



Use of the Internet to Reach Teens with Diabetes

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The Problem

- ▶ 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

Grey, M., Cameron, M. E., Lipman, T. H., & Thurber, F. W. (1995). Psychosocial status of children with diabetes in the first two years after diagnosis. *Diabetes Care*, 18, 1330-1336.

Coping Skills Training

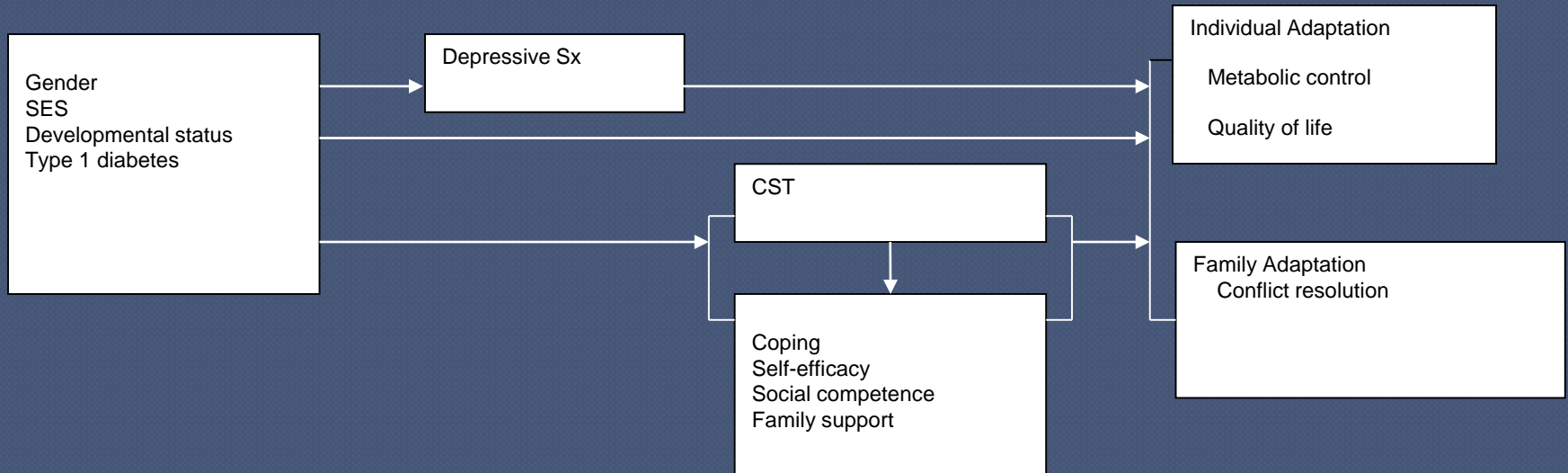
- ▶ Increase sense of mastery & competence by retraining non-constructive coping styles & forming more positive patterns of social behavior.
- ▶ Behavioral & cognitive behavioral approaches, usually in small groups, to teach a variety of coping skills

Davidson, M., Boland, E. A., & Grey, M. (1997). Teaching teens to cope: Coping skills training for adolescents with insulin dependent diabetes mellitus. *Journal of the Society of Pediatric Nurses*, 2, 65-72.

Coping Skills

- ▶ Problem solving
- ▶ Social skills
 - Assertiveness
 - Negotiation
- ▶ Stress reduction
- ▶ Cognitive behavior modification
- ▶ Conflict resolution

Conceptual Framework

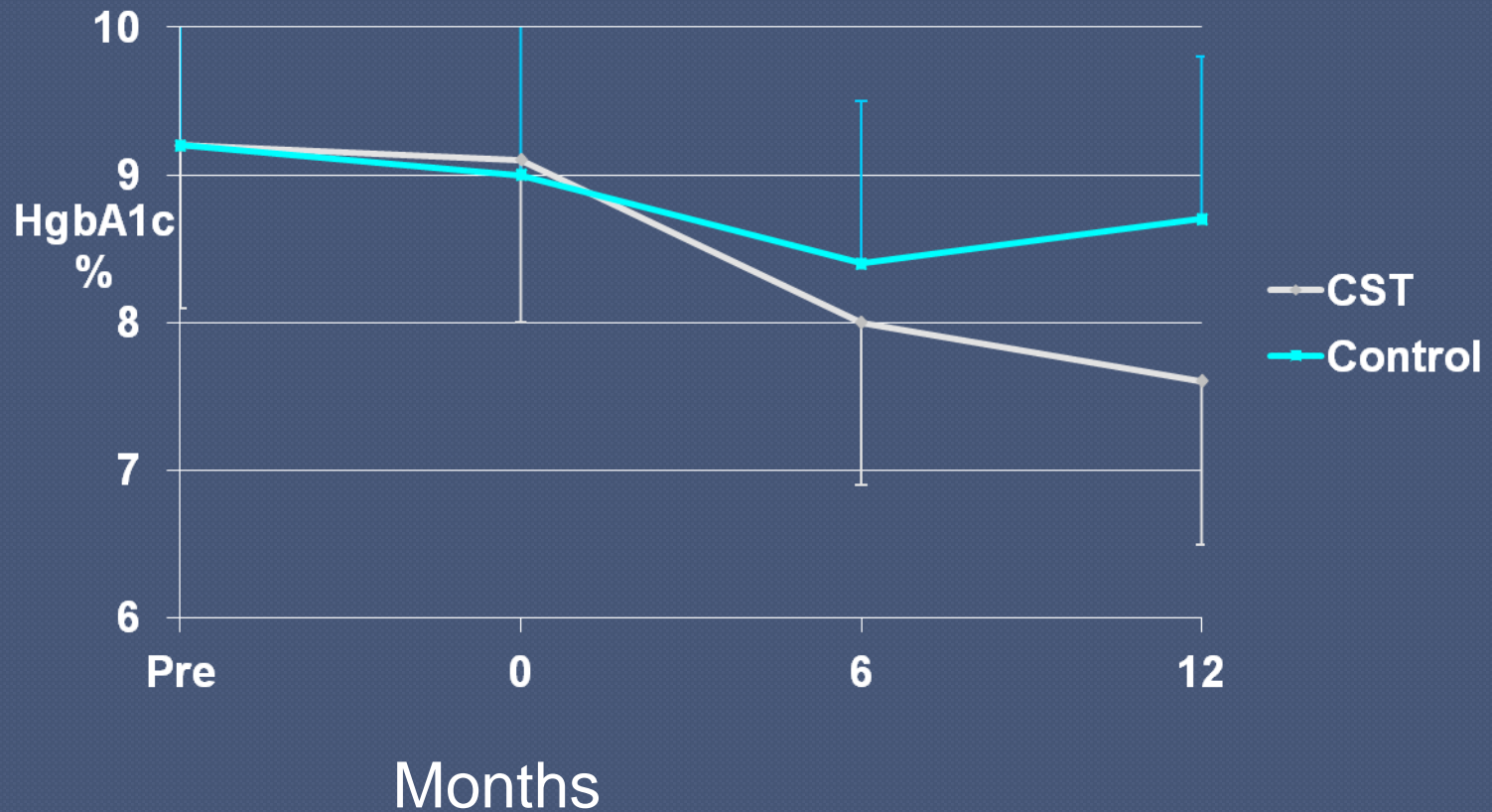


Whittemore, R., Jaser, S., Guo, J., & Grey, M. (2010). The Childhood Adaptation to Chronic Illness Model: An update. *Nursing Outlook*, 58, 242-251.

