

**Preliminary Results from a  
Randomized Controlled Trial of a  
Smartphone Application for Veterans  
with Suicidal Ideation**

Nigel E Bush PhD, Steven K Dobscha MD

# Support & Disclaimer

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*Opinions, interpretations, conclusions and recommendations are those of the presenter and are not necessarily endorsed by the MSRC, Department of Defense, or Department of Veterans Affairs.*

# Project Team

## T2

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# Audience Poll

- How familiar are you with the concept of a hope kit, also known as hope box or self-soothing kit?
  - Not at all
  - Somewhat familiar
  - Very familiar

# Outline

- Background on Hope Box; rationale
- Development of VHB prototype
- Pilot project and findings
- RCT design
- RCT preliminary findings
- Translation into practice

# Background

**High risk individuals need support and coping skills when away from the clinic**

**Cognitive Therapy (CT) & Dialectical Behavior Therapy (DBT):**  
can be effective in managing suicidal ideation and self-harm behavior

- Aimed at redirecting the distressed individual's attention towards reasons for living and using effective coping skills
- Combined with stress-reduction techniques
  - relaxation and distraction



# Background

**Hope Box, Self-Soothing Kit:** Commonly-used adjunct to CBT and DBT

- Physical representation of the patient's reasons for living that the patient creates and customizes
- Stores items that a patient can refer to during times of hopelessness: e.g. favorite CD, family photographs, reminders of accomplishments and future aspirations, supportive messages from loved ones.



**A “Virtual Hope Box” (VHB) using smartphone vehicle has potential to enhance access and experience.**

# Advantages of Virtual Hope Box

**Conventional Hope Box:** Physically unwieldy and inconvenient - often not available when patient needs it most, during crises.

**“Virtual Hope Box” (VHB):** Takes common hope box practice and uses smartphone vehicle and features to enhance access and experience.

# Advantages of Virtual Hope Box

- Service members are **highly mobile**. Need for psychological support most likely to **emerge in absence of healthcare providers**.
- Smartphone apps can **expand the reach** of traditional therapeutic interventions beyond the clinic and benefit from **rich multimedia**.
- Smartphone-based app allows for easily **personalized** VHB that is highly **portable** and always **discreetly available** to a user in distress wherever they are.

# T2 Virtual Hope Box Prototype

VHB designed as tool for use by MH providers with patients as an accessory to treatment.

The VHB primarily designed to restore emotional equilibrium when periodic “dips” occur during treatment.

Patient and MH Provider work together in clinic to populate VHB using patient’s own smartphone with personalized content.

Patient uses VHB away from clinic and continues to add/change content as needed, with guidance from provider

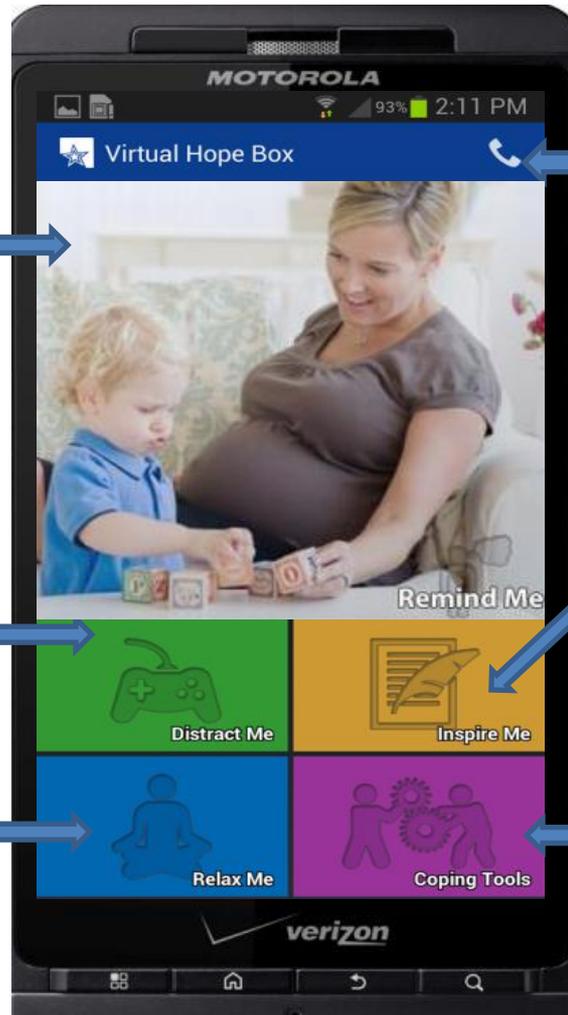


# T2 Virtual Hope Box

**Reminders:** Focuses the user on cherished memories, reminders in digital media: Photos, videos, recorded messages, music.

