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Treating Childhood Depression over Videoconferencing

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ABSTRACT

Effective cognitive-behavioral treatments for childhood depression have developed over the last decade, but many families face barriers to such care. Telemedicine increases access to psychological interventions by linking the child and the clinician using videoconferencing (VC). The current study evaluated an 8-week, cognitive-behavioral therapy (CBT) intervention for childhood depression either face-to-face (F2F) or over VC. The telemedicine setup included two PC-based PictureTel systems at 128 kilibits per second (kbps). Success was defined by (1) decreasing depressive symptoms at similar rates in both the VC group and the F2F group and (2) demonstrating the feasibility of a randomized controlled trial in telemental health. Children were assessed for childhood depression using the mood section of the Schedule for Affective Disorders and Schizophrenia for School Age Children–Present Episode (K-SADS-P). Twenty-eight children were randomized to either F2F or VC treatment. The participants completed the K-SADS-P and the Children's Depression Inventory (CDI) at pre- and post-treatment. The CBT treatment across the two conditions was effective. The overall response rate based on post-evaluation with the K-SADS-P was 82%. For the CDI total score, both the Time and the Group by Time effects were significant ($p < 0.05$). The interaction effect reflected a faster rate of decline in the CDI total score for the VC group. The study serves as a model for building on past research to implement a randomized controlled trial. This information provides persuasive research data concerning treatment effectiveness for clinicians, families, and funders.

INTRODUCTION

IN THE MENTAL HEALTH FIELD, psychiatrists have used technology to expand patient care for over four decades.[1,2] Recent telepsychiatry applications with adults include a range of settings such as rural areas,[3,4] inner city sites,[5,6] and prisons.[7] Case reports with adults suggest successful telemedicine intervention for Post Traumatic Stress Disorder,[8] gender identity issues,[9] depression,[10] anxiety,[11] agoraphobia,[12] and eating disorders.[13]

A limited number of studies have also addressed child mental health applications.[14,15] Case studies with children have suggested positive effects with treatment over interactive videoconference (VC) for oppositional defiant disorder,[16] family conflict,[17] and externalizing behaviors.[18] Families and clinicians are overwhelmingly satisfied with telemental health services in the United States and across the world.[19,20]

The current study sought to build on telemental health's history and to implement a

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controlled trial for children with depression. Childhood depression was selected because the condition meets telemedicine's central mission—to bridge the gap between high need and low access. Despite the high morbidity associated with childhood depression (with suicide as the third leading cause of child and adolescent death[21]), only one-third of children identified with depression receive treatment.[22] There are many barriers to accessing care, including distance, provider shortage, stigma, and cost. Hence, telemedicine provides a potential delivery system to help match high clinical need with well-validated services.

Mood disorders affect one in 40 children and one in 12 adolescents at any point in time.[23] The symptoms of childhood depression, as defined by the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders*[24] (DSM-IV), have an impact on every aspect of the child's life, interfering with the child's academic, social, and familial functioning. Children with depression experience the same symptoms as do adults with depression. They have problems with mood and behavior (lethargy or agitation), and may experience alterations in physiologic regulation including changes in appetite, sleep, or energy.

Fortunately, meta-analyses have demonstrated the effectiveness of cognitive behavioral therapy (CBT) in treating childhood depression, with moderate to strong effect sizes compared with wait-list control conditions and other treatments.[25,26] In the CBT model, depression results from faulty interpretations of the environment and negative interactions with it. Treatment involves challenging negative cognitions and increasing adaptive behaviors. Cognitive behavioral treatments include practicing positive attributions; accurate identification of feelings; monitoring and increasing self-reward; problem solving; social skills; and relaxation procedures.[27]

Definitions of success

In the current study, children were randomized to the same empirically supported treatment[28,29] either F2F or over VC. This design was predicated on two definitions of success. The first definition was comparable decreases in depression in the VC and the F2F groups. Improved functioning was measured in two ways: (a) remission from depression using the semi-structured clinical interview, the Schedule for Affective Disorders and Schizophrenia for School Age Children–Present Episode (K-SADS-P); and (b) decreases in depressive symptoms using the continuous self-report measure, the Children's Depression Inventory (CDI).

