Mobile App Delivering an Evidence-based Weight Management Program to Veterans with Serious Mental Illness:
CoachToFit

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Disclosure

No relationships or conflicts of interest related to the subject matter of this presentation for either speaker

Spotlight on VA Mental Health Centers of Excellence

- **VA Mental Health Centers of Excellence** (including Mental Illness Research, Education and Clinical Centers [MIRECCs]) are critical to VA's response to meeting the mental health needs of Veterans.
  - **Shared mission:** To improve the health and well-being of Veterans through world-class, cutting-edge science, education, and enhanced clinical care.
  - **Shared structure:** To combine education, research, and clinical care into a single program to dramatically reduce the length of time between scientific discovery and implementation.

- **15 Centers** located across the country

- **Distinct specializations** (specific disorders, type of problem, populations, settings) to best understand the complex context of health care services access and delivery.

- **Significant collaborative partnerships** with clinical, research, and educational experts from academic affiliates and other organizations

- Learn More at www.mirecc.va.gov

VA Desert Pacific MIRECC

- Dedicated to improving the <u>long-term functional outcome of patients</u> with <u>serious mental illness</u>.

- Units: Clinical Neuroscience & Genetics; Data; <u>Neuroimaging</u>; Neuropsychopharmacology; Treatment; Health Services; Education & Dissemination

- Located in San Diego, Long Beach, Los Angeles
- Director: Stephen Marder, MD

Today's Plan

- Obesity and schizophrenia

- Mobile delivery of services

- CoachToFit development

- CoachToFit testing and results

Schizophrenia

- Most common serious mental illness
- Positive symptoms: hallucinations, delusions
- Negative symptoms: alogia, anhedonia, avolition, affective flattening
- Disorganized symptoms: disorganized speech, behavior, attention
- Cognitive deficits: attention, memory, information processing, executive functioning

- 1% of the population
- 10% of all permanently disabled people
- $22 billion annually in healthcare costs

- Evidence-based practices exist
  - many not available or used; outcomes much worse than expected

Must tailor the practices

Obesity Epidemic

- The causes of obesity in those with schizophrenia are from a complex interplay of genetic and familial risk factors, lifestyle factors, illness-related factors, and side-effects of psychopharmacological treatments
  - Lifestyle factors: poor diet, inactivity, alcohol consumption
  - Medication side-effects: +10 lbs/month as a consequence of the most popular antipsychotic medications

- Assessing Body Mass Index (BMI): Height and weight
  - <18.5 Underweight
  - 18.5 – 24.9 Normal weight
  - 25.0 – 29.9 Overweight
  - 30.0+ Obese

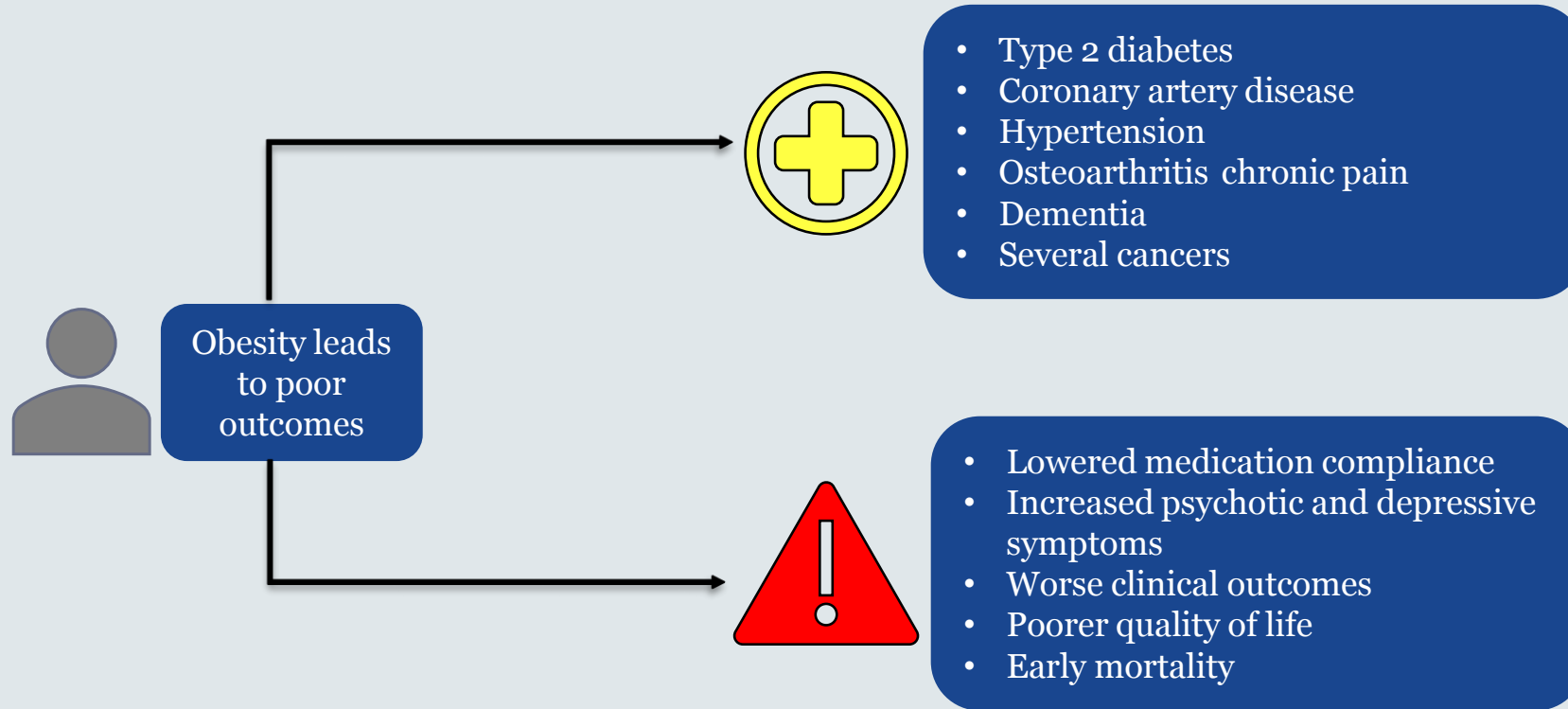$$BMI = \frac{(\text{weight in pounds} \times 703)}{\text{height in inches}^2}$$

Obesity Epidemic

- Significantly higher average body mass index (BMI) in the population with schizophrenia vs controls
  - BMI 32.1 (with) vs 27.6 (control)

- Significantly larger percentage of the population is obese in those with schizophrenia vs controls
  - 58.5% (with) vs 27.5% (control)

Obesity Leads to Poor Outcomes

Obesity leads to poor outcomes

- Type 2 diabetes
- Coronary artery disease
- Hypertension
- Osteoarthritis chronic pain
- Dementia
- Several cancers

- Lowered medication compliance
- Increased psychotic and depressive symptoms
- Worse clinical outcomes
- Poorer quality of life
- Early mortality