**Distraction tools:** Puzzles/word search games taken from user content.

**Relaxation tools:** controlled breathing tool, progressive muscle relaxation, guided meditations.



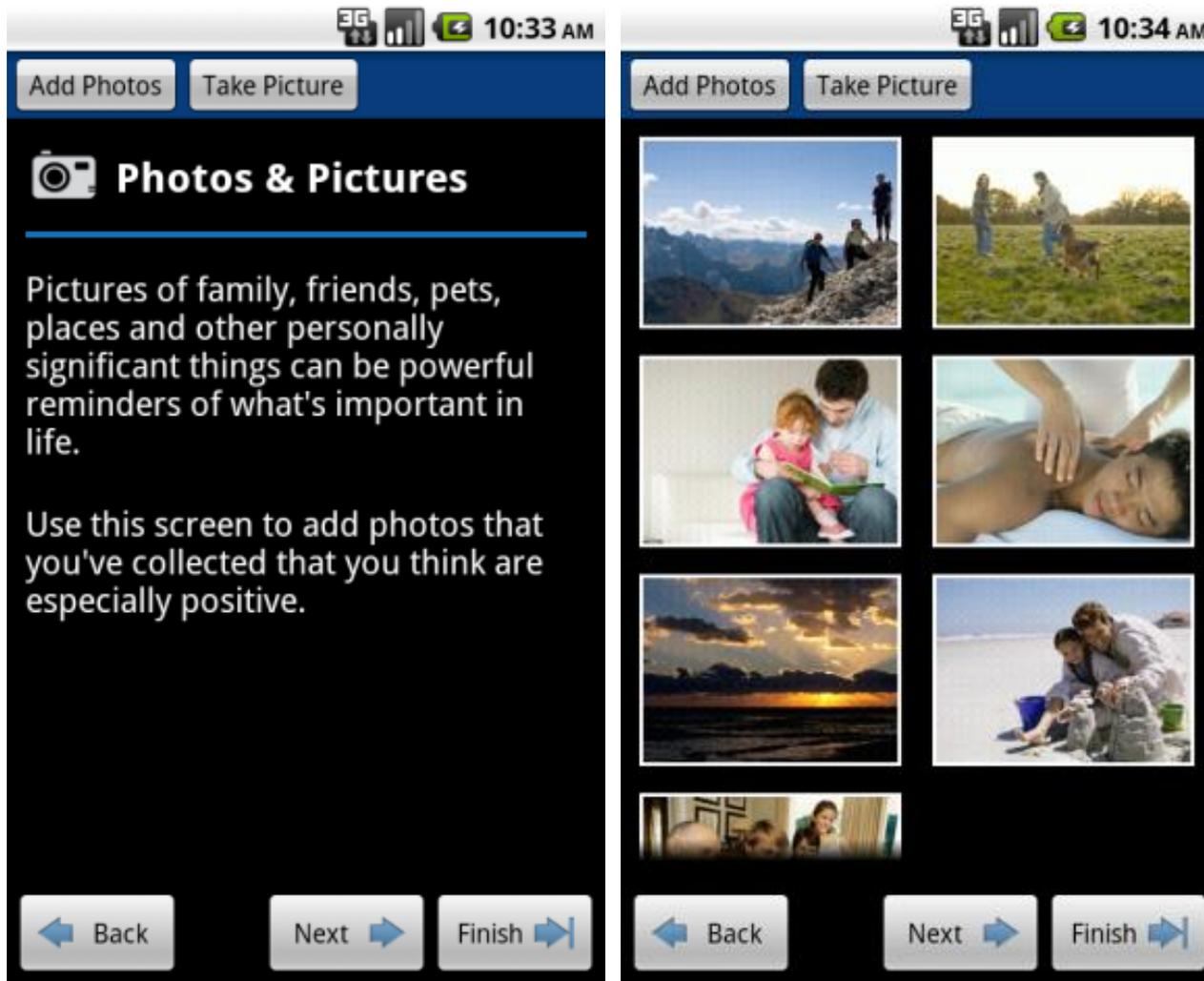
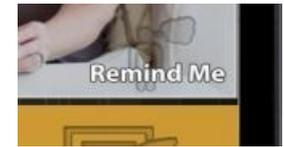
User customized **support contacts**, hotline info.

Preloaded **inspirational quotes** can be supplemented or replaced by personal quotes, family aphorisms, biblical phrases, etc.

