of Medicine; Department of Psychology, Yale University

Abstract

Though group interventions are widely used in community-based and clinical settings, there are few brief instruments for assessing the group environment. Two studies on the development of a brief measure to assess intervention group environments are described, and psychometric properties of the new scale are presented. The new measure is based on Moos' (1994) Group Environment Scale (GES). Participants in the studies were from two independent randomized controlled clinical trials (RCTs) of group interventions (combined $N = 334$). In Study 1 ($N = 139$), the factor content of the original 90-item GES was examined. The scale was shortened, the response format was changed, and items were adapted and added to in an effort to increase applicability to community-based and clinical intervention groups. In Study 2 ($N = 195$), the new scale was evaluated, the factor solution obtained in Study 1 was cross-validated, and subsequently the length of the scale was shortened again. The final scale contains 25 items with three subscales. Reliability and validity of the new scale was examined. Finally, the research and practice implications of the scale are discussed.

Group interventions have been proposed as perhaps the most promising psychosocial treatment modality for persons receiving care in clinical and community-based health care settings (Simonton & Sherman, 2000), and interest in and practice of group interventions is growing among researchers and practitioners (Sherman et al., 2004). For the purposes of this study, group interventions refer to the broad range of behavioral and mental health interventions that are delivered within the group environment. Types of groups that fall under the umbrella of a "group intervention" include psychotherapeutic groups, educational groups, support groups, skills-building groups, and any combination of the four. Using this perspective, group

interventions may take place as a part of a research study examining the effectiveness of an intervention (e.g., a randomized controlled clinical trial), or they can exist as a part of services provided to clients in public or private health service organizations or community-based organizations. Likewise, intervention groups refer to groups that are unstructured and conducted for indefinite periods of time, as well as those that are structured and delivered for a predetermined number of sessions to a fixed number of participants.

There are many advantages of using the group environment to deliver an intervention. These advantages include: (a) the development of a sense of universality, cohesion, and social support among group members; (b) the opportunity for modeling and social learning from other group members, and (c) the positive experience of sharing with and helping others (Burlingame, MacKenzie, & Strauss, 2003; Hyde, Appleby, Weiss, Bailey & Morgan, 2005; Yalom, 1985). Additionally, research suggests that participants often view group interventions as less stigmatizing than individual interventions (Sherman et al., 2004). Furthermore, group interventions have been shown to be effective (Burlingame, Fuhrman, & Mosier, 2003), are more cost-effective than individual-level interventions (Holtgrave & Pinkerton, 1998) and allow for fewer personnel and reduced implementation-related costs. These features may make group interventions more desirable and practical for clinical and community-based prevention and treatment programs.

While research has made clear the import of the group intervention as an integral part of behavioral and mental health interventions (Burlingame, MacKenzie, & Strauss, 2003; Hyde et al., 2005; Sherman et al., 2004), the social environment of the group, as well as relationships among group members and leaders (i.e., facilitators, therapists, or other personnel in charge of running and organizing the group) remain relatively undocumented in intervention research. Nonetheless, the perceived social environment of a group can exert a considerable influence on an intervention's efficacy in reaching its designated goals and may help explain variation in behavioral and mental health outcomes among individual members of groups. Seminal research by Barker (1968, 1978) extensively documented the role that social settings play in influencing behavior and psychological well-being. Barker theorized that established standing patterns of behavior guide and shape interactions between persons within a setting, as well as learning and other psychological processes. Extending his theory to group interventions, one could posit that the group environment plays an important role in shaping the outcomes that interventions seek to change. Yalom (1985) echoed this idea in his work examining group psychotherapy. He noted that group cohesiveness, broadly defined as the participant's relationship to the group leader, the other group members, and the group as a whole, is a strong determinant of positive therapeutic outcomes.

Several studies have demonstrated that features of group environments have an impact on the effectiveness of interventions. In one study, examining members' appraisals of self-help groups (i.e., Multiple Sclerosis, Compassionate Friends, and Overeaters Anonymous groups), members who perceived that their group was well organized and had a proficient leader reported greater satisfaction with the group, higher levels of self-esteem, and lower levels of depression (Maton, 1988). Similar findings have been obtained in other studies, which have shown that primary group outcomes are related to several features of group environments, including perceived levels of group cohesion (Budman, Soldz, Demby, Feldstein, Springer & Davis, 1989; Meredith, 1987), disruptive group dynamics (Faris & Brown, 2003), group leadership and implementation (Kulic, Horne, & Dagley, 2004), and perceived group climate (Choi, Price, & Vinokur, 2003; MacKenzie, Dies, Coché, Rutan, & Stone, 1987).

Existing Scales Used to Assess Group Environments

In an effort to better understand and describe group environments, Moos developed the Group Environment Scale (GES; 1986, 1994). The GES was designed for a broad range of groups, including task-oriented groups, social and recreational groups, and psychotherapy, self-help and support groups. The GES contains ninety items that are organized into 10 subscales: (1) cohesion, (2) leader support, (3) expressiveness, (4) independence, (5) task orientation, (6) self-discovery, (7) anger and aggression, (8) order and organization, (9) leader control, and (10) innovation. Research conducted to validate the GES suggests that the number and scope of factors (i.e., subscales) of the GES varies depending on the types of groups used (e.g., college freshman classrooms: Meredith and Schmitz, 1986; mental health consultation groups: Hartsough & Davis, 1986; self-help groups: Goetzel, 1984). The variability in findings demonstrates the need for careful interpretation of the GES, as meaningful content appears to be related to the type of group setting the scale seeks to assess.

