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Relative Contributions of Naturalistic and Constructed Support: Two Studies of Women with Type 2 Diabetes

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Abstract

Do distinct sources of social support have differential effects on health? Although previous research has contrasted family and friend support (naturalistic support), research on the relative effects of naturalistic support and constructed support (e.g., support groups) is extremely rare. Two studies of women with type 2 diabetes were conducted that assessed the independent effects of naturalistic and constructed support on physical activity and glycosylated hemoglobin (HbA1c). Participants were women diagnosed with type 2 diabetes from the intervention arms of two randomized controlled trials: primarily European American women (Study 1; N = 163) and exclusively Hispanic women (Study 2; N = 142). Measures assessed physical activity, HbA1c, and friend and family support at baseline and at 6 months, as well as group support after 6 months of intervention. In Study 1, only group support was related to increases in physical activity (ΔR^2 = .036). In Study 2, group support and family support showed independent effects on increases in physical activity (ΔR^2 = .047 and .060, respectively). Also, group support was related to decreases in HbA1c in Study 1 (ΔR^2 = .031) and Study 2 (ΔR^2 = .065). Overall, constructed (group) support was related to outcomes most consistently, but naturalistic (family) support showed some independent relation to physical activity improvement.

Keywords

social support; support groups; type 2 diabetes; physical activity; HbA1c

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Social relationships are hypothesized to affect health through a variety of mechanisms. They may facilitate the practice of healthful lifestyle behaviors, and promote healthful cardiovascular, neuroendocrine, and immune system functioning (Cohen, 1988; Uchino, 2006). The greatest research attention has been directed at social relationships formed with family members and friends, or what might be termed naturalistic support (Cohen, 2004). Considerable interest also has been given to social support interventions that construct new social support entities, such as support groups, by bringing together participants around a common health condition or shared interest in improving their well-being (Hajek et al., 2010; Hogan et al., 2002; Schulz et al., 2008; van Dam et al., 2005). Some behavioral health interventions use support groups as vehicles for delivering program content and for fostering attachments between participants, which can promote engagement with intervention activities and commitment to the challenging process of lifestyle change (Schulz et al., 2008).

Natural social support systems do not disappear when people participate in support groups as part of structured interventions. In fact, some support groups might encourage the mobilization of natural support as a strategy for helping participants cope with life stressors and make lifestyle changes. For intervention developers who seek a deeper understanding of factors related to differential success *within* treatment conditions, it is useful to know how much therapeutic change can be attributed to group support and how much to naturalistic support.

The possible relations between natural and constructed group support also are relevant. For instance, support group interventions might be perceived as most helpful to those who lack naturalistic support, or what might be termed a “need-for-support” effect (suggesting a negative relation between pretreatment naturalistic support and support group support). Several studies have found that people who lack natural support from friends and family are most likely to participate in support interventions, such as support groups and even computer-mediated virtual support activities (Cummings et al., 2002; Myers & James, 2008; Ussher et al., 2006). Individuals with ample support from family and friends might have little need for an intervention’s support group component (Nápoles-Springer et al., 2007). On the other hand, naturalistic supporters could encourage a person’s participation in a formal support group (Nápoles-Springer et al., 2007; Sherman et al., 2008). Also, active participation in natural social support networks as well as support groups might be rooted in individual difference factors such as sociability (suggesting a positive relation between naturalistic and support group support).

In efforts to determine whether source of support influences health outcomes, family and friend support have been contrasted in several studies (e.g., Dupertuis et al., 2001; Gallant et al., 2007); however, research on the contemporaneous effects of support group and natural support is extremely rare. As one example, a questionnaire study of a convenience sample of 66 adults with type 2 diabetes compared various combinations of family, friend, and support group support on measures of general self-care, health-specific self-care, and self-reported health (Wang & Fenske, 1996). The authors found that, when compared to participants who reported no sources of support, those who reported support from both family members and friends, as well as from family and support groups, reported better self-care and health. Unfortunately, measures of support were not described. Also, the study did not determine the independent contributions of family, friend, and group support.