**Coping Tools:**  
(a) Coping Cards highlight adaptive thoughts and behaviors when in crisis or managing problematic core beliefs.

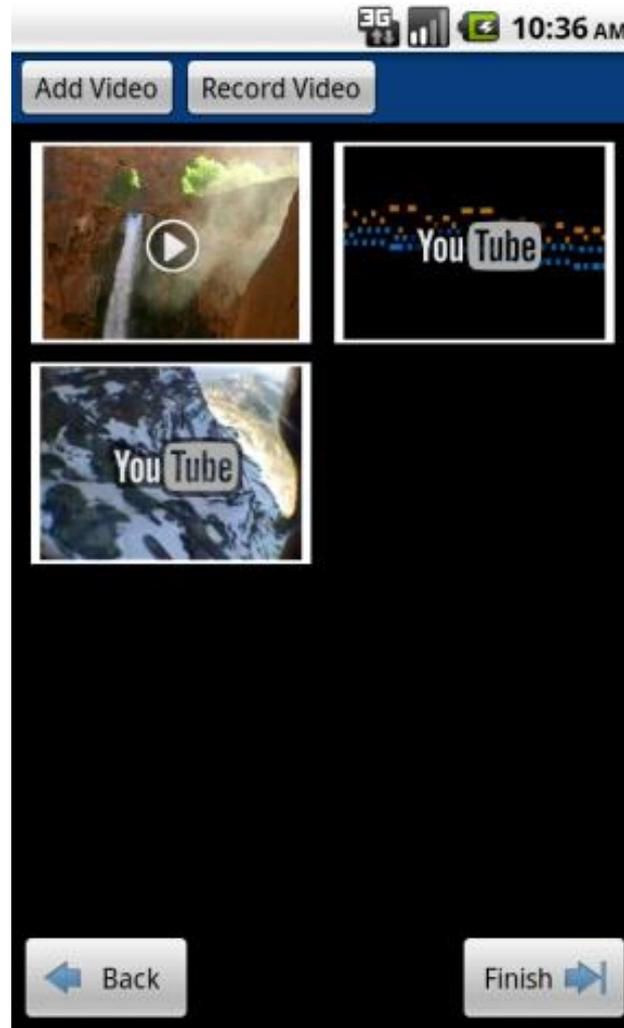
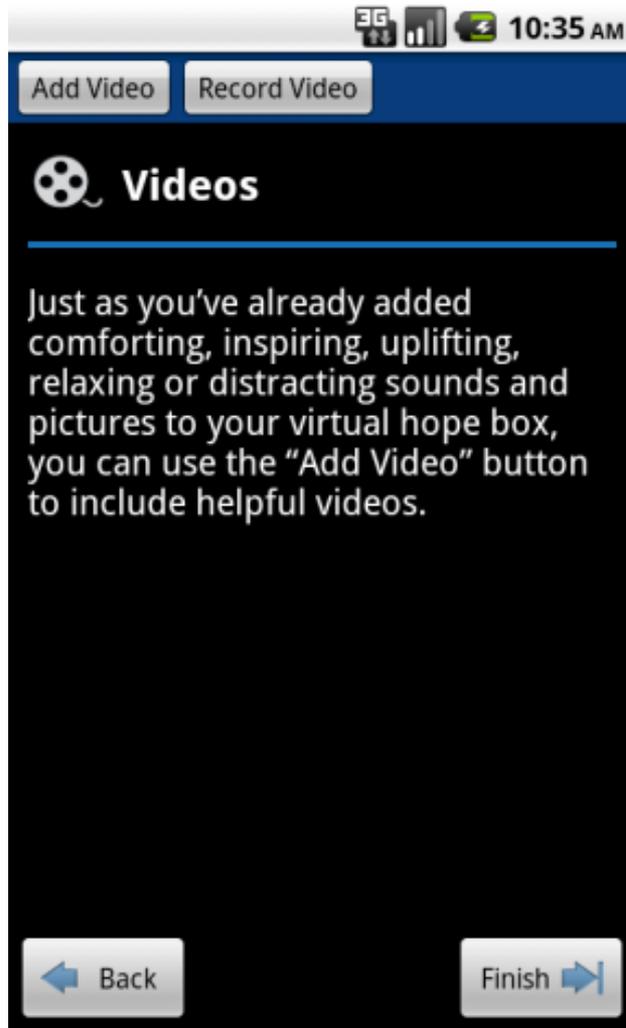
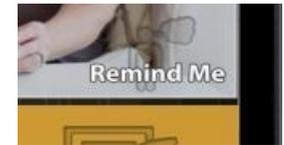
(b) Activity Planner used to improve mood by engaging in activities that are meaningful.