Though the GES is widely used and has been shown to be reliable, there are some features of the scale that may make it impractical for use in community-based and clinical intervention settings. Specifically, the scale length and the number and relevancy of particular subscales is problematic. Containing a total of 90 items, the GES takes considerable amount of time to complete and may be too burdensome for group members with mental health or medical conditions. Additionally, administering the scale during a scheduled group time may be disruptive to the group environment, and scoring the measure can take a great deal of time for staff members to complete. Most important, given the variability of findings from factor analytic studies of the GES, each of the 10 subscales determined by Moos may not be relevant to community-based and clinical group interventions. However, determining appropriate factors for a particular type of group intervention may be difficult, as this requires that a large sample of participants complete the GES, and depends on the availability of statistical software, and knowledge of psychometrics and factor analysis. This may be beyond the resources of many community-based organizations that employ group interventions, as well as researchers testing the effects of interventions delivered in the group environment.

Other than the GES, there are very few measures that have been created to assess group environments. MacKenzie (1981) created the Group Climate Questionnaire (GCQ) in an effort describe and evaluate the impact of group psychotherapy patients' perceptions of group climate, which was defined as "dimensions of observed group behavior that reflect that impact of norm expectations" (p. 287). The scale has long-and short- forms, containing 32 items and 12 items, respectively. Though the GCQ has not been evaluated to the extent as the GES, the scale has been demonstrated to be psychometrically sound. However, given its explicit focus on psychotherapeutic processes, the GCQ is best suited to assess psychotherapy-based intervention groups, and not other types of groups. Most items in both the long- and short-versions of the GCQ are primarily relevant to psychotherapy groups (e.g., "The members research personal information which is usually kept secret," and "Members tried to understand why they do the things they do, tried to reason it out"), and the majority studies using the scale have been conducted with psychotherapeutic groups (MacKenzie et al., 1987; MacKenzie & Livesley, 1986; Ogrodniczuk & Piper, 2003). While this type of group is often used in clinical work, a measure specifically designed for psychotherapy groups may not be relevant to many group interventions taking place in community-based and clinical settings that are not psychotherapy-based.

Developing the Intervention Group Environment Scale

In developing a scale to assess intervention group environments, we chose to base our new scale on the GES, which applies to a broader spectrum of group interventions than the GCQ.

The breadth and length of the GES allows for the opportunity to adapt the scale to effectively measure different kinds of intervention group environments. This is extremely important, as a well-developed measure of intervention groups needs to be relevant to the different kinds of group interventions (i.e., psychotherapeutic, educational, support, skills-building, etc.) that occur in community-based and clinical settings. While the GES was used as the foundation in developing the scale, our goal was to create a measure that is thematically and qualitatively different from the original GES. However, the new measure would be considered complementary to both the original GES and the more setting-specific GCQ.

The purpose of this study is to describe the development of a scale to measure intervention group environments, named the Intervention Group Environment Scale (i.e., Intervention GES) and to present findings on the psychometric properties of the scale¹. The Intervention GES was developed in stages, using two different samples of participants in distinct randomized controlled trials (RCTs) of group-level interventions. The goal of this work was to create a reliable and valid tool that both researchers and practitioners can use to assess community-based and clinical intervention group environments.

STUDY 1

In the first study, the factor content of the original 90-item GES was examined, the scale was shortened, and the item content was reformulated in order to increase applicability to intervention groups. Only items that were conceptually relevant and that had strong factor loadings in initial principal component analyses of the original GES were retained.

METHODS

Participants—Participants in Study 1 were part of a coping group intervention RCT for HIV-positive persons who had experienced the loss of a loved one to AIDS within the previous two years (referred to as the Bereavement sample; Sikkema, Hansen, Kochman, Tate, & DiFranceisco, 2004; Sikkema, Hansen, Meade, Kochman, & Lee, 2005). Study participants were recruited from community-based organizations, including public health and AIDS service organizations, and health care clinics in Milwaukee, Wisconsin, and New York, New York between June 1997 and April 1999. Participants were randomized into either the coping group intervention condition or an individual therapy upon request comparison condition. Those who participated in the coping group ($N = 139$) were administered the original 90-item GES within 2 weeks of completing the intervention. Characteristics of the sample are presented in Table 1.

Intervention—The bereavement coping group intervention consisted of a cognitive-behavioral group intervention based on stress and coping theory (Lazarus & Folkman, 1984), specifically tailored to address the complexity of coping with both an AIDS-related loss and living with the disease itself. (See Sikkema, Hansen, Kochman, et al., 2004; Sikkema et al., 2005 for further details.) Development of social support and group cohesion was an important theme throughout the intervention, as well as other themes such as adaptive coping and goal setting. Intervention techniques utilized included group discussion, exercises, role-plays, and assigning tasks to practice between sessions. Cofacilitators delivered the intervention weekly in a local community health center for twelve 90-minute sessions.

Measure—All participants in Study 1 completed the 90-item GES. Detailed information regarding the creation of the original 90 GES items can be found in Moos (1994). In summary,

¹We received permission from Rudolf Moos and from Mind Garden, Inc. to use and modify the original Group Environments Scale and to examine the psychometric properties of his original scale and the newly developed scale using our study data.

the items from the original scale were rigorously validated using samples including more than 300 assorted groups. Item content was chosen to be diverse in order to allow for breadth in the constructs covered in the 10 subscales of the original GES. Items were answered using a dichotomous True/False response option, where respondents indicated whether they believe each statement is an accurate or inaccurate description of their group.

Statistical Methods—Data was factor analyzed using principal components analysis (PCA) with varimax rotation. A PCA employing an orthogonal rotation such as varimax is commonly used in psychometric research to explore the factor structure of psychological and behavioral measures (Floyd & Widaman, 1995). Following the factor analysis, the GES was shortened and modified through both statistical and rational processes (described below). All analyses were conducted using SPSS.

