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The Impact of Social Support on Outcomes in Adult Patients with Type 2 Diabetes: A Systematic Review

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Abstract

Diabetes is one of the fastest growing chronic diseases globally and in the United States. Although preventable, type 2 diabetes accounts for 90% of all cases of diabetes worldwide and continues to be a source of increased disability, lost productivity, mortality, and amplified health-care costs. Proper disease management is crucial for achieving better diabetes-related outcomes. Evidence suggests that higher levels of social support are associated with improved clinical outcomes, reduced psychosocial symptomatology, and the adaptation of beneficial lifestyle activities; however, the role of social support in diabetes management is not well understood. The purpose of this systematic review is to examine the impact of social support on outcomes in adults with type 2 diabetes.

Keywords

Diabetes; Type 2 diabetes; Social support; Glycemic control; Psychosocial factors

Introduction

Burden of Diabetes

Diabetes is one of the most prevalent and fastest growing chronic illnesses, globally affecting more than 346 million people worldwide [1]. It is emerging as a global epidemic due to the rapid increase in overweight, obesity, and physical inactivity [1]. The combined impact of poor awareness, insufficient access, limited services, and inadequate resources makes diabetes the leading cause of blindness, amputation, and kidney failure worldwide [1]. Cardiovascular disease (CVD) accounts for 50%–80% of deaths in people with diabetes, a number expected to rise by more than 50% in the next 10 years [1]. For these reasons, diabetes has become a major cause of premature illness and death in most countries and is predicted to become the seventh leading cause of death in the world by 2030 [1]. Additionally, diabetes accounted for 11.6% of total health-care expenditure in 2010 [2].

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Estimated global health-care expenditures to treat and prevent diabetes and its complications are expected to exceed US$490 billion by 2030; this equals approximately $561 billion (international dollars) by 2030 [2].

Currently in the U.S., 25.8 million people (or 8.3% of the population) have diabetes, and 7.0 million are still undiagnosed [3]. Nearly 1.9 million people 20 years of age or older were newly diagnosed with diabetes in 2010 in the U.S.; an estimated 79 million adults 20 years of age or older have prediabetes [3]. Men and minorities—non-Hispanic Blacks, Hispanics (Mexican Americans, Puerto Ricans, and Cubans), and American Indians/Native Americans/ Pacific Islanders—are more affected, as compared with women and non-Hispanic Whites, respectively [4]. As has been observed globally, diabetes is the leading cause of complications, including heart disease and stroke, kidney failure, and nontraumatic lower-limb amputations [3, 4]. It is the cause of new cases of blindness among adults in the U.S. and, according to 2007 estimates, is the seventh leading cause of death in the U.S. [3, 4]. Regrettably, people diagnosed with diabetes have twice the risk of death of people of similar age without diabetes [3]. Given the vast numbers of people affected by this chronic disease, total estimated costs for diabetes in the U.S. are $174 billion annually [3].

Although preventable, type 2 diabetes (T2DM) accounts for 90% of all cases of diabetes worldwide [1, 3]. Evidence shows that at least 30 min of moderate exercise, along with healthy eating habits, aids in preventing and managing diabetes and diabetes-related outcomes [1, 3, 4]. These behaviors, in addition to other self-care activities such as home blood glucose monitoring, taking medications as prescribed, obtaining preventive services, and limiting alcohol intake and tobacco use, make living and adjusting to a life with diabetes more manageable. Self-management of T2DM, however, requires the assistance of multiple sources of support. In this article, we present the results of a systematic review of studies examining the effect of social support onT2DM and diabetes-related clinical outcomes.

Definitions of Social Support

Social support is a multifaceted experience that involves voluntary associations and formal and informal relationships with others [5]. It is a *perception* that one is accepted, cared for, and provided with assistance from certain individuals or a specific group or the *realization* of actual support received from another. Social support can be positive or negative and can arise from different sources, including family members, friends, and peers (informal support) and healthcare professionals and organizations (formal support) [6, 7]. It can be perceived differently on the basis of the recipient's gender, racial or ethnic background, or cultural practices. It is a construct thought to mediate improved self-management practices and health care outcomes. In contrast, social networks are considered webs of social relationships and social linkages and must be distinguished from social support [6]. Social networks are best gauged by size and include all individuals in a person's environment who provide support [6, 7]

In a previous international review of social support in diabetes, van Dam et al. outlined three accepted definitions of social support [6]. First, social support is a free exchange of resources between at least two people that increases the well-being of the receiver [6]. Second, it is evidence from others that an individual is valued and part of a network of mutual communication and obligations [6]. Third, social support is the degree to which an individual's social needs are met through various types of interactions [6].

Four categories of social support have been established: emotional, tangible, informational, and companionship [7, 8]. *Emotional support* includes the expression of feelings indicating value and worth. It embodies warmth and nurturance provided by sources of support [6, 7, 8]. *Tangible support* describes the concept of provision, including financial assistance,

material goods, and services [6, 7, 9]. *Informational support* is the use of information, advice, guidance, and suggestions to help others solve problems [6, 10, 11]. *Companionship support* encompasses a sense of social belonging and the presence of companions for engagement in shared social activities [12].

