Seeing Is Believing: Using Skype to Improve Diabetes Outcomes in Youth

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CLIN CARE/EDUCATION/NUTRITION/PSYCHOSOCIAL

OBJECTIVE

The objective of this study was to compare the relative effectiveness of two modes of delivering Behavioral Family Systems Therapy—Diabetes (BFST-D) to improve adherence and glycemic control among adolescents with type 1 diabetes with suboptimal glycemic control (HbA_{1c} ≥9.0% [74.9 mmol/mol]): face to face in clinic (clinic) and Internet videoconferencing (Skype) conditions.

RESEARCH DESIGN AND METHODS

Adolescents ages 12 to 18 years and at least one adult caregiver were randomized to receive BFST-D via the clinic or Skype condition. Participants completed up to 10 therapy sessions within a 12-week period. Changes in youth- and parent-reported adherence and glycemic control were compared before and after the intervention and at follow-up assessment.

RESULTS

Using an intent-to-treat analytic approach, no significant between-group differences were identified between the before, after, and follow-up assessments. Groups were collapsed to examine the overall effects of BFST-D on adherence and glycemic control. Results identified that statistically significant improvements in adherence and glycemic control occurred from before to after the intervention; improvements were maintained at 3-month follow-up.

CONCLUSIONS

Delivery of BFST-D via Internet-based videoconferencing is viable for addressing nonadherence and suboptimal glycemic control in adolescents with type 1 diabetes, potentially reducing important barriers to care for youth and families.

The intensive management of type 1 diabetes has been well established as critical to optimizing long-term health outcomes (1). Modern diabetes care is difficult to accomplish, however, because it is often complex and demanding for youth and families. Achieving optimal management of type 1 diabetes is difficult at any age (2) but particularly during adolescence, as youth assume increasing responsibility for their care (3–5). While numerous factors likely contribute to adherence difficulties during this critical developmental period, family functioning is an important predictor of adherence and glycemic control (6–8). Specifically, family conflict, parent–adolescent communication, and family problem-solving have been associated with diabetes outcomes during adolescence (9,10).

Given the role of family interactions, interventions to address family functioning during this developmental period have been well tested. Behavioral family systems

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therapy (BFST) is a well-supported intervention designed to improve family functioning and adherence in youth with diabetes. BFST is a structured, manualized intervention that includes four primary components: problem solving, communication skills, cognitive restructuring, and family systems interventions. BFST improves family communication and problem-solving when compared with standard medical care (11–13). A modified version, BFST for Diabetes (BFST-D), which specifically targets optimizing diabetes care, significantly improves glycemic control, treatment adherence, and diabetes-related family conflict among adolescents with type 1 diabetes (14,15). Further, a home-based version of BFST-D has resulted in statistically and clinically meaningful improvements in family functioning and glycemic control (16,17), thus demonstrating that modified delivery methods can be used to improve access to care.

While growing evidence supports the benefits of interventions such as BFST-D to assist with adherence in pediatric chronic health conditions, access to well-trained providers remains a barrier to implementation. Specialty behavioral health care often is concentrated in large urban areas and associated with university clinics and/or academic medical health centers. Rural settings present particular challenges to accessing behavioral health services because of shortages of providers. While primary care providers in rural settings often attempt to address their patients' behavioral health needs, limitations in time, expertise, and reimbursement for such services (18,19) are barriers to addressing the often complex behavioral health and family dynamic needs of youth with poorly controlled diabetes. Accessibility limitations in rural and underserved communities often require families to travel considerable distances to receive services or forgo mental health services altogether.

Although effective, home-based delivery of BFST-D is unlikely to be a practical or sustainable solution to reducing barriers to care, particularly for patients in rural areas. Thus additional methods of delivering evidence-based treatment are needed. The use of technology to delivery behavioral health care is one mechanism for increasing access to services.