Results—The PCA yielded four factors, each having eigenvalues greater than 1.0. The factors had low to moderate inter-correlations, with Pearson correlations ranging from 0.05 to 0.35. In an effort to begin to adapt the scale and describe the four factors that were obtained, only items with loadings above 0.40 were examined². A total of 59 items with loadings below 0.40 were discarded. The 41 remaining items were assigned to one of the four identified factors based on (in order of relevance for decision-making): factor loadings on each factor, item-total correlations within each factor, and conceptual relevance. Based on the items comprising each factor, four factors were defined. These factors included: (a) group cohesion, which focused on closeness and support among group members; (b) group structure, which focused on group orderliness and preparation; (c) constructive activity, which focused on positive and productive activity among group members; and (d) counterproductive activity, which focused on argumentative and other negative behaviors among group members. Adaptation of the Original GES.

Three types of modifications to the 41 items in the original GES were made. First, five items were reworded from original phrasings to promote simplicity and ease of comprehension and to make them more appropriate for intervention groups. For example, the original item “New approaches are often tried in this group” was reworded to “Group members learn new ways of solving problems.” Likewise, the item “The leader usually decides what the group will do next” was changed to “The leaders provide direction for the group.” Second, the item response format was modified. We observed that respondents in our intervention groups might require more flexibility in rating statements than is provided in the True/False response option. This is essential to rating a group environment where multiple group members can influence the group process, thereby making it challenging to rate something as true or false. Thus, the response option was changed to a 4-point Likert scale, with “*strongly disagree*,” “*somewhat disagree*,” “*somewhat agree*,” and “*strongly agree*” as the response options. In using the Likert scale, it is possible to obtain a more precise description of respondents’ perceptions of the intervention groups in which they are involved. Further, Likert scale responses generate numerical data that can be easily summarized across the sample. Third, seven new items were created to enhance the content validity of the scale. This resulted in 12 items for each of the four factors, for a total of 48 items. Three of the coauthors, each experienced in developing and facilitating intervention groups, worked together to create new items for the scale. The team carefully reviewed the 90 items on the original GES and the 41 highly loading items and then identified other group processes that may need to be monitored. Team members then independently created 10 to 20 new items to measure these processes and, through consensus, chose the 7 most relevant ones (see Table 2 for the new items used in the final scale). The result of this

²Contact the first author for factor loadings and eigenvalues for the 90-item GES and 48-item GES.

work was a new 48-item scale, with 4 subscales each containing 12 items. This scale was further refined in a subsequent study.

STUDY 2

The goal of the second study was to examine the 48-item scale obtained in Study 1, and to further shorten and refine scale. Specifically, the Likert scale response format was evaluated, the four-factor solution was cross-validated, and items with poor factor loadings were dropped to further reduce scale length. Also, construct validity of the final scale was examined.

METHODS

Participants—Participants in Study 2 were part of a coping group intervention RCT for HIV-positive persons who had experienced childhood or adolescent sexual abuse (referred to as the *trauma* sample; Sikkema, Hansen, Tarakeshwar, Kochman, Tate, & Lee, 2004). Study participants were recruited from community-based organizations (similar to those in the *bereavement* sample) in New York City between March 2002 and January 2004.

Participants were randomized into a coping group intervention condition or support group comparison condition. At the post-intervention assessment, persons from both groups ($N = 195$) were administered the 48-item scale that was developed in Study 1. Characteristics of the trauma sample are presented in Table 1.

Interventions—The trauma coping group intervention, based on stress and coping theory (Lazarus & Folkman, 1984), additionally integrated the transactional framework for understanding sexual abuse outcomes (Spaccarelli, 1994), combining developmental and environmental factors that may moderate relationships between sexual abuse stressors and victim responses and cognitive-behavioral change principles to prevent HIV transmission and disease progression. (See Sikkema, Hansen, Tarakeshwar, et al., 2004 for further details.) Themes and intervention techniques were similar to the bereavement intervention, with special care being taken to share experiences and feelings associated with trauma and HIV infection, thereby developing a safe and cohesive environment. Cofacilitators delivered the intervention weekly in a local community health center for fifteen 90-minute sessions.

The support group intervention was based on a standard community support group model, with participants meeting weekly to discuss their experiences with sexual trauma and living with HIV-infection and offer mutual support for these stressors. Cofacilitators who were blind to the trauma coping intervention model led these groups for fifteen 90-minute sessions. Groups were administered at the same community site as the coping group.

Measures—All participants in Study 2 completed the 48-item scale developed and described in Study 1. Three other measures were used in Study 2 to assess construct validity. These measures included: (a) the number of group sessions attended; (b) perceived availability of support (a subscale of the Social Relationship Scale; Obrien, Wortman, Kessler, & Joseph, 1993); and (c) social well-being (a subscale of the Functional Assessment of HIV Infection measure; Peterman, Cella, Mo, & McCain, 1997). The perceived availability of support subscale contains seven items ($\alpha = 0.87$) that ask respondents to indicate if they have someone to go to for assistance in different hypothetical situations across four domains of social support (emotional, instrumental, financial, and informational). Respondents use a 5-point Likert scale to provide the degree to which they have support in each scenario. The social well-being subscale contains eight items ($\alpha = 0.86$) that ask respondents to rate their well-being during the past 7 days, using a 5-point Likert scale. Example items include “I get along well with others” and “I have trouble getting along with friends and close acquaintances.” Response options range from “*Never*” to “*Almost Always*.”