The second definition of success was based on the feasibility of this design in the telehealth setting. Randomized controlled trials (RCTs) are considered the gold standard in evidence-based medicine.[30] The design offers direct comparison between different treatments, or in this case, alternative delivery methods. Although such research had an early start in telemedicine,[31] there are very few RCTs within telemental health. There are many barriers to RCTs in telemedicine including distances to provide F2F care, difficulty reaching adequate sample size, and rapidly changing technologies.

In the systematic review of Hersh et al.[32] of clinical telemedicine interventions, only 25 articles out of the 4,628 reviewed articles met the criteria of comparing telemedicine interventions to a control group of in-person care. Hersh et al. report that no adult or child mental health studies met their criteria.

In an assessment study comparing F2F versus VC, Elford et al.[33] found 96% agreement on the primary diagnosis in evaluations of 23 children with a range of presenting concerns. In one of the few clinical RCTs in child telemental health, Glueckauf et al.[34] compared adolescents with seizure disorder receiving counseling, over speakerphone, or F2F.

The current study's second definition of success was meeting the Consolidated Standards of Reporting Trials (CONSORT) criteria for RCTs. The CONSORT checklist was developed to improve the quality of reporting of randomized controlled trials, and it is the accepted standard for conveying such information in the literature.[35]

MATERIALS AND METHODS

Equipment selection

The current project was an adjunct to Kansas University Medical Center's TeleKidcare® project in an urban school district. This project links

KUMC clinicians with patients in the school health room using 128 kilibits per seconds (kbps) VC units.[36] These same PC-baed systems were used in the current project, utilizing PictureTel software and ISDN lines. TeleKidcare® serves the pediatric and mental health needs of children who have transportation and financial barriers to traditional care. The urban TeleKidcare® project includes 12 schools. From early September 1999 to April 2002, over 1,400 consults occurred including more than 350 mental health consults. Given the strong telemedicine history with mental health services in Kansas[37] and the urgent need to increase access for services for childhood depression in rural and urban areas across the state, the current project was developed to investigate psychotherapy delivery over VC versus the same treatment F2F.

Initially, the researchers considered use of the TeleKidCare® units connecting KUMC with the urban school district. The final technology selection was two VC units at the Medical Center. The decision was made due to recruitment considerations, particularly interest in recruiting a wider range of participants across school districts in order to increase generalizability. Because both units were on site, the research question was one of treatment efficacy—whether the delivery systems work equally well with all other factors constant.

Participants

Enrollment/dropout. Thirty-eight families enrolled in the study and 28 families completed the study. The reasons for drop-out included: too busy for the appointment; parent belief that the child was doing better and no longer needed intervention; poor caregiver health; moving; and entering the juvenile justice system. Dropout was comparable across group assignment (five participants from the VC group and five from the F2F group).

Twenty-eight children between the ages of 8 and 14 completed the study, including 20 boys and eight girls. The average age of the participants was 10.3 years (SD = 2.0). Twenty participants were identified by their parent as Caucasian, six as Hispanic, and two as African American. Most (16) fell within the middle socioeconomic status (SES) according to the Hollingshead criteria,[38] while eight were classified as low SES and four were classified as high SES. Ten children attended the urban school district, four attended the parochial schools, and 14 attended the suburban school districts.

Exclusion. According to the protocol, children with thought disorders or with current suicidal ideation were excluded from the study and referred to appropriate treatment. In practice, no child evaluated for this study met these criteria.

Measures

Telemedicine Satisfaction Questionnaire. The 12-item self-report questionnaire[39] measured satisfaction with the telemedicine consult. The questionnaire was completed by parents and children at the post evaluation. The families in the face-to-face group did not complete this questionnaire because questions were specific to the use of technology.