Interventions for Obesity

- Change to different antipsychotic medication with less weight gain potential

- Augment with a weight loss medication

- Provide a psychosocial weight management intervention

Prevalence of Problems and
No Appropriate Medication Changes
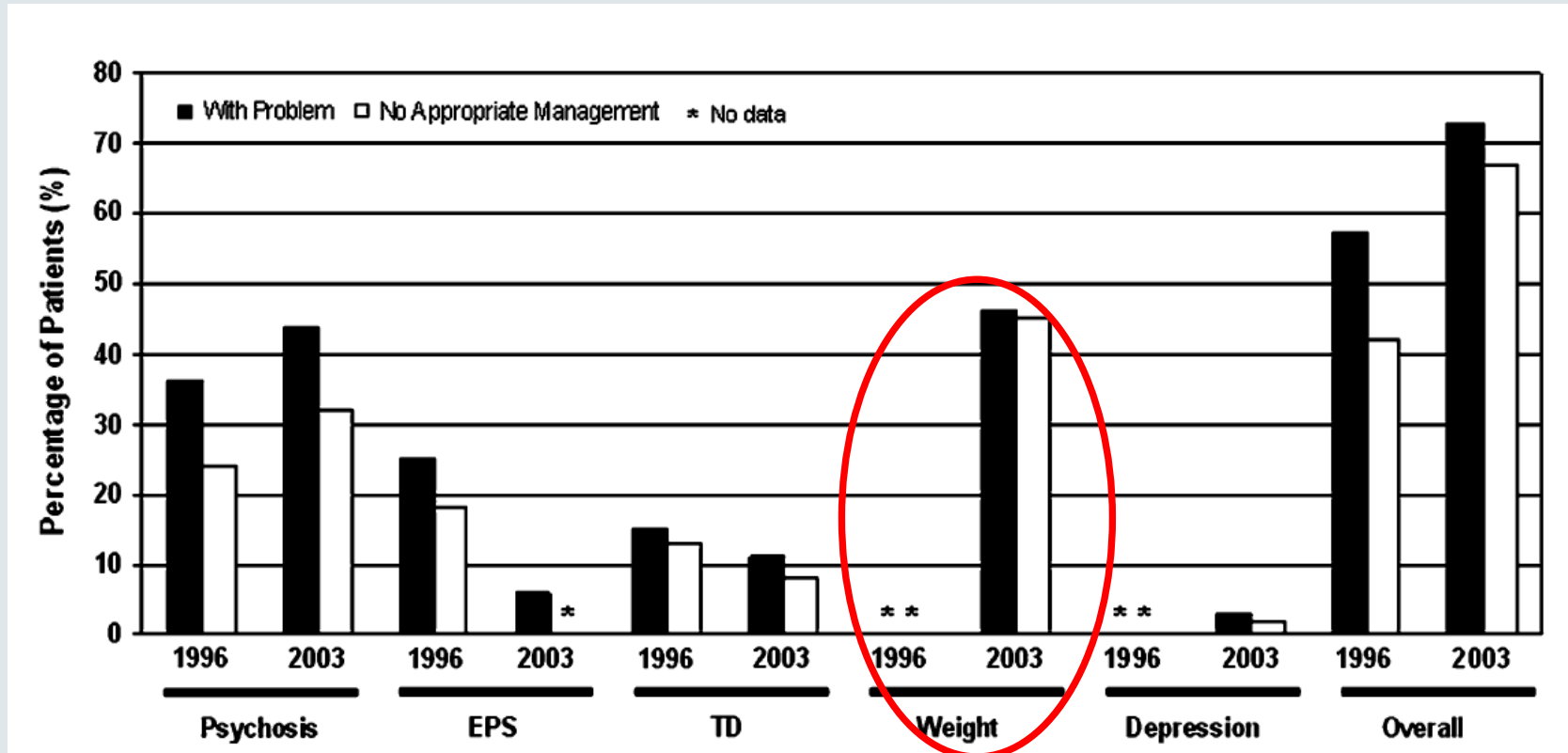
Young, A.S., Niv, N., Cohen, A.N., Kessler, C., McNagny, K. (2010). The appropriateness of routine medication treatment for schizophrenia. Schizophrenia Bulletin, (4); 36: 732-739.

Interventions for Obesity

- Change to different antipsychotic medication with less weight gain potential

- Augment with a weight loss medication

✔Provide a psychosocial weight management intervention

Included in Guidelines

"Individuals with schizophrenia who are overweight (BMI = 25.0–29.9) or obese (BMI ≥ 30.0) should be offered a psychosocial weight loss intervention that is at least 3 months in duration to promote weight loss."

Schizophrenia PORT Guidelines 2009 Recommendation

Dixon, L.B., Dickerson, F., Bellack, A.S., Bennett, M., Dickinson, D., Goldberg, R.W.,...Schizophrenia Patient Outcomes Research Team. (2010). The 2009 Schizophrenia PORT Psychosocial Treatment Recommendations and Summary Statements. Schizophrenia Bulletin, 36(1), 48-70.

MOVE!

- Less than 5% of overweight Veterans with schizophrenia participate in MOVE!, the VA's weight management program

- Why?
  - Numerous handouts
  - Calorie counting
  - Meal diaries
  - Dislike for group interventions
  - Travel issues

Evidence for Psychosocial Weight Management

- Reviews and meta-analyses indicate there are effective psychosocial weight interventions *specifically designed* for individuals with schizophrenia

- 7 RCTs indicated:
  - intervention > control
  - individual or group format
  - 3-6 months
  - modest weight loss; mean = 6 pounds
  - modest weight loss has been associated with health benefits

Alvarez-Jimenez, M., Hetrick, S.E., Gonzalez-Blanch, C., Gleeson, J.F., & McGorry, P.D. (2008). Non-pharmacological management of antipsychotic-induced weight gain: Systematic review and meta-analysis of randomised controlled trials. British Journal of Psychiatry, 193, 101-107.

What are the Challenges?

- System → limited tracking of outcome data, limited space

- Clinicians → lacking key competencies, limited time

- Patients → presence of symptoms and cognitive deficits, limited literacy, limited diet/exercise and cooking knowledge and skills, poor advocates, transportation issues

Mobile Delivery of Services

Poll Question

How many of the following do you personally use?

smartphone, landline phone, tablet, public computer (e.g., library), and/or cellphone without apps

- 1
- 2-3
- 4+

We're all connected...

n=457 individuals with schizophrenia/ Non-VA   (Gay et al., 2016)

Device	Percent
Personal computer	89%
Smartphone	54%
Landline phone	52%
Tablet	35%
Public computer	32%
Cell phone without applications or...	31%

% Using 1 Device: 9%
% Using 2-3 Devices: 61%
% Using 4+ Devices: 29%
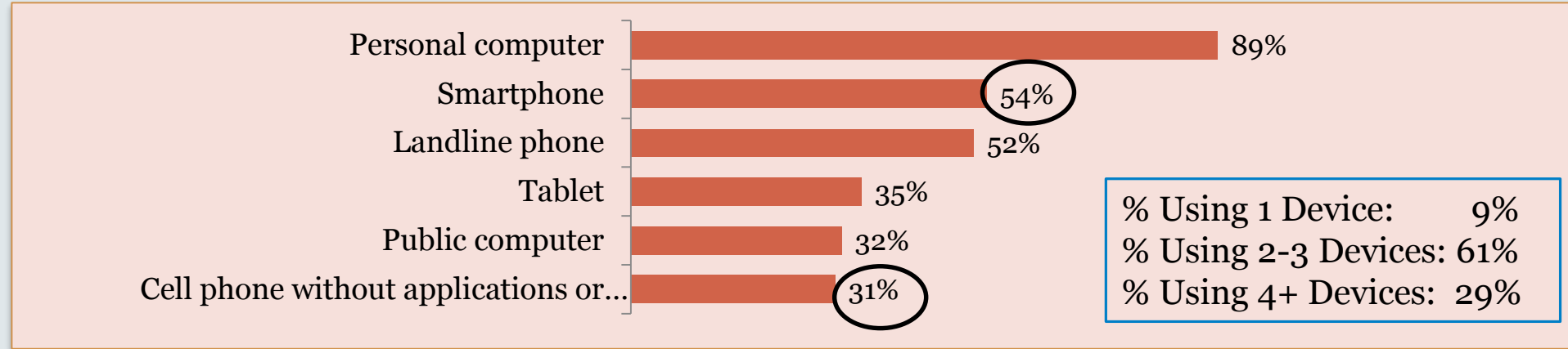
n=249 individuals with serious mental illness/ VA & Non-VA   (HSR&D IIR 09-083; R34 MH090207)

Cellphone	Frequency	Percent
iPhone	40	16
Windows-based phone	0	0
Android	105	42
Blackberry	4	2
Non-smartphone	51	21
Unknown cellphone	13	5
No cellphone	36	14

86% have a cellphone

60% have a smartphone

And we're on them all the time...