Telemental health care, or the delivery of psychological or behavioral health care via communication networks, has been deployed to overcome a shortage of and/or uneven distribution of behavioral health resources and infrastructure (20). Importantly, recent technological advancements such as the increasing availability and rapid growth in the adoption of household Internet among low-income and rural families (21,22) has created opportunities to provide services using telemental health. In particular, Internet-based videoconferencing may be an effective method of overcoming obstacles to care by increasing the availability of expert or specialized services to address regional shortages of qualified providers (20,23,24). Use of Internet-based videoconferencing platforms offers several pragmatic advantages, including being available at no or low cost to families, allowing for real-time audio and visual interaction between patients and providers, and facilitating delivery of treatment in the family home, which decrease the direct costs and time associated with treatment.

The use of telemental health is receiving increased attention (25,26). Most studies, however, have been preliminary or descriptions of feasibility and usage rather than well-controlled randomized clinical trials (25). While interventions that use Internet technology are beginning to include youth with diabetes (26,27), to date reports have focused exclusively on feasibility and enrollment outcomes. Well-controlled randomized clinical trials examining the effectiveness of behavioral health interventions using teleconferencing technology for youth with poorly controlled diabetes (i.e., HbA_{1c} ≥9.0% [≥74.9 mmol/mol]) are absent in the published literature.

We report the results of a clinical trial comparing the delivery of BFST-D to adolescents with poorly controlled diabetes and their caregiver(s) randomized to receive the intervention via conventional conditions (clinic) or videoconference (Skype). Because BFST-D has been shown to improve family functioning, adherence, and glycemic control, our primary interest was whether outcomes would differ depending on delivery method. Thus, our first hypothesis was that BFST-D delivered via videoconferencing (Skype) would yield outcomes that were not significantly different than conventional clinic-based delivery. Second, regardless of condition, we hypothesized that BFST-D would significantly improve regimen adherence and glycemic control in youth with poorly controlled type 1 diabetes.

RESEARCH DESIGN AND METHODS

Participants

Inclusion criteria at enrollment required a diagnosis of type 1 diabetes of at least 1 year duration, age 12 to 19 years, and suboptimal glycemic control. Suboptimal glycemic control was operationalized as HbA_{1c} ≥9.0% (≥74.9 mmol/mol). Adolescents needed to reside with and be accompanied by a primary caretaker, intend to reside with the primary caretaker for the duration of the study (7 months), have no history of mental retardation or other mental health condition that would preclude the completion of study measures, and not have an uncontrolled medical condition (e.g., cystic fibrosis) that would confound assessment of adherence to diabetes care recommendations.

A total of 138 individuals and families were approached; 9 youth were determined ineligible and 39 declined participation. Thus, 90 youth and at least one legal guardian completed the baseline assessment. No known mortality threats were identified as a result of attrition. Total dropout rate was 21%. Figure 1 summarizes participants' progress through the trial recruitment and assessment stages in the format recommended by the Consolidated Standards for Reporting Clinical Trials (28).

The mean age of participating youth was 15.04 years (SD 1.79 years), and 55% were male (Table 1). Most caregivers were mothers (76.7%), while 21.1% were fathers and 2.2% grandmothers. Forty percent of youth were reported to reside with both parents. The sample included the following proportion of families in each Hollingshead socioeconomic stratum: lower, 5.6%; lower middle, 8.0%; middle, 41.0%; upper middle, 37.4%; and upper, 8.0%. The race/ethnic distribution of youth participants was 87.8% white, 4.4% Hispanic/Latin American, 1.1% Native American, 1.1% Hawaiian/Pacific Islander, and 5.6% reported bi- or multiethnic. Youth and caregivers who declined to participate (n = 39) did not significantly differ from participants on age, duration of