Statistical Methods—Several analyses were conducted in order to evaluate and reduce the 48-item scale, and to create the Intervention GES. These included exploratory factor analyses, descriptive analyses on individual items and subscales, internal consistency reliability analyses, and analyses to establish construct validity. The analytic approach employed was iterative—the scale was refined and finalized through repeating the same analyses until the most statistically robust and conceptually relevant scale was obtained.

An exploratory factor analysis using PCA with a varimax rotation was performed on the 48-item scale. Also, Pearson's correlations between subscales and corrected item-total correlations were examined. Items with correlations below 0.40, and with weak factor loadings (as determined by the PCA on the 48-item scale) were considered for deletion. After removing poor performing items, another PCA was conducted in order to obtain the final factor structure and internal consistency reliabilities for the final scale and subscales were computed.

Finally, construct validity (specifically convergent validity) was established by examining participants' Intervention GES scores in relationship to specific measures and subscales of measures that were hypothesized to be related to participants' perceptions of intervention group environments. The number of group sessions attended was thought to be related to Intervention GES scores as participants who perceived the group negatively may be least likely to attend. Also, because other research has demonstrated a link between increased social support and social well-being as a result of participating in positively evaluated intervention groups (Hyde et al., 2005; Maton, 1989), the relationship between these factors and Intervention GES scores was examined. A contrasted groups approach was used in evaluating construct validity. ANOVAs were conducted to compare participants with low (i.e., lowest 25% of the distribution of scores, $n = 51$), middle (middle 50% of the distribution, $n = 74$), and high (highest 25% of the distribution, $n = 54$) Intervention GES scores on each of the three measures/subscales. All analyses were conducted using SPSS.

Results—The results of the PCA on the 48-item scale suggested four subscales, with 12 items on each subscale². This was consistent with findings from the PCA on the original 90-item scale. However, some of the subscales were strongly correlated. Notably, cohesiveness was related to structure ($r = 0.76$) and constructive activity ($r = 0.77$), and structure was related to constructive activity ($r = 0.84$). All other correlations between the subscales were less than 0.45. The large correlations between the cohesiveness and structure subscales and cohesiveness and constructive activity subscales were expected, as theory supports the idea that group cohesiveness may underlie other dimensions of group environments (Yalom, 1985). However, we did not anticipate the relationship between the structure and constructive activity subscales to be so large. The correlation of 0.84 suggested that the two subscales shared more than 70% variance. Thus, these two subscales were combined into one, with the 24-item subscale being labeled *implementation and preparedness*.

After examining corrected item-total correlations and factor loadings a total of 23 items were removed from the scale because of weak correlations or loadings. Four items were removed from the *cohesiveness* subscale, 13 items were removed from the *implementation and preparedness* subscale, and six items were removed from the *counterproductive activity* subscale. The resulting 25 items make up the Intervention GES.

Final Analyses of the Intervention GES—The 25 items in the Intervention GES are presented in Table 2, as are item means, standard deviations, and item-total correlations. The means and standard deviations suggest that the responses to the items were normally positive, and did not vary greatly. However, frequencies for each of the 25 items showed that all four response options were endorsed by participants. Item-subscale correlations ranged between 0.44 and 0.71, while item-total correlations ranged from 0.34 to 0.70. Internal consistency

reliability estimates, which are also presented in Table 2, were strong. Cronbach's alpha was 0.87 for the Cohesiveness subscale, 0.90 for the implementation and preparedness subscale, and 0.80 for the counterproductive activity subscale. The alpha for the full scale was 0.92. Correlations among the final three subscales were as follows: 0.71 for cohesiveness and implementation and preparedness, -0.39 for cohesiveness and counterproductive activity, and -0.20 for implementation and preparedness and counterproductive activity.

A final PCA was conducted for the Intervention GES. The rotated factor loadings and eigenvalues for each factor can be found in Table 3. The factor solution obtained in the PCA upheld the three subscales. However, it should be noted that the PCA identified four factors with eigenvalues over 1.0, though the fourth factor was not considered to be relevant for several reasons. First, the eigenvalue of the factor was 1.1—just above the 1.0 cutoff traditionally used to identify factors—and the percentage of variance explained was low at 4%. Second, as Figure 1 shows, the scree plot of eigenvalues for the final PCA suggests a three-factor solution, as the “elbow” of the scree plot curve clearly appears after component three (Cattell, 1966). Finally, and most important, very few items loaded strongly on the fourth factor and did not fit together conceptually. Each of these reasons represented a strong argument not to include the factor in the final solution (Floyd & Widaman, 1995).

The first factor identified in the PCA represented the Implementation and Preparedness subscale. This factor accounted for 36% of variance in scores on the Intervention GES. Four items from the cohesiveness subscale and one item from the counterproductive activity subscale had loadings on this factor above .30, which is typically considered meaningful (Floyd & Widaman, 1995). However, in all but one case the items loaded higher on the factors representing the subscale in which the item was contained. The second factor identified represented the counterproductive activity subscale. This factor accounted for 12% of variance in scores. Lastly, the third factor obtained represented the cohesiveness subscale, accounting for 6% of variance in scores. As was the case for the first factor, items from the two other subscales loaded on this factor but were most strongly loaded on the factors representing the subscale of which they were part. The total variance explained by the three factors was 54%, which suggests that the factor solution is statistically robust (Streiner, 1994).