Personal computer:

     1+hr/day---89%

     10+ hrs/day---18%

Mobile phones:

     1+ hr/day---85%

     3+hrs/day---48%

66% said technology will only become a bigger part of their recovery in coming years

n=457 individuals with schizophrenia/ Non-VA   (Gay et al., 2016)

Mental Health Apps are a small proportion
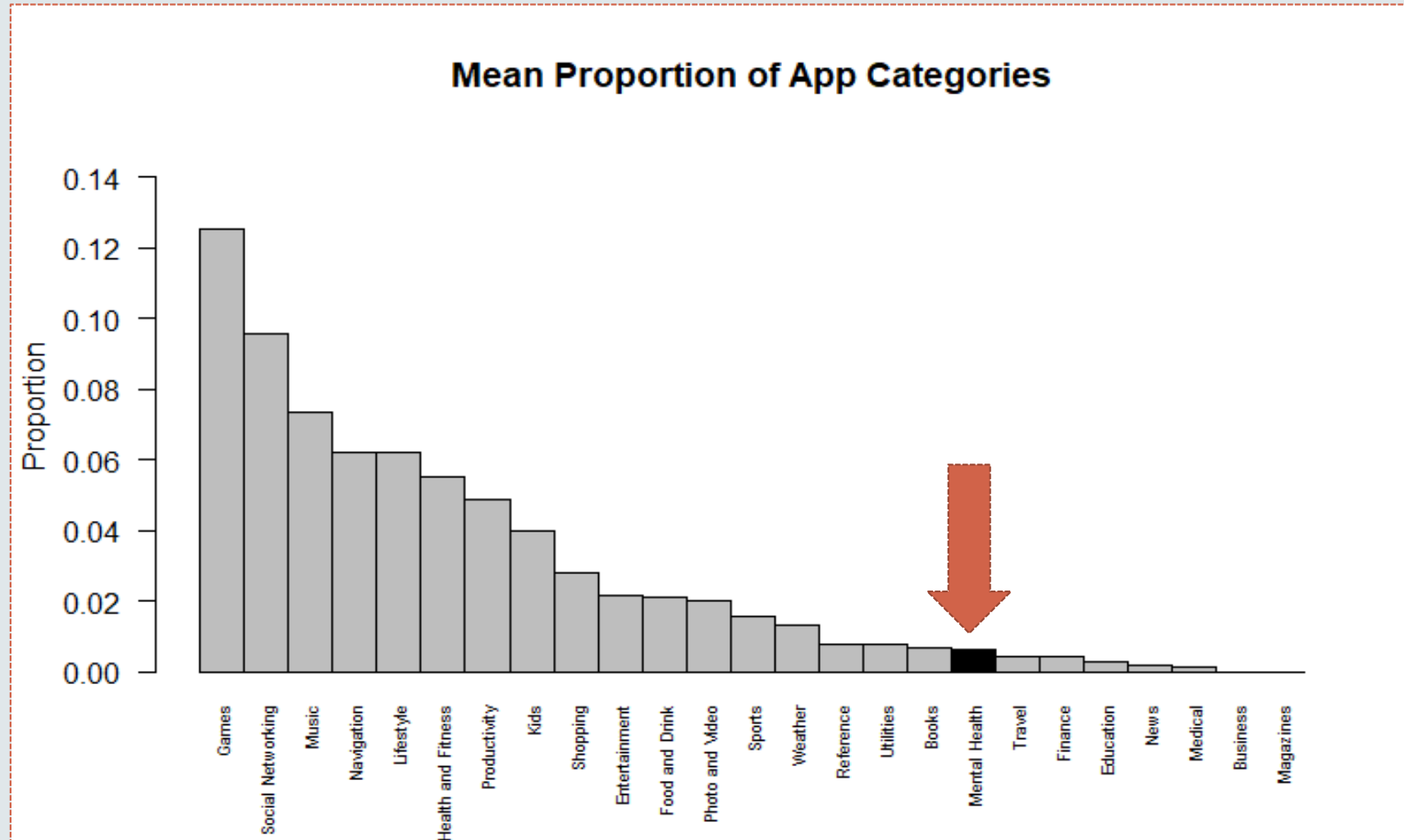
Mean Proportion of App Categories

Torous, J., Wisniewski, H., Lium G., Keshavanm, M. (2018). Mental health mobile phone app usage, concerns, and benefits among psychiatric outpatients: Comparative survey study. JMIR Mental Health, 5(4), e11715.

But there are a lot of them

Estimate to be over 10,000 mental health related apps

Torous, J., Roberts, L.W. (2017). Needed innovation in digital health and smartphone applications for mental health: Transparency and trust. JAMA Psychiatry, 74(5), 437-8.

Tailoring for the needs of the population

- Plain colors, icons, and graphics
- Shallow hierarchy (only one or two levels past the initial screen)
- Explicit navigational aids
- Simple presentation of choices (one column of buttons per page)
- Limited text

Rotondi, A.J., Eack, S.M., Hanusa, B.H., et al. (2015). Critical design elements of e-health applications for users with severe mental illness: singular focus, simple architecture, prominent contents, explicit navigation, and inclusive hyperlinks. Schizophrenia Bulletin, 41(2), 440-448.

Tracking

https://sardaa.org/schizophrenia-app/

Tracking and Intervention

Ben-Zeev, D., Brenner, C.J., Begale, M., Duffecy, J., Mohr, D.C., Mueser, K.T. (2014). Feasibility, acceptability, and preliminary efficacy of a smartphone intervention for schizophrenia. Schizophrenia Bulletin, 40(6), 1244-53.

