

# Ecological Approaches to Self-Management: The Case of Diabetes

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In the Diabetes Initiative of The Robert Wood Johnson Foundation, an ecological perspective helped identify the following key resources and supports for self-management (RSSM): individualized assessment, collaborative goal setting, skills enhancement, follow-up and support, access to resources, and continuity of quality clinical care. These RSSM reflect the grounding of diabetes self-management in the context of social and environmental influences. Research supports the value of each of these key resources and supports. Differences among self-management interventions may be seen as complementary, rather than conflicting, ways of providing RSSM. This way of understanding differences among interventions may aid development of varied programs to reach diverse audiences. In contrast to the "5 A's" model of key provider services (Assess, Advise, Agree, Assist, and Arrange), RSSM articulate self-management from the perspective of individuals' needs. Both approaches emphasize identification of goals, teaching of skills, and facilitation and reinforcement of the use of those skills. (*Am J Public Health*. 2005;95:1523–1535. doi:10.2105/AJPH.2005.066084)

Developed from research on how people may manage their behavior,<sup>1</sup> extensions of this research to problems like smoking and overweight,<sup>2,3</sup> and research on promoting healthier lifestyles and behavior patterns in health education, the concept of "self-management" has received emphasis in diabetes care and care of other chronic diseases over the past 30 years.<sup>4–6</sup> In its *National Standards for Diabetes Self-Management Education*, the American Diabetes Association recognized self-management education as "the cornerstone of care for all individuals with diabetes who want to achieve successful health-related outcomes."<sup>7(p682)</sup> Similarly, the Web page of the American Association of Diabetes Educators describes that organization as dedicated to "self-management training and care as integral components of health care for persons with diabetes."<sup>8</sup>

In reaction to the determinism theory of behaviorism, Mahoney and Thoresen, in their 1974 book *Self-Control: Power to the Person*,<sup>1</sup> advanced the argument that people could control their own behavior. However, the question of whether the individual controls his or her own behavior or whether behavior is controlled by environmental forces remains controversial. Although he titled his

book *Self-Efficacy: The Exercise of Control*, Albert Bandura acknowledged that "Most human behavior . . . is determined by many interacting factors, and so people are contributors to, rather than the sole determiners of, what happens to them."<sup>9</sup> Nevertheless, an emphasis on individual responsibility remains a strong theme in writings on self-management. For example, a 2003 review included a statement that "Whether one is engaging in a health promoting activity such as exercise or is living with a chronic disease such as asthma, he or she is responsible for day-to-day management. . . . The issue of self management is especially important for those with chronic disease, where only the patient can be responsible for his or her day-to-day care over the length of the illness."<sup>10</sup>

Data do not support the view that self-management interventions enable individuals to control their own behavior. A meta-analysis of self-management programs in diabetes by Norris and colleagues found sharp declines in benefits only a few months after interventions ended.<sup>11</sup> Interventions promoting self-management resulted in an improvement in glycosylated hemoglobin of 0.76 percentage points in case subjects rela-

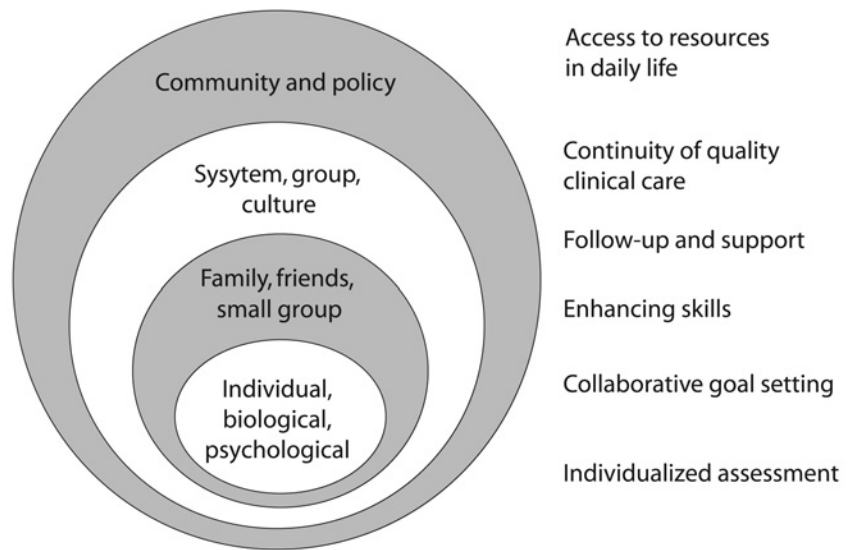
tive to control subjects at immediate follow-up, but this figure declined to 0.26 percentage points when assessments occurred more than 1 month after treatment ended. (Glycosylated hemoglobin represents the percentage of hemoglobin cells that have been modified by glucose in the blood and is thus an index of average blood sugar values over a period of approximately 120 days.<sup>12</sup> Normal levels of glycosylated hemoglobin are 4% to 6%, and 7% is a widely endorsed target for glycemic control.) This finding mirrors well-established patterns of relapse after interventions promoting weight loss<sup>13</sup> and smoking cessation.<sup>14</sup> Among the demographic and intervention characteristics examined in the meta-analysis of Norris and colleagues, only duration of the intervention was found to predict a program's success. As the authors noted, "Interventions with regular reinforcement are more effective than one-time or short-term education."<sup>15</sup> The association of benefit with length and variety of treatment has also been observed in meta-analyses of smoking cessation interventions<sup>16,17</sup> and meta-analysis of a variety of patient education programs addressing health risks or health-promoting behaviors (e.g., breast self-examination).<sup>18</sup> Self-management is dependent on the environmental contexts that surround the individual.