Schedule for Affective Disorders and Schizophrenia for School Age Children–Present Episode (K-SADS-P). The K-SADS-P is a diagnostic interview for the assessment of depression in children. It is used to identify the presence and severity of depressive symptoms in children ages 6–17 years old.[40] The K-SADS-P is a reliable and valid measure with adequate test-retest reliabilities and internal consistency.[41]

The interviewer met first with the parent and then with the child. The interview included an unstructured section to establish general information about the chronology and progress of the disorder, followed by a semi-structured portion. The parent or child rated the severity of the symptom and the symptom's impact on the child's psychosocial functioning. For the present study, only those portions of the K-SADS-P relevant to diagnosing depression or the exclusion conditions were administered. Item scores correspond to the presence and severity of symptoms. The summary ratings were used in the diagnostic decisions of whether the child met the DSM-IV criteria for childhood depression.

Children's Depression Inventory (CDI). The CDI, a self-report measure of depressive symptoms, was chosen to capture the child's subjective experience of his or her symptoms.[42] The CDI contains 27 multiple-choice items related to common depression symptoms and has ad-

equate reliability, internal consistency, and validity. Each item has three symptom statements ordered in increasing severity from 0 to 2. For each item, the child selects which of the three statements best describes the way he or she felt in the past 2 weeks. Higher scores indicate more severe depressive symptoms, with scores ranging from 0 to 54.

Method

Consenting families completed the demographic and assessment information, including the diagnostic interview and the self-report measure. Based on the assessment findings, two evaluators (a child psychologist and a child psychiatrist) independently decided whether the child met the DSM-IV criteria for depression. The interrater agreement between the two evaluators was 95% (63 out of 66 evaluated cases). The three families in which there was disagreement between the clinicians were not enrolled in the study.

Randomization in two person blocks was used to help insure equal numbers of participants in each condition. Three-quarters of families qualifying for the study chose to enroll. Among the one-quarter that did not enroll, 62% scheduled multiple times and did not keep the appointment; 23% chose to remain with their current therapist; and 15% moved out of the area.

To reach adequate power, the two-group design required a minimum total of 20 participants. This number was computed using a .80 power estimation with a moderate effect size. The effect size estimation was based on group differences calculated in the Reinecke et al.'s meta-analysis.[43]

Cognitive behavioral therapy

The therapist met with the child and parent in eight weekly CBT sessions, either F2F or over VC. To be included as study completers, the family had to complete at least six of the eight sessions. The treatment elements were similar to other CBT protocols for childhood depression.[44] The length of the first session was 90 min; the length of each subsequent session was 60 min. Time was divided between the parent and the child.

At post-evaluation, the children and parents completed the same interview (K-SADS-P) as at the beginning of the study. They also filled out the self-report measures—the Telemedicine Satisfaction Questionnaire, if applicable, and the CDI.

RESULTS

Sessions

The participants who completed the project ($n = 28$) attended a total of 204 out of 255 scheduled sessions, resulting in an 80% attendance rate. The attendance rates did not significantly vary between the VC and F2F conditions, $t(26) = -0.27$. Within the VC group, both parents and children reported high satisfaction with the telemedicine condition as assessed by the questionnaire (Table 1). The most common concern was not being able to hear well over the video, expressed by four out of 14 parents and three out of 14 children. All participants in the VC condition (14 parents and 14 children) were satisfied with the consultation, and most (11 parents and 14 children) preferred VC to seeing the therapist in person.

In addition, there were 15 equipment difficulties across 100 VC sessions. In 10 instances, the telemedicine equipment was rebooted and the session completed by VC. Three sessions were completed via telephone, and two sessions were rescheduled.

Table 1. Number of ITV Participants Agreeing with Items on the Telemdicine Satisfaction Questionnaire (Total $n = 14$)

Item	*Parents agree*	*Children agree*
1. talk about anything	12	13
2. cared about me	14	13
3. knew what doing	14	13
4. address concern	13	13
5. not nervous about equipment	11	12
6. not embarrassed	12	14
7. could hear well	10	11
8. could see well	11	13
9. as good as F2F	13	14
10. satisfied overall	14	14
11. not rather see in person	11	14
12. not worry overhear	13	13

Analysis of the interactive videoconference versus face-to-face groups

Statistical analyses were completed to assess the equivalence of the two groups following randomization. One-sample chi-square and independent-samples t tests were conducted to compare the 14 families in the VC group with the 14 families in the F2F group. The findings suggest that the two groups did not differ significantly in gender ($\chi^2(1, n = 28) = 0.00$), ethnicity ($\chi^2(3, n = 28) = 3.47$), socio-economic status ($\chi^2(2, n = 28) = 5.25$), age ($t(26) = -0.46$), or initial CDI total score ($t(26) = 0.22$).