One study investigated pretreatment naturalistic support as a moderator of two intervention types for women with breast cancer: an information-based educational group and an emotion-focused peer discussion group (Helgeson et al., 2000). The research design also included a control condition in which patients did not participate in any groups. Among many notable results, the authors found that women who lacked pretreatment support from partners derived greater physical health benefits from the education information compared to the controls; there was no intervention effect for those who reported high pretreatment partner support. In the peer discussion groups, women who reported high pretreatment partner support showed some physical functioning detriment when compared to controls with high pretreatment partner support. The assessment of changes in partner support over the relatively brief 8-week intervention was not an objective of that study.

The current research examined the effects of naturalistic and constructed support with data from two randomized controlled trials for women with type 2 diabetes (Toobert, Strycker, Glasgow, Barrera, & Angell, 2005; Toobert et al., 2011). In both trials, social support's relation to two important variables linked to the healthful self-management of type 2 diabetes, physical activity and glycosylated hemoglobin (HbA1c), were of primary interest. The relation of social support to physical activity has been the focus of several studies. A review of broad environmental factors related to physical activity (Wendel-Vos et al., 2007) included correlational studies on social support. The authors of the review concluded that social support was related positively to physical activity in seven of 12 studies (e.g., Brownson et al., 2001; Kaplan et al., 2001; Treiber et al., 1991). Only one study (Rovniak et al., 2002) in the Wendel-Vos et al.'s (2007) review used a longitudinal design to evaluate the association between social support and physical activity. In that study of 277 university students, a baseline measure of friend support was prospectively related to a latent physical activity variable measured 8 weeks later.

There have been very few evaluations of social support *interventions* that included physical activity as a primary outcome. A review of social support interventions for individuals with diabetes (van Dam et al., 2005) found only one study in which participants increased physical activity (Keyserling et al., 2002). The intervention included three group sessions and 12 peer counselor calls. Although van Dam et al. (2005) labeled that program a "social support" intervention, no social support measures were administered to determine whether the intervention improved either perceived or received social support. Also, the groups were poorly attended; only 19% of participants attended all three group meetings. Overall, there is evidence for the relation of social support to physical activity, but very few findings are based on longitudinal research or interventions that actually assessed changes in social support. None of the studies we reviewed evaluated both naturalistic and constructed support.

An association of social support with HbA1c was found in several studies, almost always cross-sectional, using a variety of social support measures (e.g., Connell et al., 1992; Egede & Osborn, 2010; Fedman & Steptoe, 2003). A rare longitudinal study of 97 older women without diabetes assessed HbA1c and a variety of psychosocial variables at baseline, and then assessed HbA1c 2 years later (Tsenkova et al., 2008). Findings showed that baseline instrumental social support was prospectively related to change in HbA1c. Two fairly recent studies explored possible mechanisms linking social support and glycemic control. A cross-sectional study of 208 Latinos with type 2 diabetes found evidence for a model in which the relation between "social-environmental support resources" and HbA1c was mediated by diabetes self-management and depression (Fortmann et al., 2011). In a novel cross-sectional study, 200 African American adults with type 2 diabetes were each asked to identify an individual who provided support for their diabetes management efforts (Brody et al., 2008). Data from participants and collaterals were used to estimate a model in which glucose monitoring was the hypothesized mediator of a path between diabetes self-management support and HbA1c. Analyses showed that the model provided a good fit to the data.

Evidence for a link between social support and HbA1c from intervention studies is extremely rare. An intervention in which medical staff conducted consultations with groups of 9–10 patients rather than consultations with individuals (Trento et al., 2001) was identified as a social support intervention in the review by van Dam et al. (2005). Patients who met in group consultations had stable HbA1c levels over 2 years; HbA1c readings for patients who had individual sessions became worse. Unfortunately, social support was not assessed to determine whether the intervention actually manipulated social support, a common limitation of research on social support interventions (Barrera, Strycker, MacKinnon, & Toobert, 2008). As was the case for studies of physical activity, we did not find research that assessed whether source of support (naturalistic or constructed) was differentially related to HbA1c. For literatures on both physical activity and glycemic control, there is a need for longitudinal research and intervention research that clearly demonstrates changes in social support.

