Group Size, Group Development, and Group Productivity

Susan A. Wheelan

Small Group Research 2009; 40; 247 originally published online Jan 6, 2009;
DOI: 10.1177/1046496408328703

Small Group Research
Volume 40 Number 2
April 2009 247-262

10.1177/1046496408328703
http://sgr.sagepub.com
hosted at
http://online.sagepub.com

Group Size, Group Development, and Group Productivity

Susan A. Wheelan
GDQ Associates, Inc.

This research investigated the impact of small and large work groups on developmental processes and group productivity. There were 329 work groups operating in for-profit and nonprofit organizations across the United States in this study. Groups containing 3 to 8 members were significantly more productive and more developmentally advanced than groups with 9 members or more. Groups containing 3 to 6 members were significantly more productive and more developmentally advanced than groups with 7 to 10 members or 11 members or more. The groups with 7 to 10 members or 11 members were not different from each other. Finally, groups containing 3 to 4 members were significantly more productive and more developmentally advanced on a number of measures than groups with 5 to 6 members. Work-group size is a crucial factor in increasing or decreasing both group development and productivity.

Keywords: *work groups; size; group development; group productivity*

The purpose of this research was to investigate developmental processes and perceived productivity in small and large face-to-face work groups. Research on the effect of size on group processes and dynamics has been ongoing for many years. A brief summary of those findings is provided next.

Group Size

A number of research investigations have focused on the effect of group size on member cohesion and intimacy (Bogart & Lundgren, 1974; Fisher, 1953; Seashore, 1954). The findings indicated that as size increased, cohesion and intimacy decreased. Members of larger groups perceived those groups to be more competitive, less unified, and more argumentative. As group size increased, member satisfaction decreased (Steiner, 1972).

The effect of group size on the participation levels of individual members also has been investigated (Bales & Borgatta, 1966; Bales, Mills, Roseborough, & Strodtbeck, 1951; Callahan, Owen, & Renzulli, 1974; Diehl & Strobe, 1987; Gentry, 1980; Hare, 1952; Hawkins, 1962; Kelley & Thibault, 1954; Schneider & Zimet, 1969). All of these studies reported that as group size increased, the amount of communication initiated by individual members decreased.

Gibb (1951) found that as size increased members reported more feelings of threat and inhibition. More disagreements and dissatisfaction with the group were found in larger versus smaller groups as well (Berkowitz, 1958; Slater, 1958).

This brief review suggests considerable consensus with regard to the influence of group size on these processes. Intimacy and cohesion, member satisfaction, participation, and expressed disagreement are all affected by increased group size. However, research findings on the influence of group size on productivity and effectiveness remain equivocal. Some studies concluded that small groups are more efficient and productive than large groups (Gibb, 1951; Gist, Locke, & Taylor, 1987; Laughlin, Hatch, Silver, & Boh, 2006; Orpen, 1986; Wheelan & McKeage, 1993). Other studies found that as size increased, productivity and performance increased as well (Fink & Thomas, 1963; Fox, Herrold, Lorge, & Weltz, 1953). Wanous and Youtz (1986) concluded that increased size broadened solution diversity, which in turn led to better decisions and enhanced productivity. Finally, a number of studies reported no differences in the quality of solutions or productivity in small groups versus large groups (Cummins & King, 1973; Dickinson & Stoneman, 1989; Kidd, 1958; Lorge & Solomon, 1959, 1960).

In an attempt to resolve these contradictory results, some researchers have proposed that the influence of size on group productivity depends on the type of task a group is working on (Anderson & Frank, 1971; Littlepage & Silbiger, 1992; Shaw, 1976; Steiner, 1972). Galvanovskis and Nemov (1982) suggested that the relationship between group size and performance may be a function of a group's developmental level. One study pursued this possibility and tentatively confirmed that relationship (Wheelan & McKeage, 1993). However, the groups in the study met for only 6 days.

In evaluating the research in this area, a number of issues emerged. Most of the research studies on the effect of group size were conducted in laboratory settings with groups that met only once or in educational settings. College, or graduate, students were disproportionately represented in these studies as a result. Reliance on laboratory studies as a means of learning

about work groups has been criticized because real groups may operate quite differently (Shaw, 1981; Steiner, 1986; Wheelan, 2005). Also, most previous studies investigated groups where size varied from 2 to 8 members. Naturally occurring groups, such as staff, board, managerial, or leadership groups, tend to be larger.

This study will investigate the relationship between group size, group development, and productivity utilizing workplace groups of various sizes that have been meeting for at least 6 months.