Social Support and Health

Researchers continue to investigate possible linkages between social support and physical and mental health. Two theories, or models, have been postulated for addressing these connections: the buffering hypothesis and the direct effects hypothesis [7, 13, 14, 15]. The *buffering hypothesis* asserts that social support is protective (or "buffering") during stressful events [7, 15]. It contends that individuals with lower levels of social support are more affected by stressful situations. In other words, stressful events will have a greater (negative) impact on those with lower levels of social support. This type of support is often observed during *perceptions* of social support, rather than in situations of actual (received) support or social integration [15]. Krause explored this theory further, arguing that, to a certain point, social support may function to alleviate stress but, eventually, may serve to exacerbate symptoms of stress long term [7].

The *direct (main) effects hypothesis* states that people with high levels of social support are in better health than people with low social support, regardless of the stress [15]. In this model, researchers suggest that high levels of social support lead to better health, fewer psychological issues, and speedy recoveries from stressors, such as chronic diseases, serious injuries, and debilitating illnesses [5]. As a result, perceived social support solely shows direct effects for mental health outcomes; both perceived support and social integration show main effects for physical health outcomes [12]. Surprisingly, no main effects are seen when support is actually received [12].

Certain factors influence, albeit positively or negatively, the social-support-health relationship; this is true despite the hypothesis used to assess the association. Satisfaction with social support depends on the perception of the recipient and may determine the relationship [7]. The size of the social support network often influences the relationship between the two entities [7]. Perceptions of the availability and type of social support needed, particularly during stressful times, may strengthen or weaken the relationship [7]. Finally, sociodemographic and sociocultural characteristics, such as socioeconomic status and race/ethnicity, may influence the alliance. Regardless of the circumstance and its effect on the direction of the relationship, all variables must be considered when assessing this noteworthy collaboration.

Social Support and Diabetes

Given the complex nature of diabetes, the aid of formal and informal relationships is warranted. Daily diabetes self-management is the cornerstone to achieving optimal outcomes [16, 17]. Social support has been considered a major component of self-management for achieving glycemic control and improving outcomes, but the mechanism is not well understood [16, 18••, 19, 20]. Studies demonstrating the relationship between social support and diabetes have been conducted; however, no consensus has been established [21•].

Although still debated, higher levels of social support are often associated with better glycemic control, increased knowledge, enhanced treatment adherence, and improved quality of life [21•, 22–25]. Social support has been found to be a critical aspect of disease prevention and awareness [25]. Furthermore, it is beneficial in diagnosis acceptance, emotional adjustment, and decreasing stress [25, 26]. Conversely, lack of social support has

been associated with increased mortality and diabetes-related complications [21, 25]. In a longitudinal study of older adults with diabetes, Zhang et al. found that social support was strongly associated with mortality and that social support was an identifiable target for intervention [25].

Consequently, numerous factors and circumstances sustain or compromise care and adherence to diabetes self-management. For example, the type and amount of care received, in addition to the source of the support, are all equally important and may be the "deal-breakers" in appropriate management [7, 16, 20]. Satisfaction with support and the size of the social network may also contribute to self-management skill development [18••, 24, 27]. Social support relationships are valuable and often deemed necessary for guidance and encouragement, particularly when beginning and maintaining new behaviors and when making informed, frequently life-altering, health decisions.

Methodology

Search Strategy and Eligibility Criteria

A reproducible strategy was used to search Medline/PubMed for articles published between January 2000 and June 2012. Four searches were conducted, yielding 1,023 articles. For all search strategies, social support was the main search term and was entered as the MeSH Major Topic and as a keyword in the abstract and title fields. For the initial strategy, the term *health* was entered; for the second, the term *diabetes*. Duplicates were removed, leaving 963 citations for assessment. Titles were eliminated if the research involved children, type 1 diabetes, or gestational diabetes. In addition, articles not written in English, not published in the U.S. (international), and using an international sample population were excluded. This produced 702 abstracts to examine for full article review. From this initial review, 33 articles of direct relevance to the systematic review (see inclusion criteria below) were selected for inclusion in this article.

An additional search, focusing on the last 2 years, was conducted to ensure a thorough review of the literature and inclusion of recent articles of interest and importance. Medline/PubMed was searched for articles published between January 2010 and June 2012; a total of 103 articles were found. After limiting search to the aforementioned time frame, humans, clinical trials/randomized clinical trials, English language, and adults, 19 years of age and older, 28 articles emerged. A more advanced strategy was employed, liming the search to U.S.-published only and eliminating articles where a specific social support measure was not identified. This resulted in nine additional items, which was narrowed further to 4 articles after removing duplicates.

The following inclusion criteria were used to determine eligible study characteristics: (1) The full article must have been published in English between 2000 and 2012; (2) the sample population had to include adults only with T2DM; (3) the studies could be cross-sectional, cohort, or intervention studies; and (4) the studies had to measure a change in a clinical (i.e., HbA1c or blood glucose, blood pressure (BP), lipids, mortality, etc.), psychosocial (i.e., depression, stress/distress), or behavioral (i.e., physical activity/exercise, diet/nutrition, self-monitoring/self-care/self-management, etc.) outcome.

Full articles were read and reviewed using a standardized checklist by the lead author (J.L.S.). The senior and corresponding author (L.E.E.) made the final decision regarding eligibility in case of uncertainty and indecision. Thirty-seven eligible studies were identified on the basis of the predetermined inclusion criteria.