In the present study, the effects of naturalistic and constructed support were investigated using data from the intervention arms of two randomized controlled trials for women with type 2 diabetes (Toobert et al., 2005; Toobert et al., 2011). Study 1, the Mediterranean Lifestyle Program (MLP), was conducted with a predominantly European-American sample of women living in Lane County, OR. Study 2, ¡Viva Bien!, was conducted with Hispanic women (Latinas) in the Denver, CO metropolitan area. Women in these trials received a 6-month intervention that included support groups. Within-group variability in support received from the support group and natural helpers (family and friends) was used to predict change in health indicators of relevance for type 2 diabetes—physical activity and glycosylated hemoglobin (HbA1c). In the present study, conventional multiple regression procedures were used to estimate the unique contribution that each form of support (family, friend, and support group support) made in the prediction of health indicators. The present research questions were examined across two separate studies that had different samples and somewhat different measures of physical activity, which added to the generalizability of the findings. The primary objective was to assess the independent effects of naturalistic support (family and friends) and constructed support (support groups) on physical activity and HbA1c. A secondary objective was to evaluate interrelations between support variables, especially the association between baseline naturalistic support and individuals' subsequent support group experience. We predicted that pretreatment naturalistic support would be related negatively to support received from support groups, that is, a "need-for-support" effect in which those who report little naturalistic support before treatment would derive the greatest support from groups. We also predicted that family, friend, and group support would independently relate to improved physical activity and HbA1c.

Study 1

Method

Participants—Participants were163 postmenopausal women with type 2 diabetes who were randomly assigned to the MLP intervention condition and who participated in support groups during the first 6 months of the study. The sample's mean age was 61 years (range: 42–75). Nearly 40% of participants were employed, 54% reported family incomes less than $30,000, and about 34% had a high school education or less. At baseline, they had a mean body mass index (BMI) of 35.1 kg/m^2 (range: 20.2–64.9), mean HbA1c of 7.4% (range: 4.8–11.0), and average 2.5 comorbid illnesses (range: 0–9).

All participants were recruited from primary care clinics. A participant was included if she was postmenopausal, diagnosed with type 2 diabetes for at least 6 months, lived independently, had a telephone, was able to read English, was not developmentally disabled, and lived within 30 miles of the intervention site. Women were excluded if they were older than 75 years of age or planned to move from the area within 2 years.

Eligible patients were sent a letter from their primary care physicians, followed by a phone call inviting them to participate. Fifty-nine of 84 practitioners (70%) who were approached to participate actually took part. Over half (54.2%) of the practitioners were affiliated with the area's largest medical group; the remainder came from independent practices and smaller group practices. The practices were located within two adjacent cities in the Pacific Northwest that form a metropolitan area of approximately 350,000 residents. Of the 544 women who met eligibility criteria, 279 (51%) agreed to participate. Comparisons of participants (N = 279) and nonparticipants (N = 217) showed no statistically differences in body mass, type of diabetes medication, or percent of smokers. The two groups did not differ on age or age diagnosed with diabetes, yet participants reported fewer years taking medications (4.9 versus 6.7, $p < .006$) and fewer years diagnosed with diabetes (8.5 versus 10.2, $p < .027$) than did nonparticipants.

All participants signed informed consent statements prior to participation. Research procedures were reviewed and approved by an institutional review board. Participants agreed to participate before they knew their assignment to condition, and they received no external incentives.

Intervention—The MLP intervention began with a 2½-day nonresidential retreat, during which women were taught all program components. Retreats were followed by 6 months of weekly 4-hour meetings consisting of 1 hour each of physical activity, stress management practice, a Mediterranean diet potluck, and support groups. A registered dietitian taught participants the Mediterranean alpha-linolenic acid-rich diet (de Lorgeril et al., 1994). The diet recommended more bread; more root vegetables, green vegetables, and legumes; more fish; less red meat, replaced by poultry; daily fruit; and avoidance of butter and cream, replaced by olive/canola oil products. In the physical activity component, participants were advised to build up to 1 hour of moderate aerobic activity per day, at least 3 days per week. An exercise physiologist led exercise sessions at the weekly meetings. In stress-management practice, participants were instructed in yoga, progressive deep relaxation, and meditation, and directed or receptive imagery (Ornish, 1990; Toobert, Strycker, & Glasgow, 1998). Participants were asked to practice the techniques for at least 1 hour per day, and were provided videotapes or DVDs for home use.