CST for Youth with Diabetes: Small Groups Model

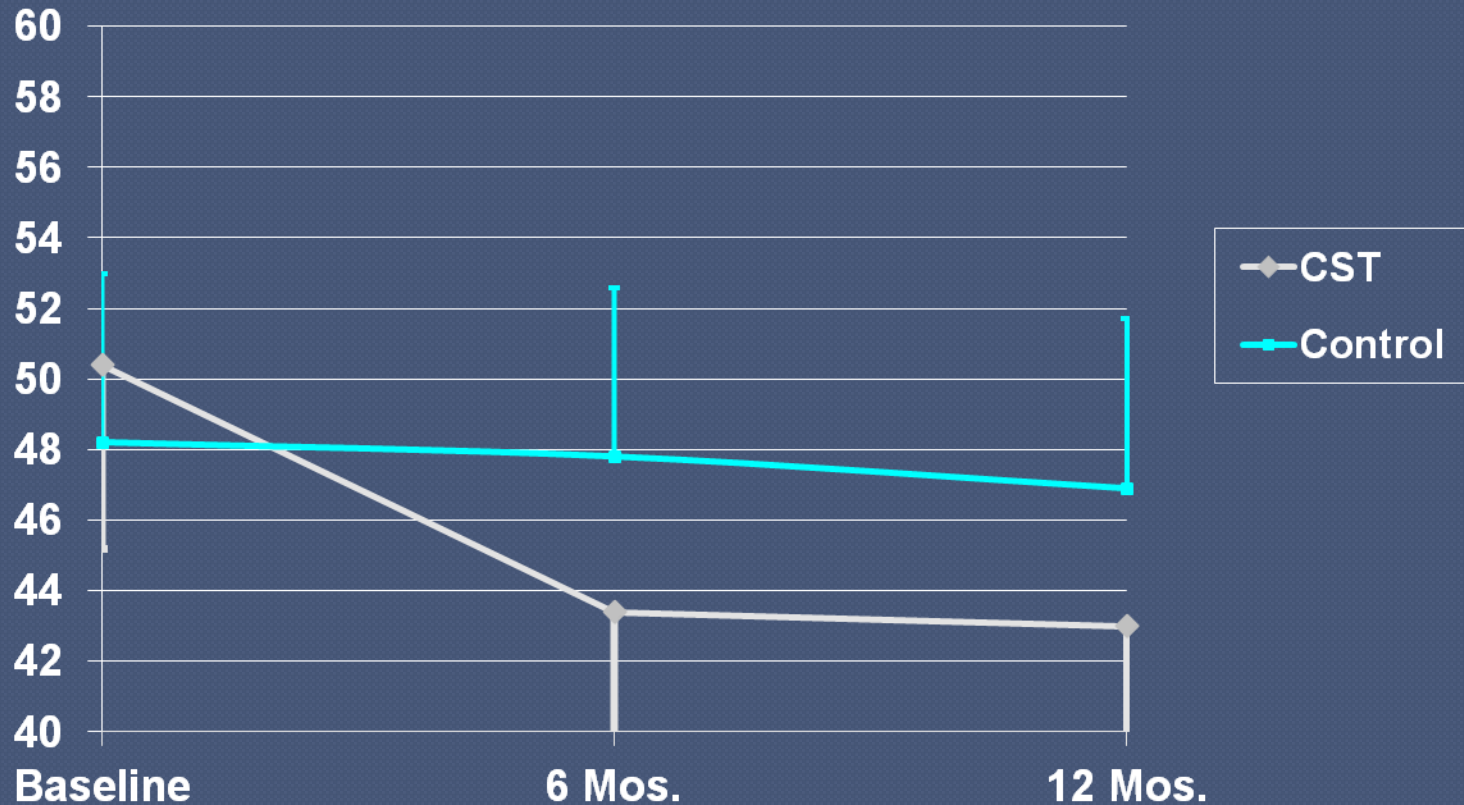
- ▶ Randomized controlled trial of youth with type 1 diabetes
- ▶ CST compared to advanced diabetes education
- ▶ Age 12.5-20 years at entry
- ▶ No other chronic illness
- ▶ Appropriate grade for age

Metabolic Control after 1 Year (N=77)



Grey, et al. (2000). Coping skills training for youth on intensive therapy has long-lasting effects on metabolic control and quality of life. *Journal of Pediatrics*, 137, 107-103

Quality of Life



Grey, et al. (2000). Coping skills training for youth on intensive therapy has long-lasting effects on metabolic control and quality of life. *Journal of Pediatrics*, 137, 107-103

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

Whittemore, R., et al. (2010). Development of an internet coping skills training program for teens with type 1 diabetes. *Computers, Informatics, and Nursing*, 28, 103-110.

Interventions

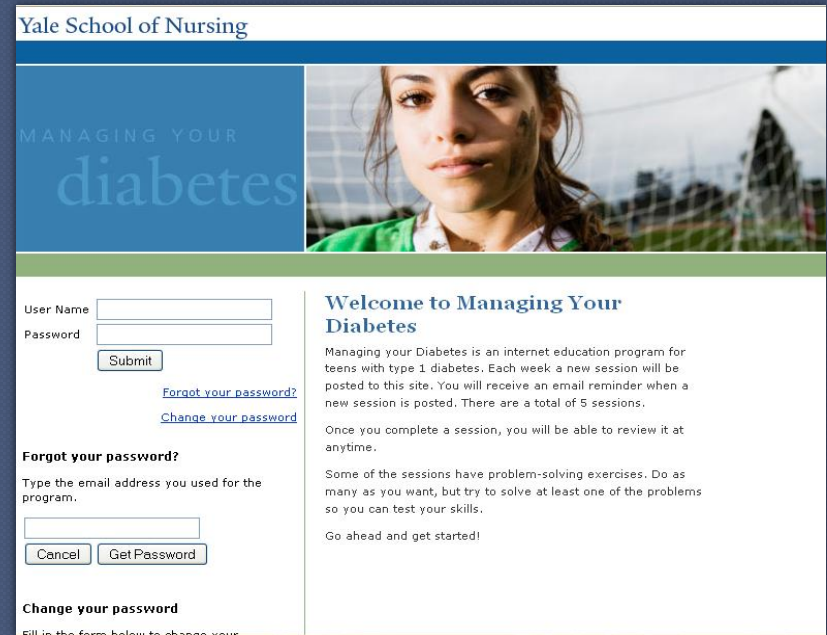
MANAGING DIABETES



TEENCOPE

Five interactive learning modules released weekly over 5 weeks.
Youth notified of release via email.

Modules took approximately 30 minutes to complete.



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

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



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[Discussion Board](#)

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My Group

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

Hi! I'm Sarah, your coach. Click here to learn a little bit more about me.



