

ACT to Treat Eating Disorders in Type 1 Diabetes

Rhonda M. Merwin, PhD

Associate Professor, Dept. of Psychiatry and Behavioral Sciences

Duke University Medical Center

Presented at the First International Conference on Eating Disorders in Type 1 Diabetes, New Orleans, LA, November 10, 2018

ACT at Duke



DukeMedicine

Division of Behavioral Medicine

and the

ACT IN CONTEXT RESEARCH LAB



Acknowledgements

- Ashley Moskovich, PhD
- Lisa Honeycutt, LPC
- Jan Mooney, MA
- Heather Batcheler, MA
- Mike Babyak, PhD
- Richard Surwit, PhD
- James Lane, PhD
- Natasha Dmitrieva, PhD
- Carl Pieper, PhD
- Nancy Zucker, PhD
- Mark Feinglos, MD

Disclosure



National Institute of
Diabetes and Digestive
and Kidney Diseases



Duke Psychiatry & Behavioral Sciences

Duke University School of Medicine

Medtronic

Book on a related topic (anorexia nervosa) in production with Guilford Press.

Dedication

Two is two too many.
In loving memory of R.H. and J.H.

Overview

- Too much.

Eating disorders

- **Difficulty regulating food intake** (e.g., restricting food, eating in a disinhibited manner, vacillating between these two extremes).
- **Maladaptive weight control strategies** (e.g., self-induced vomiting, taking less insulin than is needed to manipulate body weight or shape).
- Among individuals with T1D, might also include
 - Taking more insulin than is needed to permit eating.
 - Consuming sugary foods/drink to induce glycosuria.

Eating disorders

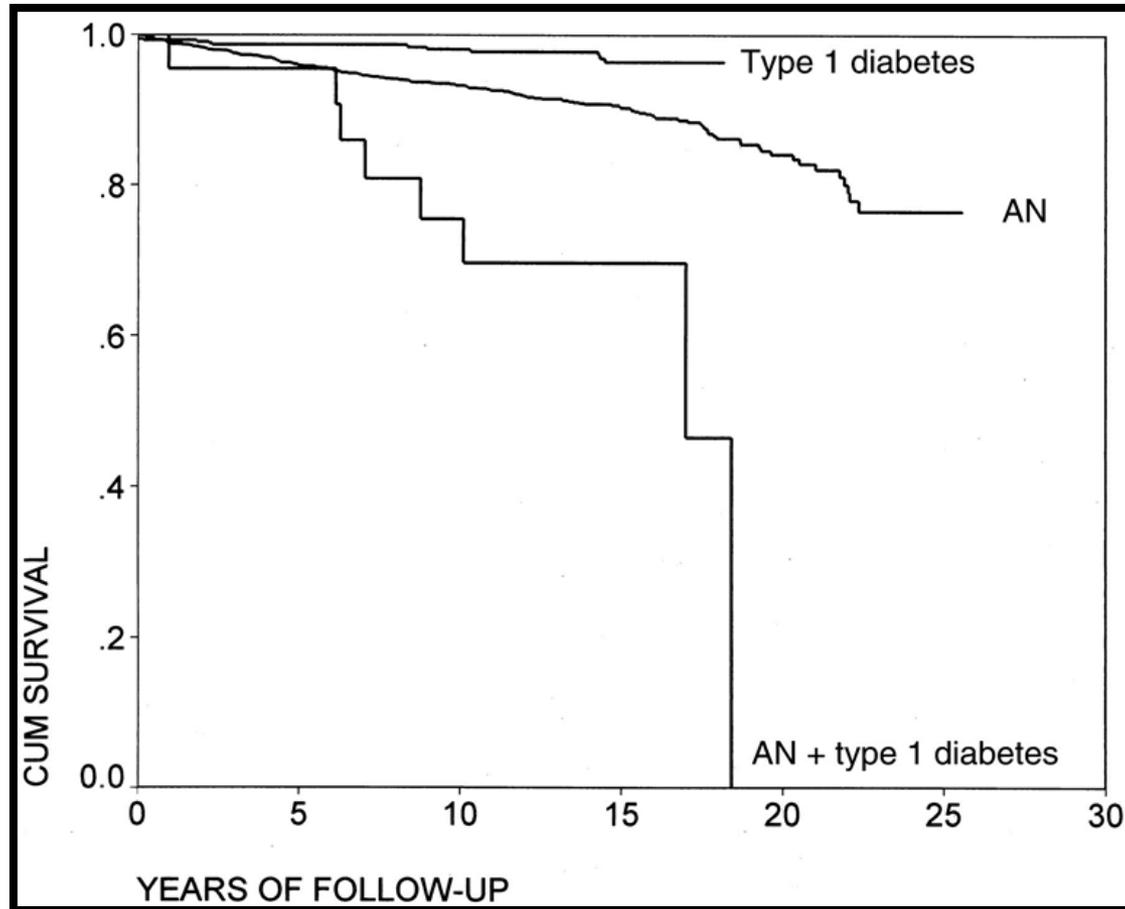
- Exist on a continuum; Characterized by primary feature:
 - Anorexia nervosa
 - Bulimia nervosa
 - Binge eating disorder
 - Purging disorder*
- Sub-threshold variants are often life-threatening in the context of T1D.

Impact on longevity and quality of life

- Increased risk of diabetic ketoacidosis, increased hospitalizations
- 3-fold increased risk for early and severe diabetes-related medical complications
- 3 to 12-fold increase in premature death

(Goebel-Fabbri et al., 2008; Nielsen, 2002)

Impact on longevity and quality of life



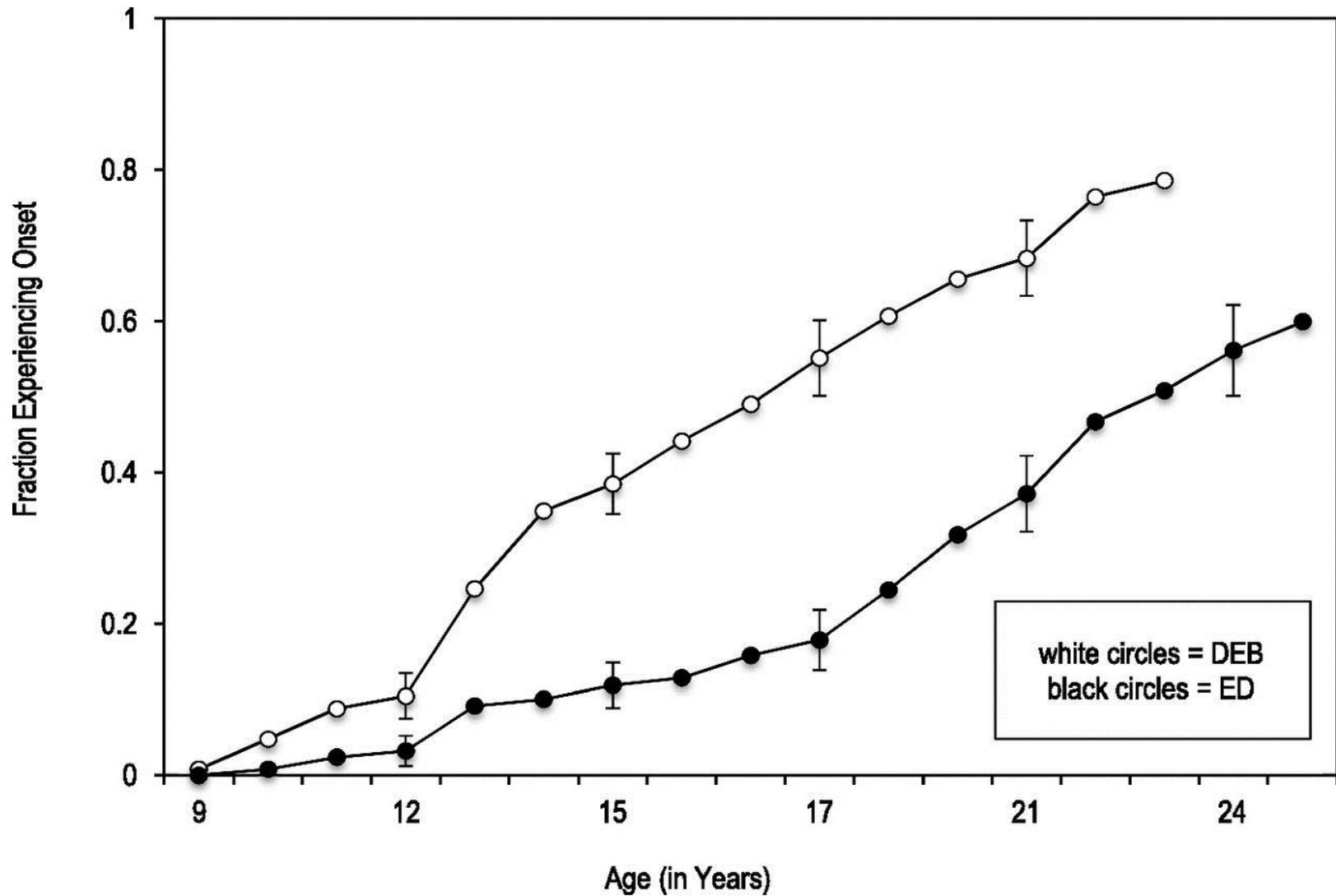
(Nielsen et al., 2002)