Much evidence exists for the importance of what has come to be called self-management training or education. For the purpose of their review, Norris and colleagues defined self-management interventions as including instruction in such skills as weight loss/weight management, physical activity, and medication management and blood glucose monitoring as well as other tasks specific to diabetes management. Self-management interventions meeting this definition have been found to improve patterns of disease management<sup>15</sup> and metabolic control among adults with type 2 diabetes.<sup>11</sup>

Additional support for self-management has come from 2 major multisite clinical trials. To demonstrate that improved metabolic control reduces complications from diabetes, the Diabetes Control and Complications Trial relied upon effective interventions to teach patients the disease-management behaviors necessary to achieve improved metabolic control and to support patients in maintaining those behaviors over the course of the trial.<sup>19,20</sup> In the Diabetes Prevention Program, behavioral interventions designed to help high-risk individuals achieve modest weight loss (7% of body weight) and modest levels of physical exercise (150 minutes per week) reduced conversion to type 2 diabetes in patients by 58% relative to controls.<sup>21</sup> Lifestyle interventions in China<sup>22</sup> and Finland<sup>23</sup> reported similar findings. Additionally, a number of smaller group and individual self-management interventions have documented improvements in self-efficacy, self-management behaviors, metabolic control, patient satisfaction, and quality of life among individuals with diabetes,<sup>24–32</sup> including older type 2 patients and ethnic minorities.<sup>33–35</sup>

## BEYOND THE SELF IN SELF-MANAGEMENT

In contrast to views of self-management that emphasize a supposed ability of the individual to control his or her own behavior, an ecological approach to self-management integrates the skills and choices of individuals with the services and support they receive from (1) the social environment of family, friends, worksites, organizations, and cultures; and (2) the physical and policy environments of neighborhoods, communities, and governments.<sup>36</sup> Self-management from an ecological perspective requires access to a variety of resources, including services provided by professionals and support for the initiation and maintenance of healthy behaviors. A range of influences cause behavior, including interventions and influences applied directly to the individual, as well as social, organizational, community, governmental policy, and economic factors.<sup>37–39</sup> Figure 1 employs an ecological approach to portray levels of influence on self-management. (It



**FIGURE 1—Correspondence of ecological levels of influence with resources and supports for self-management.**

also shows the resources and supports for self-management, which are described in the next section, that correspond with these levels of influence.)

Ecological perspectives also point to the importance of access to key resources in self-management.<sup>40</sup> Healthy eating patterns and physical activity levels are not likely to occur or persist without convenient sources of healthy foods and attractive and safe settings for exercise. The impact of “built environments” has been of increasing interest in recent years<sup>41,42</sup>; for example, studies have demonstrated the strong negative and positive effects, respectively, that access to resources for physical activity<sup>43,44</sup> and consumption of food purchased away from home have on overweight.<sup>45</sup>

## RESOURCES AND SUPPORTS FOR SELF-MANAGEMENT

The Diabetes Initiative of The Robert Wood Johnson Foundation includes 14 projects intended to both demonstrate and evaluate diabetes self-management promotion in primary care and community settings.<sup>46</sup> To develop a shared template of self-management programs across the 14 projects, we used an ecological perspective to identify

several key resources and supports for self-management (RSSM) needed by individuals: individualized assessment, collaborative goal setting, skills enhancement, follow-up and support, access to resources in daily life, and continuity of quality clinical care. These RSSM appear in Figure 1 as they correspond to the levels of behavioral influence posited by ecological perspectives. As the figure indicates, some of the RSSM, such as individualized assessment and collaborative goal setting, tend to be addressed at the individual level of influence, whereas others, such as access to resources and continuity of quality clinical care, are more often addressed at the system, group, and policy level. However, these correspondences are not rigid. Policies influence the choices and goals available to individuals; individuals may learn skills to access resources otherwise unavailable to them.

To examine the extent to which RSSM are addressed in current research and writing on diabetes management, we reviewed abstracts from Medline (available at: <http://www.ncbi.nlm.nih.gov/entrez>) published between January 2003 and June 2004 that included (a) cognates of “self-management,” “co-management,” “patient education,” or “empowerment” and (b) cognates of “diabetes.” Because this sampling covered only 18 months,

it was not meant to form a basis for drawing broad conclusions but rather to provide an overview of recent research. Table 1 presents a digest of articles that we identified, organized in terms of each of the categories of RSSM. We have also included in Table 1 articles identified in a forthcoming book chapter describing self-management in primary care settings.<sup>93</sup>

### Individualized Assessment

Substantial research has investigated psychological, cultural, and social factors in individuals' "personal models of illness."<sup>94</sup> It is therefore considered a best practice for health education to begin with the perspective of the individual and that of the culture in which he or she was raised.<sup>95</sup> This best practice often addresses issues such as concepts of illness, health, and death; the meaning of medication taking; views of the role of the individual; views of fate or control (including the natural history of diabetes); and views of the role of the individual vis-à-vis family and community. Professionals' perspectives are presented not as the "right" way of viewing things but rather as the view of Western medicine, and one that the individual may consider in efforts to live a satisfying life with a chronic disease. This emphasis on the individual's perspective contrasts with conventional practice, in which discussion and responses to the patient's questions or reservations are organized around the professional's view of the disease.

As indicated in Table 1, recent reports point to the importance of individualized assessment<sup>47</sup> and have identified variation in perceived needs among people with diabetes.<sup>48</sup> A key dimension for individualization may be individual perspectives associated with cultural differences. Self-management interventions have addressed superficial characteristics of culture, such as appropriate symbols or models, but not its deep structure, such as beliefs and norms.<sup>51</sup> Also, it is interesting that the objective of individualizing assessment may be advanced by "high-tech" approaches such as computer-based applications for systematic tailoring of interventions to individual characteristics.<sup>53,54</sup>

### Collaborative Goal Setting

Substantial research indicates both the importance of goal setting in behavior and

the value of interventions that focus on goal setting.<sup>96,97</sup> An influential demonstration of the benefits of enhancing the role of patients in planning their own care included a brief instruction and rehearsal session about how to ask questions of and negotiate with the primary care provider; the intervention resulted in significant improvements in multiple outcomes, including glycosylated hemoglobin levels, relative to controls.<sup>26</sup> Table 1 presents data regarding the importance of active collaboration between patient and provider.<sup>55,56,58</sup>

Numerous approaches to collaborative goal setting exist. Motivational interviewing<sup>98</sup> is one popular approach; it emerged from interventions for alcohol and drug dependence and gained considerable popularity in diverse patient education and health promotion interventions. Of growing interest is the application of high-tech approaches, such as computerized individual assessment to support efficient goal setting and attention to patient-selected goals throughout the course of care.<sup>53,54</sup>

Closely tied to an emphasis on collaborative goal setting is a recognition of the patient's authority over his or her illness. Anderson and Funnell<sup>99</sup> have suggested that the entire enterprise of patient education and self-management be referred to as "patient empowerment." Building on previous research emphasizing individual choice and direction in self-management,<sup>100–102</sup> they have documented the benefits of self-management interventions that stress the choices and responsibilities of the patient.<sup>99</sup> This approach contrasts with a relationship in which professionals encourage goals and the patient's role is primarily to accept them.