Pic	Name	Session 1	Session 2	Session 3	Session 4	Session 5
	No Name	N/A	N/A	N/A	N/A	N/A
No Photo	No Name	N/A	N/A	N/A	N/A	N/A
	Jesse	View	View	View	View	View
No Photo	No Name	N/A	N/A	N/A	N/A	N/A
	ihatepapers	N/A	N/A	N/A	N/A	N/A

Session 4 » Stress Management**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



Purpose

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

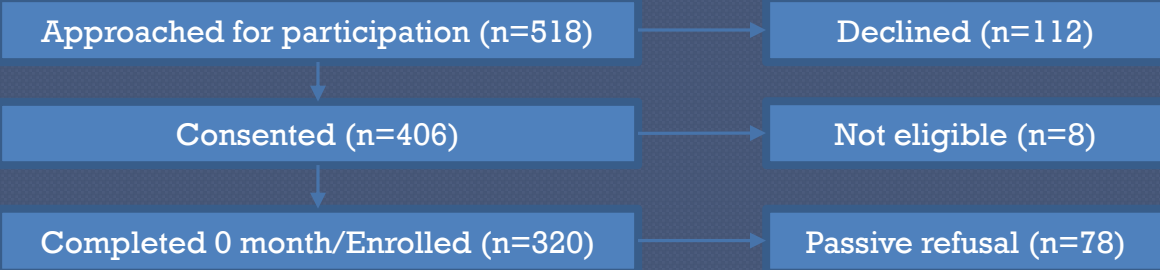
- Stress/Coping – Perceived Stress Scale
- Self-efficacy for Diabetes
- Self-management – SM of Diabetes-Adolescents
- Social competence – Self Perception Profile
- Family conflict – Diabetes Family Conflict Scale

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



TeenCope

Managing Diabetes

Allocated to intervention (n=167)
 Received intervention (n=148)
 Did not receive intervention (n=19)

Allocated to intervention (n=153)
 Received intervention (n=142)
 Did not receive intervention (n=11)

Completed 3 month data (n=115)

Completed 3 month data (n=128)

Completed 6 month data (n=106)

Completed 6 month data (n=117)

Completed 12 month data (n=120)

Completed 12 month data (n=113)

Not eligible (n=10)

Not eligible (n=6)

Did not receive x-over intervention (n=42)

Received x-over intervention (n=57)

Received x-over intervention (n=65)

Did not receive x-over intervention (n=41)

Completed 18 month data (n=42)

Completed 18 month data (n=57)

Completed 18 month data (n=65)

Completed 18 month data (n=41)

Measures

Physiological:

- ✦ A1C

Behavioral:

- ✦ Self-Management of T1D in Adolescence (SMOD-A, Schilling et al., 2006)

Family:

- ✦ Diabetes Family Conflict Scale (DFC, Hood et al., 2007)

Psychosocial:

- ✦ Perceived Stress Scale (PSS, Cohen et al. 1993)
- ✦ Self-Efficacy for Diabetes Scale (Grossman, Brink, and Hauser, 1987)
- ✦ Self-Perception Profile for Adolescents (SPPA, Harter, 1988)
- ✦ Responses to Stress Questionnaire (RSQ, Connor-Smith, et al., 2000)
- ✦ Pediatric Quality of Life Inventory (PedsQL, Varni et al., 1999)

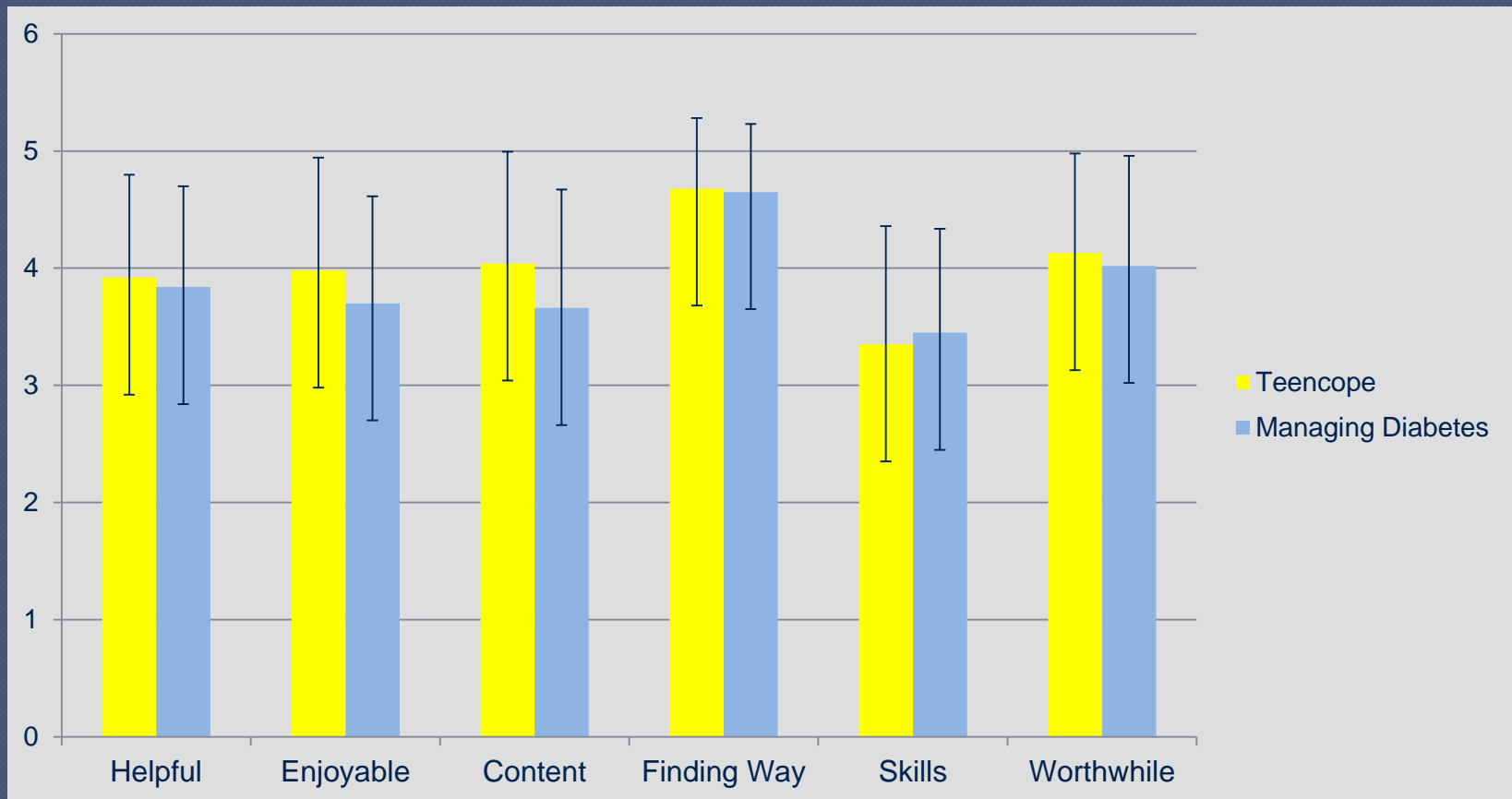
Sample (N=320)