Lack of treatment options

- Conventional treatments for AN/BN are not as effective for individuals with T1D (Clery et al., 2017).
- Inpatient/residential can improve HbA_{1c} (Takii)
 - However, expensive, rare and may not generalize to the home environment.
- Potential shortcomings:
 - Focus on “attitudes” about eating/body rather than their functional significance.
 - Rely on logic (e.g., challenging beliefs) to address behaviors that are heavily emotionally motivated.
 - Not sensitive to the specific context in which these problems emerge.

Prevalence

- Eating disorders affect 1-3% of the general population, but may affect 30-40% of young women with T1D
- Behaviors do not seem to remit, but rather persist and worsen over time



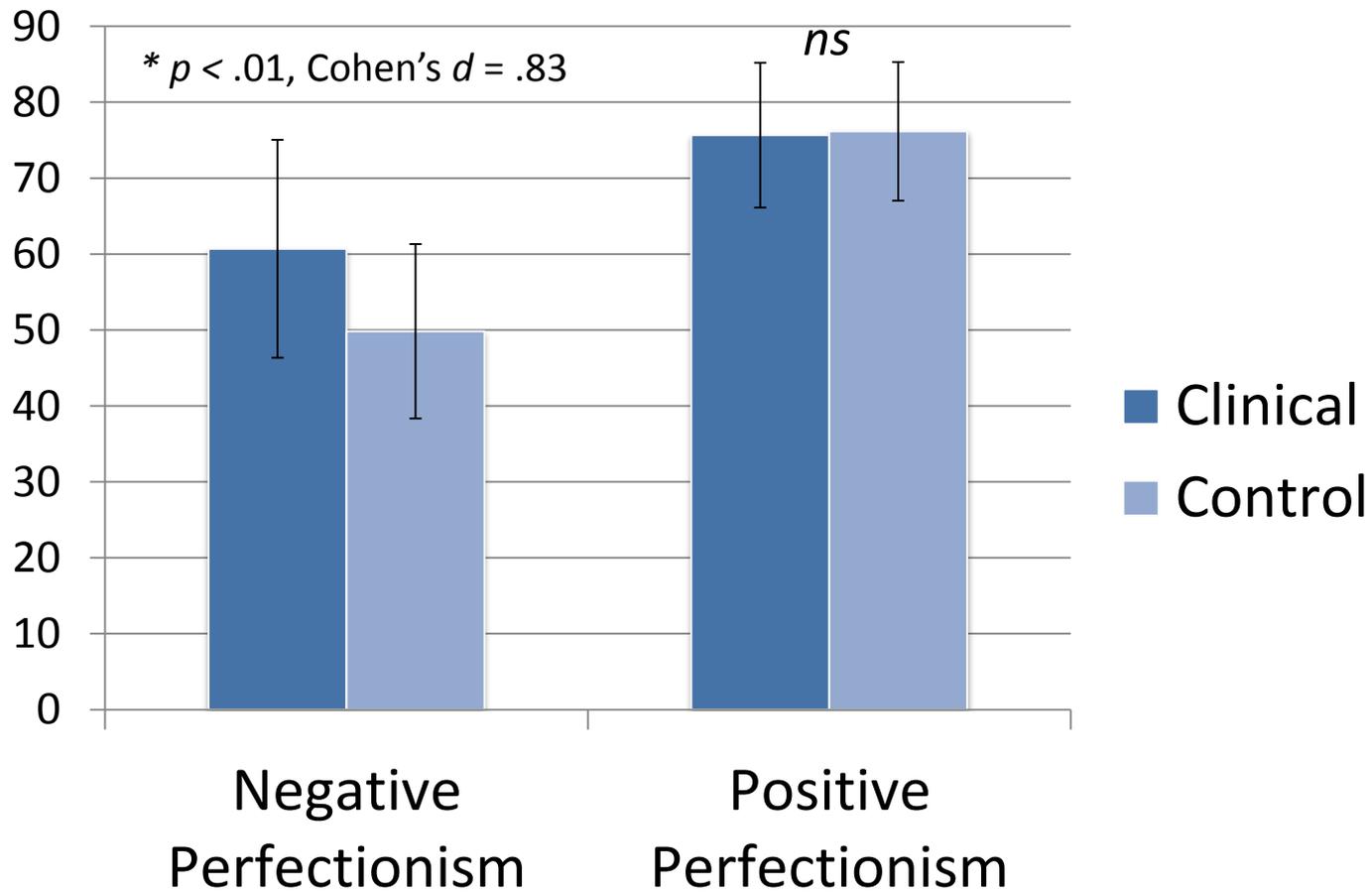
Colton et al. Diabetes Care 2015 Jul; 38(7): 1212-1217. <https://doi.org/10.2337/dc14-2646>

What accounts for the prevalence of ED in T1D?

- Powerful learning experiences regarding eating and weight
 - Acute loss before diagnosis and gain after initiation of insulin therapy
 - Management tasks turn attention toward food, eating or weight
- Importance of maintaining “control” (over eating, over BG, etc.)
- Illusion of control and evaluation/morality “language of diabetes” (good vs. bad BG, A_{1c} , correct/correction, “diabetic,” etc.)

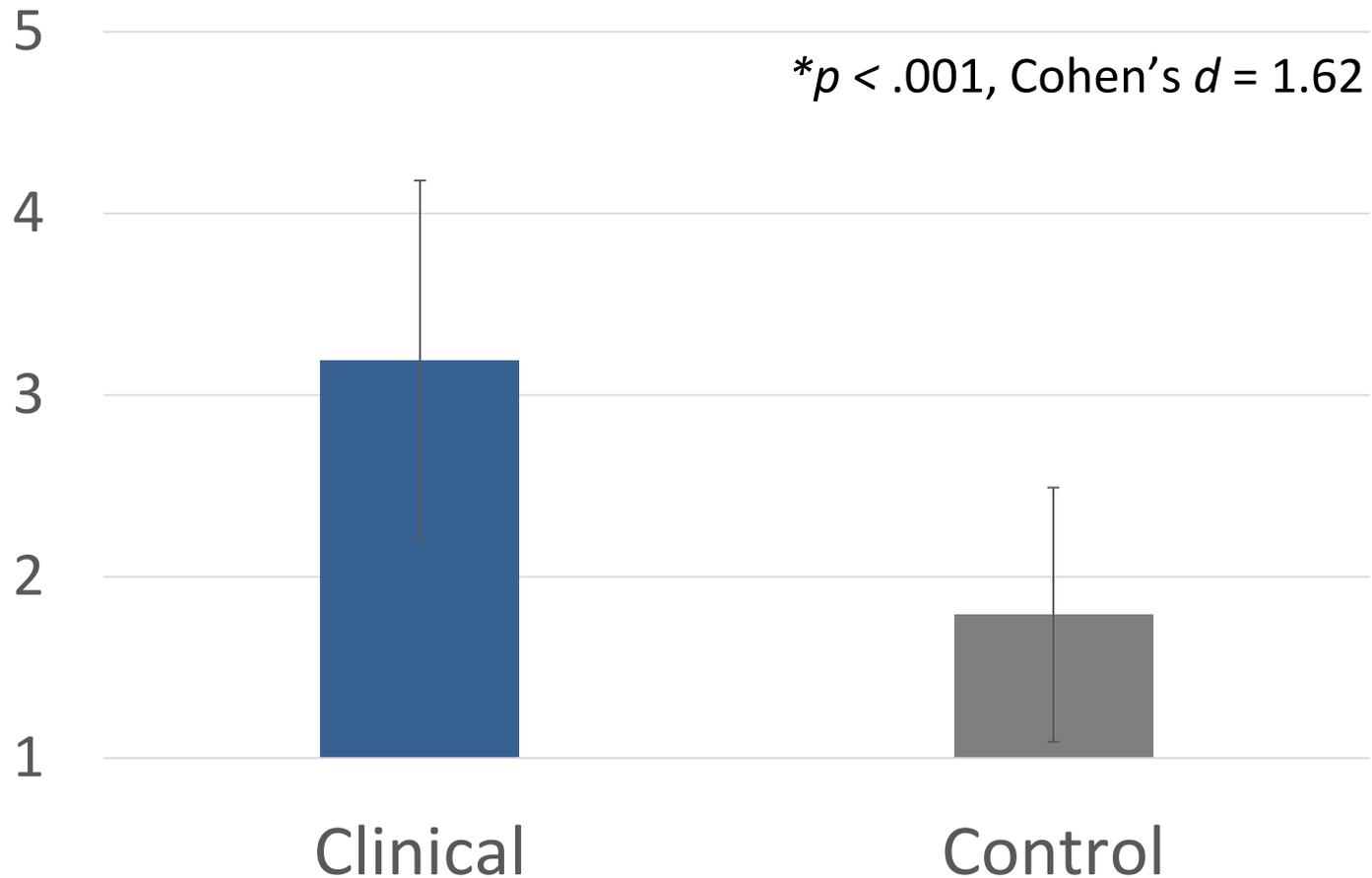
- May interact with temperament
 - Relatively greater “perfectionism,” sensitivity to punishment or making mistakes
- Significantly greater diabetes distress
 - Chicken and egg, but likely interaction and relevant to the disruption of the cycle, if not its etiology