Analyses to Establish Construct Validity—In order to ascertain construct validity, participants' Intervention GES scores were examined in relation to pertinent independent variables. Mean levels of the number of group sessions attended, participants' perceptions of the perceived availability of support, and social well-being were each compared across high-, middle-, and low-scoring Intervention GES groups. See Table 4 for group means on each measure. The ANOVA comparing Intervention GES groups on number of sessions attended was significant ($F_{(2,177)} = 2.99, p = .05$), and a Tukey HSD post hoc test confirmed that there was a significant difference in the number of groups attended between the high- and low-scoring groups. Similarly, the ANOVA comparing the Intervention GES groups on social well-being was also significant ($F_{(2,171)} = 5.29, p < .01$). A Tukey HSD post hoc test showed differences in social well-being between the high- and low-scoring groups ($p < .01$), and the middle- and low-scoring groups ($p = .10$). No significant differences between groups were observed for perceived availability of support.

DISCUSSION

This research represents the initial steps in the creation of a reliable and valid measure of intervention group environments that can be used in community-based and clinical settings. The Intervention GES has been designed for the variety of types of groups used in interventions—psychotherapeutic groups, educational groups, support groups, skills-building groups, and any combination of these. The scale is brief and easy to administer, yet it is comprehensive

with three subscales tapping into different dimensions of intervention group environments. Also, the scale is based on Moos' original 90-item GES, which is perhaps the most widely used measure of group environments and has been validated through multiple research studies. As the use of group-level interventions increases in both research and applied settings, it is very important to document the possible moderators to individuals' change as a result of participating in an intervention group (Stefanek, 2004). As previous research has shown, features of group environments play an important role in determining the effectiveness of a group-level intervention (Budman et al., 1989; Choi et al., 2003; MacKenzie et al., 1987; Maton, 1988; Meredith, 1987). Thus, researchers and practitioners utilizing interventions groups may benefit from routinely asking: "How do participants' perceptions of the group environment affect their individual progress, and progress for the intervention as a whole?" Use of the Intervention GES can allow for these important questions to be answered.

The research conducted to create the Intervention GES provided preliminary evidence of reliability and validity for the new scale. The analytical approach employed in this research was iterative—analyses were conducted on two different datasets from intervention groups with similar methodologies until the most statistically robust yet simple version of scale was obtained. In the first study, the primary interest was to explore the psychometric properties of the 90-item GES, and adapt the scale to promote applicability to intervention groups. Item content was refined through adding newly created items to the scale and by changing the response format for items from True/False to a 4-point Likert scale. In using items that were most applicable to intervention group environments but that were also conceptually relevant to several different kinds of intervention groups (e.g., psychotherapeutic groups, skills-building groups, etc.), we were able to ensure that the Intervention GES could be used in a variety of group interventions. After evaluating item performance and content, a scale with 48-item and four subscales was derived. The second study sought to describe the factor structure of the new scale, examine the effectiveness of the item content, further reduce the scale, and establish construct validity. The final 25-item Intervention GES covers a broad range of potential features of intervention group environments that may impact intervention effectiveness.

Though a few of the items of the Intervention GES loaded on more than one factor in the final PCA of the scale, the final factor solution was encouraging in that it highlighted three separate but interconnected factors in the scale: implementation and preparedness, counterproductive activity, and cohesiveness. We find it interesting that of these three subscales, implementation and preparedness accounted for the most variance, as shown in Table 3. This suggests that orderliness and guidance, as provided by group leaders and members, is very important in determining participants' overall perceptions of intervention group environments. Indeed research has suggested that the way a group intervention is developed, implemented, and managed impacts the way participants view the group's atmosphere and productivity (Kulic et al., 2004). It should be noted that group cohesiveness, which has been long understood to be the most salient factor in determining the effectiveness of psychotherapeutic group interventions (Budman et al., 1989; Yalom, 1985), was the factor that explained the least variance in items making up the Intervention GES. Nonetheless, the cohesiveness subscale was significantly correlated with both the implementation and preparedness and counterproductive activity subscales. This suggests that group cohesion has a role in shaping participants' responses on items from each of the three subscales but that it does not in essence define the intervention group environment.

The three subscales that were obtained in our analyses may result from this study's aim to produce a scale that can be used across different types of intervention groups. They provide a contrast to dimensions of group environments obtained in studies of scales used to measure perceptions of specific types of groups. For example, factor analysis of the short form of MacKenzie's (1983) Group Climate Questionnaire, which was designed specifically for

psychotherapeutic groups, resulted in three subscales. These subscales were (a) engagement, (b) avoidance, and (c) conflict. Similarly, a factor analysis of a scale used to assess the group climate of a skills training group aimed at helping participants enter the job market revealed five subscales: (a) supportive leadership, (b) positive leader perception, (c) open group climate, (d) positive group perception, and (e) job-search efficacy (Choi et al., 2003). The findings from the factor analyses of these different but related measures share commonalities with the Intervention GES, which arguably could produce reliable and valid estimates of perceptions of both types group environments (i.e., psychotherapeutic and skills training). Conversely, one could posit that due to the specificity of its content, the Group Climate Questionnaire could not reliably assess participant's perceptions of skills training groups. Likewise, the skills training group measure may not be able to reliably assess perceptions of psychotherapeutic groups. Thus, because of its broad applicability to various types of intervention groups, we perceived a great deal of utility in using the Intervention GES to measure group environments.

It should be noted that we were able to establish construct validity through our analyses. We examined convergent validity, a form of construct validity, by examining differences between low-, middle-, and high-scoring Intervention GES groups on key variables thought to be related to perceptions of group environments. The findings showed that participants who were in the high-scoring category attended more group sessions and felt higher levels of social well-being than participants in the low-scoring category. One might expect that participants who perceived a more positive group environment attended more group sessions than participants who did not—participants are more likely to consistently attend groups when they enjoy the atmosphere and feel comfortable participating (Mancowski, Humphreys, & Moss, 2001). Similarly, we expected participants with positive feelings about the intervention group environment to experience higher levels of social well-being than participants with less positive feelings, as this has been confirmed in prior research (Maton, 1989). Thus, these findings serve as preliminary support to the validity of the Intervention GES. We did not find it surprising that perceptions of social support did not differ among the low-, middle-, or high-scoring groups as existing sources of social support may not have been likely to change as a result of perceiving the group environment to be positive. However, these findings may have been different if our intervention groups explicitly sought to build support networks and/or foster lasting friendships among group members.