- ✦ 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%**

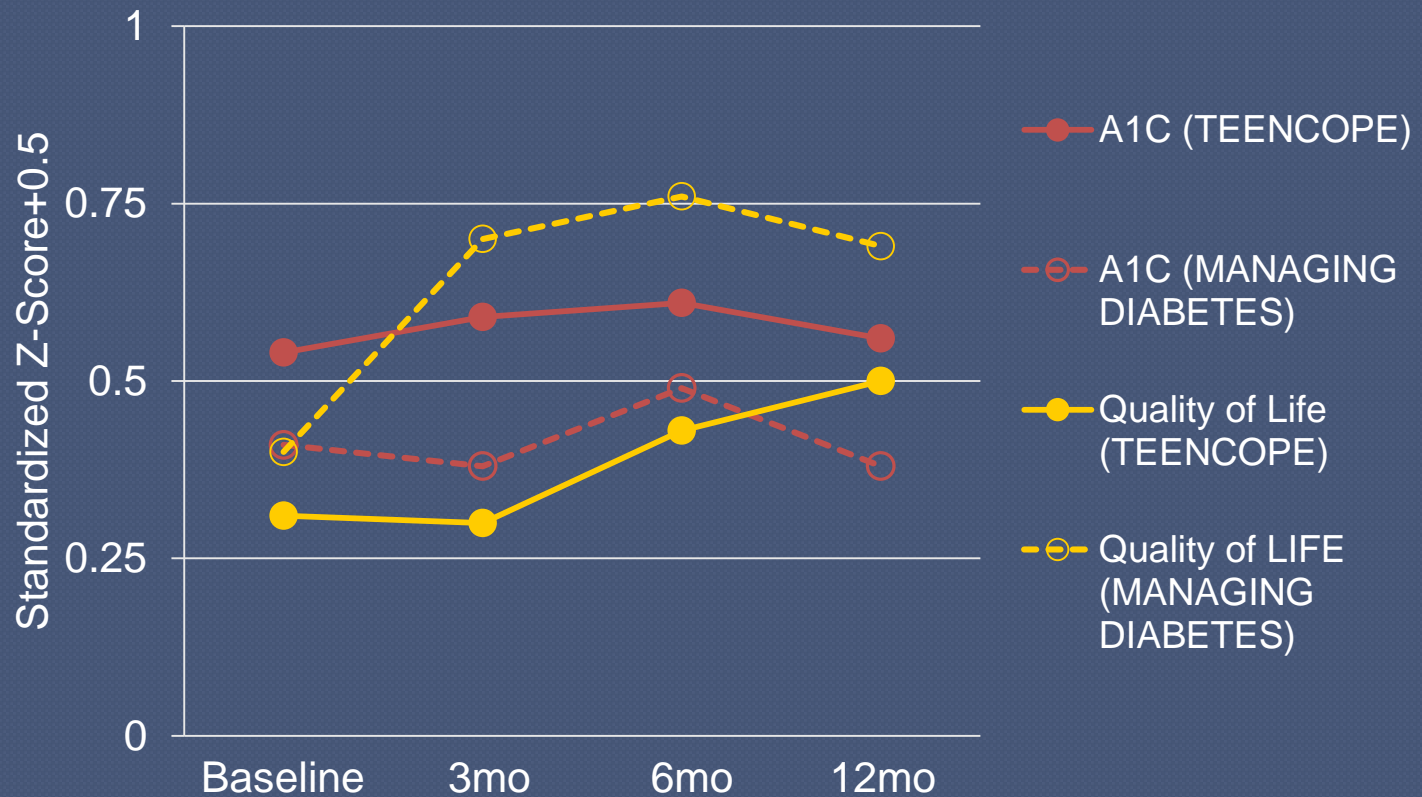
Satisfaction by Study Group



Hypotheses

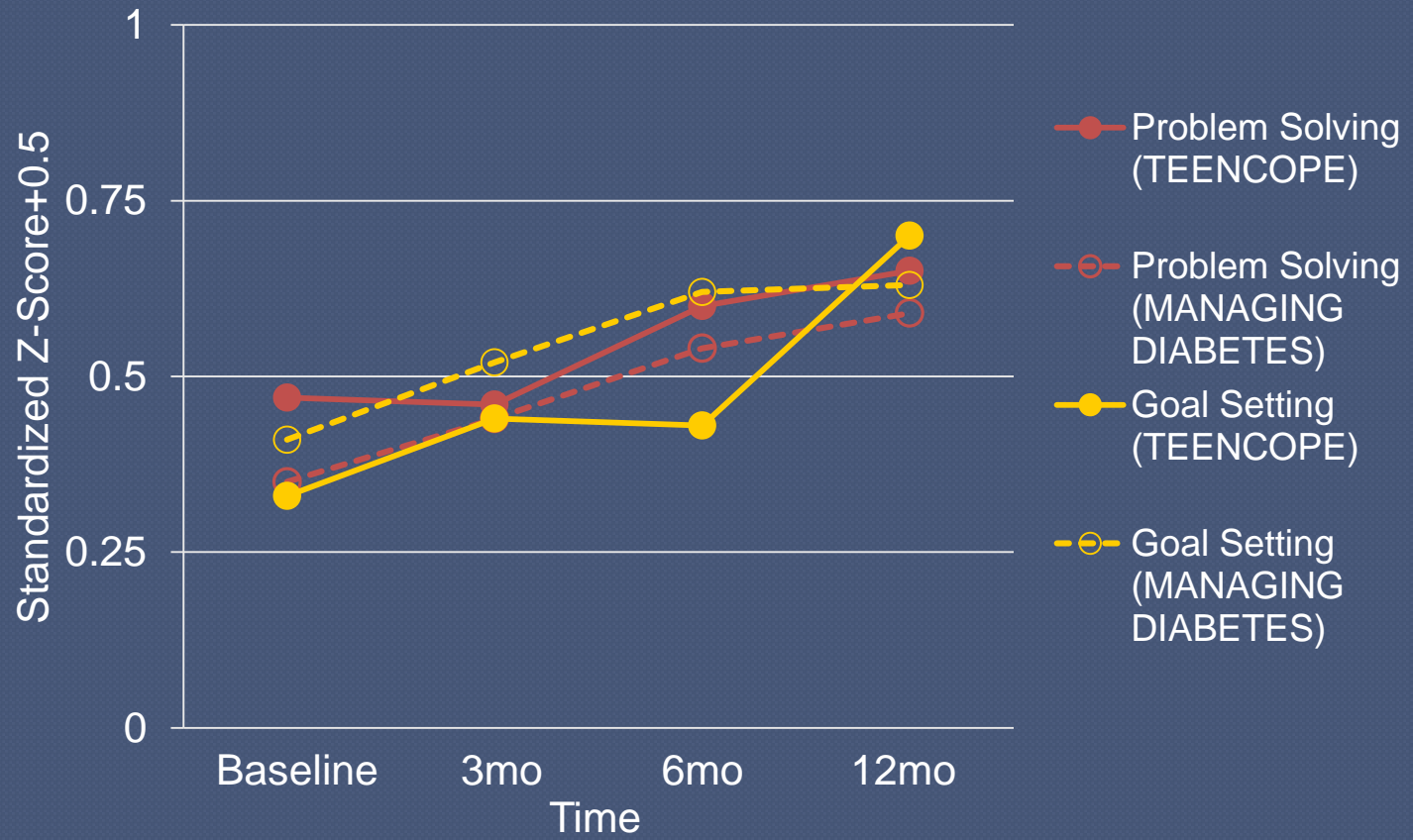
- Youth who participated in **TEENCOPE** will have better quality of life and HbA1c than those in Managing Diabetes after 12 months
- Participating in both programs rather than only one leads to better outcomes