Positive and Negative Perfectionism Scale (PANPS): ED-DMT1 vs. T1D



Diabetes Distress Scale: ED-DMT1 vs T1D

(also found in our momentary data)



- Difficulty regulating emotional distress (lack of emotional clarity, feel OOC when experiencing emotion, lack of access to strategies...)
 - Interoceptive conditioning and the role that it might play?

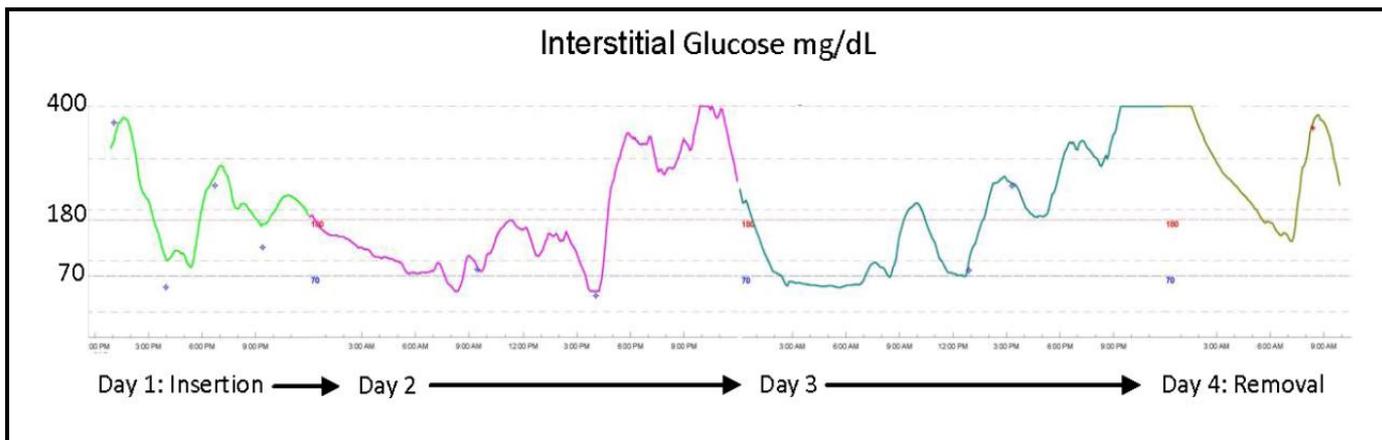
Difficulties in Emotion Regulation Scale (DERS): ED-DMT1 vs. T1D

	<i>t</i>	<i>df</i>	Mean diff (<i>SE</i>)	Cohen's <i>d</i>
Global score	4.32*	45.05	20.50 (4.74)	0.99
Nonacceptance of emotions	2.55**	35.57	3.37 (1.33)	0.62
Difficulties engaging in goal directed behavior when upset	2.68**	34.71	2.90 (1.08)	0.66
Feel a loss of control when emotional	4.44**	69.00	3.30 (.74)	0.92
	*			
Lack of emotional awareness	2.72*	28.26	3.29 (1.21)	0.72
Limited access to emotion regulation strategies	3.27**	41.88	5.05 (1.54)	0.76
Lack of emotional clarity	4.45**	65.75	2.60 (.58)	0.93

Momentary assessment of ED behavior (R01 DK089329; Merwin)



- Signal and event-contingent recording of mood, eating and insulin dosing over 3 days
 - Random prompts with automated telephone system @ 1-2/hour
 - Participant-initiated calls for eating
- Time synced with CGM





Momentary Predictors of Insulin Restriction Among Adults With Type 1 Diabetes and Eating Disorder Symptomatology

Diabetes Care 2015;38:2025–2032 | DOI: 10.2337/dc15-0753



CrossMark

Rhonda M. Merwin,¹
Natalia O. Dmitrieva,¹ Lisa K. Honeycutt,¹
Ashley A. Moskovich,¹ James D. Lane,¹
Nancy L. Zucker,^{1,2} Richard S. Surwit,^{1,2}
Mark Feinglos,¹ and Jennifer Kuo¹

Take home (Merwin et al., 2015)

- Higher average levels of pre-meal negative affect predicts insulin restriction
- Momentary increase in pre-meal in anxiety and guilt/shame doubles odds of restricting insulin at that meal
- Feeling as though one broke a food rule, *Odds Ratio*=11
- Insulin restriction associated with increased emotional distress in real-time (generally and specifically about T1D)

Time of Day When Type 1 Diabetes Patients With Eating Disorder Symptoms Most Commonly Restrict Insulin

Merwin, Rhonda M. PhD; Moskovich, Ashley A. PhD; Honeycutt, Lisa K. MA; Lane, James D. PhD; Feinglos, Mark MD; Surwit, Richard S. PhD; Zucker, Nancy L. PhD; Dmitrieva, Natalia O. PhD; Babyak, Michael A. PhD; Batchelder, Heather MA; Mooney, Jan MA

Psychosomatic Medicine: February/March 2018 - Volume 80 - Issue 2 - p 222-229

doi: 10.1097/PSY.0000000000000550

Original Articles

Synopsis (Merwin et al., 2018)

- $N=59$
- $M\ CGM=195.01\ (SD=60.59)$
- $HbA_{1c}\ M=9.3\%\ SD=2.5\%$
- Restriction ranged from 0-100%, $M=18.9\%$ ($SD=25.2\%$)
- Frequency of restriction correlated glycemic control and accounted for 35% of variance in A_{1c}

Results

- Generalized estimating equation tested global hypothesis that insulin restriction varied as a function of time, $p = 0.16$.
- Least common at breakfast (6-8:59am).
- Most common in mid afternoon (3-5:59pm) (29%) and for eating overnight (between 12-6am) (peak 3am, 67%)**
- More common for snacks than meals.
- Insulin restriction for meals accounted for 27.2% of variance in HbA_{1c}; snacks accounted for an additional 7.9%.
- Postprandial BG $M=214.5$ vs. 170.5 (CI=22.7-68.5). Includes all episodes, full and partial restriction and for big and small amounts of food.

