Use of the Internet to Reach Teens with Diabetes

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Diabetes management in teens compromised by adolescent development

Excellent diabetes control associated with reduced risk for long-term complications

Primary & secondary control coping associated with better outcomes

Behavioral approaches may assist teens to make better health decisions & have better outcomes

Increase sense of mastery & competence by retraining non-constructive coping styles & forming more positive patterns of social behavior.

Behavioral & cognitive behavioral approaches, usually in small groups, to teach a variety of coping skills.

Coping Skills

- Problem solving
- Social skills
  - Assertiveness
  - Negotiation
- Stress reduction
- Cognitive behavior modification
- Conflict resolution
Randomized controlled trial of youth with type 1 diabetes
CST compared to advanced diabetes education
Age 12.5-20 years at entry
No other chronic illness
Appropriate grade for age
Summary: Group-based Model

- Improved A1c & quality of life
- Busy teen lives hamper ability to meet in groups - ~ 50% enrolled
- Difficult for clinicians to implement in real life practice
- Not covered by usual insurance in the U.S.
Need for a broader reach

- 93% of youth access internet regularly
- On their own time and schedule
- Characters teens can relate to
- Less didactic, more interactive
Web Program Development

- Multi-phase mixed methods approach
  - Focus groups
  - Prototype development
  - Think-aloud interviews
  - Pilot study

TEENCOPE

Five interactive learning modules released weekly over 5 weeks.
Youth notified of release via email.
Modules took approximately 30 minutes to complete.
## THE TEENCOPE STUDY

### Intervention Content

#### TEENCOPE
- Introduction to Coping Skills and "Self-Talk"
- Communication Skills
- Social Problem Solving
- Stress Management
- Conflict Resolution

#### MANAGING DIABETES
- Healthy Eating
- Exercise
- Glucose Control
- Preventing and Managing Sick Days
- Diabetes Technology and Research

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### THE TEENCOPE STUDY
Managing Diabetes

- Internet-based diabetes psycho-educational program
- Diabetes management problem-solving & self-efficacy
- Case studies and problem-solving activities
- Interactive with tailored responses
- Culturally appropriate
The TeenCope Study

- Internet-based coping skills training program
  - Graphic novel format
  - Includes asynchronous discussion board
- RCT comparing to *Managing Diabetes in Teens 11-14 years of age*
- Transition to adolescence is critical period for diabetes control & behaviors
## My Group

Click below to view the profiles of other teens in your group, or view their session answers.

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<tr>
<th>Pic</th>
<th>Name</th>
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<th>Session 3</th>
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Relaxation Techniques

You may have listed some of these. Here’s what other teens have told us about ways they relax and handle stress:

- **Sleep on it/ Take a nap**
  It’s easier to think things through when you are well rested.

- **Listening to music**
  Music can help to calm you down. What music could you listen to the next time you’re stressed?

- **Do something physical**
  Exercise can boost your mood and give you energy. What form of exercise would you do? There are lots of different ways to move! You could:
  - Dance
  - Take a walk or run
  - Play sports
  - Stretch
  - Work out
To compare the efficacy of **TEENCOPE™** to **MANAGING DIABETES** for youth with T1D on primary outcomes of HbA1c and Quality of Life as well as secondary outcomes at 12 months.

To explore the impact of participation in one program compared to both programs after 18 months.
Secondary Outcomes/Mediators

- Stress/Coping – Perceived Stress Scale
- Self-efficacy for Diabetes
- Self-management – SM of Diabetes-Adolescents
- Social competence – Self Perception Profile
- Family conflict – Diabetes Family Conflict Scale
Methods

4 diverse U.S. sites (Yale, Children’s Hospital of Philadelphia, University of Miami, University of Arizona)

Youth randomized to either TEENCOPE or MANAGING DIABETES

Data collected at baseline, 3, 6, and 12 months

At 12 months, youth encouraged to cross over to the other program with data collected at 18 months
Inclusion Criteria

- Age 11-14 years
- Diagnosed with T1D for ≥ 6 months
- No prior exposure to previous studies of *Coping Skills Training*
- No other significant health problems
- School grade appropriate for age
Approached for participation (n=518)
  ↓
Consented (n=406)
  ↓
Completed 0 month/Enrolled (n=320)
  ↓
Allocated to intervention (n=167)
  |  Allocated to intervention (n=153)
  |  Allocated to intervention (n=167)
  ↓  ↓  ↓
Received intervention (n=148)
  |  Received intervention (n=142)
  |  Received intervention (n=148)
  ↓  ↓  ↓
Did not receive intervention (n=19)
  |  Did not receive intervention (n=11)
  |  Did not receive intervention (n=19)
  ↓  ↓  ↓
Completed 3 month data (n=115)
  |  Completed 3 month data (n=120)
  |  Completed 3 month data (n=115)
  ↓  ↓  ↓
Completed 6 month data (n=106)
  |  Completed 6 month data (n=106)
  |  Completed 6 month data (n=106)
  ↓  ↓  ↓
Completed 12 month data (n=120)
  |  Completed 12 month data (n=120)
  |  Completed 12 month data (n=120)
  ↓  ↓  ↓
Not eligible (n=10)
  |  Not eligible (n=10)
  |  Not eligible (n=10)
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Did not receive x-over intervention (n=42)
  |  Received x-over intervention (n=57)
  |  Received x-over intervention (n=57)
  ↓  ↓  ↓
Completed 18 month data (n=42)
  |  Completed 18 month data (n=57)
  |  Completed 18 month data (n=65)
  ↓  ↓  ↓
Received x-over intervention (n=65)
  |  Did not receive x-over intervention (n=41)
  |  Did not receive x-over intervention (n=41)
  ↓  ↓  ↓
Completed 18 month data (n=65)
  |  Completed 18 month data (n=41)
  |  Completed 18 month data (n=41)
  ↓  ↓  ↓
Completed 18 month data (n=65)
  |  Completed 18 month data (n=41)
  |  Completed 18 month data (n=41)
  ↓  ↓  ↓
Not eligible (n=6)
  |  Not eligible (n=6)
  |  Not eligible (n=6)
  ↓  ↓  ↓
TeenCope