Results: A1C & Quality of Life

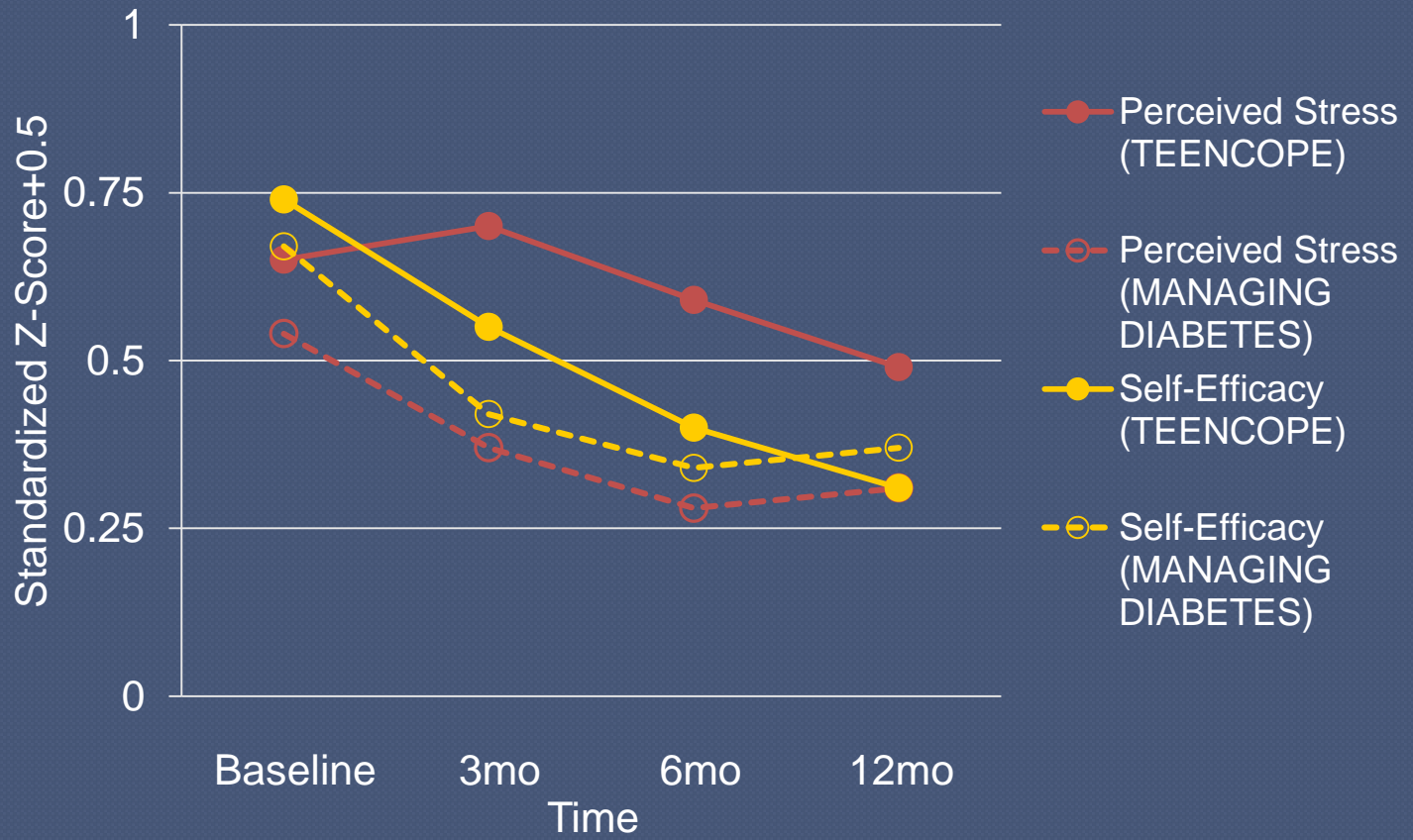


Grey, M., et al. (2013). Internet psycho-education programs improve outcomes in youth with type 1 diabetes. *Diabetes Care*, 36, 2475-2482.