In the support group hour, a professional with at least master's-level training in counseling psychology and one peer leader (e.g., a woman who had personal or family experience with diabetes) led each support group. There were five professional and five peer group leaders who conducted a total of 12 groups, each consisting of 12–15 participants. Professional and peer leaders received extensive training in the supportive-expressive group therapy model used with the chronically and terminally ill (Spiegel & Classen, 2000). A research staff member who was a licensed psychologist provided weekly supervision to all leaders.

Measures—Participants reported their age, family income, education, employment status, and comorbidities. A score for illnesses that were comorbid with type 2 diabetes was calculated by counting the number of comorbidities out of 11 possible (e.g., stroke, kidney disease, cancer).

At baseline and at the 6-month assessment, participants rated the supportiveness of family members and friends using the format of the UCLA Social Support Inventory (Schwarzer et al., 1994). Participants rated the frequency of: (a) receiving information or advice, (b) receiving physical assistance, (c) receiving encouragement and reassurance, (d) having people listen to concerns and understand feelings, and (e) feeling loved and cared for. Frequency of receiving such support over the previous 6 months was rated on a five-point scale from "never" to "very often." Internal consistency (Cronbach's alpha) reliabilities of the scales for family members and friends were .87 and .91, respectively.

After the 6-month intervention, women rated the supportiveness of support groups using the same format of the UCLA Social Support Inventory that was used to assess family and friend support (Schwarzer et al., 1994). Internal consistency (Cronbach's alpha) reliability of this scale was .97.

The CHAMPS Activities Questionnaire for Older Adults (Stewart et al., 1997) provided an estimate of total kilocalories expended per week in physical activity. This is a widely used measure that has been shown to be sensitive to change in similar populations and was significantly correlated with pedometer ratings in this project (Strycker, Duncan, Chaumeton, Duncan, & Toobert, 2007). The measure was administered at baseline and at the 6-month assessment.

HbA1c was assayed with ion exchange high-performance liquid chromatography using the BioRad Variant II Instrument and conducted at Oregon Medical Laboratories in Eugene, OR. HbA1c was assessed at baseline and at 6 months.

Statistical Analyses

The same statistical plan was used for Study 1 and Study 2. We computed residualized change scores for family and friend social support, physical activity, and HbA1c by regressing 6-month scores on baseline scores. The primary research questions were addressed with multiple regression models that contained either physical activity or HbA1c change as the criterion, and group support and family and friend support change as predictor variables. To identify possible covariates to add to the regression models, physical activity and HbA1c change were correlated with baseline age, education, BMI, and comorbidities. Subsequently, significant correlates were added to all regression models as covariates. SPSS versions 18 and 20 were used to conduct statistical analyses.

Results

Of the 163 women who began the intervention, 26 participants did not complete 6-month assessments (84% completion) and were excluded from analyses that required posttest measures. Attrition was not significantly related to any baseline variables used in the present analyses. Number of group sessions attended ranged from 0 to 20 (of 23 possible) with a mean of 12.4 (SD = 5.7). Table 2 shows the simple correlations among social support (group, friend, and family) and outcome measures (physical activity and HbA1c) at baseline and 6 months. Baseline friend support (but not family support) was prospectively related to group support, $r\ (137) = .31$, $p < .001$.

The background variables of age, education, BMI, and comorbidities were correlated with residualized change scores for physical activity and HbA1c to identify covariates for use in regression analyses for the two studies. When physical activity residualized change was the criterion, comorbidity was a significant correlate in Study 1 ($r = .184$, $p = .041$). When HbA1c residualized change was the criterion, education was a significant correlate in Study 2 ($r = -.248$, $p = .012$) and comorbidity was marginally significant ($r = .193$, $p = .054$). To maintain symmetry, regression models for both studies and for both physical activity and HbA1c used education and comorbidities as covariates.

As shown in Table 3, there was significant baseline-to-6-month change for the naturalistic support variables, physical activity, and HbA1c. Residualized change scores were created by regressing 6-month scores on baseline scores for family support, friend support, physical activity, and HbA1c. Change scores could not be created for group support because there were no baseline scores, so the 6-month score was used in regression analyses.