Data Collection

Data collected from the eligible articles are shown in Tables 1 and 2 and have been placed in one of two categories: observational studies or interventional studies. Observational studies, including articles with cross-sectional and longitudinal designs, are shown in Table 1. Table 2 comprises studies that incorporate an interventional component and may have been designed as a randomized control trial (RCT), community experiment, or pilot study. The articles in both tables are arranged in descending chronological order by year of publication.

Data were extracted on the study design, social support measure(s), sample population, major findings, and study limitations. These tables include data from papers meeting inclusion criteria: social support, T2DM, indications for clinical outcomes (glycemic control, BP, lipid control, mortality), psychosocial effects (depression, stress), behavior adaptations (increased physical activity, adherence to a healthier diet), and perceptions of social support (increased, decreased, no support).

Results

Thirty-seven articles met the inclusion criteria set for this review and analysis. Twenty-one were observational studies, while 16 were intervention studies. For observational studies (Table 1), 18 were cross-sectional studies, 2 were longitudinal studies, and 1 was a pilot study. Nine articles provided clinical outcome results, 8 reported behavioral findings, 1 discussed psychosocial factors, and 3 reported perceptions of social support. There were 16 interventional studies (Table 2), of which 9 were RCTs, 3 were community based, and 4 were pilot studies. For the interventional studies, 8 articles demonstrated changes in clinical outcomes, 5 articles showed (behavioral) lifestyle adaptations, 1 discussed the psychosocial results, and 2 articles described perceptions of social support. Overall, the impact of social support on clinical outcomes and behavioral modification were described in 17 and 13 articles, respectively. A total of 2 articles reported on psychosocial qualities, and 5 articles reported on perceptions of support. Sample sizes ranged from 12 to 3,535 of participants. Specific clinical outcomes were not extracted for independent discussion.

Social Support and Clinical Outcomes

On the basis of inclusion criteria of the database searches, 17 articles were reviewed that examined the impact of social support on clinical outcomes. Nine studies were cross-sectional, and 8 studies were interventional [21•, 22–26, 28••, 29•, 30–34, 35••, 36••, 37, 38]. Sample sizes ranged from 15 to 3,535 participants. In both designs, more studies suggested that higher levels of social support were associated with improved diabetes-related clinical outcomes (HbA1c, BP, lipids) [17, 22, 24, 26, 28••, 29•, 30, 33, 34, 35••, 36••, 37, 38]. This association held true regardless of the avenue for social support exchange or delivery (i.e., peer support, couples/spouse, and nurse manager) [22, 23, 34, 35••, 36••, 37, 38]. Three articles focused on diet support, while one (of the three) focused on exercise effects as well. Both of these behavioral-targeted support mechanisms improved clinical outcomes in diabetes management [24, 30, 33]. Furthermore, Epple and colleagues demonstrated that diet-related clinical outcomes (low-density lipoprotein [LDL], total cholesterol, triglycerides [TG], and HbA1c) were best when “other family members” (not the patient with T2DM) cooked the meals [33]. It should be mentioned as well that these “best outcomes” were observed in female participants [33]. Additionally, when the relationship between social support and mortality was examined, two studies were found. Both studies showed that higher levels of social support decreased mortality rates in patients with T2DM [21•, 25].

Contrary to those reports, however, three articles showed the opposite or no effect [24, 31, 32]. Two articles did not show an association between social support and clinical outcomes [31, 32]. In research exploring the relationship between perceived social support and CVD risk, McNeil and colleagues found that, despite having high levels of social support, no significant relationship existed between the two variables [31]. In another study, Chlebowy et al. were not able to show significance in the relationship between social support and self-care management or social support and glycemic control [32]. In addition, Chlebowy found that Blacks had less social support satisfaction [32]. In a similar study on race/ethnicity, social support, diabetes self-care, and clinical outcomes, Rees et al. did not find differences in social support by race, although Blacks were observed to have better clinical outcomes (decreased diastolic BP) and behavior modification (increased exercise, improved self-management) [28••]. In that same study, Whites had better LDL levels, and no significant clinical effects were observed in Latinos. Tang et al. demonstrated that negative support (and lower social support) increased the risk of medication noncompliance [24].

In this review of social support and clinical outcomes, there was strong evidence that higher levels of social support were associated with better clinical outcomes and behavior adaptations. Similarly, as observed in the literature, all articles in this review did not find a positive association between the two variables. Data from the opposing studies indicate that study limitations may have minimized the effects seen. For two of the studies, which were cross-sectional studies, small, homogeneous samples were studied [31, 32]. A third study, which was a randomized control trial of 200 participants, did show that there was a significant overall reduction in the mean HbA1c levels from baseline to 6 months but that there were no significant differences between groups [35••]. This outcome may have been due to study attrition, study design, and inherent biases.

Social Support and Psychosocial Outcomes

Two articles were reviewed that examined the impact of social support and psychosocial effects [17, 26]. One study was cross-sectional, and the other was interventional. Sample sizes ranged from 62 to 86 participants. Major findings were consistent across both studies, with participants having higher levels of social support experiencing fewer depressive symptoms and diabetes-related symptoms. In an international study that was excluded from the review, researchers concluded that participants with higher social support and, therefore, less depression developed better diabetes self-management skills and improved certain clinical outcomes (body mass index and TG) [39]. Despite the smaller sample size, Bond and colleagues were able to determine that Web-based interventions were effective in sustaining psychosocial well-being in older patients with diabetes [17].