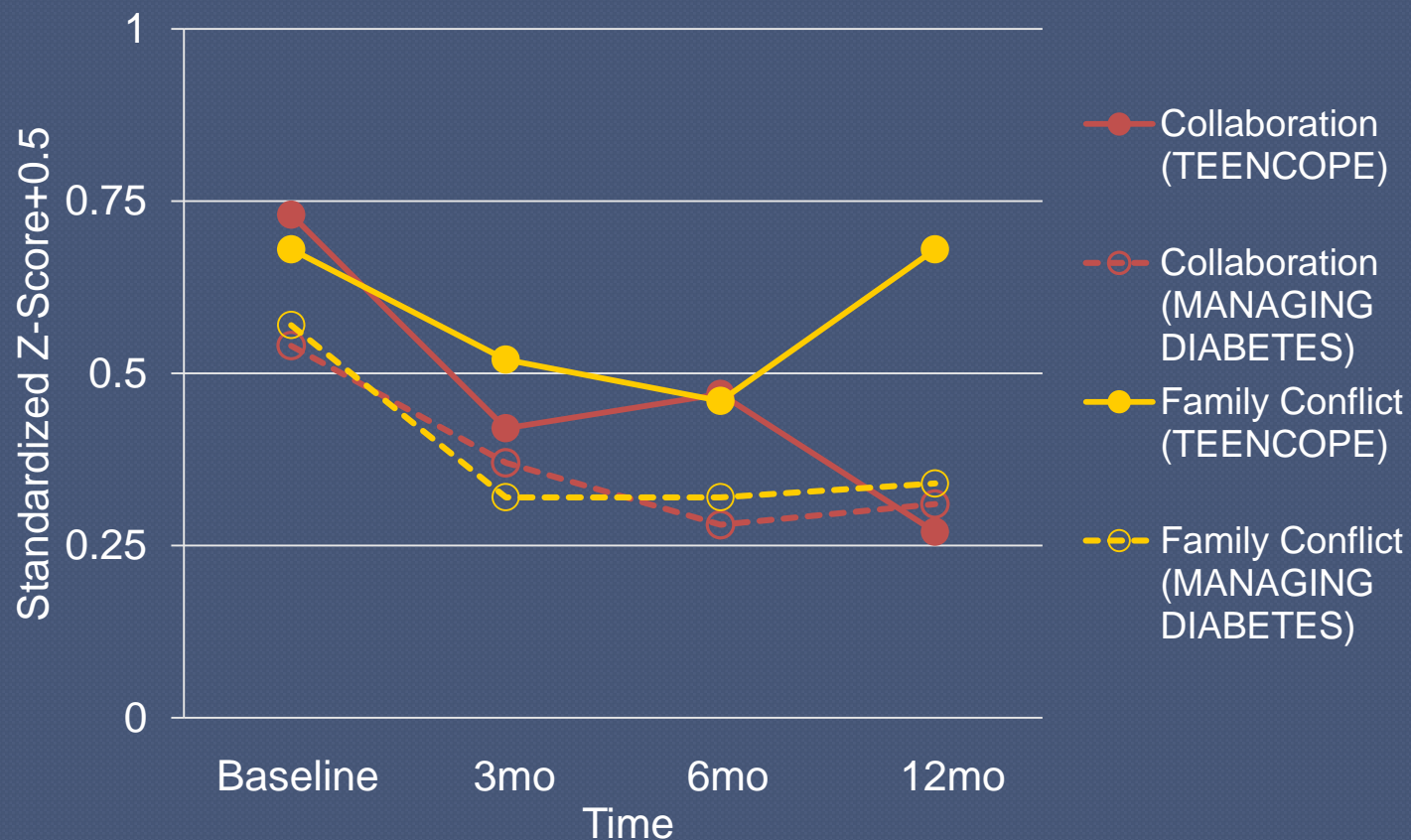
Problem Solving & Goal Setting



Perceived Stress & Self-Efficacy

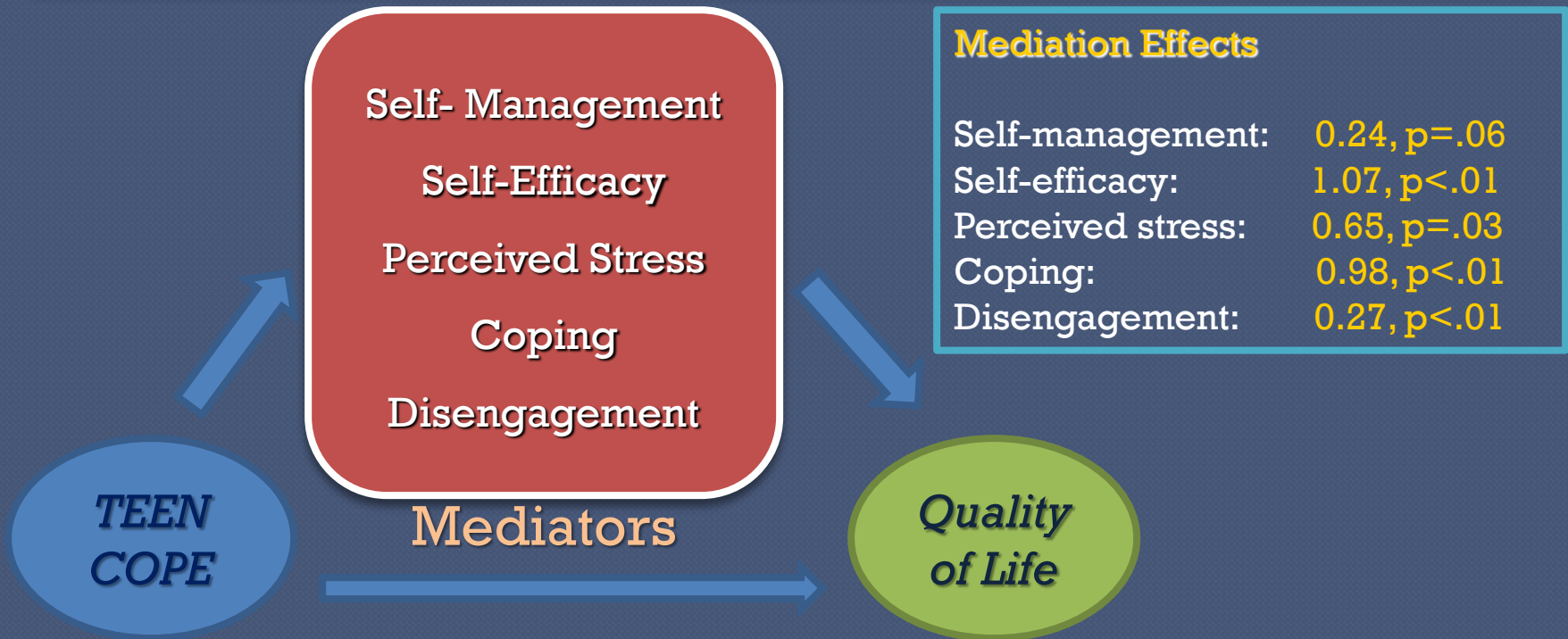


Collaboration & Family Conflict



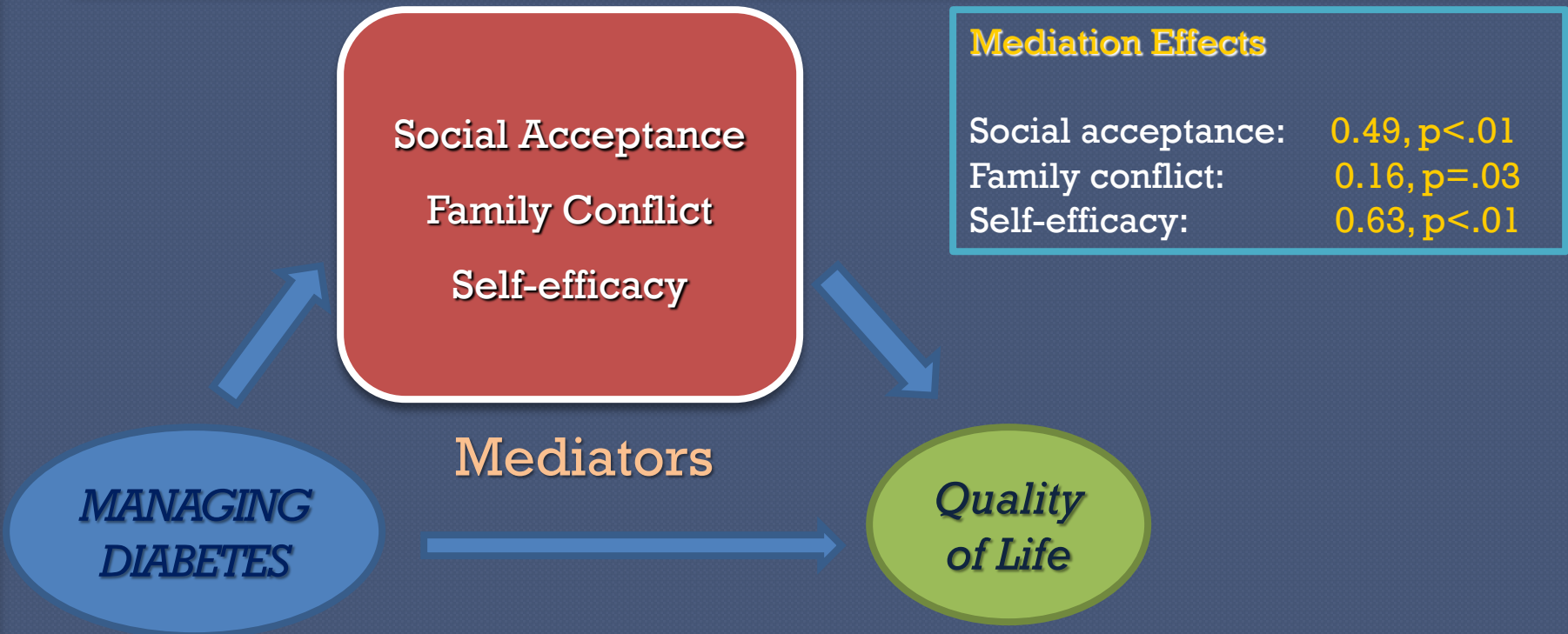
THE TEENCOPE STUDY

Mediation in TEENCOPE



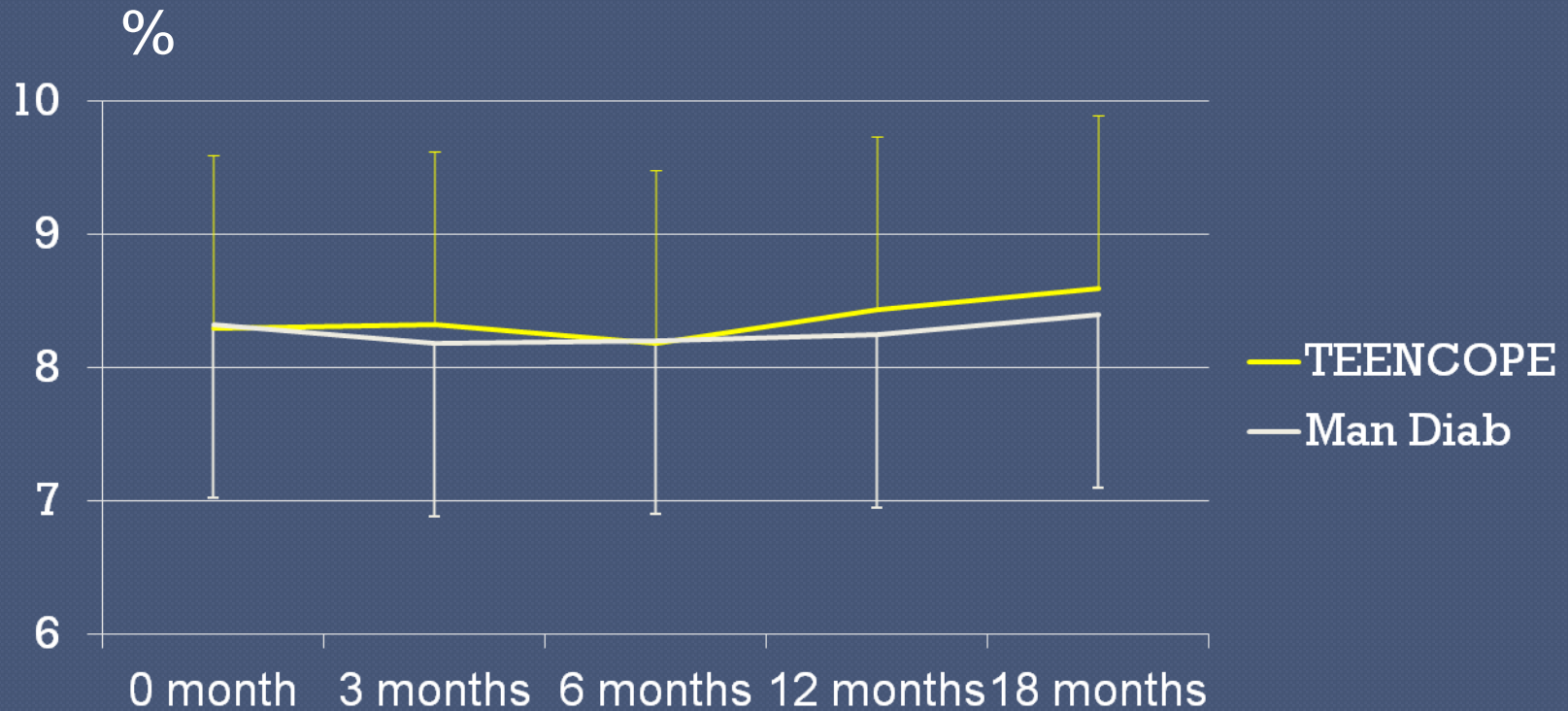
Jaser, S. S., Whitemore, R., Chao, A., Jeon, S., Faulkner, M. S., & Grey, M. (2013). Mediators of 12-month outcomes of two internet interventions for youth with type 1 diabetes. *Journal of Pediatric Psychology, 39*, 306-315.