Group Development

The concept of group development is well documented in the literature (e.g., Bennis & Shepard, 1956; Bion, 1961; Mann, 1966; Wheelan, 2005). Researchers have conducted extensive reviews of the literature to consolidate previous work and to propose a unified model of group development (e.g., Tuckman, 1965; Tuckman & Jensen, 1977; Wheelan, 2005). A brief description of the integrated model of group development (Wheelan, 2005) follows. The validity of the integrated model has been established in a number of investigations (Verdi & Wheelan, 1992; Wheelan & Abraham, 1993; Wheelan, Davidson, & Tilin, 2003; Wheelan & Krasick, 1993; Wheelan & McKeage, 1993).

The first stage of group development, dependency and inclusion, is characterized by significant member dependency on the designated leader, concerns about safety, and inclusion issues. In Stage 1, members rely on the leader to provide direction. Group members may engage in activities such as exchanging stories about outside events or other activities that are not relevant to group goals. During this stage, members tend to agree with the suggestions made by the leader. Productivity levels during Stage 1 tend to be low.

The second stage of group development is referred to as a period of counterdependency and fight. At Stage 2, members disagree among themselves about group goals and procedures. Conformity with emerging group norms, evident at Stage 1, decreases. Conflict is an inevitable part of this stage. The group's task is to develop a unified set of goals, values, norms, and operational procedures. That task inevitably generates some conflict, which is necessary for the establishment of trust and a climate in which members feel free to disagree with each other.

If the group manages to work through the inevitable conflicts of Stage 2, member trust, commitment to the group, and willingness to cooperate increase. Also, communication becomes more open and task oriented.

Stage 3 of group development, trust and structure, is characterized by mature negotiations about roles, organization, and procedures. Stage 3 also is a time in which members work to solidify positive work relationships with each other. Member conformity with group goals and norms increases during Stage 3 because consensus about these goals and norms has been achieved. Group productivity begins to increase as well.

The fourth, or work, stage of group development is a time of intense productivity and effectiveness. Having resolved many of the issues of the previous stages, the group can focus most of its energy on goal achievement and task accomplishment.

Group Productivity

Groups that function at the higher stages of development are more productive. Links between the stage at which a work group is functioning and that group's productivity have been established in a number of studies. For example, members of undergraduate cohort groups functioning at higher stages of group development earned higher grade point averages than did members of cohort groups functioning at lower stages of development (Wheelan & Lisk, 2000). Financial teams functioning at higher stages of group development generated more revenue in less time, and were rated more positively with regard to customer service (Wheelan & Furbur, 2006; Wheelan, Murphy, Tsumura, & Fried Kline, 1998). Intensive care units functioning at higher stages of group development had better patient outcomes than did other intensive care units (Wheelan, Burchill, & Tilin, 2003). Students whose faculty groups function at the higher stages of group development performed better on statewide standardized tests (Wheelan & Kesselring, 2005; Wheelan & Tilin, 1999).

Not all groups reach the higher stages of group development, however (Gabarro, 1987; Goodacre, 1951; Zurcher, 1969). Some groups remain stuck in, or regress to, earlier stages of development. Such groups are less productive and have less influence over member behaviors and attitudes.

Since the effect of size on work-group development and productivity has received little attention, this study investigates these factors. Specifically, the research addressed the following questions:

RQ1: Are there significant differences in certain individual or organizational demographics in these small and large work groups that might account for differences in member perceptions of group development, effectiveness, and productivity?

RQ2: Are there significant differences between member perceptions of group development, group effectiveness, and productivity in small and large work groups?

Method

Participating Groups

There were 329 work groups in this study. These groups were selected from a larger database containing hundreds of groups. The criterion for selection for this study was that groups must have been meeting for 6 months or more. Research has demonstrated that groups develop across time. In general, it takes about 6 months to traverse the stages of group development (Wheelan, Davidson et al., 2003). Therefore, to avoid confusing normal developmental shifts in the early months of group life with the effects of group size, only groups that had been meeting for 6 months or more were included in this study. Of course, like people, some groups do not move through the developmental stages within that time frame. This study sought to determine what effect group size might have in delaying, or arresting, group development and reducing member perceptions of effectiveness and productivity.

Of the 329 work groups, 186 (56.5%) were functioning in for-profit organizations and 143 groups (43.5%) were functioning in nonprofit organizations. The groups ranged in size from 3 to 25 members. There were a total of 2,623 people in these groups. Forty-six groups (14%) failed to report the number of males, females, or both. Based on the 283 remaining groups, 55% of the members were female and 45% were male. Work groups had been meeting without significant change in membership for a period of 6 months to 20 years.