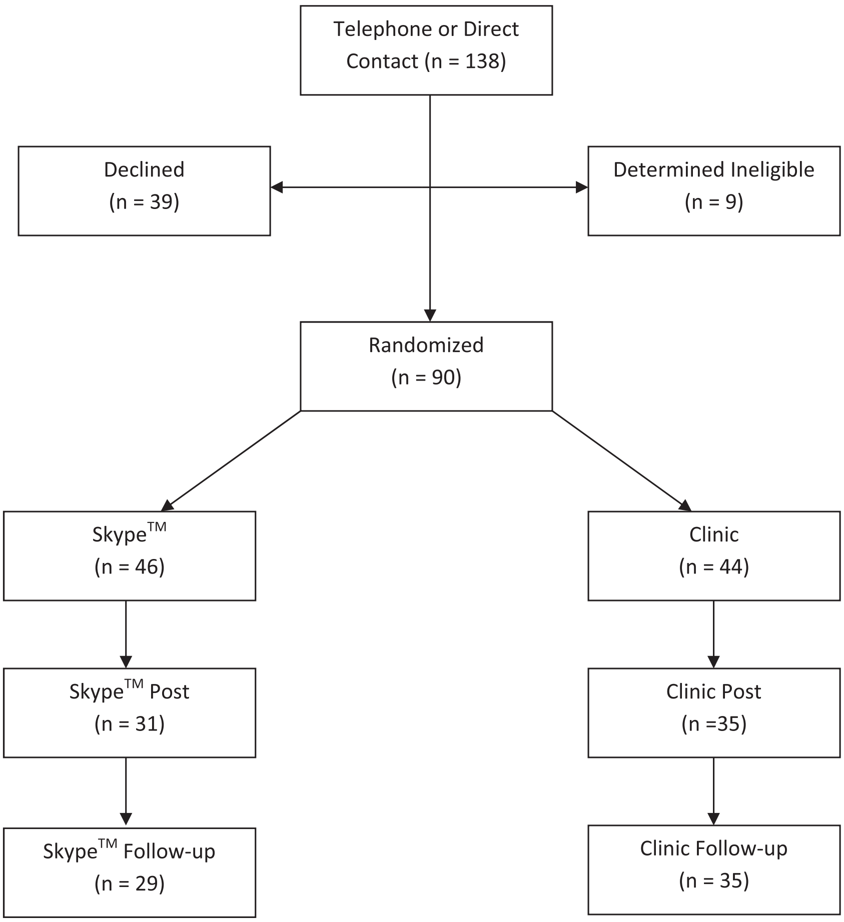

Figure 1—Consolidated Standards of Reporting Trials statement of youth recruitment.

diabetes, socioeconomic status, sex, race/ethnicity, family composition, and parental marital status. Further, youth and caregivers who did not complete outcome assessments at all assessment points did not significantly differ on the same demographic variables from those who completed the outcome assessment at all points.

Measures

Demographic Information

A demographic information form was completed by caregivers to gather medical information and the demographic data necessary to calculate the Hollingshead Index of Social Status (29). Youth and/or families who declined to participate completed a modified demographic information form to allow for comparison with participants.

Measurement of Adherence

The Diabetes Self-Management Profile-Diabetes (DSMP) (30) is a 25-item semistructured interview with a possible score of 84; higher total scores indicate better adherence. Administration takes approximately 15–20 min. Questions assess five areas of diabetes management, including insulin administration and dose adjustment, blood glucose monitoring, exercise, diet, and hypo- and hyperglycemia management. Analogous caregiver and youth forms were used in this study. Previous research (30) demonstrated good psychometric properties for the DSMP. For the current study, internal consistency was acceptable and consistent across assessments for youth measures (before intervention: α = 0.75; after intervention: α = 0.81; follow-up, α = 0.76) and caregiver (before intervention, α = 0.81; after intervention: α = 0.82; follow-up: α = 0.84).

Measure of Glycemic Control

Glycemic control was evaluated via an HbA_{1c} assay using a Seimens/Bayer DCA 2000 analyzer, which provided an estimate of blood glucose concentrations over the preceding 2–3 months (31). Glycemic control was estimated by an HbA_{1c} assay conducted concurrent with (or within 4 weeks of) the before, after, and follow-up assessments. The equivalence of DCA 2000 and reference laboratory measurements has been established previously (32).