However, given that the sample size of both of these studies was small, it is imperative that these studies be reproduced in larger, heterogeneous populations to ensure valid and reliable results. In addition, one of the studies was a recent randomized control trial using a Web-based intervention [17]. Findings demonstrated the effectiveness of sustained psychological well-being with the intervention. Given that result, Web-based interventions should be considered in those with lower social support and more positive psychological needs.

Social Support and Behavioral Modification

Eight cross-sectional studies and five interventional studies were evaluated to assess the role of social support on life-style modification [16, 18••, 20, 27, 40–46, 47•, 48••]. For these 13 studies, sample sizes ranged from 21 to 1,788. As was observed with social support and clinical outcomes, 7 studies demonstrated a positive association between social support and behavioral outcomes [16, 20, 40–42, 47•, 48••]. From a sample of 1,788 older adults with T2DM, Nicklett and colleagues found that increased diabetes support increased the

likelihood of adherence to healthier outcomes (i.e., diabetes regimen)—thus, a negative association with health decline [20]. They added that the duration of diabetes diagnosis and the burden of illness were associated with a positive decline in health [20]. Within different study populations, Rosland et al., Wen et al., and Shaw et al. all demonstrated that family support improved glucose monitoring, diet self-management and exercise, and diabetes self-care, respectively [40–43]. Of importance, Rosland also showed that support from nonphysician health care professionals increased the likelihood of meal planning and preventive services, such as checking feet [40]. In a sample of older Mexican-American patients with T2DM, Wen found that increased family support decreased perceived barriers to diet self-care management [41, 42]. This was particularly true in older patients who lived with family members [42]. Participants also determined that higher social support was an indicator of positive family functioning [41]. Similarly, in a study conducted by King and colleagues, support from family, friends, and the community motivated participants to adopt healthier eating habits and increase physical activity [47•]. Having the support of the social environment increased the likelihood of diet and exercise adherence [47•]. Using an integrative health (IH) coaching intervention, Wolever et al. showed that participants in the IH group had increased perceptions of social support and increased self-report of medical adherence, physical activity, and perceived health status [48••]. As compared with participants in the usual care (control) group, individuals in the IH group reported less stress and improved clinically (decreased HbA1c). Although no physiologic outcomes changed in their study, McEwen et al. reported that social support improved self-care behaviors, increased diabetes knowledge, and reduced diabetes-related distress [16]. Results by Gleeson-Kreig and colleagues opposed previous findings, stating that social support was not related to self-management behaviors [27]. In an online community support group designed to facilitate increased walking patterns in patients with T2DM, Richardson et al. failed to demonstrate changes in behavior [46]. They were able to report, however, that those with lower baseline social support used the online community more by posting requests and viewing supportive statements. Given the recent advances in technology and measurable barriers to health care (i.e., access, transportation, finances, language, etc.), online communities may be of considerable interest when working with populations exhibiting lower levels of support.

As was detected in social support and clinical outcomes, results demonstrating the impact of social support on behavioral outcomes was also consistent with the literature. Major findings supported the hypothesis that higher levels of social support were associated with increased diabetes self-management and self-care behaviors. One study did find that social support was not related to self-management [27]. This study was conducted in a homogeneous sample of urban participants who lived at home with other relatives; this situation likely diminished the effect and limited the generalizability of the study.

Perceptions of Social Support

Five articles—three cross-sectional and two interventional—discussing the perceptions of social support were included for discussion [19, 49–52]. As was stated previously, the manner in which social support is perceived often varies from actual social support received [51]. This interpretation or receipt of support can differ on the basis of numerous factors, including gender, race/ethnicity, culture, or social environment. One study included in this review assessed the primary source of support in couples [18••]. In that study, males reported their female spouses as primary sources of support; the same was not true for females [18••]. In contrast, females rated nonspouse sources as their primary foundations for support [18••]. The source (or availability) of the support, the amount of the support, and manner of delivery may also contribute to perceptions of support [19, 52].

In a study of over 700 English- and Spanish-speaking U.S. patients with T2DM from four urban public hospital systems, Sarkar and colleagues found racial/ethnic differences in preference for self-management social support modes of delivery [49]. Urban Hispanics in this sample preferred telephone and group medical visits, as compared with Whites residing in urban areas [49]. As compared with Whites, Blacks, on the other hand, did not have a specific preference in delivery mode [49]. They would accept self-management support via telephone, group medical visits, and the Internet. In a small sample of White men and women with T2DM, Gleeson-Kreig found a preference for support by the media, followed by health care professionals, personal, and work [50]. Support from family, friends, and community members were least acceptable modes of delivery for this sample population [50]. Contrary to the findings by Gleeson-Kreig and associates, Shaw et al. demonstrated a higher preference for community, neighborhoods, and community organizations in adults living with T2DM in upstate New York [43]. Overall, this section has been included, in particular, to draw attention to differences in sources of support as received from different study populations, in the hope that tailored studies and interventions may be created that directly target areas of greatest need.