The groups in this study were middle management teams and project teams. The tasks that these groups were working on were different in content but similar in process. Based on Steiner's (1972) model, the tasks were divisible. That is, subtasks could be accomplished by subgroups or individuals. Tasks also were optimizing since quality was important. Finally, these groups were discretionary. That is, members and the leader could choose their own method of combining member inputs. Examples of tasks include developing a plan to improve postoperative care, coordinating curriculum, and reducing the amount of time needed to complete a transaction.

Data were collected from each of the groups at its work site. Team consultants, trained to administer the Group Development Questionnaire (GDQ; Wheelan & Hochberger, 1996), collected the data and submitted it to the database.

Table 1
Sample Items Contained in GDQ (Group Development Questionnaire) Scales

Scale	Sample Questions
GDQI	Members tend to go along with whatever the leader suggests. There is very little conflict expressed in the group. We haven't discussed our goals very much.
GDQII	People seem to have very different views about how things should be done in this group. Members challenge the leader's ideas. There is quite a bit of tension in the group at this time.
GDQIII	The group is spending its time planning how it will get its work done. We can rely on each other. We work as a team. The group is able to form subgroups, or subcommittees, to work on specific tasks.
GDQIV	The group gets, gives, and uses feedback about its effectiveness and productivity. The group acts on its decisions. This group encourages high performance and quality work.

Note: GDQI = scale I (dependency and inclusion); GDQII = scale II (counterdependency and fight); GDQIII = scale III (trust and structure); GDQIV = scale IV (work).

The Group Development Questionnaire

Based on the Integrated Model of Group Development (Wheelan, 2005), the 60-item GDQ contains four scales that correspond to the first four stages of group development: Stage 1: dependency and inclusion; Stage 2: counterdependency and fight; Stage 3: trust and structure; and Stage 4: work. Each scale contains 15 items.

Scale I measures the amount of energy a group is expending in attempting to deal with issues of dependency and inclusion. Items were designed to identify the presence or absence of the characteristic behaviors of groups at this first stage of development. Scale II seeks to ascertain the degree of group focus on issues of conflict, counterdependency, and other characteristics associated with the second stage of development. The third scale assesses the degree of trust and structure that is present in the group. Scale III, then, is related to issues associated with the third stage of group development. The characteristics of the fourth developmental stage of work are assessed by scale IV. Table 1 contains sample items from each GDQ scale.

Each item is scored from 1 (*never true of this group*) to 5 (*always true of this group*). Therefore, the minimum score on each scale is 15 and the maximum score is 75. An effectiveness ratio also is determined by dividing a team's actual mean score on GDQ scale IV by its potential maximum score (75). The minimum effectiveness ratio, then, is 20% and the maximum is 100%. A group's productivity mean represents the average response to the question "In your opinion, how productive is this group?" Respondents rate the group from 1 (*not productive at all*) to 4 (*very productive*).

To ensure the reliability and validity of the GDQ, the instrument has been subjected to a number of statistical tests (Wheelan & Hochberger, 1996). Test-retest correlations for each scale ranged from .69 to .89. All correlations were significant. The internal consistency of each 15-item scale was investigated using Cronbach's alpha. Coefficients ranged from .54 to .88 and all alpha coefficients were significant. To establish concurrent validity the GDQ was correlated with the Group Attitude Scale (GAS; Evans & Jarvis, 1986), which measures member attraction to the group. Results indicated that the concurrent validity of the GDQ and GAS is in the moderate range with a significant positive correlation ($r = .48$, $p = .03$) between the two measures overall.

Criterion-related validity also was investigated. Work groups that ranked high on organizational measures of productivity had significantly higher scores on GDQ scales III and IV, the effectiveness ratio, and the productivity mean than groups that ranked low on these external productivity measures. Likewise, groups ranked high on organizational measures of productivity had significantly lower scores on GDQ scales I and II (Wheelan, Burchill, et al., 2003; Wheelan & Kesselring, 2005; Wheelan & Lisk, 2000; Wheelan et al., 1998; Wheelan & Tilin, 1999).