Growth in the Field

Smartphones for Smarter Care?
Self-Management in Schizophrenia

August 2017

Intervention: MOVE! Coach

Not Tailored!
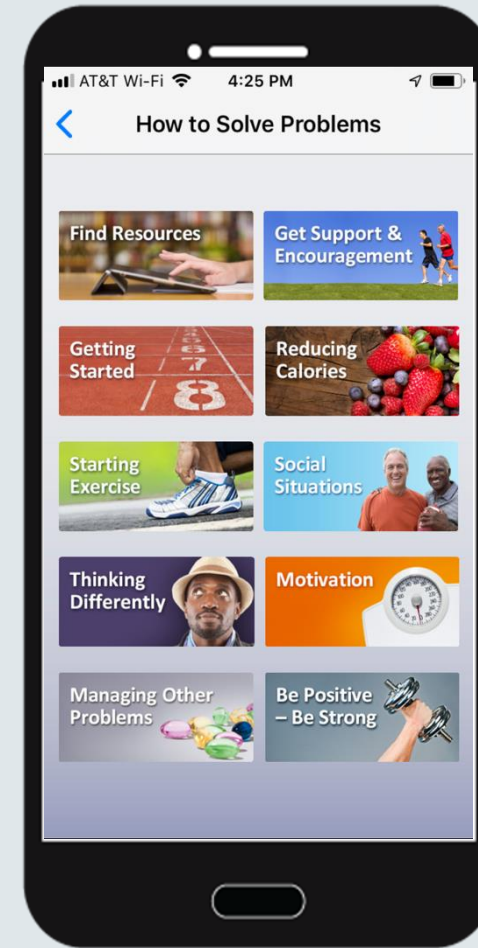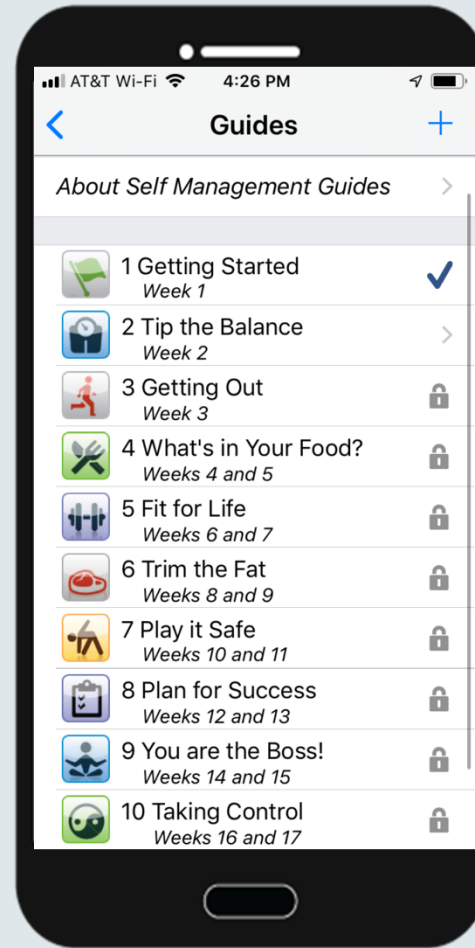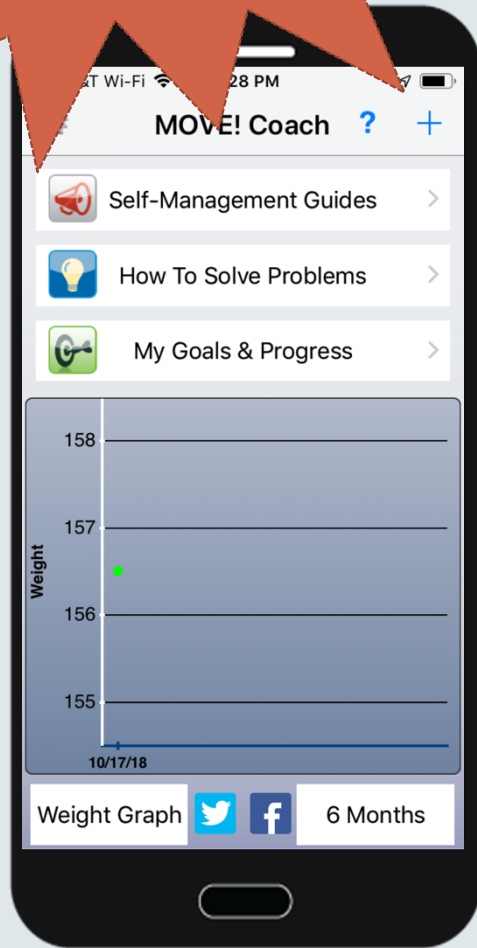
Weight Management App: wellness

COACH to FIT

CoachToFit

- 2-year HSR&D merit to design and conduct initial testing of an app to combat obesity in Veterans with serious mental illness---schizophrenia, bipolar disorder, schizoaffective disorder

- User-centered and agile development processes

- Involve peer specialists as wellness coaches

Lived experience with

- serious mental illness
- obesity
- disability
- veteran
- VA service delivery

Expertise in

- treatments for serious mental illness
- treatments for obesity
- tailoring services
- peer specialists
- VA service delivery
- health services research

Expertise in

- mobile development
- data capture
- data visualization
- linked devices
- Ohmage server
- ADA 504 compliance

True partnership

User-Centered Design

- VA HSR&D COIN: CSHIIP Veteran Engagement Group
- Focus Groups (n=6; across 2 groups)
- In-Lab Usability Testing (n=10; individual testing)
- Experiential Usability Testing (n=37; 30+ days)

CoachToFit Interfaces
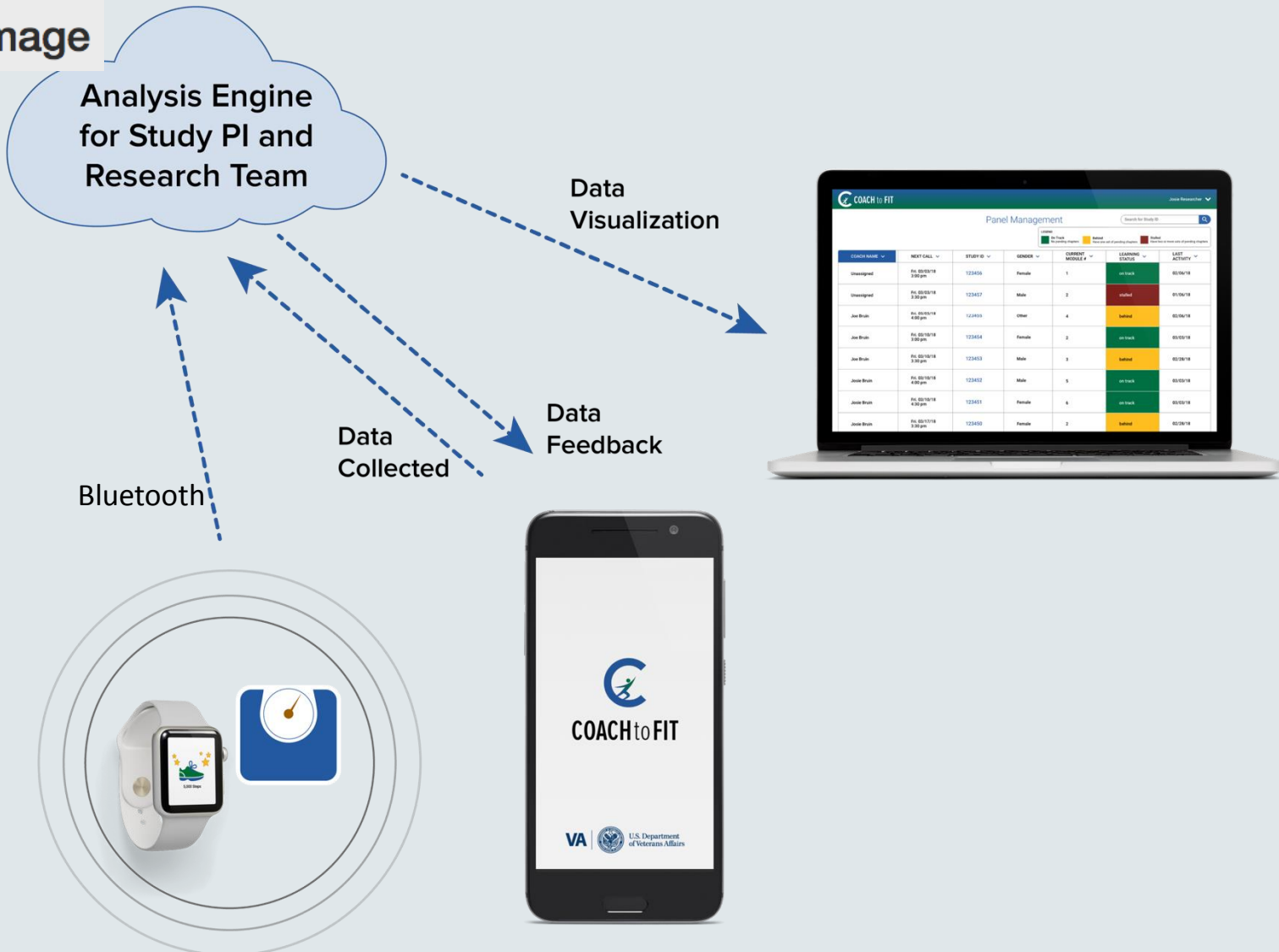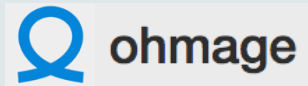
Poll Question

- What kind of wearables/sensors have you used:

  - Fitbit watch
  - Android or Apple watch
  - Alexa or other home device
  - Smart Scale
  - Other

CoachToFit Native Apps

- Single Code base, compiled for:

  - Apple's iOS Store

  - Google's Android Store

(Custom built iOS App)
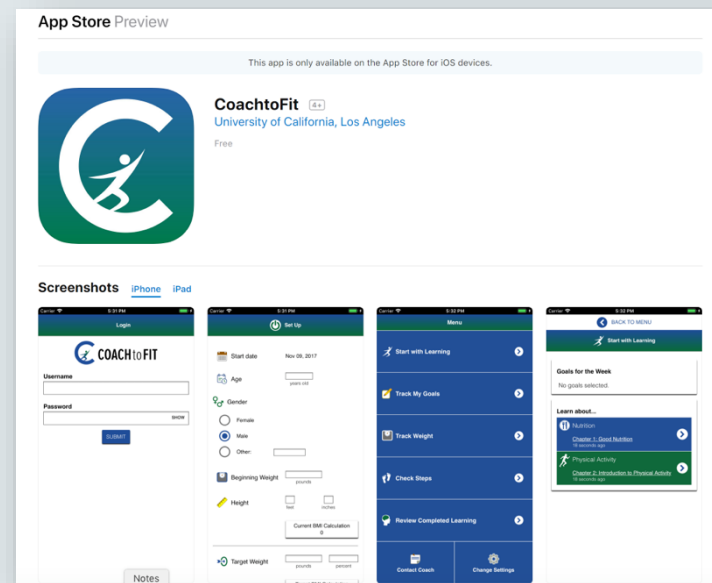
(Custom built Android App)
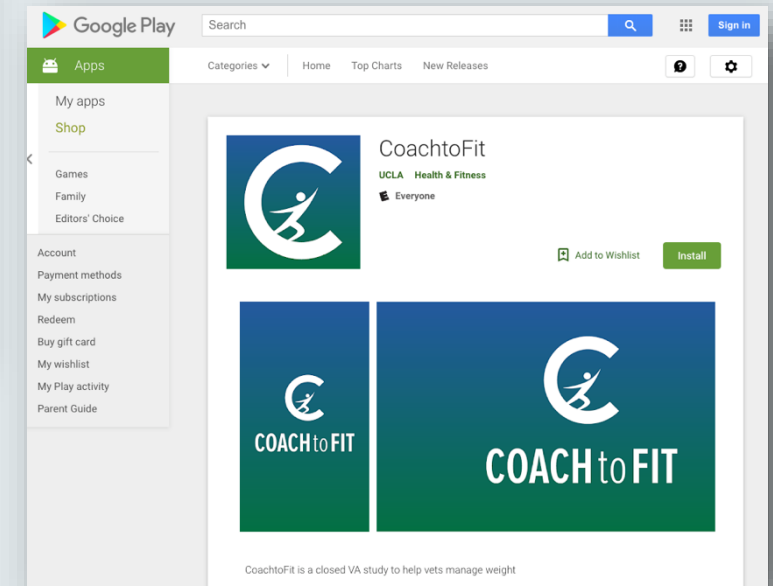
CoachToFit Native Apps

- Design Phase included
  - Logo Design
  - Simple navigation
  - Color coordination
  - Consistent Symbols
  - ADA 504 Compliance
    - Color contrast
    - Usable with phone accessibility options turned on
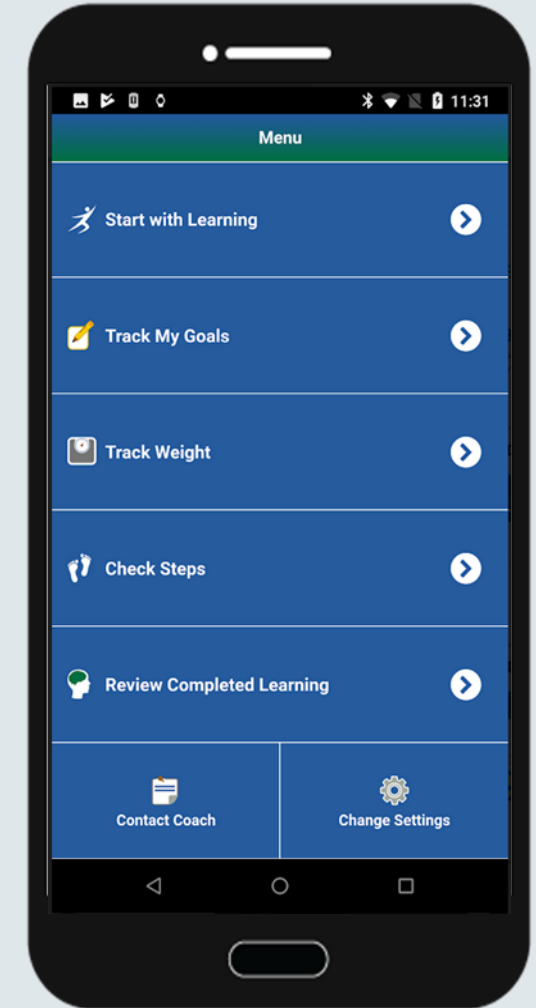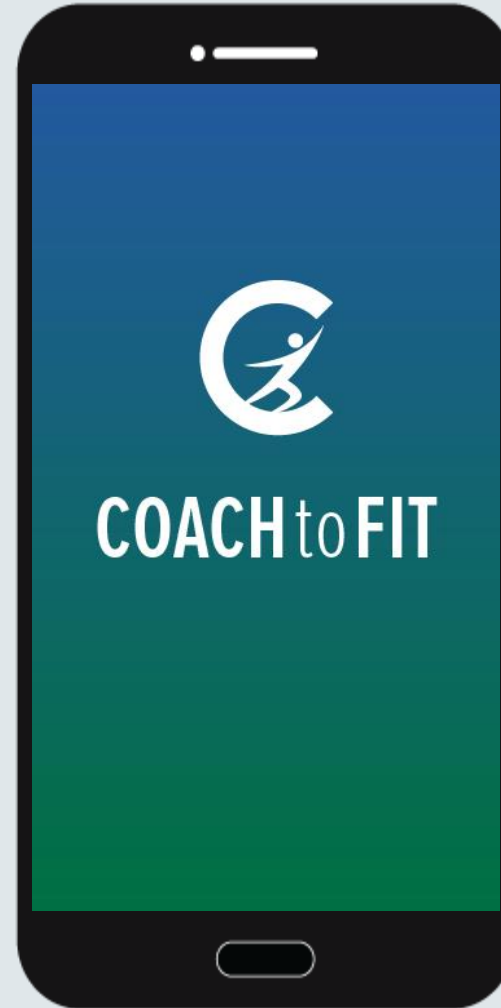
CoachToFit Learning Goals & Assessments

- ## Design Phase included
  - Logo Design
  - Simple navigation
  - Color coordination
  - Consistent Symbols
  - ADA 504 Compliance
    - Color contrast
    - Usable w/ phone accessibility