### Skills Enhancement

A consensus document on self-management sponsored by The Robert Wood Johnson Foundation and the Center for the Advancement of Health noted that only an estimated 20% of skills in disease management are disease specific.<sup>103</sup> This figure may be an underestimate for diabetes, given the complexity of management of this disease. Nevertheless, many of the skills to be taught in disease management are general problem-solving skills, skills for resisting temptation and preventing

relapse, self-monitoring strategies applicable across behaviors, and skills for enhancing general healthy-lifestyle patterns, such as healthy eating and physical activity. Well-established principles of patient education and behavior change include the importance of (1) identifying and teaching *concrete* behaviors and skills (e.g., how to read food labels for frozen and processed foods; how to estimate percentages of protein, carbohydrates, and fats in daily diet); (2) modeling and demonstrating skills; (3) rehearsing skills; (4) self-monitoring and providing feedback to enhance performance; (5) monitoring the implementation of skills in real-life settings and reviewing results; (6) revising plans and testing revised plans in light of results of initial efforts; and, at each step, (7) reinforcing progress.<sup>13,104–106</sup>

Successful self-management interventions incorporate a sequence of contacts, often group meetings, in which skills are introduced, practiced, and reviewed, with opportunities for real-world tests between sessions followed by further review, practice, and skill enhancement. This approach is in marked contrast to interventions that provide a series of didactic lectures or presentations about disease management but do not focus at the level of individual skills and their successful application in daily life.<sup>15,106</sup>

As outlined in Table 1, research provides strong evidence for the importance of enhancement of skills for self-management and for the utility of the patient's sense of competence or self-efficacy as an indication that interventions are effective.<sup>9,25,67,102</sup>

Because disease management must become established throughout the individual's daily life, it affects diverse areas of his or her activities and faces a wide range of barriers. Consequently, disease management requires skills for solving problems in daily life. Most approaches to teaching problem-solving skills use a sequence of steps: (1) identifying and pinpointing the problem, (2) identifying alternative ways of coping with the problem, (3) choosing from among those alternatives, (4) rehearsing the chosen alternative, (5) attempting the alternative, and (6) reviewing, revising plans, further rehearsing or developing skills. These steps also occur in common approaches to problem solving.<sup>10,13,107,108</sup> They have been extended to a wide range