Procedures

Primary recruitment (*n* = 85) occurred during regularly scheduled visits to a tertiary diabetes clinic at a large teaching hospital located in the U.S. Pacific Northwest. Several participants (*n* = 5) were identified via flyers and recommendations provided by other diabetes clinics at local hospitals and were referred to the primary recruitment center to confirm eligibility and complete consent/assent procedures. Participants' HbA_{1c} from their most recent clinic visit before recruitment was used to prescreen for potential eligibility. Potential participants who were contacted through flyers placed at other regional hospital-based diabetes centers were screened for major inclusion criteria before their study intake visit.

Informed consent was obtained following institutional review board guidelines, and caregivers(s) and adolescents signed institutionally approved informed consent and assent forms before participation. After obtaining consent/assent, participants were randomized to either Skype (*n* = 46) or clinic (*n* = 44) treatment conditions using a

Table 1—Adolescent participant demographic information

	Clinic	Skype
Sex		
Female	18 (51.4%)	17 (48.6%)
Male	26 (47.3%)	29 (52.7%)
Age (years)	15.04 (1.79)	14.94 (1.77)
Diabetes duration	6.51 (3.24)	6.56 (3.77)
Baseline HbA_{1c}, % (mmol/mol)*	11.10 (2.14) (97.8 [18.86])	11.15 (1.73) (98.4 [15.27])
Hollingshead index	37.02 (11.90)	37.64 (9.93)

Data are mean (SD). *Before the intervention.

block design. Participants in each condition received up to 10 sessions of BFST-D that lasted 1–1.5 h each. Therapists and families communicated to establish regular meeting times, and a research assistant provided reminder calls for upcoming appointments approximately 2 days before the appointment. When participants missed appointments, a research assistant attempted to reschedule until the appointment occurred or until a 3-month time window for receiving treatment elapsed. All participants continued to receive regular medical care by their diabetes care providers during the course of the study.

Data on adherence and glycemic control were gathered at three time points: pre- (within 4 weeks preceding the first treatment session), post- (within 4 weeks of either the last treatment session or at the end of the 3-month window for treatment), and at follow-up (3 months after treatment). Blood samples necessary for conducting HbA_{1c} assays were collected concurrent with questionnaire administration and as a normal part of the participants' routine clinic visits, when possible. Trained research personnel unfamiliar with the participants completed all interviews and administered all standardized outcome measures, with the exception of HbA_{1c}, which was measured by clinic nursing staff.

Participation Incentives, Travel Reimbursement, and Equipment

Participants were provided monetary incentives to promote completion of study-related tasks. Youth received $90 for each evaluation completed. Each family received $20 per treatment session completed, regardless of treatment condition. Families who traveled more than 50 miles round trip for study-related purposes were eligible to receive $0.55 per mile up to a maximum of $250 over the course of the study. Families randomized to the Skype condition were loaned a laptop computer with a webcam and mobile hotspot (or funds to pay for Internet access), if needed. Families were free to use their personal home computer and Internet access rather than services or equipment supplied by the study, if preferred.

Treatment

BFST-D was delivered by clinicians with a master's or doctoral psychology degree trained in the intervention and supervised by the first author (M.A.H.); each clinician provided treatment to participants in both conditions. BFST-D consisted of four primary components: training in problem-solving, communication training, cognitive restructuring (dispelling strong beliefs), and family therapy approaches. Problem-solving included training families to use a formal problem-solving approach with discrete steps consisting of defining the problem; generating solutions; group decision making; planning, implementing, and monitoring chosen solution(s); and revisiting, renegotiating, and refining ineffective solutions. Communication training included instructions, feedback, modeling, and rehearsal of approaches to address common parent/adolescent communication errors. Cognitive restructuring included addressing and altering family members' irrational beliefs, attitudes, and attributions that could impede effective parent–adolescent interactions. Family therapy interventions included both functional and structural approaches to target maladaptive or ineffective family system patterns and characteristics (e.g., weak parental coalitions and cross-generational coalitions) that could impede effective problem-solving and communication.