- ## Delivery of Curriculum
  - 1st Deployment – Progress Based
  - 2nd Deployment - Prescheduled
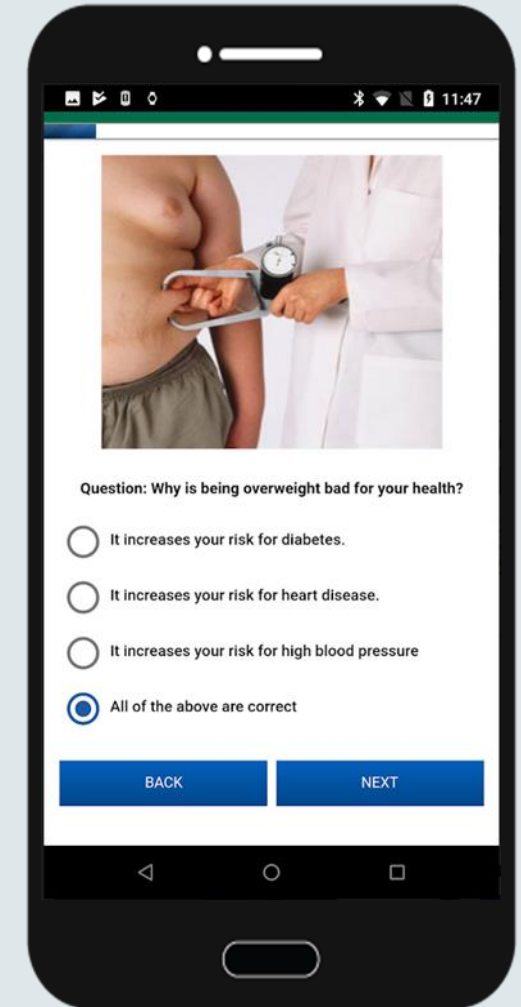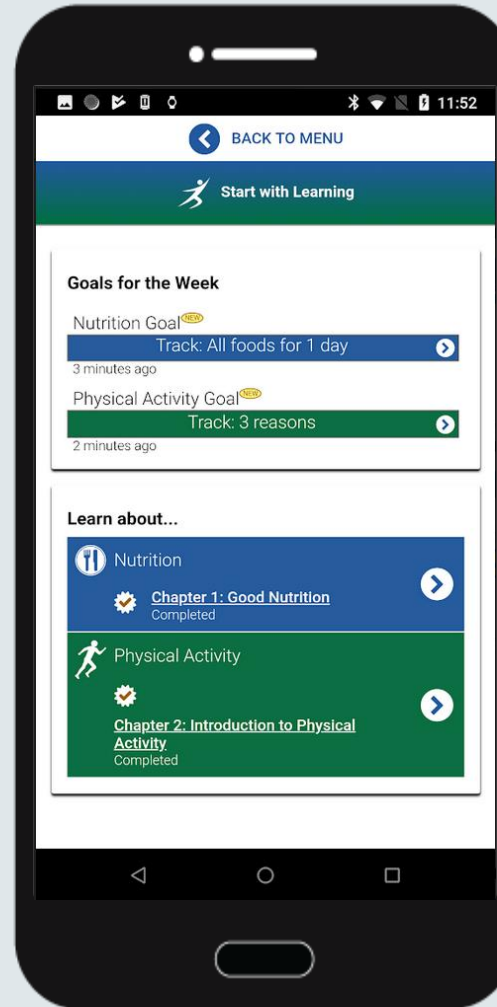
CoachToFit Learning Goals & Assessments

- Goal Tracking included
  - Local Reminders – pre-scheduled
  - Progress Tracking
  - Re-enforced Success badges

- Assessments included
  - Multiple choice questions
  - Animated 'Good Job' visual
  - Audio chimes
    - Happy chime
    - Sad chime + encouragement to 'Try Again'
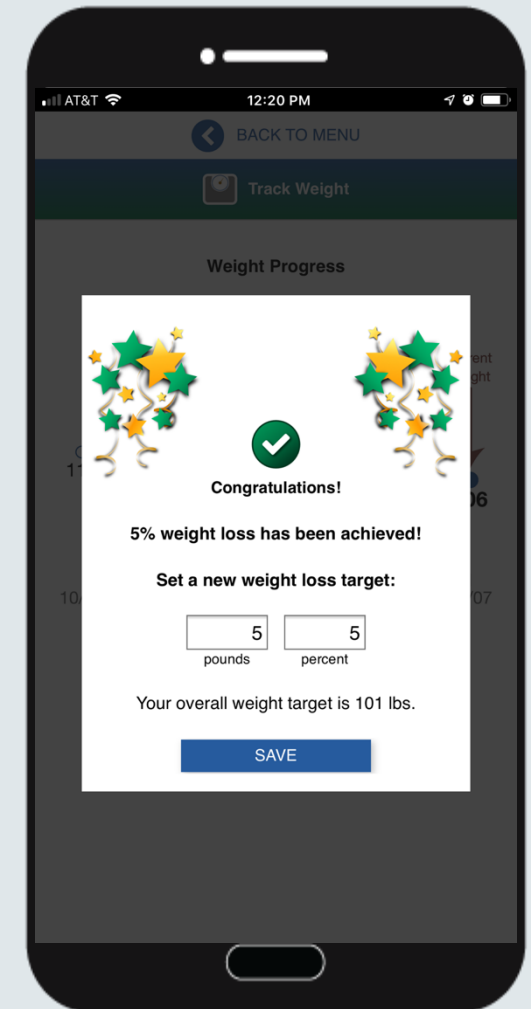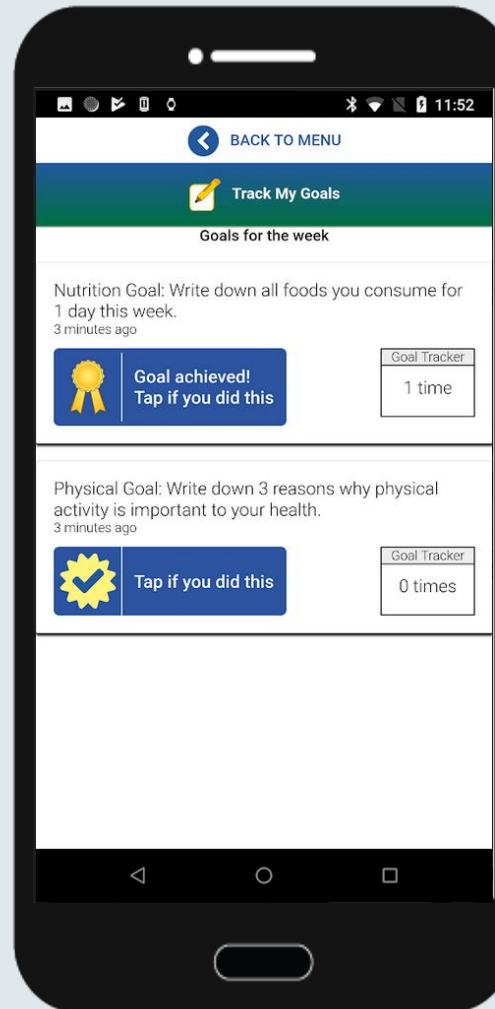
CoachToFit Dashboard: Panel Management

- Custom Built for Peers
- Coach Dashboard
  - Guide Call Workload
    - Green
    - Yellow
    - Red
  - Track Call Outcomes