Binge eating (under review)

- Higher average negative affect before meals, greater odds of OBE (1.5-2Xs)
- Trend for momentary increases in sadness and anger prior to eating to predict a binge
- Differential; not same predictors of insulin restriction

Appetite regulation among individuals with T1D and eating disorder symptomatology

- Coming.
- Lab-based study of ghrelin levels during OGTT w and w/o bolus insulin

Treatment development

*i*ACT

(R21 DK106603; Merwin)



National Institute of
Diabetes and Digestive
and Kidney Diseases

EDs as a Solution to Emotional Pain

Perfectionism,
Punishment
Sensitivity



Negative affect
generally or about T1D
(Enter a mealtime)

Impose inordinately strict
dietary rules

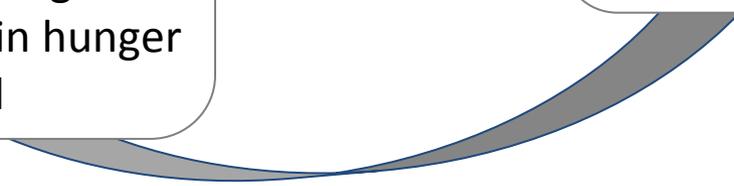
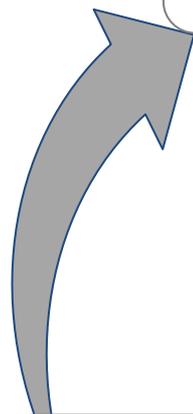


Feel deprived

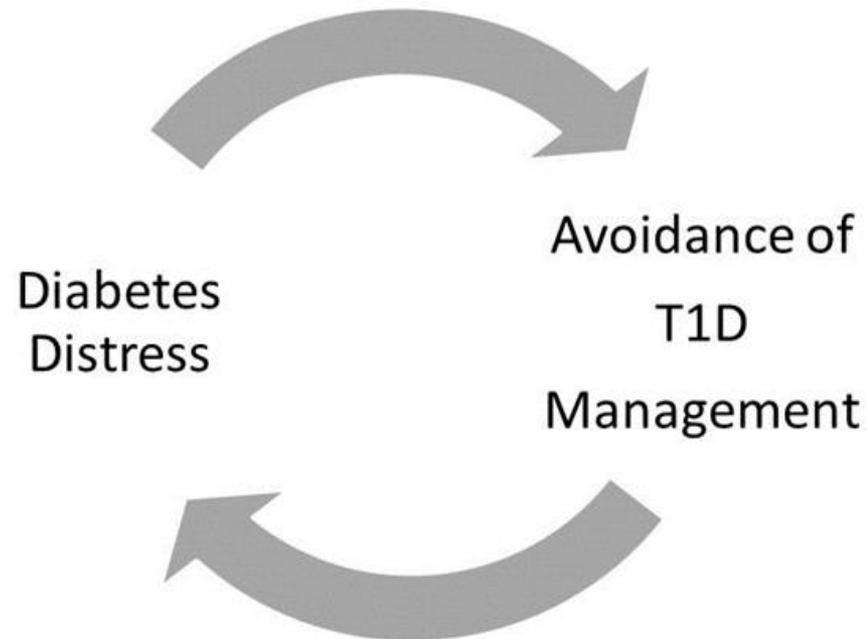


Eat or overeat highly
palatable foods,
Avoid T1D management (i.e.,
checking BG, giving insulin)

Decreased distress in the
short-term. BG remains high
perpetuating feelings of fear,
failure and producing BG-
driven disruptions in hunger
and mood



The system that traps





DO I MANAGE DIABETES OR MY WEIGHT?

Consider the Options

- T1D
 - No matter how hard you try, you can't fully account for all the influences on BG.
 - And no matter how good you do, it isn't good enough.
 - If you turn away from this adversity and toward weight, most people will not know. Failure is private.
- Weight
 - Predictable, controllable.
 - Outcomes are positive and powerful.
 - Success (or failure) is public.

*i*ACT: A Novel Treatment

(R21 DK106603; Merwin)

- Sensitive and specific to T1D/living with diabetes.
 - Including distress about diabetes that might turn patients' toward weight control
 - Emotional “triggers”/Cues are unavoidable, and occur multiple times a day
- Grounded in **Acceptance and Commitment Therapy (ACT)**
- Uses a tailored **mobile app** to facilitate skill acquisition and generalization



ACT

- Contemporary Cognitive Behavioral Therapy (CBT)
- Grounded in functional contextualism
- Uses acceptance, mindfulness and personal values
- A valued, vital life under any and all circumstances; Thoughts and feelings do not need to change in order for behavior to change.
- >200 RCTs on ACT; incl Bmed pops, Preliminary study with T2D (Gregg et al., 2007)

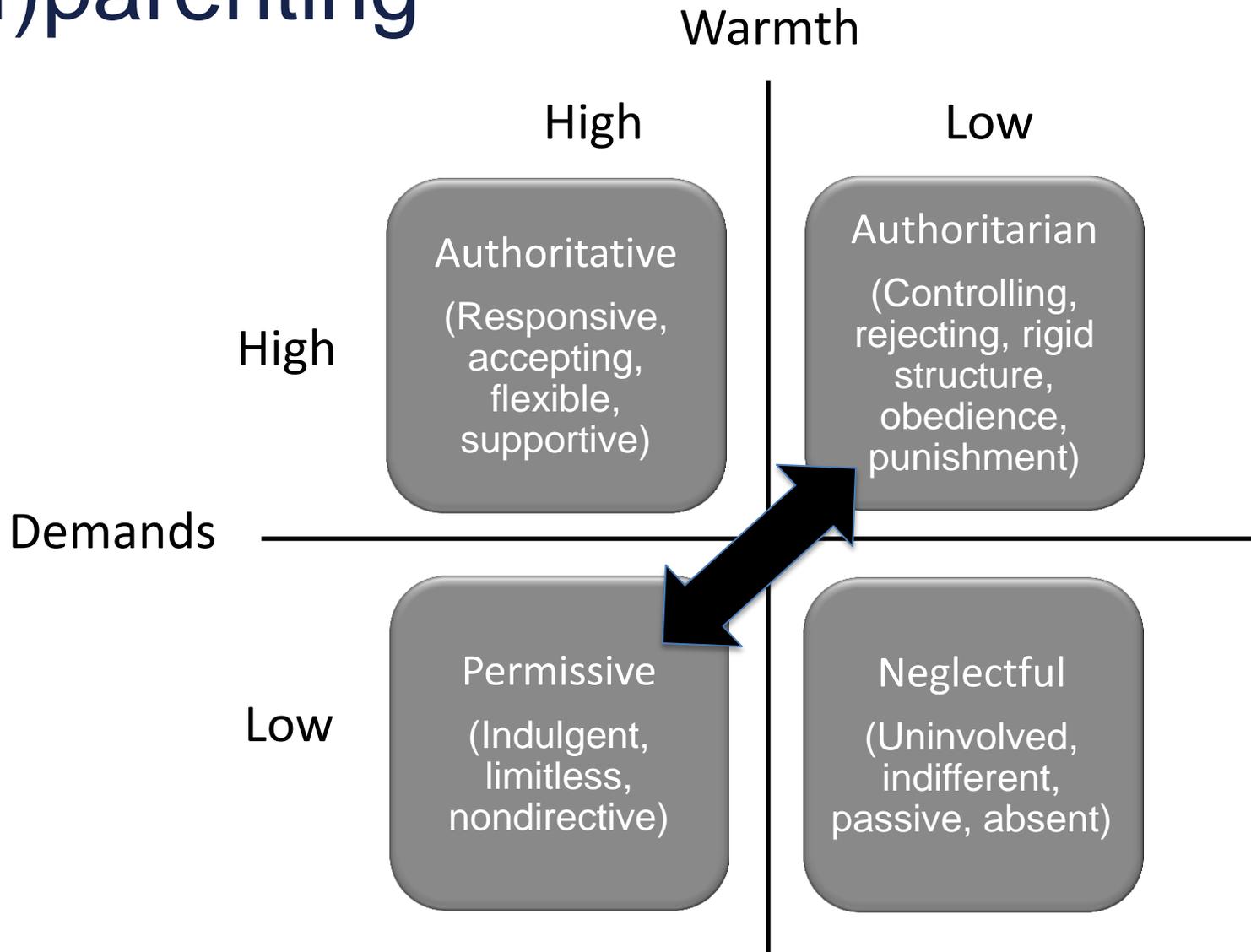
- Diabetes is a s*it sandwich.
- Pain is inevitable. Suffering is optional.