# Example: Remind Me



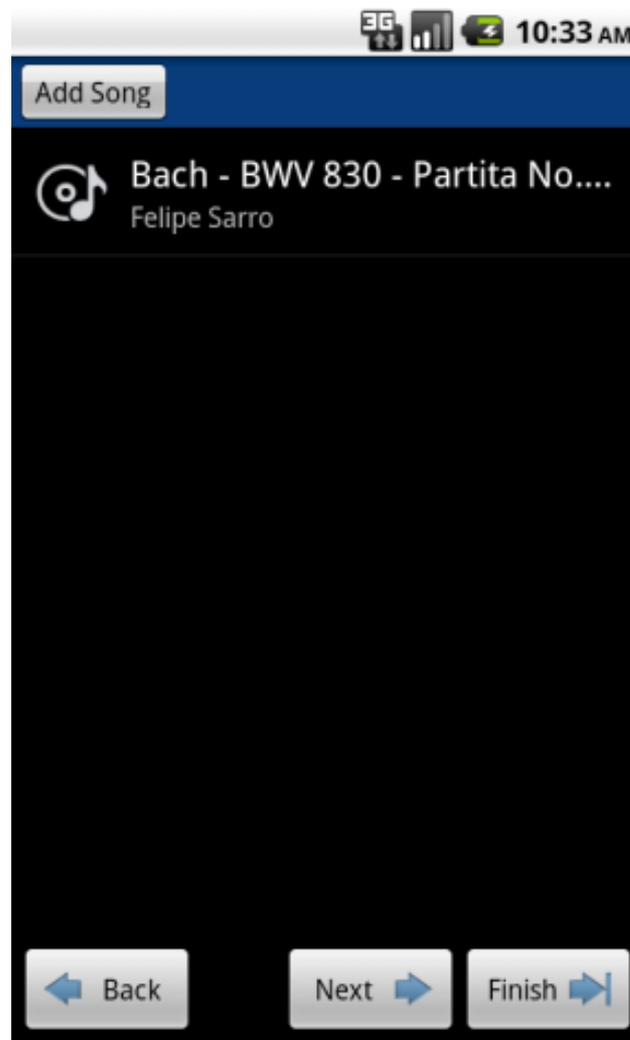
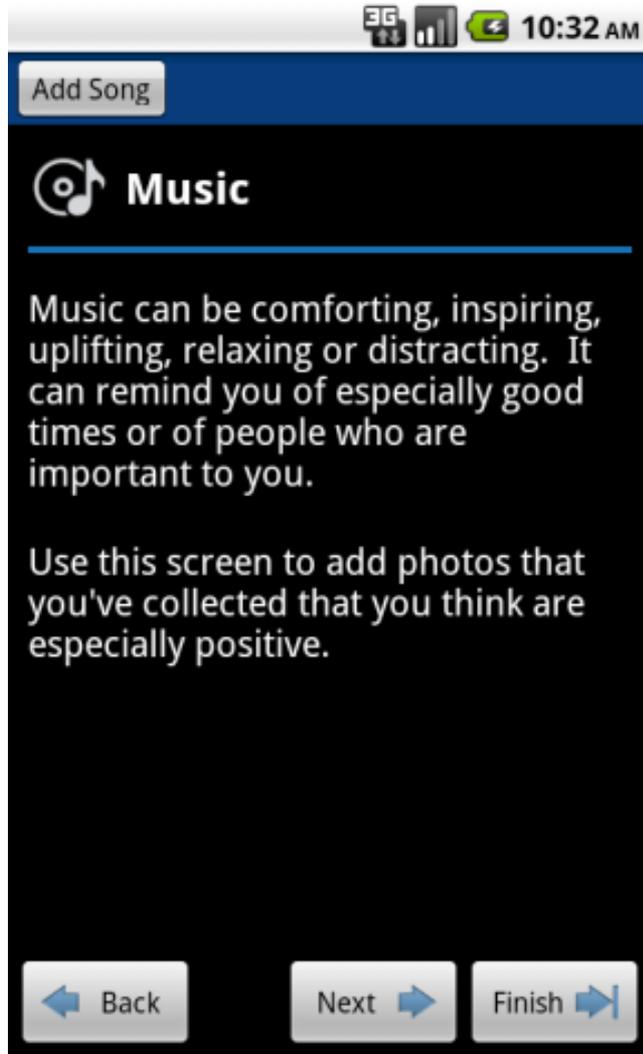
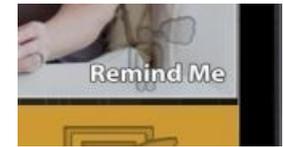
Take photos with phone, select photos existing from phone, or download