Procedures

All 2,623 members of the 329 work groups included in this study completed the GDQ. Productivity and effectiveness scores, and scores on each scale of the GDQ, were calculated for each individual. Mean group scores also were calculated. Based on these group scores, each group's stage of development was determined. Of the 329 work groups, 65 groups were perceived by their members to be functioning at Stage 1, 63 groups were perceived to be functioning at Stage 2, 106 groups were perceived to be functioning at Stage 3, and 95 groups were perceived to be functioning at Stage 4.

Results

To answer RQ1 about the influence of individual and organizational demographics on member perceptions of group development, effectiveness, and productivity, three variables that potentially could influence member perceptions of group development and productivity were investigated. These variables were: (a) the number of months that a group had been meeting (group age); (b) the number of females and males in a group; and (c) whether the group was operating in a for-profit or in a nonprofit organization.

ANOVA revealed no significant differences between group age and GDQ scale scores, the effectiveness ratio, or the productivity mean. A total of 283 groups reported the number of males and females in the group. The data were divided into three categories: (a) groups that contained more males than females, (b) groups that contained more females than males, (c) groups that had an equal number of males and females. No significant differences were noted between these categories and GDQ scale scores, the effectiveness ratio, or the productivity mean.

No significant differences were noted between groups operating in for-profit and nonprofit organizations and mean scores on GDQ scale I, III, IV, the effectiveness ratio, or the productivity mean. However, a significant difference, $F(1, 327)= 6.77$, $p = .01$, was noted on GDQ scale II, which measures Stage 2, the counterdependency and fight stage of group development. Members of for-profit work groups perceived significantly more conflict among members and disagreement with the leader than did members of nonprofit work groups.

To answer RQ2 about the influence of group size on member perceptions of group development, effectiveness, and productivity, ANOVAs were conducted. Based on the conclusions of other studies (e.g., Hackman and Vidmar, 1970; Orpen, 1986), in the first analysis, groups with 3 to 8 members were compared with groups that contained 9 or more members. Significant differences were noted, $F(1, 327) = 23.12$, $p = .0001$, between the small and large work groups on GDQ scale I (dependency and inclusion). Members of groups that contained 9 or more members perceived more dependence on the leader, inclusion, and safety issues than did members of smaller groups. Likewise, significant differences were noted, $F(1, 327) = 21.86$, $p = .0001$, between the small and the large groups on GDQ scale II (counterdependency and fight). Members of groups that contained 9 or more members perceived more conflict with the leader and among members than did members of smaller groups.

Significant differences also were noted, $F(1, 237) = 11.86$, $p = .001$, between the small and large work groups on GDQ scale III (trust and structure).

Members of groups that contained 9 or more members perceived less trust and less structure and organization within the group than did members of smaller groups. Likewise, significant differences were noted, $F(1, 327) = 11.53$, $p = .0001$, between the small and large groups on GDQ scale IV (work). Members of groups that contained 9 or more members perceived less focus on work in their groups than did members of smaller groups. Finally, members of larger groups perceived their groups as less effective, $F(1, 327) = 13.97$, $p = .0001$, and less productive, $F(1, 327) = 13.97$, $p = .0001$, than members of smaller groups did (see Table 2).

In the second analysis of variance, groups containing 3 to 6 members, 7 to 10 members, and 11 or more members were compared. Significant differences were noted, $F(2, 326) = 6.96$, $p = .001$, among the three sets of groups on GDQ scale I (dependency and inclusion). Likewise, significant differences were noted, $F(2, 326) = 12.22$, $p = .0001$, among the three sets of groups on GDQ scale II (counterdependency and fight).

Significant differences also were noted, $F(2, 326) = 6.21$, $p = .002$, among the three sets of groups on GDQ scale III (trust and structure). Likewise, significant differences were noted, $F(2.326) = 5.79$, $p = .003$, among the three sets of groups on GDQ scale IV (work). Finally, significant differences were noted among the three sets of groups on the effectiveness ratio, $F(2, 326) = 8.36$, $p = .0001$, and the productivity mean, $F(2, 326) = 3.08$, $p = .047$; see Table 3.

Tukey's post hoc results for GDQ scale scores (I-IV), the effectiveness ratio, and productivity mean indicated that the set of groups that contained 3 to 6 members was significantly different from the set of groups that contained 7 to 10 members and the set of groups that contained 11 or more members on all measures. However, the set of groups that contained 7 to 10 members and the set of groups that contained 11 or more members were not significantly different from each other.

In the two sets of work groups containing 7 to 10 members and 11 or more members, 48% of the groups were perceived to be in either stage 1 or 2 and 52% in stage 3 and stage 4. In contrast, members of work groups containing 3 to 6 members perceived only 27% of the groups to be in stage 1 or 2 and 73% in stage 3 and stage 4.