“May you live all the days of your life.” – Jonathan Swift

Treatment approach

- Compassion, kindness, permission
 - What am I feeling and what do I need? (kind parent)
- Teach effective coping with distressing thoughts/feelings in-the-moment with acceptance and mindfulness
 - “We can not direct the wind, but we can adjust the sails.” -Calloway
- In the service of deeply held personal values
 - “A man who has a why to live can bear almost anyhow” --Nietzsche
- Focus on process (rather than outcome) and SMART goals

(self)parenting



Mobile app

- App corresponds with session content and facilitates skill acquisition and generalization
 - Practice new skills in the moment at home
 - Shift contingencies to favor approaching T1D management
- 2 focus groups and 48 online and in-person interviews to develop the final feature set
- Final beta testing with T1D patients

Feature set

Table 6. Features of the Standard RR App and our T1D-Specific Adaptations		
App Feature	iACT Adaptations	Sample Item
Self-Monitoring (Meal, Feeling and Behavior Logs)	Practical Management of T1D	Did you check your blood sugar?
	Mismanagement	Did you take less insulin than you should have?
	T1D-Specific Triggers	Do you feel like a failure in T1D?
Coping Skills Display	ACT-Based Coping Skills Presented when Patients Endorse High Levels of DD	<i>“Give It Space: Take a moment to notice the feeling you are having. See if you can create a little more space for the feeling to be there. You don’t have to want it or like it, but can it be there while you chose action based on your values”</i>
	Personalized Values	Display includes picture of the patient’s child with a personalized caption: “for my child”
Goal Templates	T1D-Specific Goals	Administer 100% of short-acting insulin at mealtimes
Graphs	Goal Attainment (rather than frequency of problem behaviors)	Number of times insulin was administered as prescribed
Reflections	Messages Specific to T1D	<i>“You don’t know how strong you are until strong is the only choice you have. Type 1.”</i>

Focus group themes

Table 7. Sample Themes and Patient Responses During T1D Focus Groups (n=10) and Interviews (n=48)

Table 7. Sample Themes and Patient Responses During T1D Focus Groups (n=10) and Interviews (n=48)				
General Adaptations	Themes	Patients' Response to General Adaptation		
Inclusion of the individual's values	Personal Relevance	<p>"I think it would strike a chord with me [...] I would see it as encouragement to stay on track and improve behaviors."</p> <p>"I think it would be most beneficial to <i>me</i> to have the reminders involve things that are important to <i>me</i>, such as my family."</p>		
Self-monitoring features that include insulin administration	Perceived Usefulness	<p>"This is a great idea and offers the ability to capture more information at the exact time of the trigger, or stressor."</p> <p>"I think this is good too. It will allow doctors to understand the patterns and habits of the individual and help them to relate it to current weight, goals, etc."</p>		
Specific Item	Themes	Patients' Response	Revised Item	Patients' Response
Did you check your BG prior to eating? [Yes/No]	Ease of Use	"There needs to be options for checking before or after meals – if I couldn't do that I would just skip it."	Did you check your BG? [Yes/No]. If Yes, [Before, During, After Meal]	"I really like that before/ during/after meal option was added. I think that's smart."
Did you take less insulin than you should have?	Acceptability	"I think the word 'should' can bring out a great deal of shame."	Did you take less insulin than you needed?	"I like the phrasing... It's not judgmental, but asks for an honest response."

Tailored Mobile App

The image displays four sequential screenshots of a mobile application designed for diabetes management, each showing a different screen:

- 1. Meal Log:** A screen titled "Meal Log" with a "Cancel" button. It contains four questions: "Are you feeling joy?", "Are you feeling guilt?", "Are you feeling disgust?", and "Are you feeling anxious?". Each question has "No" and "Yes" buttons. The "joy" question also features a slider control set to "Moderate".
- 2. Values:** A screen titled "Values" featuring a black and white photograph of three smiling children. Below the photo is a yellow text box that reads: "Give it Space: Take a moment to notice the feeling you are having. See if you can create a little more space for the feeling to be there. You don't have to want it, or like it, but can it be there while you chose action on your values."
- 3. Goals:** A screen titled "Goals" with the heading "Insulin Dosed". It shows a line graph with a peak and a dip. A pop-up dialog asks "Did you achieve any of today's clinical goals?" with "No" and "Yes" buttons. Below the dialog, a text box says "I gave my prescribed insulin at this meal." with a green checkmark icon.
- 4. Your Likes:** A screen titled "Your Likes" with a purple background. It contains the text: "YOU DON'T KNOW HOW STRONG YOU ARE, UNTIL BEING STRONG IS THE ONLY OPTION YOU HAVE" and "TYPE ONE" in large blue letters. Below this is a quote: "We don't control the wind, but we can adjust the sails." and a green box with a cartoon juicebox character and the text "A JUICEBOX SAVED MY LIFE".

Each screenshot is numbered 1, 2, 3, and 4 respectively at the bottom.

Cancel Meal Log

Do you feel like a failure in T1D?

No Yes Extreme

Do you feel upset or anxious?

No Yes Moderate

Cancel Meal Log

Did you check your BG?

No Yes

Before Meal During Meal After Meal

Did you break a food or eating "rule?"

No Yes

Did you take less insulin than you needed?

No Yes

Tell us more.

I exercised and didn't want to go low.

Meal Log

Reflect Goals Rewards

Life is not about finding yourself, it is about creating yourself

LIKE

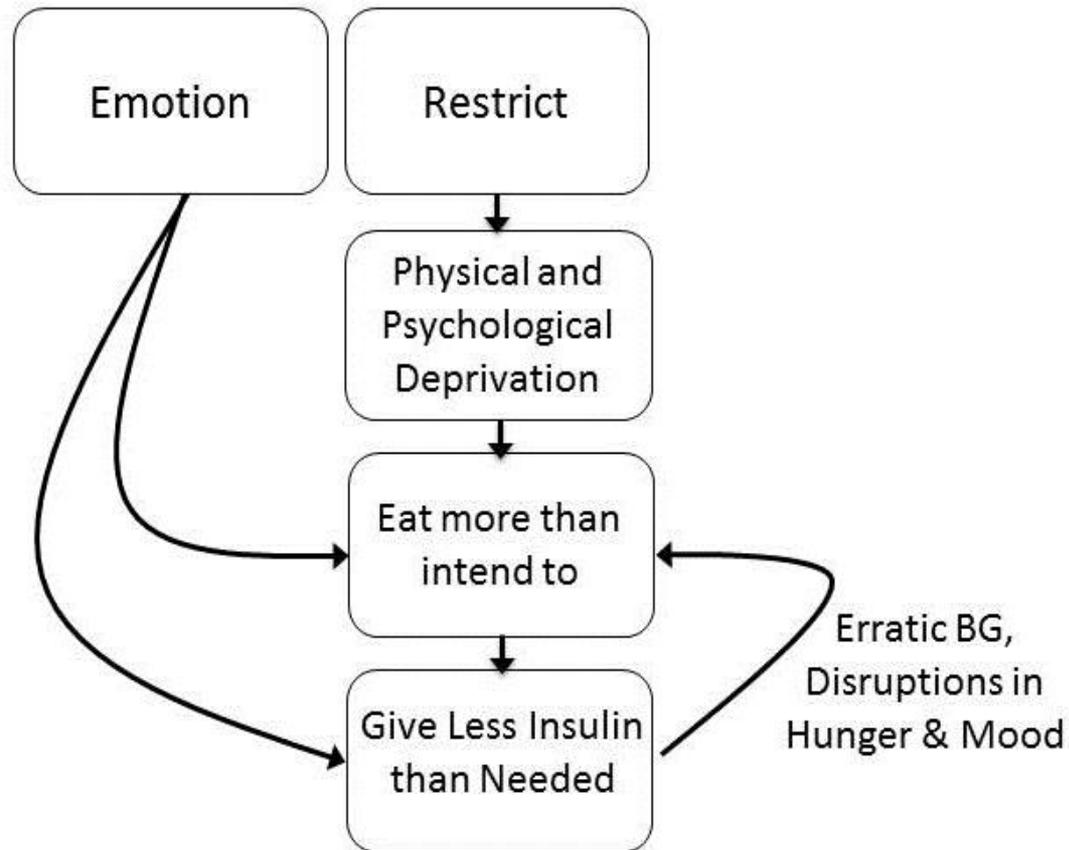
[Author a positive affirmation for others](#)