# Example: Remind Me



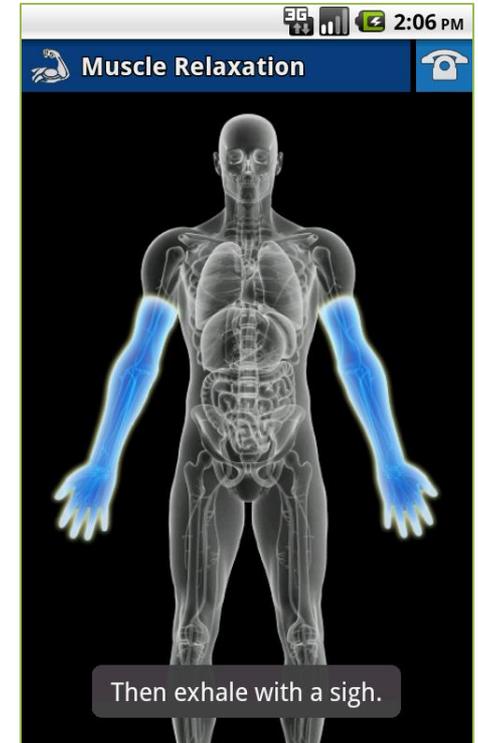
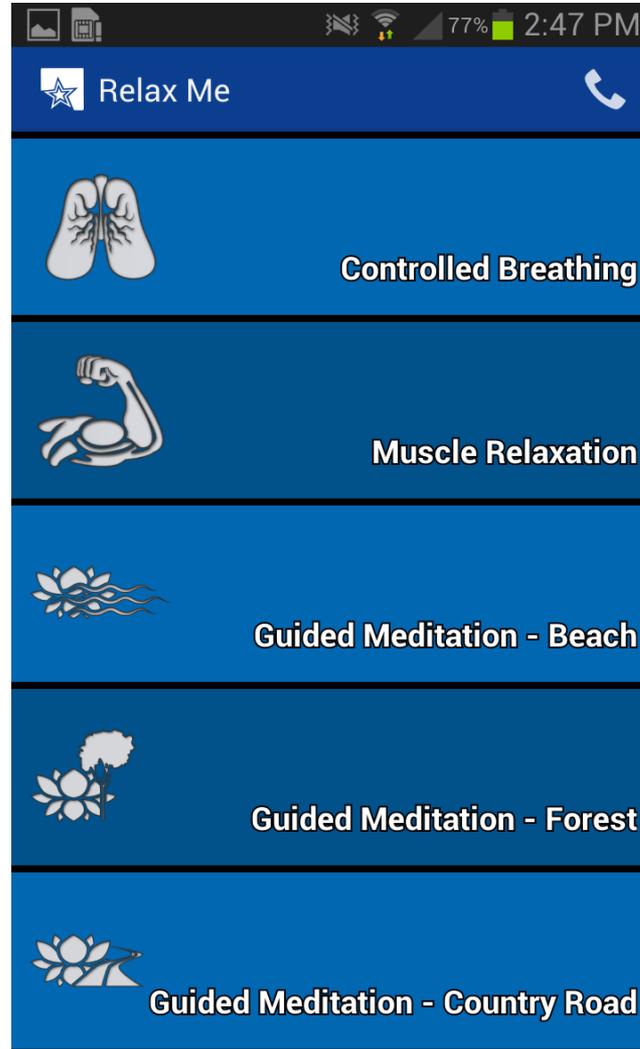
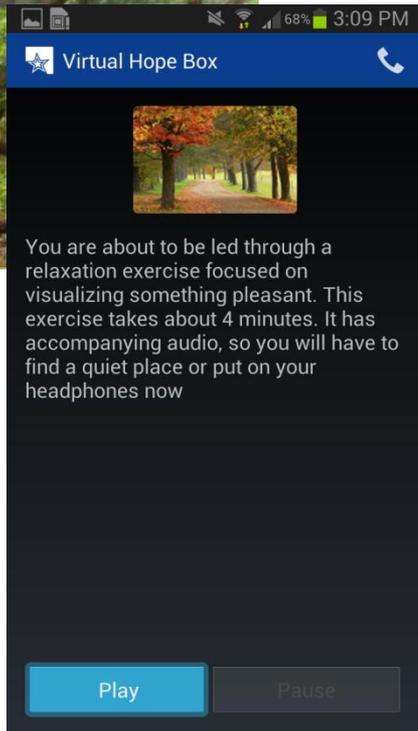
Record personal audio or video with phone, select existing from phone, or download