COACH to FIT

Joe Coach

Change Password
Log Out

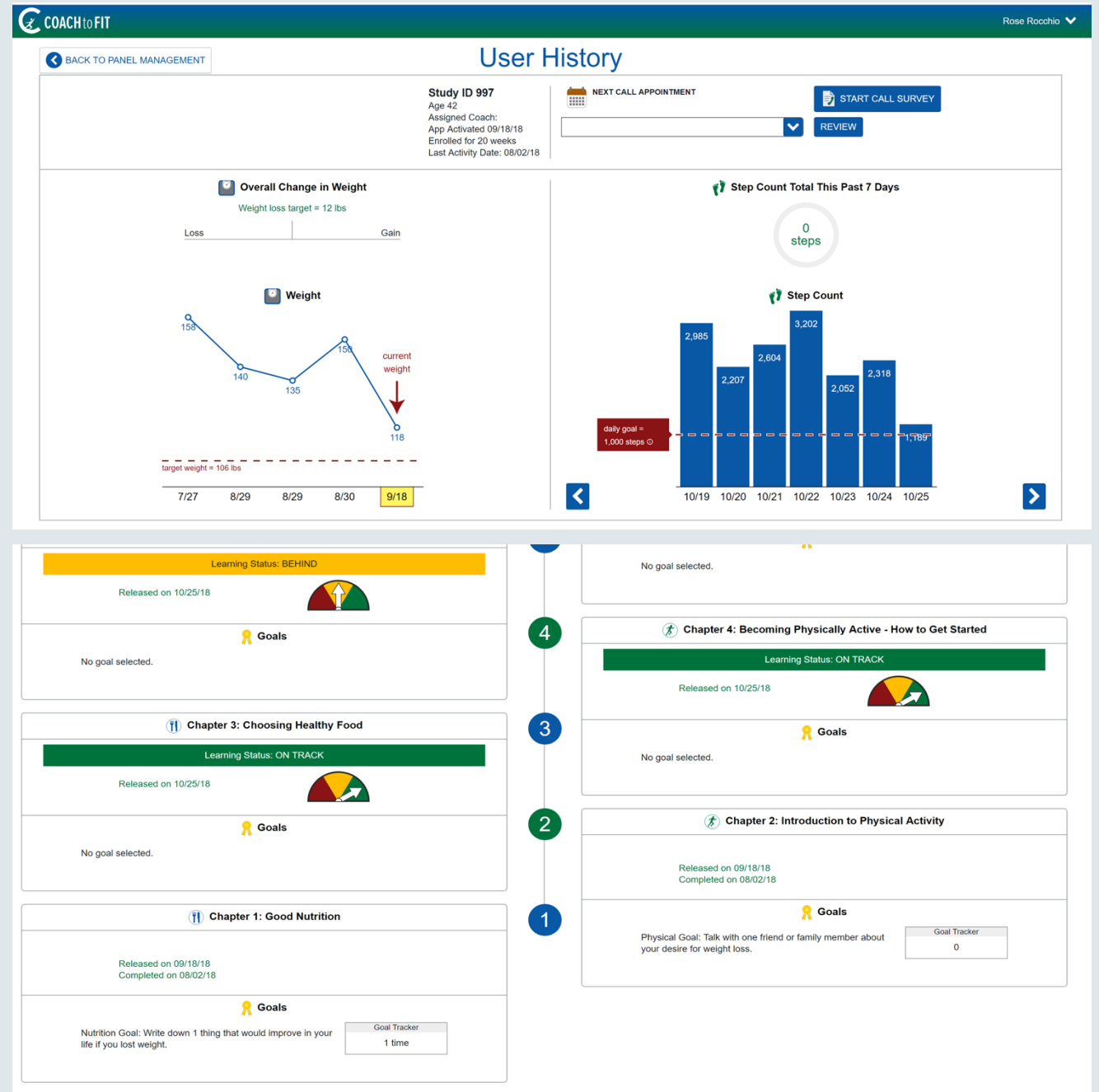## Panel Management

Search for Study

NEXT CALL	STUDY ID	COACHING STATUS	COACH'S NOTES	CURRENT MODULE #	LEARNING STATUS	LAST ACTIVITY
Fri. 03/03/18 3:00 pm	123456	Answered and we talked	Lorem ipsum dolor sit amet, consectetur adipiscing elit.	1	on track	02/06/18
Fri. 03/03/18 3:30 pm	123457	Answered but didn't talk	Lorem ipsum dolor sit amet, consectetur adipiscing elit.	2	stalled	01/06/18
Fri. 03/03/18 4:00 pm	123455	No answer, no message	Lorem ipsum dolor sit amet, consectetur adipiscing elit.	4	behind	02/06/18
Fri. 03/10/18 3:00 pm	123454	No answer, left message	Lorem ipsum dolor sit amet, consectetur adipiscing elit.	2	on track	03/03/18
Fri. 03/10/18 3:30 pm	123453	Answered but didn't talk	Lorem ipsum dolor sit amet, consectetur adipiscing elit.	3	getting behind	02/28/18
Fri. 03/10/18 4:00 pm	123452	No answer, left message	Lorem ipsum dolor sit amet, consectetur adipiscing elit.	5	on track	03/03/18
Fri. 03/10/18 4:30 pm	123451	Answered and we talked	Lorem ipsum dolor sit amet, consectetur adipiscing elit.	6	on track	03/03/18
Fri. 03/17/18 3:30 pm	123450	No answer, left message	Lorem ipsum dolor sit amet, consectetur adipiscing elit.	2	getting behind	02/28/18
Fri. 03/17/18 4:00 pm	123449	No answer, no message	Lorem ipsum dolor sit amet, consectetur adipiscing elit.	4	stalled	02/01/18
Fri. 03/17/18 3:00 pm	123448	Answered and we talked	Lorem ipsum dolor sit amet, consectetur adipiscing elit.	2	on track	03/02/18

CoachToFit Dashboard: User History Screen

- ## Guides Peer Discussion
- ## Evidence of progress
  - ### Step Data
  - ### Weight Progress Chart
  - ### Chapter Goals
    - Outcomes
    - Materials
- ## Delivery of Curriculum
  - ### 1st Deployment – Progress Based
  - ### 2nd Deployment - Prescheduled

Data extraction via Ohmage Data Repository

CoachToFit Experiential Testing and Results

COACH to FIT

CoachToFit: Experiential Usability Methods

- Overweight Veterans with serious mental illness who own a smartphone
- 2 cohorts
  - Some changes between cohorts in app
- App, watch, scale
- 5-8 weeks (pre-post quantitative and qualitative)
- Weekly peer coaching by phone
  - Some changes between cohorts in dashboard

CoachToFit Experiential Testing sample

- 89% Male
- SMI: schizophrenia (n=10); schizoaffective disorder (n=1); bipolar disorder (n=19); major depressive disorder (n=1)

- Age = 57 (SD 10)
- 44% White; 44% African-American
- 72% not married
- 28% ≤ High School diploma
- 39% employed

- BMI = 32.2 (SD 3.7)---obese
- PROMIS Global Physical Health and Global Mental Health –1 SD worse than general population

- 28% iOS (Apple iPhone); 72% Android

CoachToFit Results: Usability

- 57% completed 5+ modules; 10% completed no modules
- 51% repeated at least 1 module

CoachToFit Results: Acceptability

- Strong acceptability
  - Would like to use it often
  - Easy to use
  - App, watch, scale worked well together
  - Felt confident using the app
  - Found it not complicated
  - Would not need technical assistance to use
  - Felt it was made for people like them
  - Coach very valuable

CoachToFit Results: Efficacy

Exploratory and hypothesis generating analyses of change in weight and steps

- Using GLM predicting pounds lost by day, there was a significant weight loss by day ($p<.01$) with an <u>estimate of 9 lbs lost over 8 weeks</u>.

- Using GLM predicting percent weight lost by day, there was a significant percent loss observed ($p<.01$) with an <u>estimate of 4.5% lost over 8 weeks</u>.

- We also explored changes in physical activity, predicting average daily steps per week, but there was <u>no significant change in steps over 8 weeks</u>.