A third ANOVA compared groups containing 3 to 4 members and 5 to 6 member. No significant differences were noted between the two sets of groups on GDQ scale I (dependency and inclusion) and GDQ scale III (trust and structure). Significant differences were noted, $F(1, 136) = 9.269$, $p = .003$, between the two sets of groups on GDQ scale II (counterdependency and fight). Significant differences also were noted, $F(1, 136) = 4.004$,

Table 2
Analysis of Variance for GDQ (Group Development Questionnaire) Scales, Effectiveness Ratio, and Productivity Mean in Work Groups of 3 to 8 Members vs. Work Groups of 9 or More Members

	Sum of Squares	*df*	Mean Square	*F*	Significance
GDQI					
Between groups	306.794	1	306.794	23.124	0.0001
Within groups	4325.191	326	13.267		
Total	4631.985	327			
GDQII					
Between groups	1385.552	1	1385.552	21.857	0.0001
Within groups	20665.980	326	63.393		
Total	22051.533	327			
GDQIII					
Between groups	462.035	1	462.035	11.859	0.001
Within groups	12701.064	326	38.960		
Total	13163.099	327			
GDQIV					
Between groups	517.625	1	517.625	11.530	0.001
Within groups	14635.920	326	44.895		
Total	15153.545	327			
Effectiveness ratio					
Between groups	1109.639	1	1109.639	13.969	0.0001
Within groups	25896.111	326	79.436		
Total	27005.750	327			
Productivity mean					
Between groups	1.252	1	1.252	5.002	0.026
Within groups	81.124	324	0.250		
Total	82.376	325			

Note: GDQI = scale I (dependency and inclusion); GDQII = scale II (counterdependency and fight); GDQIII = scale III (trust and structure); GDQIV = scale IV (work).

$p = .047$, between the two sets of groups on GDQ scale IV (work). Finally, significant differences were noted between the two sets of groups on the effectiveness ratio, $F(1, 136) = 3.998$, $p = .048$, and the productivity mean, $F(1, 136) = 1.120$, $p = .037$; see Table 4.

Discussion

The results of this field study strongly suggest that work group size is linked with group development and group productivity. In the first analysis,

Table 3
Analysis of Variance for GDQ (Group Development Questionnaire) Scales, Effectiveness Ratio, and Productivity Mean in Work Groups of 3 to 6 Members vs. Work Groups of 7 to 10 Members vs. Work Groups of 11 or More Members

	Sum of Squares	*df*	Mean Square	*F*	Significance
GDQI					
Between groups	191.278	2	95.639	6.956	0.001
Within groups	4481.996	326	13.748		
Total	4673.275	328			
GDQII					
Between groups	1540.079	2	770.039	12.220	0.0001
Within groups	20543.357	326	63.016		
Total	22083.436	328			
GDQIII					
Between groups	484.069	2	242.035	6.214	0.002
Within groups	14633.821	326	38.951		
Total	15153.722	328			
GDQIV					
Between groups	519.901	2	259.950	5.791	0.003
Within groups	14635.920	326	44.889		
Total	15153.545	328			
Effectiveness ratio					
Between groups	1316.752	2	658.376	8.355	0.0001
Within groups	25689.502	326	78.802		
Total	27006.254	328			
Productivity mean					
Between groups	1.537	2	0.769	3.079	0.047
Within groups	80.873	324	0.250		
Total	82.410	326			

Note: GDQI = scale I (dependency and inclusion); GDQII = scale II (counterdependency and fight); GDQIII = scale III (trust and structure); GDQIV = scale IV (work).

groups that contained 3 to 8 members were significantly different from groups that contained 9 or more members on all measures of group development and productivity. Sixty-seven percent of the smaller work groups were functioning in the higher stages of group development as opposed to 51% in the larger groups. In the second analysis, work groups that contained 3 to 6 members were significantly different from groups that contained 7 to 10 and groups that contained 11 or more members on all measures of group development and productivity. Groups that contained 7 to 10 and 11 or more

Table 4
Analysis of Variance for GDQ (Group Development Questionnaire) Scales, Effectiveness Ratio, and Productivity Mean in Work Groups of 3 and 4 Members vs. Work Groups of 5 and 6 Members