Regression models were specified separately for 6-month change in physical activity and HbA1c. Because the social support variables were correlated with each other, models were structured to determine: (a) the unique contribution of each social support variable when it was entered by itself immediately after the covariates and (b) the unique contribution of each social support variable when all support variables were entered simultaneously (see Tables 4 and 5).

In the regression models for physical activity, only group support had significant effects when it was entered independently of naturalistic support variables as well as conjointly (see Table 4). In the regression models for HbA1c, the naturalistic support variables were not significantly related to the criterion. Group support showed a significant effect when entered simultaneously with the natural support variables.

Although interactions between group support and both family and friend support were not hypothesized, they were tested. None were statistically significant.

Discussion

Pretreatment friend support was prospectively related to group support at 6 months, but in a positive direction instead of the predicted negative direction. Rather than indicating a “need-for-support” effect, in which those with the poorest friend support derived the greatest support from the groups, the positive correlation suggested a “rich-get-richer” effect, in which those receiving friend support also reported receiving the greatest group support.

Changes in naturalistic support were not significantly related to changes in the two health outcomes. Only group support was associated with improvements in physical activity and HbA1c over the first 6 months of the intervention. The magnitude of the effects for group support (3.6% and 3.1% of the variances in physical activity and HbA1c change, respectively) were modest. It must be remembered that the analyses assessed variability of change within treatment group participants only. This treatment, when compared to a usual-care control condition, showed significant intervention effects for both physical activity and HbA1c (Toobert et al., 2005). Thus, within a treatment condition that was generally effective, group support was still related to variability in outcome success.

The expressive/emotion focus of the support groups may not have been optimal for linking support in the group to lifestyle changes outside the group, or to the mobilization of friends and family members. A second study conducted with Latina women altered the support group focus to enhance connections to natural support.

Study 2

To expand the generalizability of the findings in Study 1, a similar study was done with a sample comprised of Hispanic women (Latinas) who received health services from a large HMO and a community health center serving low-income families. There were changes with sample recruitment, support group procedures, and the measure of physical activity, but other measures, research goals, and the data analytic approach were the same as those in Study 1.

Method

Participants—Hispanic women (Latinas) with type 2 diabetes were assigned randomly to (a) usual care through their HMO or community health center (n = 138), or (b) usual care plus ¡Viva Bien! (n = 142) a cultural adaptation of MLP. As in Study 1, the present analyses were restricted to the 142 women in the active intervention, which included support groups. ¡Viva Bien! sessions were conducted in community facilities throughout the Denver, CO metropolitan area weekly for 6 months. Assessments were conducted at baseline and 6 months.

Procedures for recruiting participants from a large HMO and a community health center have been reported previously (Toobert et al., 2010). Letters in English and Spanish, signed by the project’s Latino physician, were mailed to potential participants, along with selfaddressed stamped postcards that could be returned to decline further contact or request more information. Women who did not return postcards or request further information were telephoned by bilingual project recruiters who described the program, confirmed eligibility and Latina identity, and invited qualified candidates to participate. Those who agreed were scheduled to visit a participating health facility, where they completed formal consent procedures and baseline assessments. To reduce participation barriers, the project offered flexible assessment times, bilingual staff and materials, and free transportation. Among eligible patients, 61% agreed to participate. Participants did not differ from nonparticipants on age, age diagnosed, preference for Spanish, years taking diabetes medication, or type of diabetes medication. Compared with nonparticipants, participants had higher BMI (33.9 vs. 31.9) and were less likely to be smokers (9.8% vs. 16.4%). The study was approved by the institutional review boards of the participating research organizations.

On average, participants were 55.6 years old (range: 32–75), were obese (mean BMI = 35.4 kg/m^2, range: 20.2–59.2), had a baseline HbA1c greater than 8% (range: 5.5–15.2%), and averaged two comorbid disorders (range: 1–3). Approximately two thirds reported an annual family income of less than $50,000, and more than half had a high school education or less. Sixteen percent preferred Spanish to English.

Intervention—All of the basic MLP components were maintained with the exception of support groups. We modified the supportive-expressive group therapy model used in MLP to more explicitly promote problem solving and social support among family and friends. Support groups were occasions when women could share successes and difficulties in making lifestyle changes, but general “check-in” meetings were supplemented with structured sessions devoted to mobilization of natural support, and to learning basic problem-solving strategies and their application in daily living. Also, as part of the cultural adaptation of the intervention (Osuna et al., 2011), periodic family nights were added in an effort to educate families about the lifestyle changes that were targeted by the intervention and to enlist their help in supporting changes.