**TABLE 1—Recent Research in Diabetes Management Regarding Resources and Supports for Self-Management**

Resource or Support Addressed	Reported Results of Research
Individualized assessment	<ul style="list-style-type: none"> <li>• Report noted the importance of individualized assessment to support collaborative goal setting in deciding whether or not to initiate insulin therapy.<sup>47</sup></li> <li>• Adults with diabetes who smoked reported poorer health status, more depression, poorer self-management, completion of fewer recommended tests, and less desire for and receipt of social support for diabetes management than those who did not smoke, and less readiness to quit than smokers in the general population.<sup>48</sup></li> <li>• There were no substantial differences on a measure of attitudes toward self-management and diabetes management practices<sup>49</sup> between Whites and African Americans with diabetes enrolled in Food Stamp Education Program; authors concluded that self-management for African Americans with diabetes need not differ from that for Whites.<sup>50</sup></li> <li>• Review of community-based interventions in meta-analysis of Norris et al.<sup>15</sup> examined attention to cultural issues.<sup>51</sup> Most articles addressed surface structure of cultures (e.g., culturally appropriate symbols, vernacular, models) but not deep structure (e.g., history, beliefs, norms).<sup>52</sup></li> <li>• Computer-based individual dietary assessment and intervention in a primary care setting that included goal setting, 15- to 20-minute problem-solving intervention, and 2 follow-up calls resulted in improved dietary behavior and cholesterol levels relative to controls.<sup>53,54</sup></li> </ul>
Collaborative goal setting	<ul style="list-style-type: none"> <li>• Patients' perception of receiving autonomy support from providers predicted autonomous motivation and perceived competence, which in turn predicted changes in GHb; self-management behaviors mediated relationship between perceived competence and GHb.<sup>55</sup></li> <li>• Patients' education, belief in treatment efficacy, and reports of shared decisionmaking and providers' reports of self-management counseling were associated with agreement in selection of treatment goals and strategies; agreement on goals and strategies predicted patients' assessment of own self-management and self-efficacy. Results suggest a complex of shared decisionmaking and patient engagement in diabetes care.<sup>56</sup></li> <li>• Focus groups with participants in group self-management classes indicated importance of (1) negotiated curriculum in which educators incorporated participants' preferences for what they wanted to learn; (2) experiential learning in which participants' expertise is acknowledged; (3) striking balance between ideal lifestyle and other concerns and interests; and (4) reducing physician resistance to collaborative goal setting.<sup>57</sup></li> <li>• In meta-analysis of self-management programs for chronic disease, inclusion of face-to-face contact was only predictor of outcomes.<sup>58</sup></li> <li>• Computer-based individual dietary assessment and intervention included review of patient-chosen goals with PCP.<sup>53,54</sup></li> <li>• Foot-care intervention through small-group meetings with nurses provided individualized behavioral contracts, foot-care education, and telephone and postcard follow-up, combined with prompts to clinicians to examine feet and follow standardized protocols. Intervention reduced foot lesions and increased both office foot examinations and foot self-management relative to controls.<sup>59</sup></li> <li>• Touch-screen intervention in a primary care setting facilitated setting priorities for care and goals for diet, physical activity, and smoking. Printouts for patients and providers. Well-accepted by providers and by patients, including Latinos, older adults, and people with little formal education. Increased behavioral counseling received by patients. Other outcomes forthcoming.<sup>60</sup></li> <li>• Empowerment intervention for self-management led to improved GHb relative to usual care.<sup>25</sup> Six-session group intervention included skills for goal setting, problem solving, coping with barriers to achieving goals, stress management, and recruiting social support.</li> </ul>
Skills enhancement	<ul style="list-style-type: none"> <li>• Diabetes Passport <i>alone</i>, without goal setting, individualized assessment, or opportunities for skills enhancement, had minimal benefits in randomized trial.<sup>61</sup></li> <li>• Study identified key ingredients in problems solving: (1) positive orientation to self-management, (2) rational problem-solving process, (3) encouragement of drawing on past experiences and learning to develop new plans for problem solving.<sup>62</sup></li> <li>• Group patient education for 2 hours per week over 5 weeks led to progression in stage of adoption of diabetes management behaviors (e.g., foot care).<sup>63</sup></li> <li>• In Korea, telephone counseling 2 times per week for first month, then weekly for months 2 to 3 (total = 16 calls, average call length = 25 minutes) led to a 1.2-percentage-point reduction in GHb relative to a 0.6-percentage-point increase for usual care.<sup>64</sup></li> <li>• Face-to-face delivery of intervention, cognitive reframing, and including emphasis on exercise predicted beneficial effects on metabolic control (GHb) in meta-analysis.<sup>65</sup></li> <li>• Self-management and psychologically focused interventions (e.g., based on problem-solving therapy or cognitive-behavior therapy) reduced negative emotion, improved quality of life more than education interventions that were limited to conveying information.<sup>66</sup></li> <li>• Self-efficacy and concrete skills were important in self-management education.<sup>67</sup></li> <li>• Five group visits for adolescents with type 1 diabetes focused on problem solving and self-monitoring of blood glucose. Parents in concurrent group sessions. Intervention resulted in significantly greater reductions in GHb than usual care.<sup>68</sup></li> <li>• Computer-based individual dietary assessment and intervention included 15- to 20-minute problem-solving session.<sup>53,54</sup></li> <li>• Foot-care intervention<sup>59</sup> included foot-care education.</li> <li>• Touch-screen intervention in a primary care setting<sup>60</sup> that facilitated setting priorities for care and goals for diet, physical activity, or smoking increased behavioral counseling received by patients.</li> <li>• Empowerment intervention<sup>25</sup> included skills for goal setting, problem solving, coping with barriers to achieving goals, and stress management.</li> </ul>
Follow-up and support	<ul style="list-style-type: none"> <li>• Meta-analyses<sup>11,15</sup> found that the only program feature that was uniquely predictive of success after controlling for the influence of all the other program features was duration of contact. "Interventions with regular reinforcement are more effective than one-time or short-term education."<sup>15(p583)</sup></li> <li>• Nurse follow-up included attempted calls twice a week for 1 month, then weekly. Actual contact averaged 16 calls over 12 weeks with average of 25 minutes per call. Significant reductions in GHb (8.8 to 7.6) and improved diet relative to controls.<sup>69</sup></li> </ul>