Conclusions

This literature review explored the impact of social support on clinical and psychosocial outcomes, as well as behavior change, and mentioned several perceptions of support preferences. Of the 37 papers reviewed, 17 provided information on clinical outcomes, 13 on behavior modification, 2 on psychosocial factors, and 5 on support preferences. Of the clinical outcome papers, 14 demonstrated a relationship between social support and improved clinical outcomes, suggesting higher levels of social support as a positive factor for improved health-care decision making and motivation. Eleven articles reviewed for behavior change in participants yielded favorable results, showing increased diabetes self-management, medication adherence, and adoption of nutritional and active lifestyles with increased social support. The results of 2 articles demonstrated that there were fewer depressive and stress-related symptoms with increased social support. Finally, preferences for the sources of social support were stated, with clear differences based on race/ethnicity, geographical location, and gender.

The majority of adult populations evaluated within these studies experienced improved clinical outcomes, decreased mortality, and increased mental stability, regardless of race/ethnicity. Differences occurred, however, in the method of delivery and the source of social support among minority groups, as compared with non-Hispanic Whites. Latinos within these study populations often preferred telephone-based and group support (including promotoras); African-Americans demonstrated more variability in modes of delivery of social support (i.e., telephone, group, and Internet). Similarly, minorities exhibited a greater propensity for support from family and friends (including peer and support groups), as compared with Whites, who tended to rely less on support from family and the community and more on support from the media and health-care professionals. Conclusive data demonstrating the advances of various sources and methods of delivery (i.e., online support vs. tangible interpersonal relationships), as compared with others, are warranted.

With the rapid emergence of novel advances in technology, researchers must be mindful of the impact nontraditional neighborhoods, such as mobile texting groups, tablet applications comrades, and online communities, have in providing social support for individuals with T2DM. Access to these modern-day “neighborhoods” may create an environment more conducive for change and positive outcomes. These interactions may improve adherence, diminish socioeconomic and cultural barriers, and generate newfound resources for certain populations. Moreover, this system of networking may allow researchers to expand the

definition of social support, creating atmospheres geared toward acceptance, encouragement, and confirmation of desired lifestyle modifications in nontraditional settings. Knowledge of these differences will allow researchers to develop and promote future programs and interventions that are cost effective, culturally tailored, and sensitive to the needs of the populations being served. Additionally, treatment of T2DM should incorporate these beliefs and values to improve self-care behaviors and diabetes-related outcomes. Future health-care professionals and researchers should be skilled in assessing population needs and addressing the complexities and dynamics of social support; hopefully, this review will provide guidance on effective strategies.

In summary, since 2009, 19 studies—7 cross-sectional and 12 interventional—have been conducted to assess the relationship among social support and multiple variables. On the basis of these studies, evidence suggests that higher levels of social support influence more positive outcomes in participants. Given the vast number of cross-sectional studies reviewed for this article, however, it is difficult to infer causality concerning social support and its impact on diabetes management. Because of gaps and inconsistencies in the literature and differences in sample populations, more research is needed regarding the influence of social support on various diabetes-related outcomes. This research, particularly randomized trials, should be developed to target specific areas of improvement and key determinants. A better understanding of the function of social support in diabetes management will likely help patients achieve better control and reduce the burden of diabetes experienced globally.

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Table 1

Observational studies: Social support (SS) in adults with type 2 diabetes (T2DM)

Primary author, study year	Study design	Social support measure(s)	Sample population	Major findings	Study limitation(s)
Rees et al., 2010	Cross-sectional	2005–2006 NHANES (estimating the associations of SS on DM outcomes)	450 black, white, and Latino respondents who self-reported a DM diagnosis	No differences in SS by race/ethnicity. SS associated with controlling weight and fat/calories, exercising, and lower DBP in Blacks. SS was associated with lower LDL in Whites. No significant effects in Latinos.	Did not use a fully validated SS measure; measures of support and networks not differentiated; lack of different aspects of SS in NHANES data
Nicklett et al., 2010	Cross-sectional	Diabetes-related support (2002 Health and Retirement Scale, HRS)	1,788 adults over 60 years with T2DM	DM-related support strongly associated with adherence to health-promoting activities. Illness-related support important in DM.	Limited study duration; subjective, self-reported data; did not assess other psychosocial factors; introduced “floor effect” error into analyses by assessing decline; did not examine additional measures of SS; analyses restricted to reporting on six regimen components
Ciechanowski et al., 2010	Longitudinal Study	4-item relationship questionnaire	3,535 non-depressed adult patients with T1DM and T2DM enrolled in an HMO	A lower propensity to reach out to others was associated with a higher mortality over 5 years	Generalizability; high attrition
Okura et al., 2009	Cross-Sectional	8 items regarding diabetes-related SS drawn from the DCP	1,097 adults, age >50, with DM in the US	Those with high levels of SS had significantly lower odds of having higher HbA1c	Lack of validation and calibration of the HRS; self-reported and missing data; difference in timing between the DM study and HRS wave; cannot determine causality
Choi et al., 2009	Cross-sectional	Diet family support via the 16-item DFBC-II	143 Korean immigrants with T2DM	Higher level of diet family support was significantly associated with lower HbA1c; stronger in men (after adjusting)	Causality cannot be determined; diet family support assessed with a 4-item subscale; generalizability given examination of family support only
Misra et al., 2008	Cross-sectional	Perceived SS via the Personal Resource Questionnaire-Part II (PRQ85)	180 T2DM patients from two local health clinics in Texas	High levels of SS increased acceptance and reduced perceived difficulty of self-care behaviors (SCB). Knowledge reduced perceived SCBs difficulty but was not associated with QoL.	Causality cannot be determined; lack of random sampling; small sample size; use of perceived difficulty as a proxy for adherence; self-reported data