Managing Diabetes

Not eligible (n=10)

Not eligible (n=6)

Not eligible (n=8)

Not eligible (n=6)
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<th>Psychosocial</th>
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<td><strong>A1C</strong></td>
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<td>Family:</td>
<td><strong>Diabetes Family Conflict Scale (DFC, Hood et al., 2007)</strong></td>
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<td><strong>Perceived Stress Scale (PSS, Cohen et al. 1993)</strong></td>
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<td><strong>Self-Efficacy for Diabetes Scale (Grossman, Brink, and Hauser, 1987)</strong></td>
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<td><strong>Self-Perception Profile for Adolescents (SPPA, Harter, 1988)</strong></td>
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<td><strong>Responses to Stress Questionnaire (RSQ, Connor-Smith, et al., 2000)</strong></td>
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<td><strong>Pediatric Quality of Life Inventory (PedsQL, Varni et al., 1999)</strong></td>
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Sample (N=320)

- Age: 12.3 (±1.1) years
- Duration: 5.0 (±3.5) years
- A1C: 8.3 (±1.5)%
- 60% pump users
- 55% female
- 36% non-White
- 21% < $40K
- Parent education: 14.6 (±2.8) years
Acceptability

- Session Participation
  - Completed 4/5 = 78%
    - TeenCope – 77%
    - Managing Diabetes – 52%
  - Completed at least 1-90%
- Discussion Board – 52%
- Retention rate – 12 months – 78%
Satisfaction by Study Group

Legend:
- **Yellow**: Teencope
- **Blue**: Managing Diabetes

Categories:
- Helpful
- Enjoyable
- Content
- Finding Way
- Skills
- Worthwhile

Graph shows the satisfaction levels across different categories for both study groups, with error bars indicating variability.
Hypotheses

- Youth who participated in **TEENCOPE** will have better quality of life and HbA1c than those in **Managing Diabetes** after 12 months.
- Participating in both programs rather than only one leads to better outcomes.
Results: A1C & Quality of Life

Problem Solving & Goal Setting

The TEENCOPE Study

Problem Solving
- TEENCOPE
- MANAGING DIABETES

Goal Setting
- TEENCOPE
- MANAGING DIABETES

Baseline 3mo 6mo 12mo

Time

Standardized Z-Score + 0.5
Perceived Stress & Self-Efficacy

Baseline       3mo          6mo         12mo

Perceived Stress (TEENCOPE)
Perceived Stress (MANAGING DIABETES)
Self-Efficacy (TEENCOPE)
Self-Efficacy (MANAGING DIABETES)
Collaboration & Family Conflict

The TEENCOPE Study

- Collaboration (TEENCOPE)
- Collaboration (MANAGING DIABETES)
- Family Conflict (TEENCOPE)
- Family Conflict (MANAGING DIABETES)

Time:
- Baseline
- 3mo
- 6mo
- 12mo

Standardized Z-Score + 0.5
Mediation in TEENCOPE

Mediation Effects

- Self-management: 0.24, p=.06
- Self-efficacy: 1.07, p<.01
- Perceived stress: 0.65, p=.03
- Coping: 0.98, p<.01
- Disengagement: 0.27, p<.01

Mediation in Managing Diabetes

Mediation Effects

Social acceptance: 0.49, p<.01
Family conflict: 0.16, p=.03
Self-efficacy: 0.63, p<.01

Mediators

Social Acceptance
Family Conflict
Self-efficacy

MANAGING DIABETES

Quality of Life

Quality of Life Over 18 Months (n=320)

All p>.05 group x time and time

“I loved that it was on the internet.”
“Made me feel safe to share my thoughts”
“Helps you understand things that the doctors tell you- but you don't really understand at the time”
Potential Cost-benefit

- Cost to develop $235,609
- Maintenance $137/month/youth with PT professional ‘coach/moderator’
- Reduction in long-term complications by 10-25% if previous findings hold
- Costs will be reduced with new methods of internet program creation

Next Steps

- Dissemination project currently underway, supported by American Diabetes Association
- Combined TeenCope and Managing Diabetes = Teens.Connect
- After randomization, prescription by provider to website
- 80% of youth do at least one session

ADA grant 1-12-SAN-10
Limitations

- Strong comparison treatment leading to few significant between group effects
- 25% attrition, but intent to treat procedures used
- Youth recruited only from tertiary care centers.
- Sample biased toward youth in better metabolic control
- Minority and low-income youth more likely to drop out before randomization
Conclusions & Implications

- Web delivery feasible & acceptable
- Satisfaction high
- Participation in both programs leads to improved outcomes over time
- Each program has differential effects on secondary outcomes
- Potential for wider dissemination if efficacious in current clinical trial
- Creative approaches to diabetes care important for engaging teens
Acknowledgements

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