	Sum of Squares	*df*	Mean Square	*F*	Significance
GDQI					
Between groups	29.452	1	29.452	1.658	0.200
Within groups	2415.893	136	17.764		
Total	2445.345	137			
GDQII					
Between groups	669.269	1	669.269	9.269	0.003
Within groups	9820.372	136	72.209		
Total	10489.641	137			
GDQIII					
Between groups	136.966	1	136.966	2.819	0.095
Within groups	6607.007	136	48.581		
Total	6743.973	137			
GDQIV					
Between groups	236.772	1	236.772	4.004	0.047
Within groups	8042.691	136	59.137		
Total	8279.462	137			
Effectiveness ratio					
Between groups	358.344	1	358.344	3.998	0.048
Within groups	12190.568	136	89.637		
Total	12548.912	137			
Productivity mean					
Between groups	1.120	1	1.120	4.417	0.037
Within groups	34.245	135	0.254		
Total	35.366	136			

Note: GDQI = scale I (dependency and inclusion); GDQII = scale II (counterdependency and fight); GDQIII = scale III (trust and structure); GDQIV = scale IV (work).

members were not significantly different from each other. Seventy-three percent of the work groups that contained 3 to 6 members were functioning in the higher stages of group development as opposed to 52% of the two sets of larger groups.

In the final analysis, groups that contained 3 to 4 members were significantly different from groups that contained 5 or 6 members. Groups that contained 3 to 4 members had significantly lower scores on GDQ scale II (counterdependency and fight) and significantly higher scores on GDQ scale IV (work), the effectiveness ratio, and the productivity mean. However, since determining group stage is based on a range of scores, these

Table 5
Determining Stages of Development Based on GDQ (Group Development Questionnaire) Scores

Stage	GDQI	GDQII	GDQIII	GDQIV
Stage 1	> 42	< 42	< 53	< 56
Stage 2	< 45	> 46	< 53	< 56
Stage 3	< 44	< 40	54 to 58	57 to 62
Stage 4	< 44	< 40	> 59	> 63

two sets of groups had an equivalent percentage (73%) of groups functioning at the higher stages of group development (see Table 5).

Based on these results, it seems logical to conclude that work-group size is an important factor in both group development and group productivity. These results support the findings of a number of previous studies (e.g., Gibb, 1951; Gist et al., 1987; Laughlin et al., 2006; Orpen, 1986; Wheelan & McKeage, 1993). What this study adds to the discussion is its focus on real work groups operating in organizational settings.

In addition, this study sought to link group size, group development, and group productivity. The findings suggest that small work groups of 3 to 6 members have a much better chance of reaching the higher stages of group development than larger groups. Group productivity has been linked with the higher stages of group development in previous studies (e.g.,Wheelan, Burchill, et al., 2003; Wheelan & Kesselring, 2005; Wheelan & Lisk, 2000; Wheelan et al., 1998; Wheelan & Tilin, 1999). The results of this study support the conclusion that group size increases or decreases the likelihood that work groups will reach the third or fourth stage of group development and, as a result, positively or negatively affects group productivity.

Group size is determined at the very beginning of the life of a group. Determining group size, then, is a crucial decision. However, there has been little information available to help leaders and managers make that decision. For example, many manufacturing product-development teams contain 18 to 22 members. Senior leadership teams in both for-profit and nonprofit organizations also tend to be large. A team in a hospital may consist of all nurses, physicians, and ancillary personnel working on a particular unit, which can be as many as 40 people. These examples, based on the author's consulting experience and the large work groups in this study, are not uncommon. Many work groups are as large as the average U.S. small business (Crain & Hopkins, 2001).

Some social scientists have been advocating for smaller work groups for many years (e.g., Gladstein, 1984, Hackman, 1987, 2002; McGrath, 1984). However, research support for their position was limited. Perhaps this study will generate renewed interest in this area of study and encourage work-group leaders and managers to limit work group size to the smallest number of members necessary to accomplish group goals.

References

Anderson, L., & Frank, J. (1971). Effects of task and group size upon productivity and member satisfaction. *Sociometry*, *34*, 135-149.

Bales, R., & Borgatta, E. (1966). Size of group as a factor in the interaction profile. In A. P. Hare, E. Borgatta, & R. Bales (Eds.), *Small groups: Studies in social interaction* (pp. 495-512). New York: Knopf.

Bales, R. F., Mills, T. M., Roseborough, M, & Strodtbeck, F. L. (1951). Channels of communication in small groups. *American Sociological Review*, *16*, 461-468.

Bennis, W., & Shepard, H. (1956). A theory of group development. *Human Relations*, *9*, 415-437.