*Continued*

TABLE 1—Continued

	<ul style="list-style-type: none"> <li>• Failure to find duration of diabetes patient education programs was a significant predictor of beneficial effects on metabolic control (GHb), attributed by authors to lack of good measure of dose.<sup>65</sup></li> <li>• Focus groups with participants in group self-management classes indicated importance of shared empathy and exploration of attitudes and motives leading to a sense of being “not on your own.”<sup>70</sup></li> <li>• Lower levels of desired and received social support for diabetes management reported for adults with diabetes who smoke; smokers also were more likely to report fair/poor health, depression, poorer self-management and fewer recommended tests.<sup>48</sup></li> <li>• When offered monthly support group meetings over a 3- to 12-month period following 4-hour education program and individual consultations with dietitian, only 29 of 70 (41%) attended at least 1 meeting.<sup>71</sup></li> <li>• Among interventions that improved negative emotion and quality of life, those that addressed social support taught skills for recruiting support as opposed to strategies explicitly providing support.<sup>66</sup></li> <li>• Teaching adults how to set goals for and pursue acquisition and utilization of community resources was successful in increasing resource use and in maintaining physical activity levels.<sup>72</sup></li> <li>• Computer-based individual dietary assessment and intervention included 2 follow-up phone calls by health educator to check progress in achieving dietary change goals.<sup>53,54</sup></li> <li>• Foot-care intervention<sup>59</sup> performed telephone and postcard follow-up.</li> <li>• Ongoing phone calls from nurses reduced GHb relative to usual care.<sup>73</sup> Phone calls were made at least monthly and included review of patient education, adherence, and general health status as well as problem solving and access to care.</li> <li>• Combination of automated phone calls through which patients reported self-monitored blood glucose levels and individually tailored phone follow-up by nurses resulted in improved GHb as well as increased self-efficacy and decreased depressed mood among low-income and minority patients of Veterans Administration and community health centers.<sup>74-76</sup></li> <li>• Monthly newsletter to adults with diabetes was well accepted, especially by those having more problems with their diabetes.<sup>77</sup></li> <li>• Empowerment intervention<sup>25</sup> included skills for recruiting social support.</li> </ul>
Access to resources in daily life	<ul style="list-style-type: none"> <li>• Asheville Project in North Carolina trained pharmacists to provide ongoing education, training in self-monitoring of blood glucose, monitoring of status, goal setting, and collaborative medication management with physicians for adults who had completed education from certified diabetes educators. Benefits included improved, whether as an increase or reduction, GHb, lipids, blood pressure, quality of life, and satisfaction with pharmacy services and reduced health care costs.<sup>78,79</sup></li> <li>• Faculty and students of North Carolina Central University assisted a community-focused diabetes management program, Project DIRECT, in gaining community input into program planning and in developing community-based activities for diabetes management in African American churches that served the intended project audience.<sup>80</sup></li> <li>• Through linkages with community groups and organizations, The Cote-des-Neiges project in Montreal sought to develop community-based support for diabetes management including support groups, lobbying for improved medication coverage, group exercise sessions, and links to a local sports center. Although response to activities was positive, few activities were developed and implemented because of the short (1-year) project period.<sup>81</sup></li> <li>• Supplemental food programs for Native American groups were used by intended audiences but were less effective than they could be because (1) programs did not provide adequate amounts of healthy foods and (2) did not include education in healthy eating and preparation of healthy meals.<sup>82</sup></li> <li>• Mediterranean Lifestyle Project compared 2 approaches to maintenance of changes achieved through an initial, 6-month intervention. Participants were randomized to peer-led support group or an individualized intervention emphasizing multilevel community resources to maintain improved diet and other components of diabetes management.<sup>83</sup></li> <li>• Web-based resources offering chat rooms, discussion groups, and information pertinent to self-management have shown favorable acceptance and utilization among adults with diabetes.<sup>84,85</sup></li> </ul>
Continuity of quality clinical care	<ul style="list-style-type: none"> <li>• Health system instituted comprehensive approach to improving range of diabetes care services, including handouts and manuals, outpatient programs, Web-based programs, telephone/nurse case management for those with GHb &gt; 9, physician financial incentives for meeting testing guidelines, and patient incentives for obtaining annual eye exams. Improvements were reported for all measures, including reduction from 35% to 21% in percentage of patients with GHb &gt; 9.5.<sup>86</sup></li> <li>• Practice guidelines and practice design had broader benefits on management (e.g., effects on blood pressure) than a centralized diabetes service, which did better in terms of treating patients with insulin and reducing GHb.<sup>87</sup></li> <li>• Twenty-four-month “Care Ambassador” program for youths with type 1 diabetes and their families focused on scheduling visits and helping patients negotiate the health care system. Program resulted in reduced GHb and hospitalization and acute care relative to standard care.<sup>88</sup></li> <li>• Foot-care intervention included prompts to clinicians to examine feet and follow standardized protocols. It also emphasized consistency of messages and plans across all members of the team who interact with patient.</li> <li>• Touch-screen intervention in a primary care setting discussed above,<sup>60</sup> provided printouts for PCPs of patient’s dietary, physical activity, and smoking cessation goals. It produced increased completion of recommended laboratory tests.</li> <li>• In community health centers serving disadvantaged populations and other clinical settings, collaborative approaches to improving chronic care in health systems following Wagner’s Chronic Care Model<sup>89,90</sup> led to improved diabetes care, including collaborative goal setting.<sup>91,92</sup></li> </ul>

Note. GHb = glycosylated hemoglobin; PCP = primary care provider. Table was based on a Medline review of articles published between January 2003 and June 2004. It also includes articles identified in a forthcoming book chapter on self-management in primary care settings.<sup>93</sup>

of challenges, such as coping with family or social factors that may interfere with disease management and gaining support for disease management from the family or workplace.

Substantial evidence exists linking poor health and disease management not only to depression<sup>109–111</sup> but also to a variety of other negative emotions, such as hostility, anger, stress, and anxiety.<sup>112</sup> As noted in Table 1, a recent review<sup>66</sup> found that self-management interventions—as well as those that included psychological content, such as problem-solving therapy or cognitive-behavior therapy—led to greater improvements in negative mood or quality of life than did educational interventions in which “participants only received information.”

Evaluations of interventions to address negative emotions have included such emotions’ impact on clinical risk factors.<sup>113,114</sup> For example, a recent study among men in Singapore found that a 6-session group workshop on managing negative emotions and enhancing social ties and relationships produced striking reductions in depression, anger, perceived stress, heart rate, and blood pressure along with increased satisfaction with social support and quality of life.<sup>115</sup> The American Association of Diabetes Educators has recently added “Healthy Coping” to its 7 key self-care behaviors in diabetes management.<sup>116</sup>

### Follow-Up and Support

Reviews of interventions for the self-management of diabetes,<sup>11,15</sup> as well as interventions for smoking cessation<sup>14,15</sup> and interventions in other areas of health promotion,<sup>17</sup> all note the importance of ongoing follow-up and support for behavior change. The content of follow-up may include continued assistance in refining problem-solving plans and skills, encouragement when performance and success is less than perfect, and help in responding to new problems that may emerge. This assistance may entail linking patients to primary care providers or other elements of the disease management team.

Support may be provided through telephone calls<sup>73,117</sup> or the internet.<sup>118</sup> Automated telephone monitoring of patients, combined with nurse follow-up and tailored information, has been shown to reach low-

income and minority patients, to elicit valid self-reported blood glucose levels, and to produce not only decreased blood glucose levels but also increased self-efficacy and reduced levels of depression.<sup>74–76,119</sup> This finding is consistent with research in other areas, such as smoking cessation, in which telephone counseling has been shown to be effective.<sup>120,121</sup>

A popular and effective approach to providing follow-up and support is through use of community-based activities and nonprofessionals such as community health workers, lay health workers, *promotoras* (“health promoters”), or health coaches. In a number of settings, community health workers are involved in the care team and are effective in individualized assessment, goal setting, and teaching skills as well as in providing follow-up and support.<sup>122–124</sup> The Diabetes Initiative projects exemplify the widespread use of *promotoras* in individualized, peer-based patient education, problem solving, and ongoing support and encouragement. Research has identified several characteristics of such providers that may be especially beneficial, including easy access, limited constraints on the extent or focus of service,<sup>125</sup> and nondirective support (cooperating without taking control, accepting the individual’s perspective rather than prescribing correct courses of action)<sup>126,127</sup> or support that enhances autonomy.<sup>128</sup>