Following treatment, a two-way within-subjects analyses of variance was conducted to evaluate the two treatment delivery formats. The dependent variable was the total CDI score. The within-subjects factor was Time with two levels (pre and post). The Time main effect and Group × Time interaction effect were tested using the multivariate criterion of Wilks' lambda (Λ). The Time main effect (*Wilks'* $\Lambda(1,26) = 0.63$) was significant. The calculated mean across groups for the CDI total score decreased from 13.96 (SD = 9.15) to 9.18 (SD = 9.08).

The Group × Time interaction effect was also significant (*Wilks'* $\Lambda(1,26) = 0.83$). The rate of decline for the VC group was significantly greater than the rate of decline for the F2F group. For the interaction effect, the calculated mean for the VC group decreased from 14.36 (SD = 9.85) to 6.71 (SD = 4.78), and the calculated mean for the F2F decreased from 13.57 (SD = 8.75) to 11.64 (SD = 11.63). The interaction reflects a medium effect size ($Eta^2 = 0.17$), while the main effect reflects a large effect size ($Eta^2 = 0.37$).

At the post-test, 23 participants no longer met the DSM-IV criteria for depression, resulting in an 82% remission rate.

DISCUSSION

Consistent with past research, participants in the current study reported high satisfaction with services even at this low bandwidth (128 kbps). In addition to the overwhelmingly positive responses on the Telemedicine Satisfaction Questionnaire, this satisfaction is reflected in the similar rates of attendance in both the VC and F2F groups. Children tend to adapt to the VC setup quickly due to their experience with technology in other settings. The researchers successfully implemented all cognitive-behavioral treatment elements over VC. In the current study, satisfaction with telemedicine services was independent of convenience because both groups received services through the Medical Center. This supports the argument that clients adapt to the delivery system and are as pleased with VC services as with F2F care.

The study met the central definition of success—decreasing symptoms of childhood depression over VC at rates comparable to F2F. Based on the study analyses, the CV and F2F groups had no significant differences at randomization. The CBT treatment across both delivery methods was effective in decreasing depression. Twenty-three (82%) of the 28 children no longer met the depression criteria at the end of the study. This exceeds the 50% response to placebo reported in medication trials for the treatment of childhood depression.[45] This study's remission rate compares favorably with other psycho-social interventions for childhood depression, with approximately 50–60% showing significant recovery or remission as defined in each study.[46]

It is unclear why the two groups differed significantly in the rate of decrease in symptoms on the CDI. The VC group reported a greater decrease in depressive symptoms over time as compared to the F2F group. One interpretation is that the treatment delivery format influenced outcome, particularly based on a novelty effect. For example, the VC participants might have perceived themselves as somehow "special" and this might have maximized the treatment impact. Another interpretation is chance variation; this interpretation is likely given the similar outcome on other measures and the established efficacy of the treatment in F2F settings.

The study met the second definition of success, implementing a RCT in the telemedicine setting that met the CONSORT professional standards for such trials. The current study built on telemental health's long history of programmatic research and case study reports with children. Randomized controlled trials are an important step as telemental health is a ma-

turing field[47] within telemedicine and services over VC are becoming widespread. The design allowed the researchers to directly compare the two groups (VC and F2F) and rule out reasons other than treatment delivery format that might account for similarities and differences between the groups.

The history of treating childhood depression illustrates the need for caution and strong empirical support before widespread implementation of new treatments, such as telehealth interventions. The first medications for childhood depression were traditional antidepressants. These medications were prescribed for over a decade before well-designed studies and meta-analyses[45] established that they were not significantly better than placebo in treating childhood depression and carried significant side effect risk. Given this example of the serious consequences of implementing treatment before establishing efficacy through RCTs, telehealth researchers should be rigorous in testing treatments over VC and continuing to monitor treatment outcome over telemedicine.