# Example: Remind Me



Select existing music from phone, or download

# Example: Relax Me



Selectable timing and duration for inhale, hold, and exhale

# Example: Distract Me

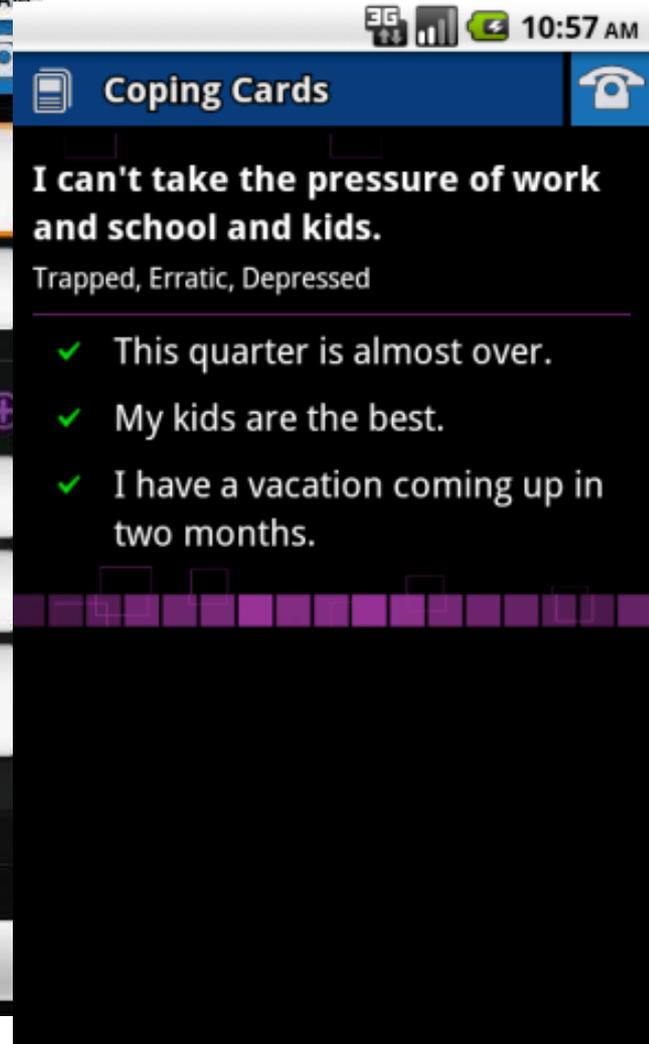
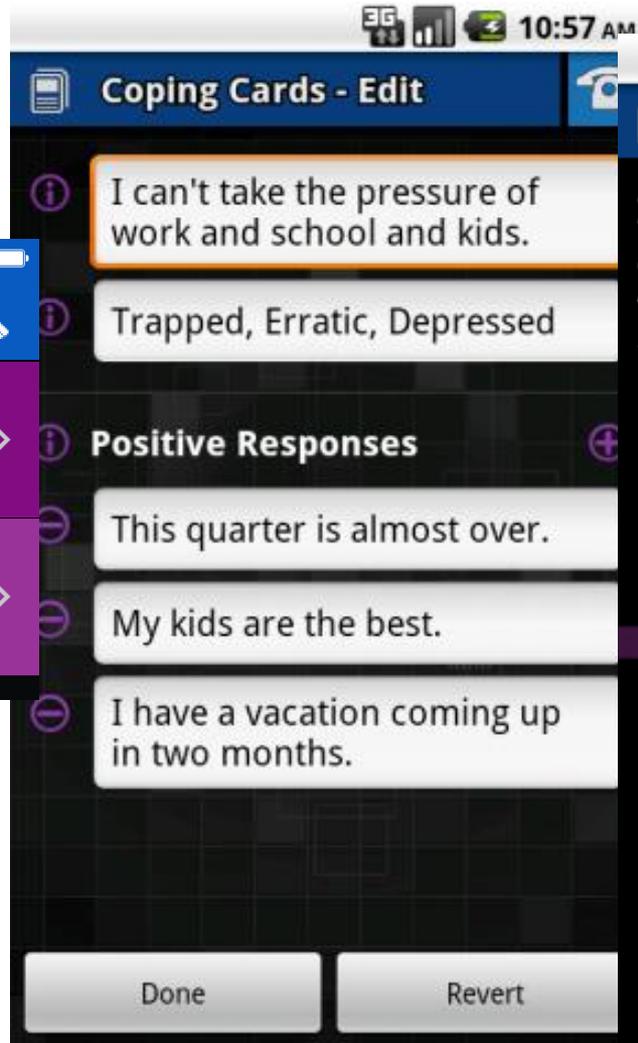