A total of 12 groups were conducted by five different group leaders who had at least bachelor’s degree training and experience in working with medical patients. Groups contained between 10 and 12 members.

Measures—The same social support instruments reported previously for MLP results were used in ¡Viva Bien!. Physical activity was assessed with the Modified International Physical Activity Questionnaire (IPAQ) (Craig et al., 2003) rather than the CHAMPS to decrease assessment burden. Analyses were conducted on one specific indicator derived from the IPAQ, number of days of exercise per week, because it captured a measurable goal of the intervention.

HbA1c assays were performed at the Kaiser Permanente Colorado Regional Reference Laboratory in Aurora, CO, and measured on a Bio-Rad Variant II Turbo liquid by high-pressure liquid chromatography. HbA1c was assessed at baseline and 6 months.

Results

Of the 142 participants who began treatment and completed baseline measures, 17 did not complete the 6-month assessment (88% completion) and were excluded from analyses that required posttest measures. Compared to those who completed the 6-month assessment, dropouts had less support from friends and lower HbA1c readings at baseline. Weekly meeting attendance averaged 58.4%. Table 2 shows simple correlations among social support (group, friend, and family) and outcome measures (physical activity and HbA1c) at baseline and 6 months. Friend and family support at baseline did not prospectively predict group support at 6 months.

As in Study 1, age and number of comorbid disorders served as covariates in the regression analyses, which were structured the same as in Study 1 (Tables 4 and 5). In the regression models for physical activity, family and group support had significant effects when they were entered independently as well as conjointly with other support variables (Table 4). In the regression models for HbA1c, only group support was significantly related to the criterion when it was entered independently of the natural support variables as well as conjointly with them (Table 5). Group support accounted for approximately 6.5% of the variance in HbA1c change.

Although interactions between group support and both family and friend support were not hypothesized, they were tested. None were statistically significant.

Discussion

The lack of prospective relations between baseline measures of naturalistic support and group support at 6 months provided evidence for neither the hypothesized “need-for-support” effect nor the alternative “rich-get-richer” hypothesis. In Study 2, pretreatment reports of support did not predict which participants would be recipients of group support.

Parsing the contributions of the support variables to improvements in physical activity showed that group support and family support made independent contributions. Furthermore, group support was related to improvements in HbA1c, a particularly important effect because it was based on an outcome measure that did not rely on self-report.

General Discussion

Group support showed similar relations across the two studies. It was significantly related to physical activity in both MLP and ¡Viva Bien!, even though the studies used different measures of physical activity and different support group formats. Similarly, group support also was significantly associated with improvement in HbA1c in both Study 1 and 2.

In Study 2, family support was related to physical activity, even after accounting for the effects of group support. This was the only effect that was statistically significant in Study 2, but not in Study 1. The effect might be attributable to changes that were implemented in Study 2. We made modifications to support groups in Study 2 by dedicating sessions to the mobilization of family and friend support. We also added “family nights” in which family members attended sessions, learned about the intervention components, and could actually participate in them. In addition, Study 2 was extended to a sample of Latinas who received medical services in a large HMO or a community health center. Latina participants might have been particularly responsive to intervention elements designed to mobilize family support. Attitudinal familism (feelings of loyalty and reliable alliance with family members) is a prominent cultural construct in virtually all Latino subcultural groups and one that does not appear to diminish with acculturation (Sabogal et al., 1987). However, because Study 2 differed from Study 1 in several respects, it is not possible to isolate the reasons why family support was related to physical activity in Study 2 only.

There are clinical implications to these findings. Not all intervention participants benefitted equally from the intervention. As intervention developers, we sought a deeper understanding of the social support component, one of several components that also included guided exercise, nutrition instruction, and stress management. The present studies indicated that perceived group support was related to within-treatment group improvement in both physical activity and metabolic control. Although these studies did not identify specific mechanisms responsible for their effects, they suggest the value of groups that foster perceptions that groups are sources of multi-faceted support provisions. Support groups should be preserved in future efforts to revise the intervention by trimming components that are ineffective.