Telemedicine continues to have the potential for much good in child health care not only in treating depression, but other illnesses as well. Telemedicine offers an avenue to meet some of the emotional, behavioral, and developmental needs of children by expanding assessment and treatment options to underserved populations in urban and rural areas. But vigilant quantitative and qualitative research is needed to complement the expansion in these services. This will insure that services over VC indeed decrease suffering at the individual level and complement public health initiatives at the community level.

REFERENCES

1. Brown FW. Rural telepsychiatry. *Psychiatr Serv* **1999;** 49:963–964.
2. Baer L, Elford R, Cukor P. Telepsychiatry at forty: what have we learned? *Harv Rev Psychiatry* **1997;**5:7–17.
3. Zaylor C. Clinical outcomes in telepsychiatry. *J Telemed Telecare* **1999;**5(Suppl 1):S59–S60.
4. Mannion L, Fahy TJ, Duffy C, et al. Telepsychiatry: an island pilot project. *J Telemed Telecare* **1998;**4(Suppl 1):62–63.
5. McLaren P, Ball CJ, Summerfield AB, et al. An evaluation of the use of interactive television in an acute psychiatric service. *J Telemed Telecare* **1995;**1:79–85.
6. McLaren P, Mohammedali A, Riley A, et al. Integrating interactive television-based psychiatric consultation into an urban community mental health service. *J Telemed Telecare* **1999;**5:100–102.
7. Zaylor C, Nelson E, Cook D. Telepsychiatry in a rural jail population. *J Telemed Telecare* **2001;***7*(Suppl 1):47–49.
8. Deitsch SE, Frueh BC, Santos AB. Telepsychiatry for post-traumatic stress disorder. *J Telemed Telecare* **2000;** 6:184–186.
9. Ghosh GJ, McLaren PM, Watson JP. Evaluating the alliance in videolink psychotherapy. *J Telemed Telecare* **1997;**3:33–35.
10. Cerda GM, Hilty DM, Hales RE, et al. Use of telemedicine with ethnic groups. *Psychiatr Serv* **1999;**50:1364.
11. Manchanda M, McLaren P. Cognitive behaviour therapy via interactive video. *J Telemed Telecare* **1998;**4 (Suppl. 1):53–55.
12. Cowain T. Cognitive-behavioral therapy via videoconferencing to a rural area. *Aust NZ J Psychiatry* **2001;** 35:62–64.
13. Bakke B, Mitchell J, Wonderlich S, et al. Administering cognitive-behavioral therapy for bulimia nervosa via telemedicine in rural settings. *Int J Eat Disord* **2001;** 30:454–457.
14. Ermer D. Experience with a rural telepsychiatry clinic for children and adolescents. *Psychiatr Serv* **1999;**50: 260–261.
15. Elford DR, White H, St. John K, et al. A prospective satisfaction study and cost analysis of a pilot child telepsychiatry service in Newfoundland. *J Telemed Telecare* **2001;***7*:73–81.
16. Rendon M. Telepsychiatric treatment of a schoolchild. *J Telemed Telecare* **1999;**4:179–182.
17. Paul N. Telepsychiatry, the satellite system and family consultation. *J Telemed Telecare* **1999;**3(Suppl 1):52–53.
18. Miller TW, Kraus RF, Kaak O, et al. Telemedicine: a child psychiatry case report. *Telemed J* **2002;**8:139–141.
19. Blackmon LA, Kaak HO, Ranseen J. Consumer satisfaction with telemedicine child psychiatry consultation in rural Kentucky. *J Telemed Telecare* **1997;**48: 1464–1466.
20. Kopel H, Nunn K, Dossetor D. Evaluating satisfaction with a child and adolescent psychological telemedicine outreach service. *J Telemed Telecare* **2001;***7*(Suppl 2):35–40.
21. National Institute of Mental Health. *In harm's way: suicide in America,* **1999.** Available: www.nimh.nih.gov/publicat/harmaway.cfm.
22. Wu P, Hoven CW, Cohen P, et al. Depressive and disruptive disorders and mental health service utilization in children and adolescents. *Psychiatr Serv* **2001;** 52:189–195.
23. Roberts RE, Attkisson CC, Rosenblatt A. Prevalence of psychopathology among children and adolescents. *Am J Psychiatry* **1998;**155:715–725.
24. American Psychiatric Association (APA). *Diagnostic*