Puzzle photos and words extracted from existing user content



Selectable levels of difficulty

# Example: Coping Tools



# Example: Inspire Me



Dr. Bush's Mother:

*"Better to be kind than clever"*

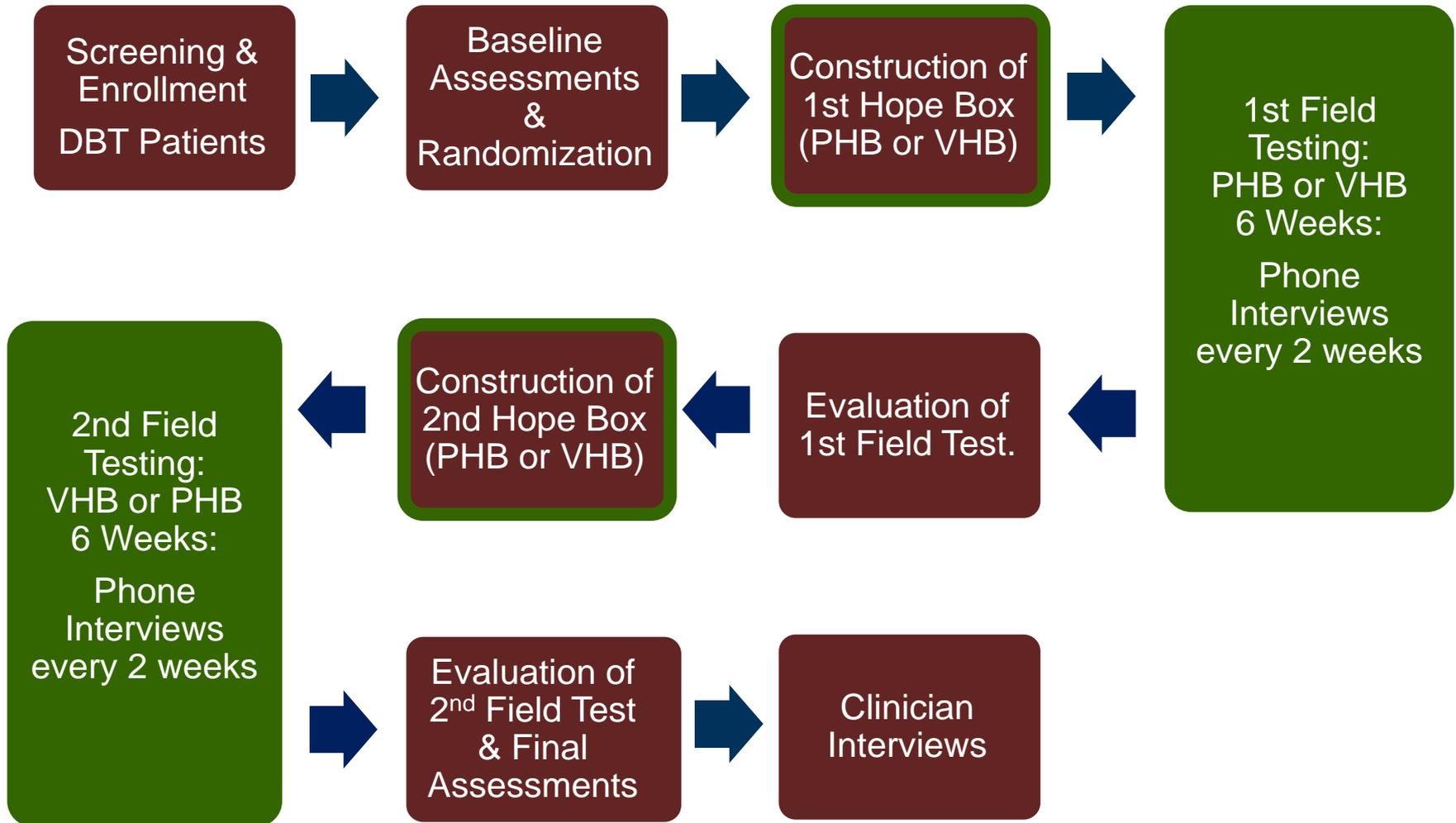
# Example: Contacts



The image displays three overlapping screenshots of an Android phone's 'Support Contacts' application. The top screenshot shows the main interface with a blue header 'Support Contacts' and a plus sign. Below the header is a section titled 'Support Contacts' with the text: 'Pick a few people from your contact who you may want to call in an emergency. You can always add more later.' At the bottom are two buttons: 'Add Contact' (blue) and 