Primary author, study year	Study design	Social support measure(s)	Sample population	Major findings	Study limitation(s)
				SCBs influenced QoL and mediated the relationship between SS, acceptance, and QoL.	
Tang et al., 2008	Cross-sectional, observational	16-item DFBC-II	89 AA adults diagnosed with T2DM	Satisfaction with SS was a predictor for improved DM-specific QoL, blood glucose monitoring. Positive support predictor for healthy eating plan (spacing CHO throughout the day) and performing PA at least 30 min daily. Negative support predictor for not taking medications as recommended	Could not infer causal relationship; positive and negative support did not include items related to foot care; not all potential SS-related variables included; generalizability
Sarkar et al., 2008	Cross-sectional	Self-management support (telephone survey)	796 English-and Spanish-speaking diabetes patients from four urban U.S. public hospital systems	Reported interest: 69% in telephone support, 55% in group medical visits, 42% in Internet. Differences by race/ethnicity: Spanish-speaking Hispanics vs. NHW—telephone support and group medical visits, less in internet self-management support; AA vs. NHW—interested in all three forms. Limited health literacy more likely to be interested in telephone support.	Response rate (47%) limits generalizability; use to telephone surveys; self-reported preferences; de-identified data resulting in inability to compare control with reported data; did not measure health literacy; no definition for “diabetes control”
Rosland et al., 2008	Cross-sectional survey	DCP	164 AA and Latino adults with diabetes living in inner city Detroit	Family and friends support was positively associated with glucose monitoring. Support from nonphysician health professionals was associated with checking feet and meal plan adherence	Small sample size; generalizability; self-reported data; examines only disease-specific support (vs. different types and friends vs. family support); cannot determine causality
Gleeson-Kreig, 2008	Cross-sectional	Modified version of the Cumulative Illness Rating Scale (CIRS)	58 White men and women	Perceived sources of support: media > health care team >	Small convenience sample; homogeneous; limited generalizability; measurement

Primary author, study year	Study design	Social support measure(s)	Sample population	Major findings	Study limitation(s)
				personal > workplace > family & friends > community. Increased PA associated with personal, media, and community support.	tools; self-reported data; causality cannot be determined
Zhang et al., 2007	Data from the Longitudinal Study of Aging cohort	7-item SS index adopted from index developed by Grant and colleagues	1,431 persons ≥70 years of age with DM	387 deaths occurred; risk of death 41% lower among people with medium levels of support and 55% lower among those with the highest levels of support (vs. people with low levels of SS). Effect of SS on mortality mediated by physical and mental health status.	Low explanatory power of regression analyses; cannot determine causality; validity and reliability of the SS index needs to be examined; generalizability; self-reported data
Shaw et al., 2006	Cross-sectional	Modified version of the CIRS	208 adults living with diabetes in two underserved communities in upstate New York (one rural; one urban)	Family and friends support for DM self-care was stronger among the urban respondents. Higher levels of support for DM self-care found in community organizations, neighborhoods, and communities by urban respondents. Least amount of support for DM self-care from organizational sources.	Sampling and recruitment strategy; generalizability; low internal consistency reliability estimate of the survey
Sacco et al., 2006	Cross-sectional	6-item Global Support subscale of the Michigan DM Research and Training Center Diabetes Care Profile	86 diabetes patients	Depression, low SS, and DM-related medical symptoms were significantly intercorrelated. Bidirectional relationship: both DM-related medical symptoms and SS independently contributed to depression; depression contributed to lower SS.	Limited causality conclusions; factors associated with these processes not assessed—DM-related stress, actual rejection, and the effect of depression on physiological and behavioral pathways; generalizability; examined DM-related SS and DM-related medical symptoms only; negative bias of depression on DM symptoms

Primary author, study year	Study design	Social support measure(s)	Sample population	Major findings	Study limitation(s)
McNeil, 2006	Cross-sectional descriptive/correlational study	20-item Medical Outcomes Survey Social Support Questionnaire (MOS-SSQ)	57 middle-aged and older AA with T2DM	Current sample had high SS scores, but there were no significant relationships between perceived SS scores and CVD risk scores	Small sample size; Framingham CVD risk scores do not take into account all risk factors for CHD and lack a quantitative index for racial ethnicity; inadequate instruments for measuring cultural differences in anxiety and depression
Chlebowy et al., 2006	Cross-sectional	27-item SS Questionnaire (SSQ)	91 adult participants with T2DM registered for outpatient visits at 1 of 3 clinical agencies	No significant relationship was found between SS and self-care behaviors or between SS and glycemic control. AA reported less SS satisfaction than Whites.	Homogeneous groups
Wen et al., 2004	Cross-sectional	Perceived family support for diet using the 2-item diet subscale from the DFBC-II; family function using the Family APGAR Scale	138 older MA adults seeking care at an outpatient university clinic	Higher levels of family functioning and family support improved diet, self-care management and reduced perceived barriers Higher levels of support were associated with perceptions of a functional family.	
Wen et al., 2004	Cross-sectional	17-item (4 diet items, 3 exercise items) DM Family Support Behavior Checklist-II (DFBC-II)	138 adults 55 years of age and older with T2DM who presented for care in a primary care clinic	Higher levels of perceived family support and SE were associated with higher levels of diet and exercise self-care. Being older and living with multiple family members were associated with higher levels of diet self-care.	Causality cannot be determined; self-reported data; location bias; generalizability; lack of DM-specific measures in older Hispanic patients
Carranza et al., 2004	Pilot Study	Included questions similar to those described by Tollotson et al. (DM Educ, 1996)	76 MA with T2DM	Self-rated adherence was related to the degree and source of SS (spouse > other family members > doctors, friends > none). Patients with supportive family members had higher levels of adherence	Generalizability; small sample size