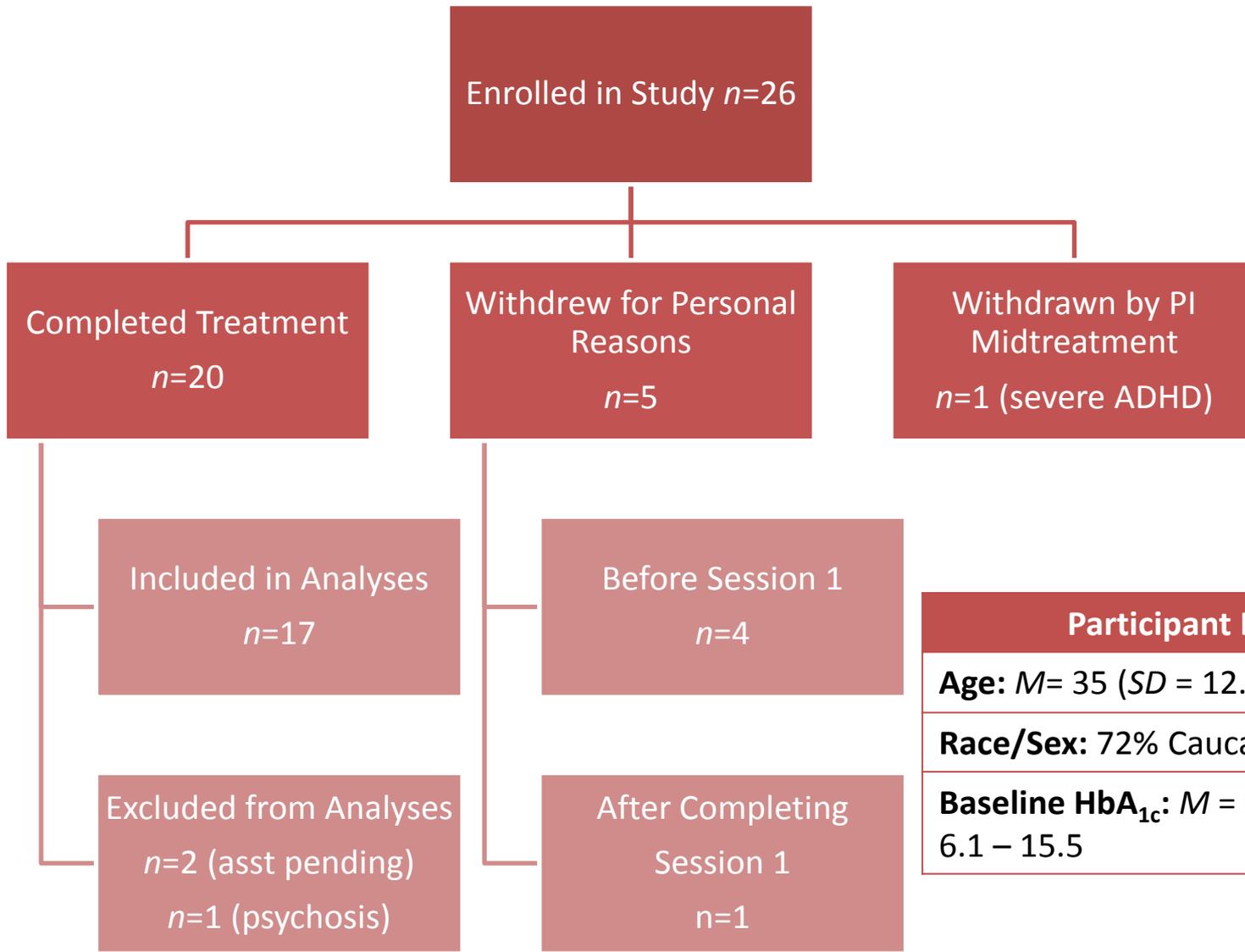
Suggested coping tactic

mindfulness Practice

... attention to the present moment non-...
... mentally. Focus attention on breathing
... observing and letting go of thoughts
... at the past or future
...
... minutes
... minutes

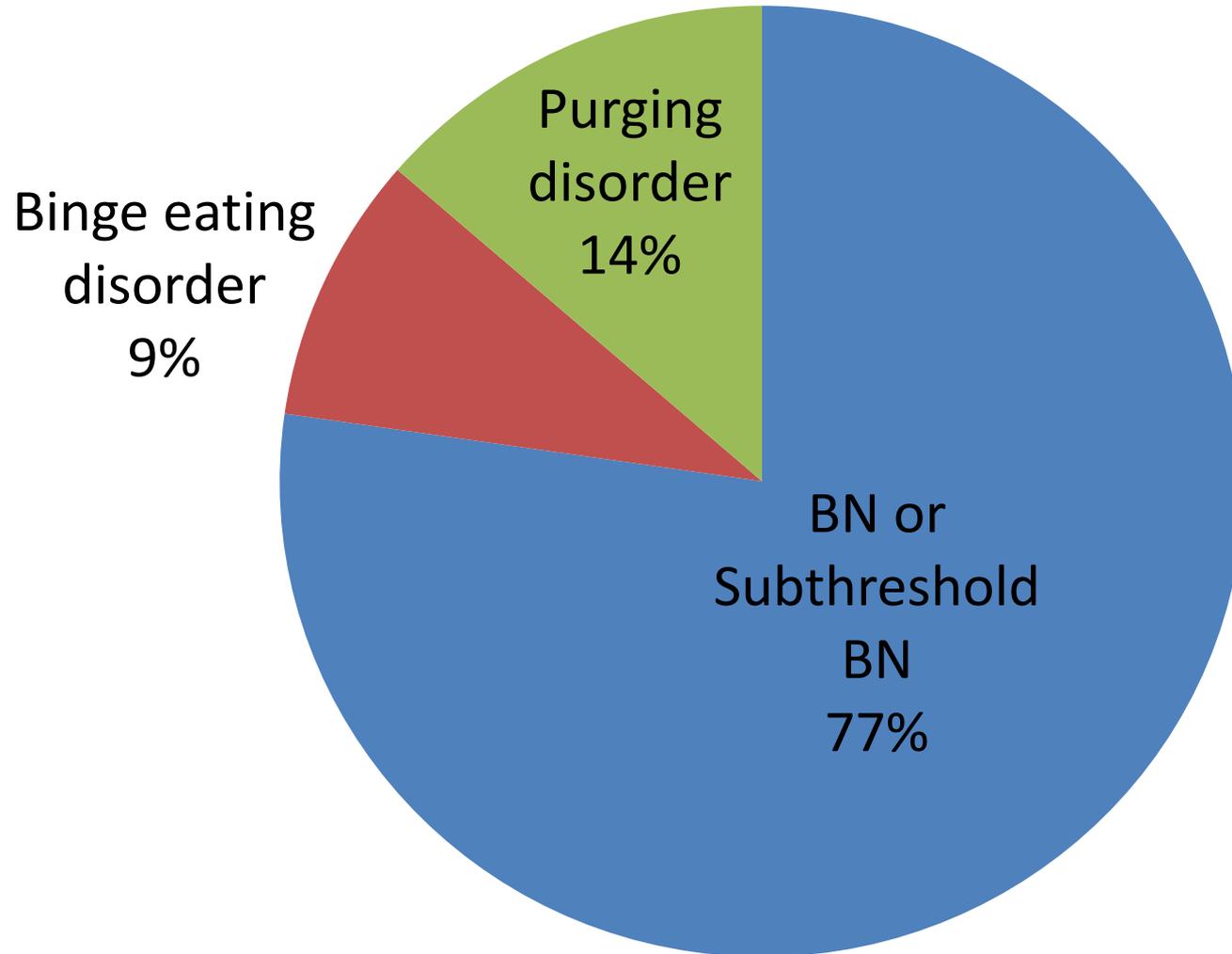
Patient Handout





Participant Demographics
Age: $M = 35$ ($SD = 12.0$), Range: 17-60
Race/Sex: 72% Caucasian, 100% Female
Baseline HbA_{1c}: $M = 9.8$ ($SD = 2.8$), Range: 6.1 – 15.5