We've come a long way…

Gordon Gekko (Michael Douglas), Wall Street, 1987

Where do we go from here? (Veterans told us....)
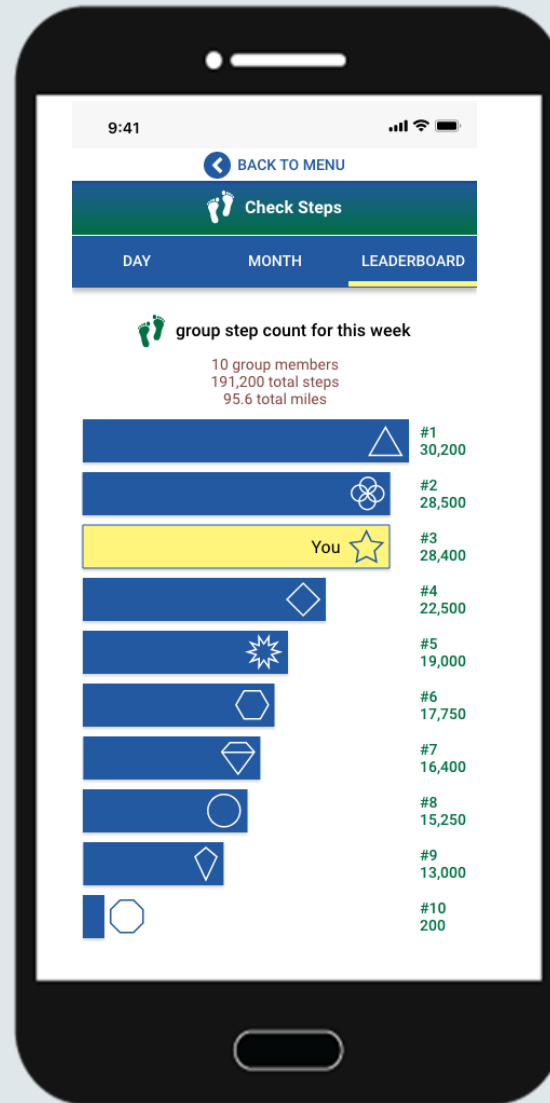
This work builds on a foundation

We thank….

Armando Rotondi, Richard Goldberg, Julie Kreyenbuhl, Alexander Young, Noosha Niv, Matthew Chinman, Dan O'Brien-Mazza, Sue Raffa, Lynn Novarska, Deborah Estrin, and Julia Hoffman

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References

- Alvarez-Jimenez, M., Hetrick, S.E., Gonzalez-Blanch, C., Gleeson, J.F., & McGorry, P.D. (2008). Non-pharmacological management of antipsychotic-induced weight gain: Systematic review and meta-analysis of randomised controlled trials. British Journal of Psychiatry, 193, 101-107.

- Annamalai, A., Kosir, U., & Tek, C. (2017). Prevalence of obesity and diabetes in patients with schizophrenia. World Journal of Diabetes, 8(8), 390-396.

- Auquier, P., Lancon, C., Rouillon, F., & Lader, M. (2007). Mortality in schizophrenia. Pharmacoepidemiology and Drug Safety, 16(12), 1308-1312.

- Bennett, L.L., Cohen, A.N., & Young, A.S. (2018). Factors associated with weight intervention participation among people with serious mental illness. The Journal of Nervous and Mental Disease, 206 (11), 896-899.

- Ben-Zeev, D., Brenner, C.J., Begale, M., Duffecy, J., Mohr, D.C., Mueser, K.T. (2014). Feasibility, acceptability, and preliminary efficacy of a smartphone intervention for schizophrenia. Schizophrenia Bulletin, 40(6), 1244-53.

- Cohen, A.N., Chinman, M.J., Hamilton, A.B., Whelan, F., & Young, A.S. (2013). Using patient-facing kiosks to support quality improvement at mental health clinics. Medical Care, 51(3), S13-S20.

- Cohen, A.N., Golden, J.F., & Young, A.S. (2014). Peer wellness coaches for adults with mental illness. Psychiatric Services, 65(1), 129-130. PMID: 24382767, PMCID: PMC4041484.

- Colton, C., & Manderscheid, R. (2006). Congruencies in increased mortality rates, years of potential life lost, and causes of death among public mental health clients in eight states. Preventing Chronic Disease, 3(2), A42.

- Dixon, L.B., Dickerson, F., Bellack, A.S., Bennett, M., Dickinson, D., Goldberg, R.W.,...Schizophrenia Patient Outcomes Research Team. (2010). The 2009 Schizophrenia PORT Psychosocial Treatment Recommendations and Summary Statements. Schizophrenia Bulletin, 36(1), 48-70.

- Dixon, L., Postrado, L., Delahanty, J., Fischer, P.J., & Lehman, A. (1999). The association of medical comorbidity in schizophrenia with poor physical and mental health. The Journal of Nervous and Mental Disease, 187(8), 496-502.

- Gay, K., Torous, J., Joseph, A., Pandya, A., Duckworth, K. (2016). Digital technology use among individuals with schizophrenia: Results of an online survey. JMIR mental health, 3(2).

- Newcomer, J.W. (2007). Metabolic considerations in the use of antipsychotic medications: A review of recent evidence. Journal of Clinical Psychiatry, 68(1), 20-27.

- Niv, N., Cohen, A.N., Hamilton, A., Reist, C., & Young, A.S. (2014). Effectiveness of a psychosocial weight management program for individuals with schizophrenia. Journal of Behavioral Health Services & Research, 41(3), 370-380.

References

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- Rotondi, A.J., Sinkule, J., Haas, G.L., et al. (2007). Designing websites for persons with cognitive deficits: Design and usability of a psychoeducational intervention for persons with severe mental illness. Psychological Services, 4(3), 202-224.

- Saha, S., Chant, D., & McGrath J. (2007). A systematic review of mortality in schizophrenia: Is the differential mortality gap worsening over time? Archives of General Psychiatry, 64(10), 1123-1131.

- Schrank, B., Sibitz, I., Unger, A., et al. How patients with schizophrenia use the internet: qualitative study. *J Med Internet Res*. 2010;12(5):e70.

- Torous, J., Roberts, L.W. (2017). Needed innovation in digital health and smartphone applications for mental health: Transparency and trust. JAMA Psychiatry, 74(5), 437-8.

- Torous, J., Wisniewski, H., Lium G., Keshavanm, M. (2018). Mental health mobile phone app usage, concerns, and benefits among psychiatric outpatients: Comparative survey study. JMIR Mental Health, 5(4), e11715.

- Valimaki, M., Anttila., M, Hatonen, H., et al. Design and development process of patient-centered computer-based support system for patients with schizophrenia spectrum psychosis. *Inform Health Soc Care*. 2008;33(2):113-123.

- van der Krieke, L., Emerencia, A.C., Aiello, M., et al. Usability evaluation of a web-based support system for people with a schizophrenia diagnosis. *J Med Internet Res*. 2012;14(1):e24.

- Weiden, P.J., Mackell, J.A., & McDonnell, D.D. (2004). Obesity as a risk factor for antipsychotic noncompliance. Schizophrenia Research, 66(1), 51-57.

- Wu, E.Q., Birnbaum, H.G., Shi, L., Ball, D.E., Kessler, R.C., Moulis, M., & Aggarwal, J. (2005). The economic burden of schizophrenia in the United States in 2002. Journal of Clinical Psychiatry, 66(9), 1122-1129.

- Young, A.S., Cohen, A.N., Goldberg, R., Hellemann, G., Kreyenbuhl, J., Niv, N., … Whelan, F. (2017). Improving weight in people with serious mental illness: the effectiveness of computerized services with peer coaches. Journal of General Internal Medicine, 32(1), 48-55. PMID: 28271427

- Young, A.S., Cohen, A.N., Hamilton, A.B., Hellemann, G., Reist, C., & Whelan, F. (2019). Implementing patient-reported outcomes to improve the quality of care for weight of patients with schizophrenia. Journal of Behavioral Health Services & Research, 46(1), 129-139. https://doi.org/10.1007/s11414-018-9641-8

References

- Young, A.S., Niv, N., Cohen, A.N., Kessler, C., & McNagny, K. (2010). The appropriateness of routine medication treatment for schizophrenia. Schizophrenia Bulletin, 36(4), 732-739.
- Young, A.S., Niv, N., Chinman, M., Dixon, L., Eisen, S.V., Fischer, E.P.,...Owen, R.R. (2011). Routine outcomes monitoring to support improving care for schizophrenia: Report from the VA mental health QUERI. Community Mental Health Journal, 47(2), 123-135.