Berkowitz, M. I. (1958). *An experimental study of the relationship between group size and social organization*. Doctoral Dissertation. Yale University. New Haven, CT.

Bion, W. (1961). *Experiences in groups*. New York: Basic Books.

Bogart, D., & Lundgren, D. (1974). Group size, member dissatisfaction, and group radicalism. *Human Relations*, *27*, 339-355.

Callahan, C., Owen, S., & Renzulli, J. (1974). Fluency, flexibility and originality as a function of group size. *Journal of Creative Behavior*, *8*(2), 107-113.

Crain, W. M., & Hopkins, T. D. (2001). The impact of regulatory cost on small firms. Washington, DC: The Office of Advocacy, U. S. Small Business Administration.

Cummins, R., & King, D. (1973). The interaction of group size and task structure in an industrial organization. *Personnel Psychology*, *26*, 87-94.

Dickinson, A., & Stoneman, K. (1989). Individual performance as a function of group contingencies and group size. *Journal of Organizational Behavior Management*, *10*, 131-150.

Diehl, M., & Strobe, W. (1987). Productivity loss in brainstorming groups: Toward the solution of a riddle. *Journal of Personality and Social Psychology*, *53*, 497-509.

Evans, N., & Jarvis, D. (1986). The group attitude scale: A measure of attraction to group. *Small Group Behavior*, *17*, 203-216.

Fink, C., & Thomas, E. (1963). Effects of group size. *Psychological Bulletin*, *60*, 371-384.

Fisher, P. H. (1953). An analysis of the primary group. *Sociometry*, *16*, 272-276.

Fox, D., Herrold, K., Lorge, I., & Weltz, P. (1953).Twenty questions: Efficiency in problem solving as a function of size of group. *Journal of Experimental Psychology*, *44*, 360-368.

Gabarro, J. J. (1987). The development of working relationships. In J. W. Lorsch (Ed.), *Handbook of organizational behavior* (pp. 172-189). Englewood Cliffs, NJ: Prentice Hall.

Galvanovskis, A., & Nemov, R. (1982). Level of development as a group factor determining the functional correlation between efficiency of a group and its size. *Voprosy-Psikhologii*, March-April, *2*, 103-108.

Gentry, G. (1980). Group size and attitudes toward the simulation experience. *Simulation and Games*, *11*, 451-460.

Gibb, J. R. (1951). The effect of group size and of threat reduction upon creativity in a problem solving situation. *American Psychologist*, *6*, 324.

Gist, M., Locke, E., & Taylor, M. (1987). Organizational behavior: Group structure, process, and effectiveness. *Journal of Management*, *13*, 237-257.

Gladstein, D. L. (1984). Groups in context: A model of task group effectiveness. *Administrative Science Quarterly*, *29*, 499-517.

Goodacre, D. M. (1951). The use of a sociometric test as a predictor of combat unit effectiveness. *Sociometry, 14,* 138-152.

Hackman, J. R. (1987). The design of work teams. In J. W. Lorsch (Ed.), *Handbook of organizational behavior* (pp. 315-342). Englewood Cliffs, NJ: Prentice Hall.

Hackman, J. R. (2002). *Leading teams: Setting the stage for great performances.* Boston: Harvard Business School Press.

Hackman, J. R., & Vidmar, N. (1970). Effects of size and task type on group performance and member reactions. *Sociometry*, *33*, 37-54.

Hare, A.P. (1952). A study of interaction and consensus in different sized groups. *American Sociological Review*, *17*, 261-267.

Hawkins, C. (1962). Interaction rates of jurors aligned in factors. *American Sociological Review*, *27*, 689-691.

Kelley, H., & Thibault, J. (1954). Experimental studies in group problem solving processes. In G. Lindzey (Ed.), *Handbook of social psychology* (Vol. 2, pp. 735-785). Reading, MA: Addison-Wesley.

Kidd, J. (1958). Social influence phenomena in a task-oriented group situation. *Journal of Abnormal Social Psychology*, *56*, 13-17.

Laughlin, P., Hatch, E., Silver, J., & Boh, L. (2006). Groups perform better than the best individuals on letters-to-numbers problems: Effect of group size. *Journal of Personality and Social Psychology*, *90*, 644-651.

Littlepage, G., & Silbiger, H. (1992). Recognition of expertise in decision-making groups. *Small Group Research*, *23*, 344-355.

Lorge, I., & Solomon, H. (1959). Individual performance and group performance in problem solving related to group size and previous exposure to the problem. *Journal of Psychology*, *48*, 107-114.