Clinical Presentation

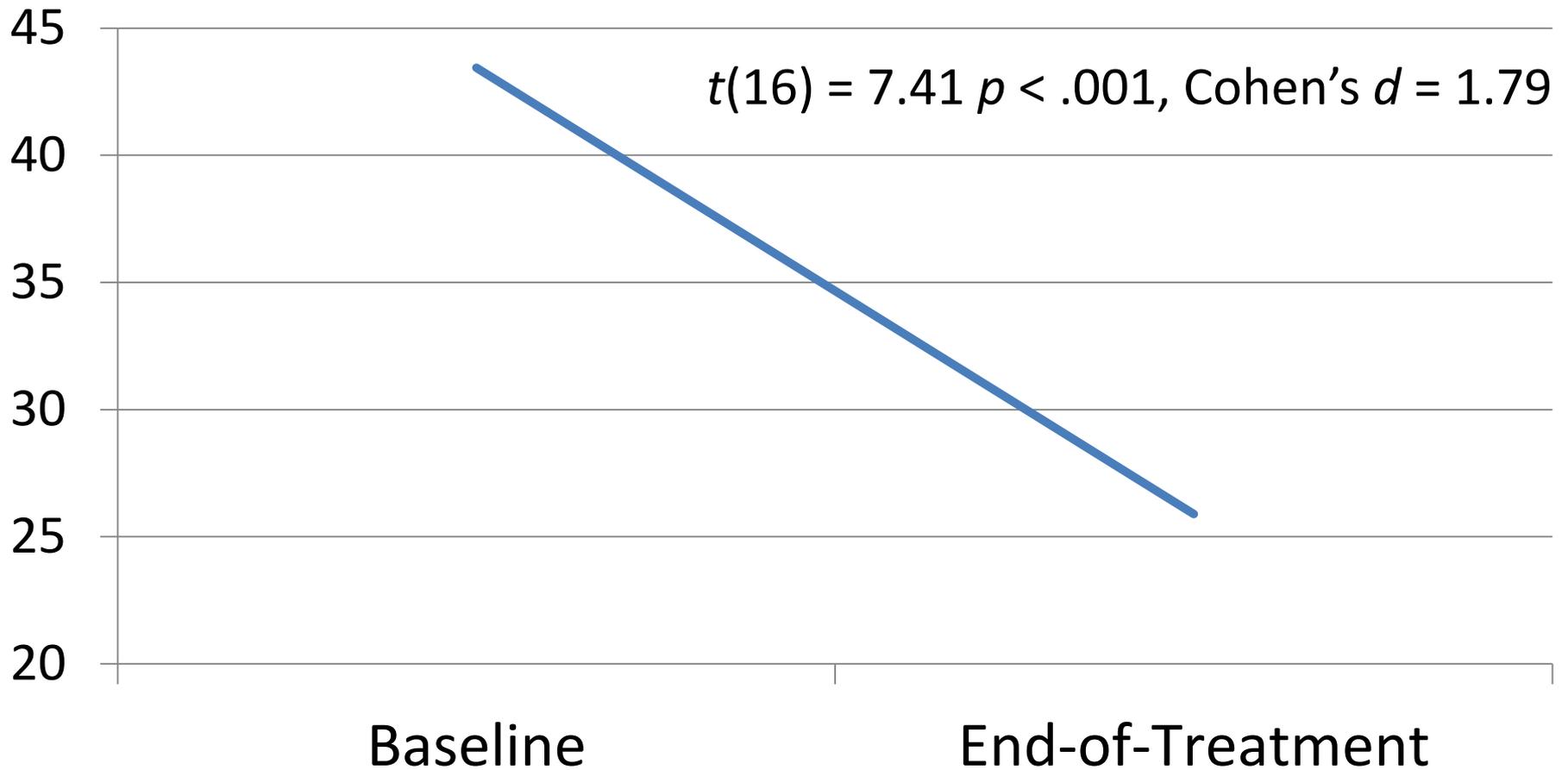


Treatment Schedule and Assessments

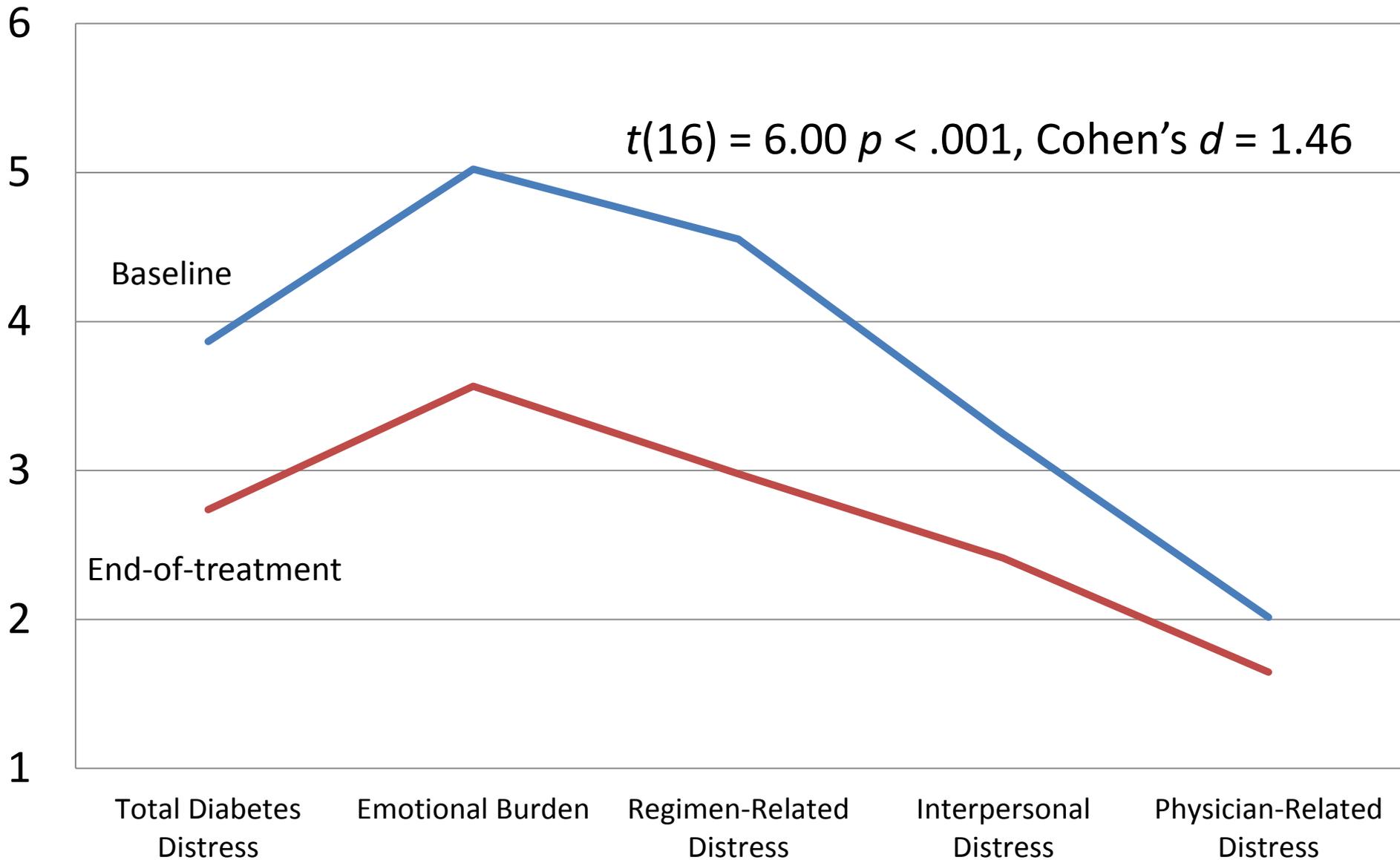
- 12 sessions, with optional 3 tapering
- App use between sessions
- Baseline, EOT, 3, 6 and 9 month FU
- Primary outcomes
 - Diabetes Eating Problems
 - Diabetes Distress
 - Diabetes Self-Management Behaviors
 - HbA_{1c}

- Participant engagement in individual sessions has been high
- Variability in app engagement