Primary author, study year	Study design	Social support measure(s)	Sample population	Major findings	Study limitation(s)
				(vs. those with SS external to family).	
Carter-Edwards et al., 2004	Cross-Sectional	Focus group guide developed by two members of the study team	12 AA women with T2DM from a DM clinic in southeastern U.S.	Sources of support: family, friends, healthcare providers.	Small sample size; generalizability; homogeneous population
Epple et al., 2003	Cross-sectional	Active family nutritional support via 42-item questionnaire developed from ethnographic interviews (based on locally relevant factors)	163 Dine (Navajo) aged ≥20 years old with T2DM	Active family nutritional support was significantly associated with control of TG, cholesterol, and HbA1c levels. DM outcomes better when “other family members” (vs. the patient with T2DM) cooked majority of meals. Control of outcomes more pronounced in women.	Generalizability; overrepresentation of females; accuracy and completeness of medical records; pathway for support not none; random sampling for blood glucose reading; lack of reliable testing for survey; no assessment of behavioral/lifestyle measurements
Gleeson-Kreig et al., 2002	Cross-sectional	SS in self-management (adaptation of the PRQ-85, Part I instrument)	95 (65 female and 30 male) Hispanic adults with insulin-treated DM	SS (number of categories of people to provide support, number of people in household, not satisfaction with support rendered) was not related to DM self-management.	Sample of urban dwellers; respondent bias; collecting data from home interviews where extended family members contributed information

Note. DM, diabetes; DBP, diastolic blood pressure; HbA1c, glycosylated hemoglobin A1c; LDL, low-density lipoprotein; CIRS, Chronic Illness Resources Survey; HMO, health maintenance organization; DFBC-II, Diabetes Family Behavior Checklist–II; QoL, quality of life; DCP, Diabetes Care Profile; PRQ, Patient Resource Questionnaire; HRS, Health and Retirement Scale; AA, African-American; CHO, carbohydrates; PA, physical activity; NHW, non-Hispanic Whites; CVD, cardiovascular disease; CHD, coronary heart disease; SE, self-efficacy; TG, triglycerides;

Table 2

Interventional studies: Social support (SS) in adults with type 2 diabetes (T2DM)

Primary author, study year	Study design	Social support measure(s) and/or intervention	Sample population	Major findings	Study limitation(s)
Long et al., 2012	RCT	Peer mentorship model (UC vs. peer mentoring vs. financial incentives)	118 AA veterans 50–70 years of age with persistently poor DM control	Mentors and mentees spoke most in first month (declined by month 6). Peer mentoring improved glucose control in sample population.	Veterans only; study lasted only 6 months
Song et al.,2012	Community-based intervention	6-item SS subscale of the DCP	83 middle-aged KAs with T2DM	Primary source of SS differed by gender (Men: spouse; Women: nonspouse). Unmet needs of SS associated with inadequate self-care activities.	Small and homogeneous sample; generalizability; assessed perceptions of SS (vs. received SS)
Frosch et al., 2011	RCT	Behavior support intervention	201 patients with poorly controlled T2DM	Significant overall reduction in mean HbA1c from baseline to 6 months, but no significant differences between groups. Differences on other clinical outcomes (lipids, blood pressure), DM knowledge, and self-care behaviors were nonsignificant.	Unblinding of the study; research staff conducting assessments were not blinded to group assignments; differential attrition
Trief et al., 2011	Pilot study	Couples-focused DM intervention (randomized to couples intervention vs. individual intervention vs. individual DM education)	44 couples >21 years of age, married or partnered >1 year, one in couple having T2DM in poor glycemic control	Couples intervention showed decline in total and LDL cholesterol (same as individual intervention; education group increased). Individual group showed greatest declines in mean change in HbA1c. Couples group showed greatest decline in mean change in waist circumference.	Sample size; individual variability; short follow-up period; did not analyze psychosocial measures
Roblin, 2011	Pilot study	SMBG peer support and mobile ICT	15 patients with T2DM (27–74 years of age) with T2DM not requiring insulin and poor glycemic control and their self-selected support partners	Patients reported improved attention to SMBG and had a reduction in average blood glucose levels by end of 3 months. Support partners reported improvements in emotional and instrumental support for lifestyle changes and improved health.	Generalizability; novice research; participant bias; sample size; exclusion of patients' primary care physicians in design of social network
McEwen et al., 2010	RCT	Culturally tailored DM self-management SS intervention	21 MA adults with T2DM in the Arizona-Sonora, Mexico border region	SS intervention improved self-care behavioral outcomes, sedentary lifestyle, distress with T2DM regimen (greatest impact), and DM knowledge; no change in physiologic outcomes.	Generalizability (due to sample size and design); difficult to distinguish whether improved outcomes attributed to individuals, group, promotoras, or the CDE; did not assess how