Pretreatment naturalistic support showed only one isolated positive relation to participants' ratings of support from support groups, providing no evidence that those who reported little naturalistic support would receive the greatest group support. In retrospect, studies that found a “need-for-support” effect often assessed the choice to participate in support interventions and not the amount of support received from support groups (Cummings et al., 2002; Myers & James, 2008; Ussher et al., 2006).

The present research had several strengths. Unlike previous studies that examined associations between social support and both physical activity and HbA1c, the present studies were longitudinal, included social support interventions, and directly assessed both naturalistic and intervention group support. Also, the support measure (Schwarzer et al., 1994) was ideally suited for the research questions because support from three sources (friend, family, and support group) was assessed with the same five items and response scales. Testing the hypotheses in two studies that varied somewhat in sample characteristics and measures of physical activity expanded the generalizability of findings. Furthermore, the research questions were examined in the context of an important and growing public health problem, type 2 diabetes.

The research also had several limitations. It was restricted to a particular multi-component lifestyle intervention for women with type 2 diabetes. To avoid a large number of analyses that would have inflated experiment-wide error, we limited the health indicators to physical activity and HbA1c. Many other health outcomes, quality of life, or diabetes self-management behaviors could have served as outcome variables. Also, the intervention length was limited to 6 months. As a chronic illness, type 2 diabetes management requires lifestyle changes that extend over much longer periods. This research included samples of European Americans and Latinas, but did not include significant numbers of women from other racial/ethnic groups who have high rates of type 2 diabetes (e.g., African Americans and Native Americans).

Future research might elucidate why group support showed such beneficial effects and, more generally, how sources of support differ in their provisions. Decades ago, the sociologist Robert S. Weiss described how social provisions from spouses, friends, and support group members were not interchangeable (Weiss, 1973). More recently, researchers discussed how differences in history, longevity, reciprocity, and obligation that differentiate family and friend relationships could result in differences in the health impact of the support they provide (Dupertuis et al., 2001; Gallant et al., 2007). It is possible, for example, that instrumental and emotional support could have different meanings and health consequences depending on whether they come from a support group member who has diabetes, a family member, or a friend (Thoits, 2011). Research advances are leading to a more nuanced understanding of social support's effect on health outcomes, such as the distinction between perceived naturalistic support and enacted support (Schwerdtfeger & Schlagert, 2011; Uchino, 2009). Distinctions between sources of support might prove to be another informative nuance (Thoits, 2011).

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Table 1

Sample characteristics

	M (SD) or %	
Characteristic	Study 1 (N = 163)	Study 2 (N = 142)
Age	61.1 (8.0)	55.6 (9.7)
Body mass index (kg/m^2)	35.1 (7.7)	35.3 (7.0)
Comorbid illnesses (of 11 possible)	2.5 (1.5)	2.0 (0.5)
ducation achieved (%) 0–11 High school graduate Some college College graduate	8.5 25.2 43.6 22.7	20.0 32.1 28.6 19.2
Ethnicity	92.0% non-Latina White	100% Latina

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Table 2

Correlations among social support, physical activity, and glycosylated hemoglobin (HbA1c) variables for two studies[1]

Variable	6-month group support	Baseline friend support	6-month friend support	Baseline family support	6-month family support	Baseline physical activity	6-month physical activity	Baseline HbA1c	6-month HbA1c
6-month group support	---	.31***	.40***	.08	.09	.13	.26**	−.07	−.14
Baseline friend support	.14	---	.72***	.36***	.20*	.06	−.05	−.06	−.08
6-month friend support	.24*	.57***	---	.26**	.31***	−.03	−.03	−.05	−.03
Baseline family support	.15	.57***	.42***	---	.78***	.01	−.17	.01	.08
6-month family support	.22*	.41***	.62***	.72***	---	−.06	−.14	.07	.08
Baseline physical activity	.04	.10	.26**	.13	.16	---	.37***	−.03	−.12
6-month physical activity	.24*	.28**	.31***	.15	.35***	.30**	---	−.20*	−.24**
Baseline HbA1c	−.03	.02	−.09	.06	−.04	−.02	−.20*	---	.80***
6-month HbA1c	−.17	−.15	−.06	−.05	.00	.02	−.20*	.60***	---

[1] Above diagonal = (study 1); below diagonal = (study 2)

Note. To measure physical activity, MLP used the CHAMPS questionnaire and assessed total kilocalories expended per week in physical activity while ¡Viva Bien! used the IPAQ instrument and assessed days per week of program-prescribed physical activity.