and statistical manual of mental disorders, 4th ed. Washington, DC: author, **1994.**
25. Reinecke MA, Ryan NE, DuBois DL. Cognitive-behavioral therapy of depression and depressive symptoms during adolescence: a review and meta-analysis. *J Am Acad Child Adolesc Psychiatry* **1998;**37:26–34.
26. Harrington R, Whittaker J, Shoebridge P. Psychological treatment of depression in children and adolescents. *Br J Psychiatry* **1998;**173:291–298.
27. Asarnow JR, Jaycox LH, Tompson MC. Depression in youth: psychosocial interventions. *J Clin Child Psychol* **2001;**30:33–47.
28. Kaslow NJ, Thompson MP. Applying the criteria for empirically supported treatments to studies of psychosocial interventions for child and adolescent depression. *J Clin Child Psychol* **1998;**27:146–155.
29. Dujovne VF. *Comparison of cognitive-behavioral to pharmacological treatment of depression in prepubertal children.* Unpublished dissertation, University of Kansas, **1993.**
30. Fuchs FD, Klag MJ, Whelton PK. The classics: a tribute to the fiftieth anniversary of the randomized clinical trial. *J Clin Epidemiol* **2000;**53:335–342.
31. Moore GT, Willemain TR, Bonanno R, et al. Comparison of television and telephone for remote medical consultation. *N Eng J Med* **1975;**292:729–732.
32. Hersh WR, Helfand M, Wallace J, et al. Clinical outcomes resulting from telemedicine interventions: a systematic review. *BMC Med Inf Decision Making* **2001;** 1:5.
33. Elford DR, White H, St. John K, et al. A prospective satisfaction study and cost analysis of a pilot child telepsychiatry service in Newfoundland. *J Telemed Telecare* **2001;**7:73–81.
34. Glueckauf RL, Fritz SP, Ecklund-Johnson EP, et al. Videoconferencing-based family counseling for rural teenagers with epilepsy: Phase 1 findings. *Rehabil Psychol* **2002;**47:49–72.
35. Altman DG, Schulz KF, Moher D, et al. The revised CONSORT statement for reporting randomized trials: explanation and elaboration. *Ann Intern Med* **2001;**134: 663–694.
36. Whitten P, Cook DJ, Shaw P, et al. Telekid Care: bringing health care into schools. *Telemed J* **1998;**4:335–343.
37. Ermer D. Child and adolescent telepsychiatry clinics. *Psych Ann* **1999;**29:409–414.
38. Hollingshead AB, Redich FC. *Social class and mental illness.* New York: Wiley, **1958.**
39. Blackmon LA, Kaak HO, Ranseen J. Consumer satisfaction with telemedicine child psychiatry consultation in rural Kentucky. *J Telemed Telecare* **1997;**48: 1464–1466.
40. Ambrosini PJ. Historical development and present status of the Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS). *J Am Acad Child Adolesc Psychiatry* **2000;**39:49–58.
41. Chambers W, Puig-Antich J, Hirsch M, et al. The assessment of affective disorders in children and adolescents by semistructured interview: test-retest reliability. *Arch Gen Psychiatry* **1985;**42:696–702.
42. Kovacs M. *Children's Depression Inventory manual.* North Tonawanda, NY: Multi-Health Systems, **1992.**
43. Reinecke MA, Ryan NE, DuBois DL. Cognitive-behavioral therapy of depression and depressive symptoms during adolescence: a review and meta-analysis. *J Am Acad Child Adolesc Psychiatry* **1998;**37:26–34.
44. Stark K. *Childhood depression: school-based intervention.* New York: Guilford, **1990.**
45. Birmaher B. Should we use antidepressant medications for children and adolescents with depressive disorders? *Psychopharm Bull* **1998;**34:35–39.
46. Asarnow JR, Jaycox LH, Tompson MC. Depression in youth: psychosocial interventions. *J Clin Child Psychol* **2001;**30:33–47.
47. Krupinski E, Nypaver M, Poropatich D, et al. Clinical applications in telemedicine/telehealth. *Telemed J* **2002;**8:13–48.

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