Another way of both providing ongoing support and integrating such support with clinical care is the group medical visit,<sup>129</sup> in which all patients in a particular category—for example, those with diabetes—are scheduled for a 2- to 3-hour group visit. Physicians and other staff perform basic assessments and individual medical visits; the group visit also includes educational and supportive discussions or other activities. Evaluations of group medical visits have indicated impressive effects on glycosylated hemoglobin and other measures relative to usual care.<sup>130,131</sup>

As indicated in Table 1, recent research on follow-up and support presents a mixed picture. The meta-analytic reviews of Norris et al.<sup>11,15</sup> point to the importance of duration of treatment. Some individual studies, such as one demonstrating the benefits of nurse follow-up phone calls over 12 weeks,<sup>69</sup> are striking examples of the value of extending

support. Other studies also support the value of telephone follow-up.<sup>73,74–76,119</sup> On the other hand, (1) some meta-analyses fail to find a relationship between duration of intervention and outcome,<sup>65</sup> (2) stated interest in support may vary among individuals with diabetes,<sup>48</sup> and (3) some efforts to provide support receive very little response from those they seek to help. For example, only 41% of participants attended even 1 meeting of monthly support groups over a 3- to 12-month period following a 4-hour education program.<sup>71</sup> Although appreciable research in diabetes and other areas indicates the importance of follow-up and support, it is not well understood what types of support will actually benefit people, how much people want or will avail themselves of support, and what the relationship is between desire for support, desirable aspects of support, and effectiveness of support. As a result, follow-up and support are among the most difficult aspects of self-management to implement and the least frequently provided for a variety of health behaviors.<sup>132,133</sup>

Implicit in focusing on follow-up and support and on access to resources is the idea that because chronic disease management is for the rest of the patient’s life, interventions to support management need also to be extended over the lifetime. In addition, changes in circumstances, such as retirement, widowhood, marriage, children moving out of the household, or reduced physical ability with aging, may have substantial impacts on diabetes self-management, necessitating review and reestablishment of self-management plans. The services outlined in this article, including goal setting, individualization of care, education about disease and the role of individual behavior in its care, skill enhancement, follow-up and support, and attention to availability of resources, need to be repeated throughout the patient’s life. The principle that “chronic disease requires chronic care” applies as much to services and interventions to support self-management of chronic disease as it does to medical management of chronic disease. It should be noted, however, that, although follow-up and support need to be extended over time, they need not be extremely intensive or costly.

### Access to Resources in Daily Life

Skills for disease management are of little utility without access to the resources needed to carry out those skills. For example, convenient access to healthy foods and to attractive and safe settings for physical activity is necessary if healthy diet and healthy levels of physical activity are to be maintained. Research on how the “built environment” influences behavior and health has increased markedly over the past decade. In a study of North Carolina communities, the availability of walking trails and places for physical activity was associated with engaging in recommended amounts of physical activity, after control for demographic and other environmental factors.<sup>43</sup> More generally, “urban sprawl” and the corresponding absence of compact, walkable neighborhoods are associated with greater obesity and hypertension and less walking.<sup>44</sup>

Research has also examined the impacts of policy and environmental factors on the availability of healthy food.<sup>134</sup> Brownell and Horgen’s 2004 book *Food Fight: The Inside Story of the Food Industry, America’s Obesity Crisis, and What We Can Do About It*<sup>135</sup> describes an “obesogenic” environment and outlines policy initiatives to address this environment. Such attention to environmental and policy influences on healthy eating, obesity, and diseases such as diabetes and cardiovascular disease has begun to identify policy initiatives resembling those combating cigarette smoking.<sup>14,136,137</sup>

A variety of community- and peer-based approaches have addressed the problem of access to resources. These include use of *promotoras* or coaches to help individuals identify available resources. Community-based groups or advisory boards may develop resources such as walking paths<sup>138</sup> or may pursue advocacy campaigns to further such development. Research has also begun to address how communities might be redesigned to improve health behaviors and thus population health.<sup>41,42</sup> A systematic review of interventions to promote physical activity<sup>139</sup> concluded that “creation of or enhanced access to places for physical activity combined with informational outreach activities” as well as social support interventions (e.g., “buddy” systems) were effective in promoting physical activity. Similarly, a recent review<sup>140</sup> found that

(1) improving access to places and opportunities for physical activity in communities and workplaces and (2) improving access to and reducing prices of healthy foods in vending machines, restaurants, and cafeterias were effective in increasing physical activity and healthy eating.

Although studies such as those cited here have reported interventions that address resources and supports for physical activity, healthy eating, and other healthy behaviors, the Medline search of articles related to diabetes self-management published between January 2003 and June 2004 identified no articles addressing access to resources. An additional search of Medline from January 1, 1996, through April 15, 2005, identified abstracts that included (1) cognates of “access” or “resources”; (2) cognates of “physical activity,” “exercise,” “diet,” “eat,” “food,” “support,” or “encourage”; and (3) cognates of “diabetes.” Restricting results to reports of studies involving humans and articles in English yielded 266 citations. Review of these articles identified the 5 projects described under “Access to Resources” in Table 1 that describe community and intervention studies to increase access to resources for diabetes self-management. These 5 projects include implementing community approaches to identify and develop resources for physical activity and healthy eating,<sup>80–82</sup> using pharmacists to provide self-management resources in individuals’ daily circumstances,<sup>78,79</sup> and developing an individualized, multilevel intervention to provide support for maintaining improvements brought about through a self-management program.<sup>83</sup> Additional studies have found that Web-based discussion groups and other information resources are well accepted and used by individuals with type 2 diabetes.<sup>84,85</sup> Although few in number, studies of access to resources in diabetes management suggest that the sorts of interventions used to promote physical activity and healthy eating in populations may be extended to management of diabetes and other chronic diseases.