* $p < .05$,

** $p < .01$

Table 3

Within-group t tests (baseline-to-6-month assessment differences) for social support, physical activity, and glycosylated hemoglobin (HbA1c)

	MLP			¡Viva Bien!		
Variable	**Baseline mean (SD)**	**6-month mean (SD)**	***t* (df)**	**Baseline mean (SD)**	**6-month mean (SD)**	***t* (df)**
Family support	3.83 (.91)	3.97 (.86)	−2.76** (136)	3.26 (1.05)	3.49 (.93)	−3.10** (102)
Friend support	3.36 (.93)	3.59 (.84)	−4.01*** (136)	2.86 (.91)	3.22 (.84)	−4.54*** (102)
Physical activity	3155.32 (2915.21)	4634.22 (3241.00)	−4.76*** (123)	3.92 (2.81)	5.38 (2.24)	−4.97*** (105)
HbA1c	7.42 (1.30)	7.07 (1.11)	5.14*** (129)	8.46 (1.89)	7.80 (1.69)	4.11*** (100)

Note. To measure physical activity, MLP used the CHAMPS questionnaire and assessed total kilocalories expended per week in physical activity while ¡Viva Bien! used the IPAQ instrument and assessed days per week of program-prescribed physical activity.

* $p < .05$,

** $p < .01$

Table 4

Relations between natural support, group support, and physical activity change in two studies

	Effects when each variable was entered immediately after the covariates (education and number of comorbid disorders)				Unique effects from final model when all variables were entered simultaneously			
Variable	***B***	***SE***	***t***	**ΔR^2**	***B***	***SE***	***t***	**ΔR^2**
(Study 1) (N = 124)								
Friend support change	222.130	477.152	.47	.001	−85.244	517.019	−.16	.0002
Family support change	166.948	504.802	.33	.001	114.451	529.530	.22	.0004
Group support	658.298	298.451	2.21*	.038	667.234	311.568	2.14*	.036
					Full Model	F (5, 123) = 1.83, p = .11		R^2 = .074
(Study 2) (N = 103)								
Friend support change	.425	.299	1.421	.020	−.215	.348	−.618	.003
Family support change	.948	.303	3.127**	.091	.947	.367	2.581*	.060
Group support	.582	.212	2.741**	.070	.479	.210	2.279*	.047
					Full Model	F (5, 94) = 3.44, p = .007		R^2 = .155

Note. To measure physical activity, MLP used the CHAMPS questionnaire and assessed total kilocalories expended per week in physical activity while ¡Viva Bien! used the IPAQ instrument and assessed days per week of program-prescribed physical activity.

* $p < .05$,

** $p < .01$

Table 5

Relations between natural support, group support, and glycosylated hemoglobin (HbA1c) change in two studies

	Effects when each variable was entered immediately after the covariates (education and number of comorbid disorders)				Unique effects from final model when all variables were entered simultaneously			
Variable	***B***	***SE***	***t***	**ΔR^2**	***B***	***SE***	***t***	**ΔR^2**
(Study 1) (N = 129)								
Friend support change	.079	.105	.75	.004	.093	.114	.82	.005
Family support change	.145	.111	1.30	.013	.133	.118	1.13	.010
Group support	−.116	.067	-1.73^{+}	.023	−.140	.069	-2.01^{*}	.031
					Full Model	F (5, 123) = 1.53, p = .185		R^2 = .058
(Study 2) (N = 87)								
Friend support change	−.132	.208	−.635	.004	−.033	.243	−.137	.0002
Family support change	−.154	.218	−.705	.005	−.012	.258	−.046	<.001
Group support	−.356	.135	-2.630^{**}	.068	−.354	.141	-2.511^{*}	.065
					Full Model	F (5, 81) = 3.24, p = .01		R^2 = .167

$^{+}p = .086$,

$^{*}p < .05$,

$^{**}p < .01$