While the findings obtained in our studies give some indication that the psychometric properties of the Intervention GES are statistically robust, further studies are required to fully examine factor structure, reliability, and validity of the scale. Likewise, there are some limitations to the current research, and ensuing implications for future work. A major limitation of the research is linked to the sample sizes used in the two studies, which were small compared to those normally used in scale development research. The findings obtained here need to be replicated with other larger samples of intervention group participants. We should note, however, that community-based samples, which were used in this research, are often smaller than those used in large-scale psychometric studies. Because the Intervention GES was designed for use with both community-based and clinical populations, we believe that the work is has a great deal of utility in spite of the small sample sizes. There are other limitations that should also be addressed. First, most of the participants in our two studies endorsed response options at the higher end of the Likert scale used for the Intervention GES items. While most interventions aim to create group environments that participants will endorse positively, it may be important for future research to incorporate data from participants who are dissatisfied with the intervention groups in which they participate. Second, while in some respects participants in Study 1 and Study 2 had very different psychological stressors (bereavement in Study 1 versus childhood sexual abuse in Study 2), participants in both studies shared many similar stressors, such as HIV-infection, minority race/ethnicity and living in a low-income, urban environment. Additionally, the three separate group interventions represented in these studies

also shared similarities. The applicability of the Intervention GES should be examined with participants with varied mental and physical health backgrounds, and with a wider variety of intervention groups. Third, we were only able to establish convergent validity in this study. Discriminate validity, another form of construct validity, should be examined in future research. Also, more data is needed on criterion validity. For instance, participant responses were based on self-report, and no data were obtained on the group environment from other perspectives, such as group leaders or independent observers. Finally, the analyses conducted in this research were all exploratory. Future research should confirm the factor structure of the Intervention GES using confirmatory factor analysis.

In conclusion, the Intervention GES shows promise for evaluating the perceived environment in intervention groups. Despite the widespread use of such groups, there exists limited research on the group environment in intervention research. This research contributes to the dearth of work, and puts forth a tool that researchers and practitioners can begin to use to describe and evaluate intervention groups.

Acknowledgements

This research was supported by grants RO1-MH62965, RO1-MH54958 (both awarded to Kathleen J. Sikkema, Ph.D.), P30-MH62294 (Center for Interdisciplinary Research on AIDS, awarded to Michael Merson, M.D.), and T32-MH20031 from the National Institute of Mental Health. The authors gratefully acknowledge our community collaborations with the AIDS Resources Center for Wisconsin, the Madison AIDS Support Network, and the Callen-Lorde Community Health Center in New York City. The authors also acknowledge Nathan Smith, Ph.D., Ashley Fox, and Amanda Brye for their assistance in conducting this research.

REFERENCES

- Barker, RG. Ecological psychology. Stanford: Stanford University Press; 1968.
- Barker, RG. Theory of behavior settings. In: Barker, RG., editor. *Associates, Habitats, Environments and Human Behavior*. San Francisco: Jossey-Bass; 1978. p. 213-228.
- Budman SH, Soldz S, Demby A, Feldstein M, Springer T, Davis MS. Cohesion, alliance and outcome in group psychotherapy. *Psychiatry* 1989;52:339–350. [PubMed: 2772092]
- Burlingame GM, Fuhrman A, Mosier J. The differential effectiveness of group psychotherapy: A meta-analytic perspective. *Group Dynamics: Theory, Research, & Practice* 2003;7(1):3–12.
- Burlingame, G.; Mackenzie, KR.; Strauss, B. Small-group treatment: Evidence for effectiveness and mechanisms of change. In: Lambert, M., editor. *The bergin and garfield handbook of psychotherapy and behavior change*. 5th ed.. New York: Wiley; 2003. p. 647-696.
- Cattell RB. The scree test for the number of factors. *Multivariate Behavioral Research* 1966;1:245–276.
- Choi JN, Price RH, Vinokur AD. Self-efficacy changes in groups: Effects of diversity, leadership, and group climate. *Journal of Organizational Behavior* 2003;24:357–372.
- Faris AS, Brown JM. Addressing group dynamics in a brief motivational intervention for college student drinkers. *Journal of Drug Education* 2003;33(3):289–306. [PubMed: 15022862]
- Floyd FJ, Widaman KF. Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment* 1995;7(3):286–299.
- Goetzel RZ. Evaluating self-help support groups for medical students. *Journal of Medical Education* 1984;59(4):331–340. [PubMed: 6708071]
- Hartsough CS, Davis JM. Dimensions of the Group Environment Scale. *American Journal of Community Psychology* 1986;14(4):371–376. [PubMed: 3752006]
- Holtgrave, DR.; Pinkerton, SD. The cost-effectiveness of small group and community-level interventions. In: Holtgrave, DR., editor. *Handbook of economic evaluation of HIV prevention programs: AIDS prevention and mental health*. New York: Plenum; 1998. p. 119-126.
- Hyde J, Appleby PR, Weiss G, Bailey J, Morgan X. Group-level intervention for persons living with HIV: A catalyst for individual change. *AIDS Education & Prevention* 2005;17:53–65. [PubMed: 15843117]