Mediation in *Managing Diabetes*



Jaser, S. S., Whittemore, R., Chao, A., Jeon, S., Faulkner, M. S., & Grey, M. (2013). Mediators of 12-month outcomes of two internet interventions for youth with type 1 diabetes. *Journal of Pediatric Psychology*, 39, 306-315.

HbA1c Over 18 Months (n=320)

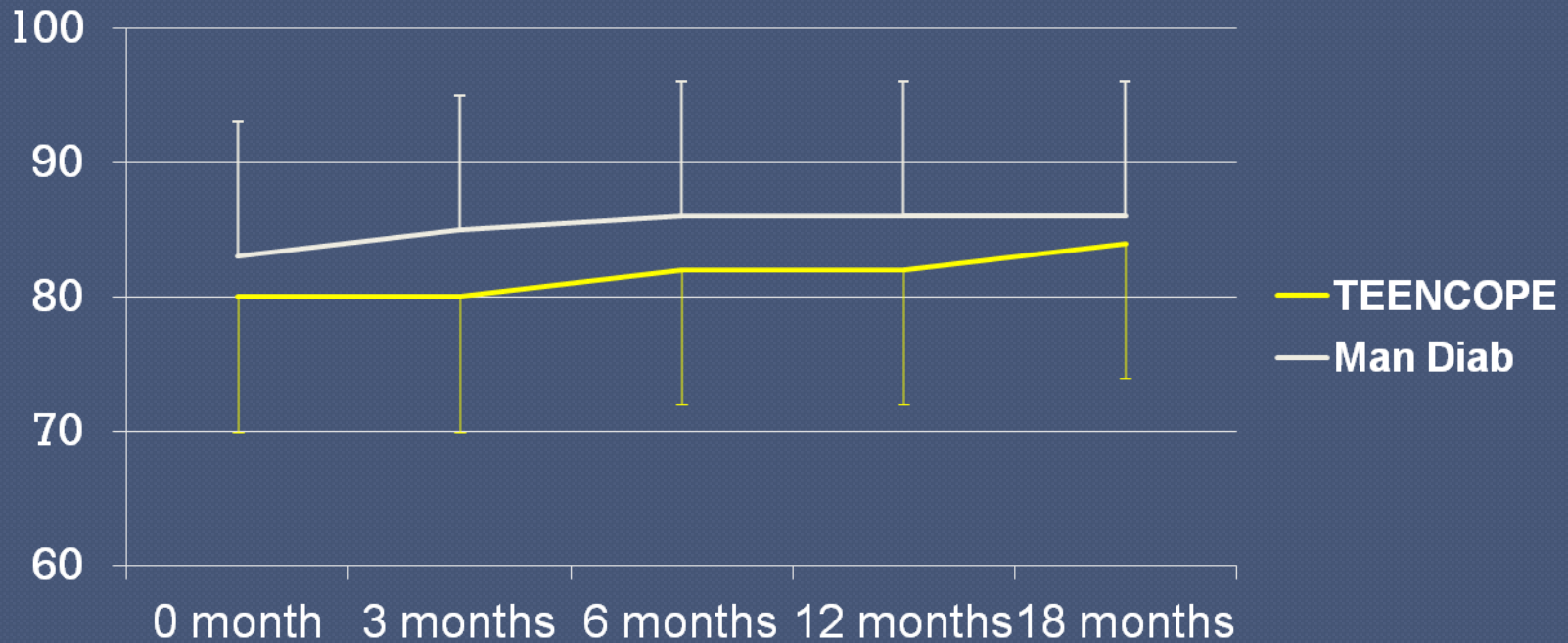


All $p > .05$ group x time and time

Grey, M., et al. (2013). Internet psycho-education programs improve outcomes in youth with type 1 diabetes. *Diabetes Care*, 36, 2475-2482.