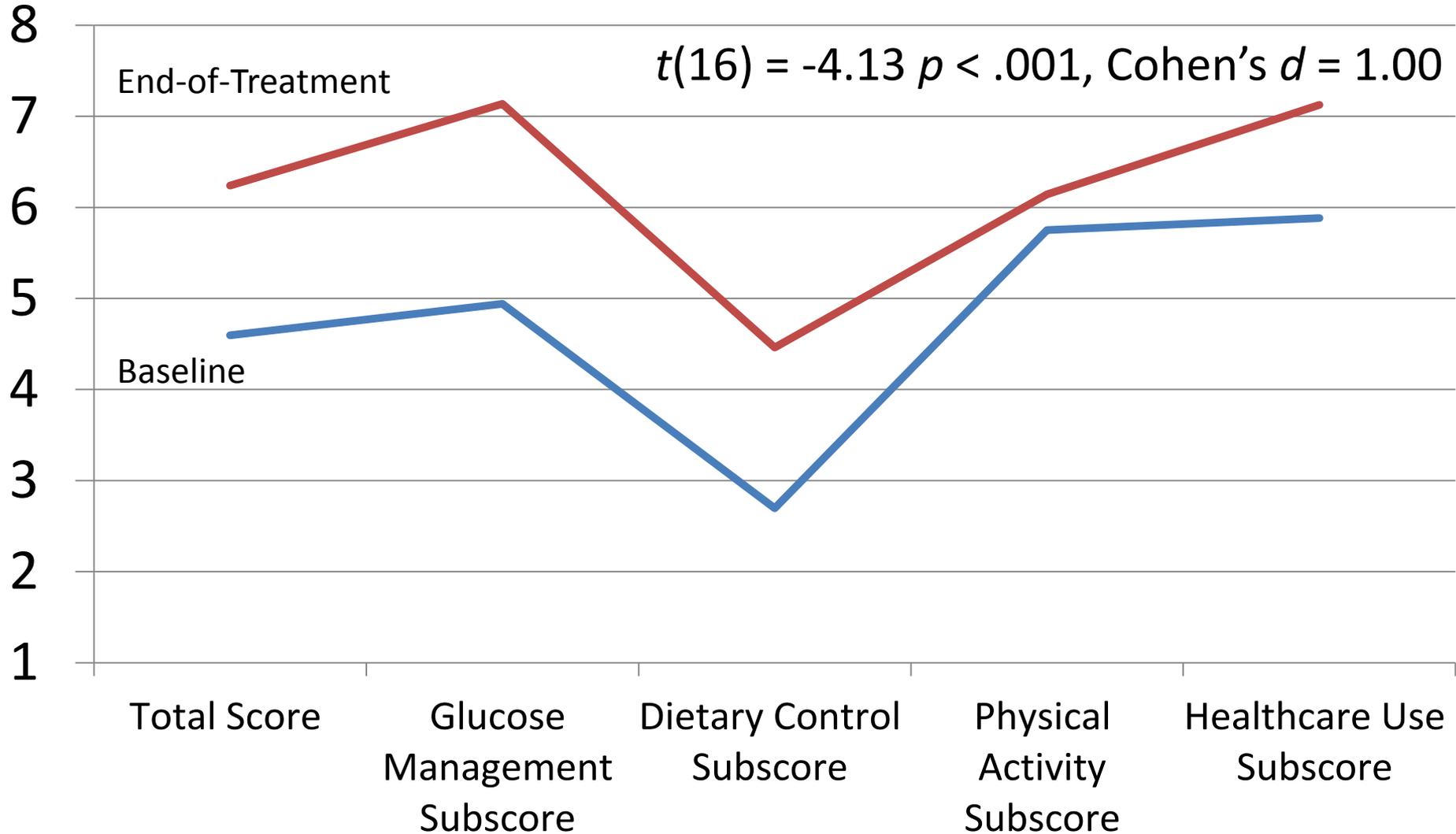
Diabetes Eating Problems Survey - Revised (DEPS-R)



Diabetes Distress Scale (DDS)



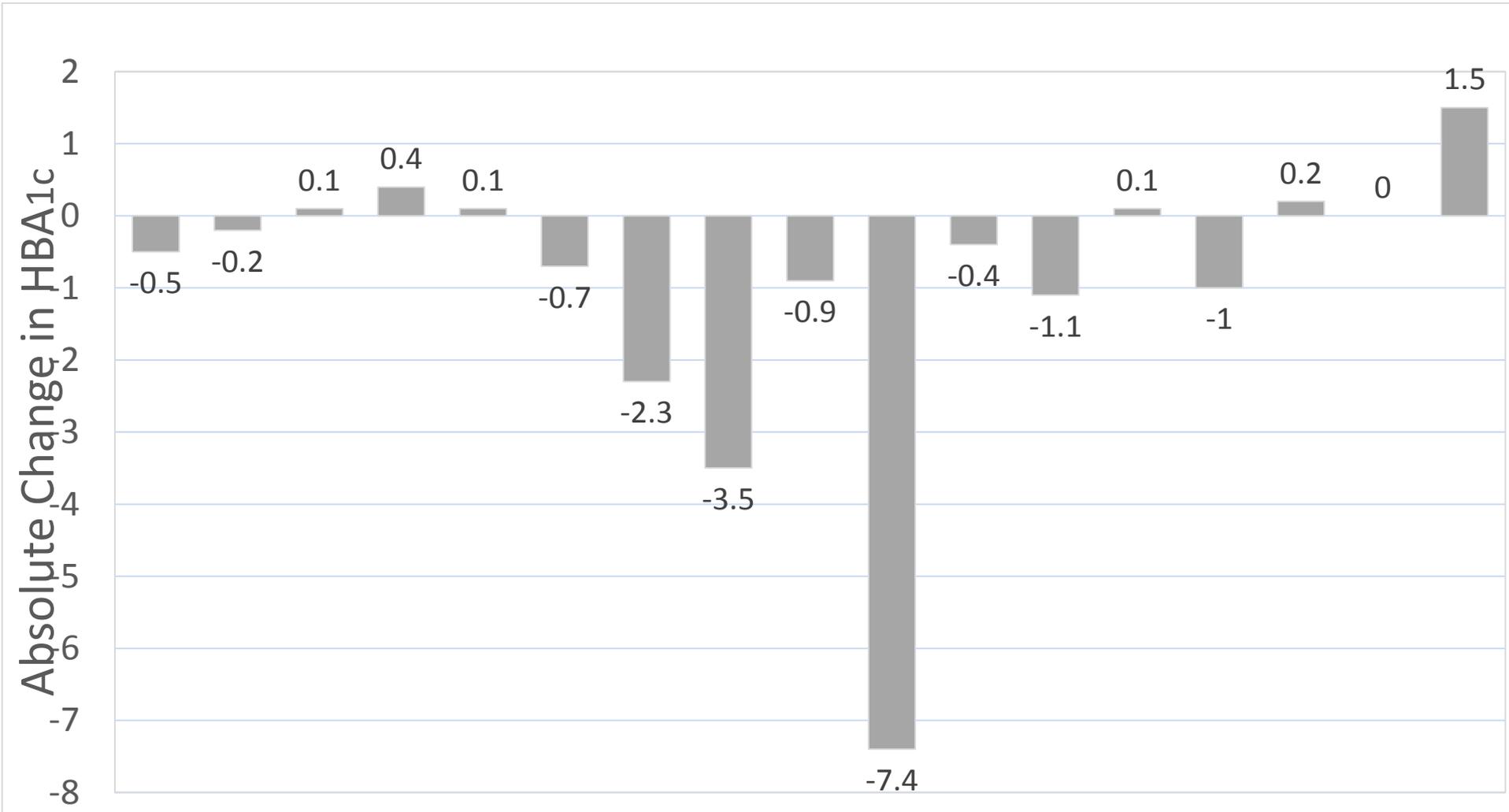
Diabetes Self-Management Questionnaire (DSMQ)



HbA_{1c}

- HbA_{1c} decreased from $M=10.03$ ($SD=2.68$) to $M=9.11$ ($SD=2.40$) (absolute change of -1%) at EOT.
- Individuals with HbA_{1c} $\geq 8\%$, Baseline $M=11.4$ ($SD=2.39$), EOT $M = 9.75$ ($SD=2.75$)(absolute change of 1.65%), $t(11) = 2.20$, $p=.05$.

Change in HbA_{1c} by Participant



- Final results with follow-up data forthcoming
- To date, 3 month post treatment data indicate FU M=8.8 (from baseline of 10)
- FU data collection complete by Spr 2019

- Q&A

Contact Us

- www.ACTatDuke.org
- Rhonda.merwin@duke.edu
- Join the Registry:

T
Linked**@**Duke
D *Linking Diabetes Patients with Research*