- Kulic KR, Horne AM, Dagley JC. A comprehensive review of prevention groups for children and adolescents. *Group Dynamics: Theory, Research, & Practice* 2004;8(2):139–151.
- Lazarus, R.; Folkman, S. *Stress, appraisal, and coping*. New York: Springer; 1984.
- MacKenzie KR. Measurement of group climate. *International Journal of Group Psychotherapy* 1981;31(3):287–295. [PubMed: 7263113]
- MacKenzie, KR. The clinical application of a group climate measure. In: Dies, RR.; MacKenzie, KR., editors. *Advances in group psychotherapy: Integrating research and practice*. Madison, CT: International Universities Press; 1983. p. 159–170.
- MacKenzie KR, Dies RR, Coché E, Rutan JS, Stone WN. An analysis of AGPA institute groups. *International Journal of Group Psychotherapy* 1987;37(1):55–74. [PubMed: 3557764]
- Mackenzie KR, Livesley WJ. Outcome and process measures in brief group psychotherapy. *Psychiatric Annals* 1986;16(12):715–720.
- Mankowski ES, Humphreys K, Moos RH. Individual and contextual predictors of involvement in twelve-step self-help group after substance abuse treatment. *American Journal of Community Psychology* 2001;29(4):537–563. [PubMed: 11554152]
- Maton KI. Social support, organizational characteristics, psychological well-being, and group appraisal in three self-help group populations. *American Journal of Community Psychology* 1988;16(1):53–77. [PubMed: 3369383]
- Maton KI. Community settings as buffers of life stress? High supportive churches, mutual help groups, and senior centers. *American Journal of Community Psychology* 1989;17:203–232.
- Meredith GM. Attributes of group atmosphere as predictors of students' satisfaction in seminar format classes. *Psychological Reports* 1987;61:79–82.
- Meredith GM, Schmitz ED. Structure of the Group Environment Scale in a seminar-format educational setting. *Perceptual & Motor Skills* 1986;63:831–834.
- Moos, R. *Group environment scale manual*. 2nd ed.. Palo Alto: Consulting Psychologists Press; 1986.
- Moos, R. *Group environment scale manual: Development, applications, research*. 3rd ed.. Palo Alto: Consulting Psychologists Press; 1994.
- Obrien K, Wortman CB, Kessler RC, Joseph JG. Social relationships of men at risk for AIDS. *Social Science and Medicine* 1993;36:1161–1167. [PubMed: 8511645]
- Ogrodniczuk JS, Piper WE. The effect of group climate on outcome in two forms of short-term group therapy. *Group Dynamics: Theory, Research, & Practice* 2003;7(1):64–76.
- Peterman AH, Cella D, Mo F, McCain N. Psychometric validation of the revised functional assessment of human immunodeficiency virus infection (FAHI) quality of life instrument. *Quality of Life Research* 1997;6:572–584. [PubMed: 9330556]
- Sherman AC, Mosier J, Leszsz M, Burlingame GM, Ulman KH, Cleary T, et al. Group interventions for patients with cancer and HIV disease: Part I: effects of psychosocial and functional outcomes at different phases of illness. *International Journal of Group Psychotherapy* 2004;54(1):29–82. [PubMed: 14986573]
- Spaccarelli S. Stress, appraisal, and coping in child sexual abuse: A theoretical and empirical review. *Psychological Bulletin* 1994;116(2):340–362. [PubMed: 7972595]
- Stefanek M. Commentary on group interventions for patients with cancer and HIV disease. *International Journal of Group Psychotherapy* 2004;54(4):569–574.
- Sikkema KJ, Hansen NB, Kochman A, Tate DC, Difranceisco W. Outcomes from a randomized controlled trial of a group intervention for HIV positive men and women coping with AIDS-related loss and bereavement. *Death Studies* 2004;28(3):187–209. [PubMed: 15053030]
- Sikkema KJ, Hansen NB, Tarakeshwar N, Kochman A, Tate DC, Lee RS. The clinical significance of change in trauma-related symptoms following a pilot group intervention for coping with HIV/AIDS and childhood sexual trauma. *AIDS and Behavior* 2004;8:277–291. [PubMed: 15475675]
- Sikkema KJ, Hansen NB, Meade CS, Kochman A, Lee RS. Improvements in health-related quality of life following a group intervention for coping with AIDS-bereavement among HIV-infected men and women. *Quality of Life Research* 2005;14:991–1005. [PubMed: 16041896]
- Simonton S, Sherman AC. An integrative model of group therapy for cancer patients. *International Journal of Group Psychotherapy* 2000;50:487–506. [PubMed: 11004771]

Streiner DL. Figuring out factors: The use and misuse of factor analysis. *Canadian Journal of Psychiatry* 1994;39:135–140.

Yalom, ID. *The theory and practice of group psychotherapy*. 3rd ed.. New York: Basic Books; 1985.

Figure 1.
Scree plot of eigenvalues from principal components analysis of Intervention GES.