Primary author, study year	Study design	Social support measure(s) and/or intervention	Sample population	Major findings	Study limitation(s)
					integration of information, emotions, and SS influenced behavioral and physiologic outcomes; interviewer bias; inconsistent method of survey delivery; small sample size.
Richardson et al., 2010	RCT	Single-item survey question designed for a message-tailored algorithm	324 sedentary, ambulatory adults	Participants with low baseline SS used the online community features more (posted and viewed more messages) than those with high baseline SS. No significant differences in step counts (walking)	Participant bias at baseline; staff involvement in online community, limiting generalizability; short duration of intervention; use of single item to assess perceived SS
King et al., 2010	Self-management RCT	11 items from the Patient Assessment of Chronic Illness Care (PACIC) survey and the CIRS	463 adults with DM having elevated BMI	Behavior-specific support from family, friends, and community resources was strongly related to healthy eating and calories expended in PA. Social-environmental support was independently associated with diet and exercise (increasing the variance, accounting for 23% and 19%, respectively).	Did not assess the quality of the physician/patient relationship; analyses limited to baseline data; self-reported data; sample limited to educated participants from one health organization
Heisler et al., 2010	RCT	Reciprocal peer support vs. nurse care management	244 male veterans with DM and poor glycemic control from 2 mid-western VA facilities	Mean HbA1c decreased in the RPS group and increased in the NCM group. Greater mean decrease in baseline HbA1c for RPS group. RPS group reported improvement in DM SS.	Only male veterans; lasted only 6 months
Bond et al., 2010	RCT	Perceptions of DM-related SS (using the 12-item DM Support Scale) and 6-month Web-based intervention on psychosocial well-being	62 adults 60 years of age or older with diabetes	Intervention group showed significant improvement (vs. control group) in depression, QoL, SS, and SE) when controlling for baseline outcome variables. Web-based interventions effective in sustaining psychosocial well-being	Small sample size of older adults who were mainly White, well-educated, and earned an annual income > $40,000; study did not look at long-term effectiveeness of the intervention; multicomponent intervention, so determination of the most effective and contributory aspect impossible; no set dosage of Internet access; sample composed of motivated group of volunteers with good glycemic control
Wolever et al., 2010	RCT	Interpersonal Support Evaluation List (ISEL-12) + Integrative Health (IH) coaching	56 patients with T2DM	Participants in the IH group had increased perceived SS, improved self-reported medication adherence,	Sample size; short duration of study intervention

Primary author, study year	Study design	Social support measure(s) and/or intervention	Sample population	Major findings	Study limitation(s)
				exercise frequency, stress, and perceived health status. Observed decreased follow-up HbA1c levels in coached group.	
Murrock et al., 2009	Mixed methods Pilot study	Peer support group as adjunct to dance intervention	46 AA women from a community-based outpatient clinic	Peer support and dance intervention encouraged attendance and helped to lower DM outcomes (BP, body fat, HbA1c)	Small sample size; generalizability
Ingram et al., 2007	Community-based intervention with 12-month pre-/poststudy design	Impact of promotoras on SS and glycemic control (support groups, home/hospital visits, telephone support, and advocacy)	70 members of a farmworker community on the US-Mexico Border	Improved HbA1c associated with promotora advocacy and participation in promotora-led support groups. Increased support from family and friends and comfort speaking about diabetes with family and friends.	Clinical data based on a community organization (excluded participants who see a physician in Mexico or who do not see a physician regularly); demonstration project; no fixed dosage of promotora contact
Barrera et al., 2002	RCT	Internet-based support intervention (assigned to one of four groups: information only, personal coach only, SS only, combined condition)	160 participants (75 men and 85 women, at least 59 years of age) diagnosed with T2DM	After 3 months of intervention, individuals in the Internet-based SS group had a significant increase in availability of perceived SS (SS group > combined group > information only group).	Sizable (20%) dropout rate at 3 months; short duration of participation; increased sensitivity to ISEL items
Smith et al., 2000	Computer-based community intervention	Telecommunication support	30 women with DM residing in rural areas	Higher levels of SS were associated with improving health, higher educational levels, being married, and having greater levels of support.	Small sample size; self-reported data

Note. HbA1c, glycosylated hemoglobin A1c; DM, diabetes; RCT, randomized control trial; UC, usual care; DCP, diabetes care profile; AA, African-American; MA, Mexican-American; KA, Korean-American; NHW, non-Hispanic Whites; SMBG, self-management of blood glucose; VA, Veteran's Administration; QoL, quality of life; SE, self-efficacy; PA, physical activity; CDE, certified diabetes educator; LDL, low-density lipoprotein; ISEL Interpersonal Support Evaluation List; ICT, Information Communication Illness Resources Survey; SMBG, self-management of blood glucose; BMI, body mass index; TG, triglyceride