Families received an intervention tailored to meet their needs as determined by baseline assessment information and ongoing observations and interactions during treatment. Sessions consisted of discussions about family problem-solving and conflict resolution. Therapists were directive and active, providing instructions and feedback, and modeling and guiding the rehearsal of skills. Behavioral assignments were provided at each session, and progress was reviewed during the next session. Each session included delivery of didactic information and emphasized teaching the family to apply independently the targeted skills in the real-life/home setting. A focus on diabetes care was integrated throughout (e.g., problem-solving completion of blood glucose checks, effective communication regarding difficulties with adherence).

Data Management and Statistical Analysis Plan

Data were entered into a computerized data file located on a secure local network. Data were checked for normality, outliers, or data entry errors before analyses. An intent-to-treat analytic approach was used. Multiple imputation procedures using pooled means (five) were used to estimate and replace missing data (33–35). Initial statistical analyses compared differences in demographic and outcome variables among treatment groups at baseline. Associations among variables were examined to identify potential covariates that may differ by treatment condition. Repeated measures ANOVA was conducted to examine within-subject changes across assessments (before, after, and follow-up) and between-subject effects for each treatment group (clinic and Skype). Effect sizes were estimated by calculating Cohen d.

RESULTS

No statistically significant between-group differences at baseline were identified for patient age, duration of diabetes, socioeconomic status, sex, race/ethnicity, family composition, or parental marital status (Table 1). The groups did not differ significantly at baseline with respect to HbA_{1c} or DSMP scores (parents and youth).

Hypothesis 1: Between-Group Differences

A Levene test of equality of error variances was conducted for measures of adherence and glycemic control and was nonsignificant for group assignment (clinic and Skype) across the three assessments (before, after, and follow-up), which suggested group variability was equal. A repeated measures ANOVA demonstrated no between-group differences in treatment effects for adherence and glycemic control ($F(1) = 0.09$; $P = 0.77$) (Table 2). In addition, groups did not significantly differ on the mean number (SD) of sessions completed (clinic = 6.82 [3.39], Skype = 5.84 [3.25]). The mean number of BFST sessions completed was significantly associated with HbA_{1c} after therapy ($r = -0.37$; $P < 0.001$) and at the follow-up assessment ($r = -0.35$; $P < 0.001$). Dropout rates were significantly different across treatment conditions (clinic: n = 9; Skype: n = 17), with a significantly greater dropout rate among those in the Skype condition ($\chi^2(1) = 10.88$; $P < 0.001$; Fig. 1).

Hypothesis 2: Total Sample Analyses

Because effects of treatment on adherence and glycemic control did not differ based on treatment delivery modality

Table 2—Means (SDs) across assessments

Group	Skype (*n* = 46)			Clinic (*n* = 44)		
	Before intervention	After intervention	Follow-up	Before intervention	After intervention	Follow-up
HbA_{1c}						
%	11.15 (1.73)	10.40 (1.66)	10.61 (1.83)	11.10 (2.14)	10.45 (2.05)	10.31 (1.95)
mmol/mol	98.4 (15.27)	90.2 (14.40)	92.5 (15.95)	97.8 (18.86)	90.7 (19.53)	89.2 (16.87)
P-DSMP	48.12 (13.55)	52.84 (13.49)	50.09 (12.91)	46.01 (12.05)	53.61 (11.83)	51.83 (11.88)
Y-DSMP	52.64 (11.59)	56.10 (13.30)	55.55 (12.81)	51.81 (11.53)	58.07 (8.25)	57.66 (9.50)

(i.e., clinic versus Skype), we collapsed groups to test our secondary hypotheses that BFST-D would result in improved adherence and glycemic control. First, a within-subjects repeated measures ANOVA was conducted to compare the effects of BFST-D on parent-reported adherence (P-DSMP) across the before, after, and follow-up assessments. The Mauchly test indicated that the assumption of sphericity was not violated ($\chi^2(2) = 3.50$; $P = 0.17$). A significant main effect for P-DSMP across assessments was identified ($F(2) = 18.96$; $P < 0.001$; $\eta^2_p = 0.176$). Given the significant main effect, pairwise comparisons were conducted that identified significant differences ($P < 0.001$) in P-DSMP scores from before (mean [SD] 47.56 [12.78]) to after the intervention (53.22 [12.64]) ($d = 0.45$), and from the assessment before the intervention (47.56 [12.78]) to the follow-up assessment (50.94 [12.38]) ($d = 0.27$). In addition, significant differences ($P = 0.009$) were identified from the assessment after the intervention (53.22 [12.64]) to the follow-up assessment (50.94 [12.38]) ($d = 0.18$). Results indicated significant improvements occurred in parent-reported adherence (P-DSMP scores) from before to after the intervention, and that a portion of the improvements were lost at follow-up; however, significant improvements were maintained at 3-month follow-up compared with baseline (Fig. 2).