Table 1

Demographic Characteristics of Study Participants in Intervention Arms of Bereavement and Trauma Samples

Variable	Bereavement sample (N = 139)	Trauma sample (N = 195)
1. Age	Mean = 40.3, SD = 6.8	Mean = 43.3, SD = 7.4
2. Gender		
<i>Male</i>	62%	48%
<i>Female</i>	37%	51%
<i>Transgender</i>	1%	1%
3. Sexual orientation		
<i>Heterosexual</i>	51%	44%
<i>Gay/Lesbian</i>	40%	43%
<i>Bisexual</i>	9%	13%
4. Years of education	Mean = 12.7, SD = 2.2	Mean = 12.2, SD = 2.4
5. Ethnicity		
<i>White</i>	26%	10%
<i>African-American</i>	52%	70%
<i>Hispanic</i>	16%	15%
<i>Native American</i>	1%	2%
<i>Asian/Pacific Islander</i>	1%	0%
<i>Other</i>	4%	3%
6. Annual income		
<\$10,000	63%	66%
\$10,000–19,999	30%	27%
>\$20,000	7%	7%

Table 2
Item Means, Standard Deviations, Correlations, and Alphas for the Intervention GES

Item wording	Mean (SD)	Item-subscale correlation	Item-total correlation
<i>Cohesiveness subscale</i> ($\alpha = 0.87$)			
1. Group members feel a sense of belongingness to the group.	3.64 (0.62)	0.54	0.59
2. Group member feel close to each other.	3.35 (0.75)	0.70	0.61
3. The group is a good place to make friends.	3.42 (0.77)	0.69	0.61
4. Group members show that they care for one another. ^a	3.67 (0.57)	0.66	0.70
5. Group members are committed to the group. ^a	3.24 (0.85)	0.51	0.51
6. Group members can understand what others in the group are going through. ^a	3.60 (0.67)	0.56	0.53
7. Group members are supportive of one another. ^a	3.72 (0.54)	0.67	0.70
8. The atmosphere of the group is a friendly one. ^b	3.74 (0.53)	0.61	0.60
<i>Implementation & Preparedness subscale</i> ($\alpha = 0.90$)			
9. The leaders provide direction for the group. ^b	3.81 (0.49)	0.68	0.51
10. The leaders are prepared for each group session. ^b	3.70 (0.60)	0.71	0.62
11. Group members come prepared for each session. ^a	3.34 (0.81)	0.55	0.58
12. The rules of the group are clearly understood by the members.	3.74 (0.59)	0.71	0.68
13. The activities of the group are carefully planned.	3.54 (0.74)	0.66	0.48
14. The group has an agenda for each meeting.	3.44 (0.83)	0.57	0.41
15. Group activities are easy to follow. ^b	3.63 (0.65)	0.65	0.59
16. Group members are encouraged to act independently.	3.53 (0.71)	0.58	0.45
17. The group concentrates on dealing with every day problems.	3.53 (0.70)	0.58	0.50
18. Group members learn new ways of solving problems. ^b	3.68 (0.57)	0.62	0.63
19. Group members encourage each other in reaching their goals. ^a	3.68 (0.57)	0.63	0.62
<i>Counterproductive Activity subscale</i> ^c ($\alpha = 0.80$)			
20. The atmosphere of the group is often hostile. ^a	3.26 (0.94)	0.53	0.34
21. Group members sometimes yell at each other.	3.03 (1.09)	0.57	0.35
22. Group members are engaged in petty quarrels with one another.	3.00 (0.99)	0.65	0.34
23. Sometimes it is hard to tell what is going on in the group.	3.15 (0.99)	0.44	0.40
24. A lot of members just seem to be passing time in group.	2.78 (1.01)	0.48	0.42
25. There seems to be a lot of tension between group members. ^b	3.17 (0.94)	0.63	0.45

Note. Alpha for full scale = 0.92.

^a newly created item.

^b reworded item from Moos' original GES.

^c items in the subscale were reverse coded.

Table 3

Rotated Factor Loadings From Principal Components Analysis Of Items in the Intervention GES

Short item wording	Factor 1 implementation & preparedness	Factor 2 counterproductive activity	Factor 3 cohesiveness
1. Members feel sense of belongingness	.41	-.11	.30
2. Members feel close to each other	.18	-.16	.75
3. Good place to make friends	.16	-.13	.70
4. Members show they care	.59	-.21	.50
5. Members committed to group	.12	-.13	.31
6. Members can understand others	.22	-.05	.29
7. Members supportive	.49	-.25	.56
8. Friendly atmosphere	.38	-.20	.63
9. Leaders provide direction	.78	-.06	-.07
10. Leaders prepared	.76	-.14	.12
11. Group members prepared	.39	-.08	.06
12. Rules clearly understood	.73	-.21	.26
13. Activities carefully planned	.66	.17	.26
14. Group has an agenda	.67	.15	.16
15. Group activities easy to follow	.60	-.10	.01
16. Members act independently	.66	.02	.07
17. Group concentrates on problems	.67	-.03	.19
18. New ways of solving problems	.54	-.10	.30
19. Members encourage each other	.57	-.10	.34
20. Atmosphere hostile	.07	.63	-.31
21. Members yell at each other	-.02	.78	.07
22. Engage in petty quarrels	.01	.81	-.07
23. Hard to tell what is going on	-.30	.58	-.13
24. Members passing time	-.00	.54	-.12
25. Tension between group members	-.05	.75	-.14
Eigenvalue	8.99	2.99	1.56
variance accounted for	36%	12%	6%

Table 4
Descriptive Statistics for Measures Used to Establish Construct Validity

Measure	High-scoring group (n = 54)	Middle-scoring group (n = 74)	Low-scoring group (n = 51)	F-test
Number of group sessions attended				
<i>Mean</i>	11.94	11.15	10.55	
<i>Standard deviation</i>	2.91	2.66	3.32	
				F(2,177) = 2.99 *
Perceived availability of support				
<i>Mean</i>	30.08	29.04	27.86	
<i>Standard deviation</i>	6.82	5.31	4.78	
				F(2,171) = 1.90
Social well-being				
<i>Mean</i>	21.68	19.63	16.59	
<i>Standard deviation</i>	8.34	8.11	6.96	
				F(2,171) = 5.29 **

*
 $p = .05$

**
 $p = .01$.