### Continuity of Quality Clinical Care

Self-management and quality clinical care are not only compatible with but also dependent on each other. Without sound

clinical care, the individual’s efforts may be misdirected—for example, in frustration over failure of dietary changes to lower cholesterol when cholesterol-lowering medications are indicated. Without self-management, however, expert clinical care will fall far short of its potential, through patients’ failure to use prescribed medications or to implement management plans, or through their failure to carry out behavioral changes that can extend the benefits of medical management.

Wagner’s chronic care model<sup>89,90</sup> provides an excellent framework for integrating RSSM with key components of clinical care. In a review of initial applications of the chronic care model, Glasgow and colleagues found that it had been successful “in over 300 diverse health care systems in the context of quality improvement efforts (Institute for Health Improvement Breakthrough Series) for asthma, congestive heart failure, depression, diabetes, and prevention of frailty in the elderly—where it has been found to provide an extremely helpful organizing framework for these diverse quality improvement efforts.”<sup>141,142</sup>

A report by Larsen et al.<sup>86</sup> (Table 1) suggests the practicality and benefits of a comprehensive approach to improved clinical care (e.g., physician incentives for meeting testing guidelines) and a wide range of self-management services (e.g., outpatient and Web-based programs, telephone case management). The authors’ emphasis on the integration of comprehensive clinical and self-management services, however, is not widely shared in health care. Rather, a general lack of support prevails for “lifestyle” or behavioral aspects of chronic care management in health care systems. For example, a recent study of 19 health plans used by 2 Fortune 500 companies<sup>143</sup> compared the number of plans offering various services relative to a base rate, 15 out of 19, of plans covering eye examinations. Nine offered smoking cessation services, and 8 offered diabetes self-management education. Only 3 offered services for obesity, 4 for exercise training, and 4 for case management.

That health systems generally fail to support lifestyle or behavioral aspects of chronic care management is apparent from surveys of individuals with diabetes. Among adults with type 2 diabetes surveyed in 1989 through the National Health Interview Survey, 91%

reported having 1 physician whom they saw for regular care of diabetes. Fifty-two percent of the adults taking insulin and 40% of those not taking insulin reported at least 4 visits per year to a physician for diabetes, but only 21% reported seeing a dietitian or nutritionist. Among the adults taking insulin, 49% reported having had a “diabetes education class or course,” but among those not taking insulin, only 24% reported such education.<sup>144</sup> Apparently, health care systems and policy-makers have failed to grasp the value of what should be central components of state-of-the-art care, even though (1) expert panels have advocated the importance of patient education in chronic care,<sup>103</sup> (2) research has clearly identified the value of patient education and self-management interventions in the prevention and management of diabetes,<sup>19,21</sup> and (3) the research summarized in Table 1 supports the value of RSSM.

### “EQUIFINALITY” AND THE VARIETY OF SELF-MANAGEMENT INTERVENTIONS

RSSM are particularly useful in that they provide a way of making sense of what is frequently a dizzying maze of competing treatment approaches. For example, both motivational interviewing<sup>98</sup> and interventions that are based on the transtheoretical model<sup>145</sup> designed for patients in the pre-contemplation or contemplation phases of change may be viewed as approaches to goal setting. Rather than viewing these approaches as competing or incompatible, it may be more helpful to see them as alternative ways of addressing the similar objectives of goal setting.<sup>146</sup>

The concept of “equifinality” may help to clarify how varied intervention approaches may have similar roles or purposes. Drawn from research on organizational behavior,<sup>147</sup> equifinality refers to different procedures or programs following different paths to achieve similar ends—that is, differing procedures and paths share common final effects. Consider smoking cessation. Evidence from the 2000 Agency for Healthcare Research and Quality guidelines for smoking cessation<sup>17</sup> indicates that the number of different formats combined in a treatment is more important than

the nature of the formats themselves.<sup>14</sup> In other words, a number of effective approaches to smoking cessation exist, with no particular intervention being remarkably more effective than others. Additionally, different interventions may be effective in fulfilling similar functions. Thus, counseling in primary care, mass media, or messages tailored to smokers not yet ready to quit may each be effective approaches for reaching smokers and helping motivate them to quit. Continuing with the example of smoking cessation, individual counseling, group programs, and self-help materials may each be effective ways to help people plan cessation and master behav-

ioral self-management skills for avoiding relapse. Follow-up from professionals, from trained volunteers, or through print or other media may also help smokers who have quit not to start again.

The concept of equifinality also applies to self-management of diabetes and to other areas of health promotion. Table 2 provides a template in which individual RSSM are listed with diverse approaches to accomplishing each. Depending on the setting, the individuals to be served, other local factors, and the preferences of those to be served, different approaches may be appropriate for addressing each of the key areas of RSSM. Thus,

**TABLE 2—Resources and Supports for Self-Management and Tactics and Channels for Addressing Them**

Resources and Supports for Self-Management	Tactics and Channels
Individualized assessment	Web-based interventions Individual counseling Delivered by PCP, nurse, community health worker
Collaborative goal setting	Web-based interventions Individual counseling Group programs Delivered by PCP, nurse, community health worker
Skills enhancement	Web-based interventions Individual counseling Group programs Group medical visits Community-based classes (e.g., for physical activity, healthy cooking) Delivered by PCP, nurse, community health worker, community-based teachers
Follow-up and support	Group medical visits Telephone follow-up Support groups Community-based activities (e.g., walking groups) Delivered by PCP, nurse, medical assistant, community health worker, community volunteers, voluntary health organizations
Access to resources in daily life	Patient education regarding locating and accessing resources Community coalitions Governmental groups (e.g., park and recreation commissions) Commercial fitness clubs and weight-loss programs Advocacy campaigns of voluntary health organizations Delivered/organized by nurses, community health workers, voluntary health organizations
Continuity of quality clinical care	Application of Chronic Care Model <sup>89,90</sup> within clinical settings Patient activation and empowerment campaigns of voluntary health organizations Health provider and health financing organizations

Note. PCP = primary care provider.



collaborative goal setting may be pursued by a primary care provider, a medical assistant, a community health worker, or a Web resource. Enhancement of skills can occur through group classes, manuals and self-help materials, television shows, or many other channels. Follow-up and support may include training family members, using community health workers for ongoing support, and providing telephone support lines, in addition to ongoing follow-up by professionals. Thus, equifinality means that a variety of tactics and intervention approaches may be used to address key functions or objectives of self management. RSSM or some similar model is necessary to identify what those key functions or objectives are.