Next, a repeated measures ANOVA was conducted to compare the effects of BFST-D on youth-reported adherence (Y-DSMP) across the assessments before and after and at follow-up. The Mauchly test indicated that the assumption of sphericity was not violated ($\chi^2(2) = 1.27$; $P = 0.53$). A significant main effect for Y-DSMP across assessments was identified ($F(2) = 13.26$; $P < 0.001$; $\eta^2_p = 0.131$). Pairwise comparisons identified significant differences ($P < 0.001$) in Y-DSMP scores from the assessment before (52.23 [11.03]) to that after (57.06 [11.10]) ($d = 0.44$), and from the assessment before (52.23 [11.03]) to that at follow-up (56.57 [11.30]) ($d = 0.39$). Results indicate that significant improvements in Y-DSMP scores occurred from before to after the intervention and that the improvements were maintained at the 3-month follow-up (Fig. 2).

Finally, a repeated measures ANOVA was conducted to compare the effects of BFST-D on glycemic control (HbA_{1c}) across assessments before, after, and at follow-up. A Mauchly test indicated that the assumption of sphericity was not violated ($\chi^2(2) = 4.21$; $P = 0.12$). A significant main effect for HbA_{1c} across assessments was identified ($F(2) = 12.95$; $P < 0.001$; $\eta^2_p = 0.127$). Pairwise comparisons identified significant differences ($P < 0.01$) in HbA_{1c} scores from the assessment before (11.13 [1.71]) to that after (10.42 [1.85]) ($d = 0.40$), and from the assessment before (11.13 [1.71]) to that at follow-up (10.46 [1.88]) ($d = 0.37$). Results indicate that significant improvements in glycemic control (HbA_{1c}) occurred from before to after the intervention, and that improvements were maintained at the 3-month follow-up (Fig. 3).

CONCLUSIONS

These results demonstrate that BFST-D can be effective when delivered via conventional methods (i.e., the clinic) or via Internet-based videoconferencing (i.e., Skype). Regardless of method, significant improvements in youth- and parent-reported adherence and glycemic control occurred. Further, there was no difference in treatment effect across conditions. Although effect sizes were relatively small, previous research suggests small improvements have important positive health implications and may reduce risk of future complications (36). Our outcomes suggest the intervention achieved an overall margin of superiority (e.g., the magnitude of