Quality of Life Over 18 Months

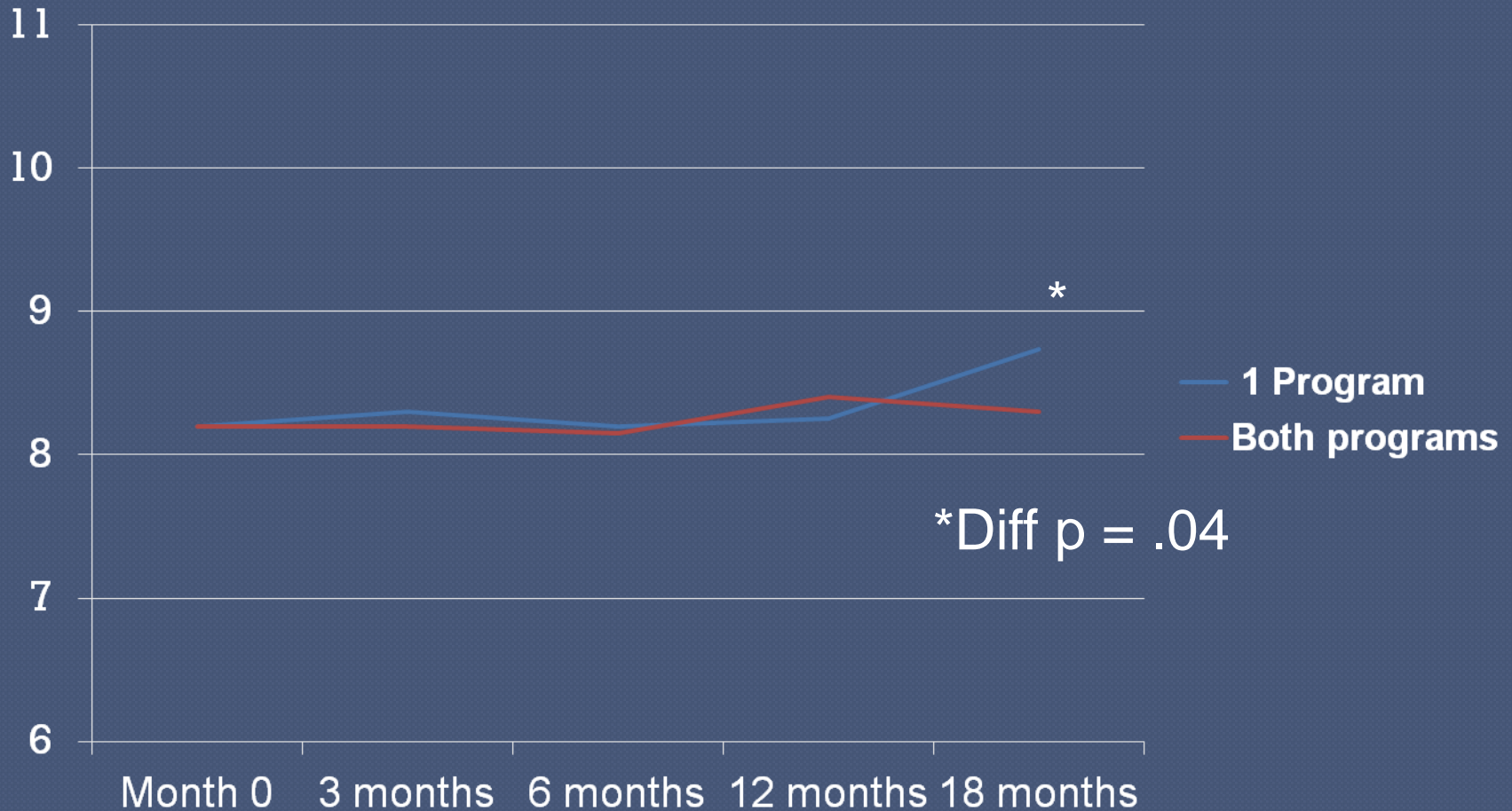
(n=320)



All $p > .05$ group x time and time

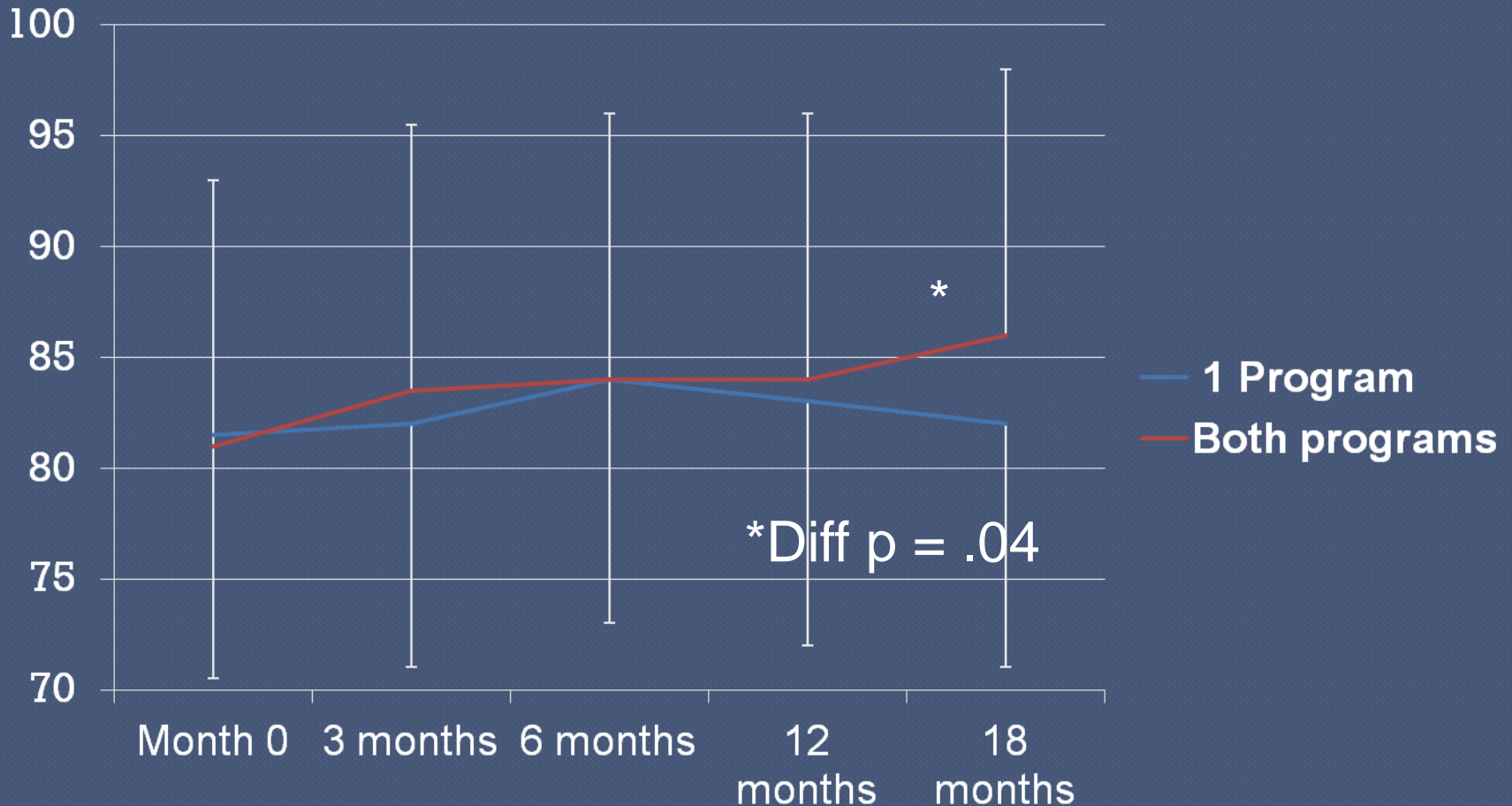
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HbA1c after 18 months, 1 program vs. 2 (n=250)



Grey, M., et al. (2013). Internet psycho-education programs improve outcomes in youth with type 1 diabetes. *Diabetes Care*, 36, 2475-2482.

Quality of Life after 18 months, 1 program vs. 2 (n=250)



Grey, M., et al. (2013). Internet psycho-education programs improve outcomes in youth with type 1 diabetes. *Diabetes Care*, 36, 2475-2482.

Comments by Teens

- ⦿ “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

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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Yale

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