**INTEGRATION OF RSSM WITH OTHER MODELS OF SELF-MANAGEMENT**

The approach to self-management emphasizing RSSM shares much with other approaches in the field. Extending the “5 A’s” mnemonic for encouraging smoking cessation in primary care,<sup>148</sup> Whitlock and colleagues<sup>149</sup> suggest Assess, Advise, Agree, Assist, and Arrange as an approach to self-management implemented through clinical

settings. The Quality Alliance program of The Robert Wood Johnson Foundation has extended the framework of the 5 A’s as a structure for planning and implementing ongoing services to support patients’ self-management at multiple levels (see Glasgow et al.<sup>150</sup>).

As shown in Table 3, the 2 versions of self-management posited by the 5 A’s and RSSM may be viewed as 2 sides of the same coin, reflecting their origins. The 5 A’s emerge from initiatives to promote self-management through clinical interventions; accordingly, they tend to direct attention to things providers can do and services providers can arrange that will promote patient self-management. Rooted in ecological perspectives, RSSM reflect individuals’ needs not only for clinical services but also for resources and supports for self-management in the context of daily life.

The difference is clearly one of emphasis rather than an essential one. For example, the “Arrange” of the 5 A’s can easily be expanded to include attention to resources for self-management in people’s daily lives. However, this difference in emphasis may have practical utility, depending on setting and objectives—for example, whether to plan and evaluate services to be offered by a provider or

provider group or whether to plan and evaluate services intended to address the full range of needs and resources available to a population. The 5 A’s may have pertinence if the focus is on implementing services in clinical or other focused settings, whereas RSSM may be helpful if the focus is on community or other broad approaches to assessing and addressing the needs of a population.

Underlying both the 5 A’s and RSSM is a simple framework of behavior change and self-management that encompasses 3 essential features: (1) identification of objectives or goals, (2) learning of skills to achieve the objectives, and (3) facilitation and reinforcement of skills and their execution. Thus, for behavior change to occur, a goal or objective must have been chosen (preferably by the person whose behavior is to change), necessary skills must be present or acquired, and incentives and opportunities must exist for the behavior to be performed. From the perspective of the individual, this framework leads to a simple characterization of self-management as requiring 3 types of assistance:

1. Help me figure out where I am and where I want to go.
2. Help me acquire the skills and resources to get there.
3. Help me stay motivated and adjust my plan.

**CONCLUSIONS**

Self-management, with its many dimensions and influences, emerges as an ecologically framed set of processes and behaviors.<sup>36–39</sup> Understanding self-management of diabetes leads to an appreciation of the complementary nature of processes rooted at the individual level (e.g., assessment, goal setting, learning skills) and processes that are intrinsically social and based in families, organizations, neighborhoods, and communities (e.g., access to resources or ongoing support and encouragement of effective management).

RSSM provide a framework for key functions in self-management and varied approaches to addressing them. This framework may be especially helpful in understanding and organizing different tactical approaches

**TABLE 3—Correspondence of Core Concepts of Self-Management with the “5 A’s” and Resources and Supports for Self-Management**

Core Concepts of Self-Management	“5 A’s”	Resources and Supports for Self-Management
Identification of objectives	Assess Advise Agree	Individualized assessment Collaborative goal setting
Skills	Assist	Skills for— <ul style="list-style-type: none"> <li>• problem solving, “temptation” management</li> <li>• stress/emotion management</li> <li>• healthy diet, physical activity</li> <li>• managing specific diseases</li> </ul>
Facilitation, incentives, support for maintaining behavior	Arrange	Ongoing follow-up and support Access to resources in daily life
Link to clinical care	Implicit in assumption that in most cases, 5 A’s are implemented within clinical settings	Continuity of quality clinical care

Note. For “5 A’s,” see Whitlock et al.<sup>149</sup>

for achieving similar ends—for example, collaborative goal setting through interaction with a primary care physician, a community health worker, or an interactive Web utility. Recognition of the concept of “equifinality”—that diverse approaches may achieve similar ends—may lead to programs offering a broader range of intervention approaches with greater appeal to adults with diabetes or other chronic diseases. Recognizing equifinality also sheds light on how different intervention tactics or approaches may contribute to intervention packages tailored to specific audiences’ contexts and environments.

Recent literature on diabetes management addresses and generally confirms the importance of each of the components of RSSM. The single exception is access to resources in daily life, such as attractive and safe locations for physical activity and sources of affordable and attractive healthy food. Substantial research in general populations indicates the utility of addressing access to and opportunities for physical activity and purchase of healthy food,<sup>41–44,138–140</sup> and several studies have suggested the promise of applying these approaches to diabetes self-management.<sup>78–85</sup> However, further research is needed in this important area. In fact, the relative scarcity of research in diabetes self-management that examines resources in daily life shows the importance of the ecological perspective in pointing out how self-management is grounded in the community, society, and health policy. Extending ecological perspectives, Stokols and colleagues<sup>151</sup> have combined an emphasis on “cultivation of human resources” (e.g., social capital<sup>152</sup>) with attention to material resources (e.g., built environment and economic and employment factors) to provide a broader approach to understanding the effects of human environments on behavior and health.

In addition to exploring ways to address RSSM, future research should address (1) how to integrate individualized assessment, collaborative goal setting, and instruction in self-management skills into primary care settings; (2) how to redesign primary care delivery to better accommodate self-management interventions, such as through group medical visits; (3) how to develop comprehensive approaches to depression and other negative emotions as

they emerge during the course of diabetes and compromise its management as well as quality of life; (4) how to provide consistent and ongoing support, monitoring, and assistance for diabetes management; and (5) how to enhance access to resources for diabetes self-management in daily life. ■

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