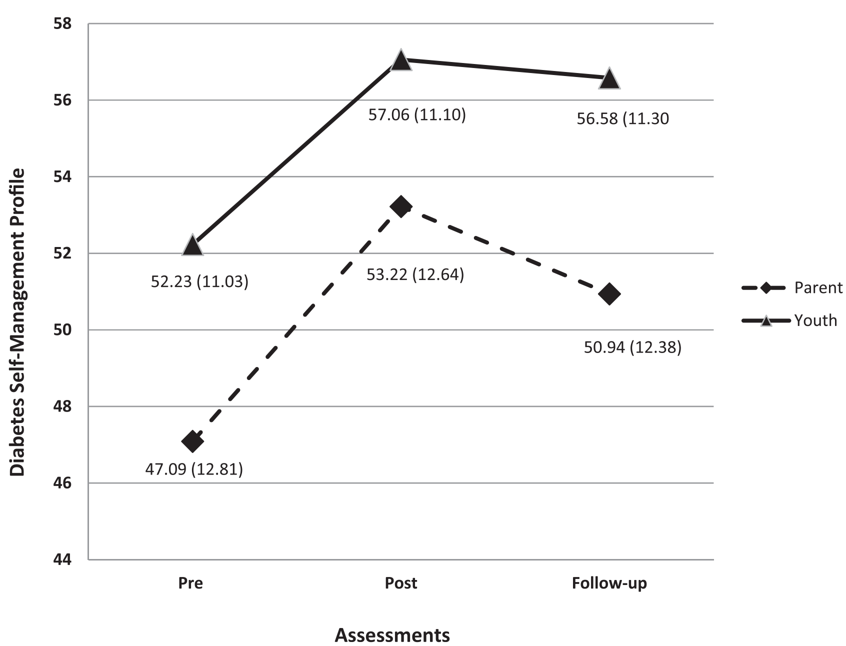

Figure 2—Mean (SD) reported adherence.

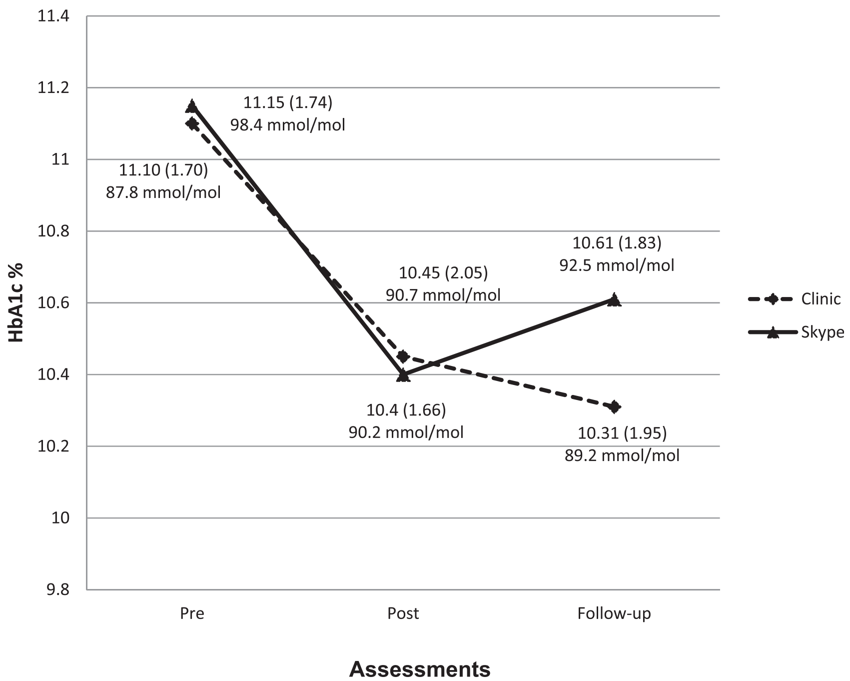

Figure 3—Mean (SD) glycemic control.

difference has practical importance), providing further evidence regarding the utility of BFST-D. The use of an intent-to-treat approach to analyses, which yields conservative estimates compared with conventional analytic methods, bolsters the evidence for the treatment's effectiveness.

The results add further evidence regarding the effectiveness of BFST-D regardless of delivery format. The primarily skills-based nature of the BFST-D likely contributes to its adaptability across delivery formats. Importantly, parents and youth reported strong working alliances regardless of whether they received BFST-D via the clinic or videoconferencing (37). As such, videoconferencing seems to be an effective and acceptable method for delivering this treatment.

Using technology to deliver specialized behavioral health care such as BFST-D has several potential advantages over traditional outpatient psychotherapy, including reducing burden to patients (e.g., travel time) and improving accessibility to specialty providers. Our findings support establishing videoconferencing to provide behavioral health services to adolescents and their families who reside significant distances from regional diabetes centers and for whom travel time and/or costs may be overly burdensome. A variety of videoconferencing platforms are freely available. Further, growing accessibility of high-speed Internet services in rural communities (21,22) has made the use of videoconferencing an increasingly achievable means of delivering behavioral health.