Lorge, I., & Solomon, H. (1960). Group and individual performance in problem solving related to previous exposure to problem, level of aspiration, and group size. *Behavioral Science*, *5*, 28-39.

Mann, R. (1966). The development of member and member-trainer relationships in self-analytic groups. *Human Relations, 19*, 85-115.

McGrath, J. E. (1984). *Groups: Interaction and performance.* Upper Saddle River, NJ: Prentice Hall.

Orpen, C. (1986). Improving organizations through team development. *Management and Labor Studies*, *11*(1), 1-12.

Schneider, C., & Zimet, C. (1969). Effects of group size on interaction in small groups. *Journal of Social Psychology*, *77*, 177-187.

Seashore, S. E. (1954). *Group cohesiveness in the industrial work group.* Ann Arbor: Institute for Social Research, University of Michigan.

Shaw, M. E. (1976). *Group dynamics: The psychology of small group behavior* (2nd ed.). New York: McGraw-Hill.

Shaw, M. E. (1981). *Group dynamics: The psychology of small group behavior* (3rd ed.). New York: McGraw-Hill.

Slater, P. (1958). Contrasting correlates of group size. *Sociometry*, *21*, 129-139.
Steiner, I. D. (1972). *Group process and productivity*. New York: Academic Press.
Steiner, I. D. (1986). Paradigms and groups. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 19, pp. 251-289). New York: Academic Press.
Tuckman, B. W. (1965). Developmental sequence in small groups. *Psychological Bulletin*, *63*, 384-399.
Tuckman, B. W., & Jensen, M. A. C. (1977). Stages in small group development revisited. *Group and Organizational Studies*, *2*, 419-427.
Verdi, A. F., & Wheelan, S. A. (1992). Developmental patterns in same-sex and mixed-sex groups. *Small Group Research*, *23*, 356-378.
Wanous, J., & Youtz, M. (1986). Solution diversity and the quality of group decisions. *Academy of Management Journal*, *29*, 149-159.
Wheelan, S. (2005). *Group processes: A developmental perspective* (2nd ed.). Boston: Allyn & Bacon.
Wheelan, S., & Abraham, M. (1993). The concept of intergroup mirroring: Reality or illusion? *Human Relations*, *46*, 803-825.
Wheelan, S., Burchill, C., & Tilin, F. (2003). The link between teamwork and patients' outcomes in intensive care units. *American Journal of Critical Care*, *12*, 527-534.
Wheelan, S., Davidson, B., & Tilin, F. (2003). Group development across time: Reality or illusion? *Small Group Research*, *34*, 223-245.
Wheelan, S., & Furbur, S. (2006). Facilitating team development: Communication, and productivity. In L. Frey (Ed.), *Facilitating group communication in context: Innovations and applications with natural groups* (Vol.2, pp. 155-176). Thousand Oaks, CA: Sage.
Wheelan, S., & Hochberger, J. (1996a). Validation studies of the group development questionnaire. *Small Group Research*, *27*, 143-170.
Wheelan, S., & Kesselring, J. (2005). The link between faculty group development and the performance of elementary students on standardized tests. *The Journal of Educational Research*, *98*, 323-330.
Wheelan, S., & Krasick, C. (1993). The emergence, transmission and acceptance of themes in a temporary organization. *Group and Organization Management*, *18*, 237-260.
Wheelan, S., & Lisk, A. (2000). Cohort group effectiveness and the educational achievement of adult undergraduate students. *Small Group Research*, *31*, 724-738.
Wheelan, S., & McKeage, R. (1993). Developmental patterns in small and large groups. *Small Group Research*, *24*, 60-83.
Wheelan, S., Murphy, D., Tsumura, E., & Fried Kline, S. F. (1998). Member perceptions of internal group dynamics and productivity. *Small Group Research*, *29*, 371-393.
Wheelan, S., & Tilin, F. (1999). The relationship between faculty group effectiveness and school productivity. *Small Group Research, 30*, 59-81.
Zurcher, L. A. (1969). Stages of development in poverty program neighborhood committees. *Journal of Applied Behavioral Science, 5,* 223-251.

Susan A. Wheelan (PhD, 1974, University of Wisconsin) is President of GDQ Associates, Inc. Previously, she was professor of Psychological Studies and Faculty Director of the Training and Development Center at Temple University. Dr. Wheelan received Temple University's Great Teacher Award in 1992. She has written numerous books and articles for publication. Currently she is consulting and engaged in research on group and organizational development.