Study limitations include participants being racially and ethnically homogenous and predominately white. Future efforts should explore the use of videoconferencing technology with minority youth with type 1 diabetes. Other limitations include almost all of the study participants receiving their diabetes care from one of three primary diabetes clinics within the same large metropolitan area. Patients who live remote from large metropolitan areas often receive diabetes care from local providers who have fewer resources (e.g., limited pediatric training, no certified diabetes educators on staff). Thus, care provided to youth with diabetes who access care in larger cities may be systematically different from that provided to youth in rural settings.

Greater attrition occurred among those in the Skype condition. Reasons for this were not systematically investigated but may relate to the convenience and ease of videoconferencing lessening personal investment in the appointment and overall process. Future studies should formally assess reasons for participant attrition. In addition, given the lack of a waitlist or mock treatment condition, the possibility that treatment effects were partially the result of regression to the mean is a limitation that should be considered in future studies. Finally, adolescents were provided compensation for the time and effort necessary to complete questionnaires and participate in the study. Whether this unduly affected patient retention should be considered in future studies and in efforts to translate the intervention to clinical settings. Given the focus of this study (i.e., to test delivery format) and the body of previous research demonstrating the effectiveness of BFST-D (11–17), we believe these findings are an important addition to the extant literature despite the limitations.

While the current findings support using freely available, Internet-based technology to deliver behavioral health care to youth with diabetes and their families, important ethical, legal, and practice implications must be considered before doing so. These issues have been nicely summarized by Richardson et al. (38) and include integrating technology into practice procedures; cross-state licensure or collaboration with certified personnel; privacy and security; standard-of-care issues (e.g., emergency protocols, determining responsibilities of involved staff, liability for risks of abandonment or negligence in the face of equipment failure); managing reimbursement regulations for telehealth and traditional services; and infrastructure management. Thus, adopting telemental health services requires careful attention to multiple issues and is more complex than simply using electronic technologies to deliver care. Further, while access to high-speed Internet is increasing in the United States (21), families in rural settings and/or of low economic means may still have limited access. Thus, disparities in access to BFST-D or other similar interventions may remain even if telehealth is implemented.

Current findings raise several important questions for future research. First, although this study demonstrated that improved outcomes were sustained at the 3-month follow-up, future studies should examine the durability of improvements over a longer time period.

Second, this study focused on adolescents known to have poor adherence and glycemic control because BFST-D is designed to effectively respond to such challenges. Third, future research may wish to explore whether traditional (clinic) BFST-D may be used to prevent nonadherence challenges by targeting preadolescents and their families. Such efforts may extend understanding of how to effectively improve health outcomes for this population. Fourth, BFST-D is an established intervention, but its application through teleconferencing technology is unique. A disassembly study to examine the contributions of each of the four primary components may inform modification of BFST-D and lead to a more streamlined intervention. Fifth, outcomes for youth with poor glycemic control were clinically meaningful and encouraging. However, most adolescents in the study remained in suboptimal glycemic control. Future work should further examine means of optimizing intervention outcomes to achieve greater improvements in glycemic control. For example, future researchers may wish to examine the intensive application of active intervention components (based on the fourth point above) and/or the influence of the intervention provided over an extended period of time to determine whether more intense treatment or longer treatment duration results in improved adherence and glycemic control. As a related issue, evaluation of how BFST-D affects quality of life for youth with diabetes may enhance the clinical utility of outcomes, even if optimal glycemic control is not achieved. To support this, previous research has shown that diabetes-specific parent–youth conflict predicts youth-reported quality of life (39). Finally, adolescents were provided compensation for the time and effort necessary to complete questionnaires and participate in the study. Whether this unduly affected patient retention should be considered in future studies and in an effort to translate the intervention to clinical settings.

In summary, these findings support the effectiveness of delivering BFST-D using videoconferencing technology. Further, the results add to growing evidence that BFST-D can be effectively delivered in varied ways. Thus, while future research will likely extend our understanding of family-based interventions to address health outcomes for youth with diabetes, available evidence suggests that identifying personnel and resources necessary to integrate BFST-D into clinical practice can be an important and effective component of diabetes care.

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