'Emergency Hotlines' (grey). The middle screenshot is a zoomed-in view of the 'Emergency Hotlines' section, showing a red warning triangle icon and the text 'Emergency Hotlines'. Below this is a contact card for 'John Doe' with a grey Android robot icon. The bottom screenshot shows the 'Emergency Hotlines' menu expanded, listing several options: 'Emergency hotlines' (with a warning triangle icon), '911', 'Veteran's Crisis Line (En)', 'Veteran's Crisis Line (Sp)', and 'DCoE Outreach Center'.

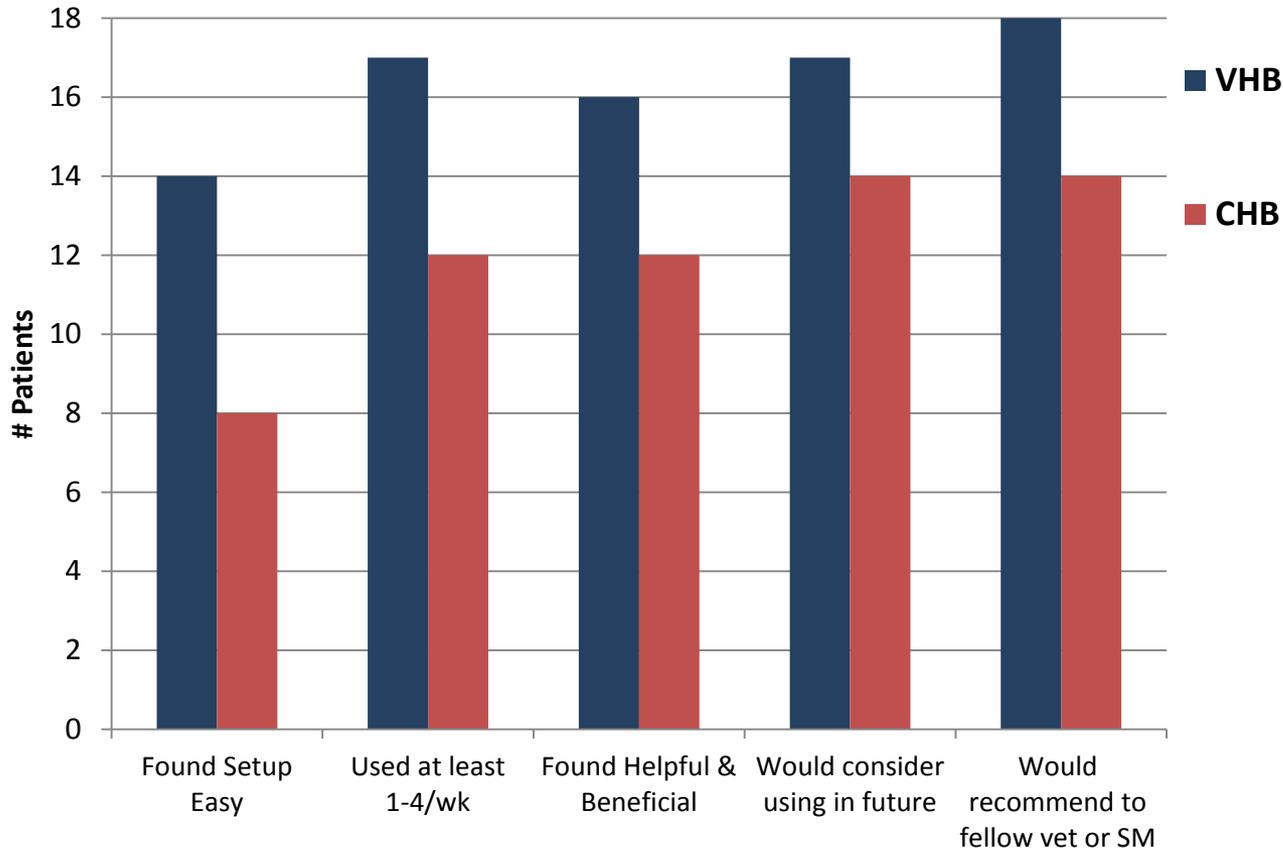
# Pilot

# Pilot study: Cross-Over Design



# Brief Summary of Pilot Study Results

VHB/CHB Patient Feedback N=18



## Compared to CHB, more patients:

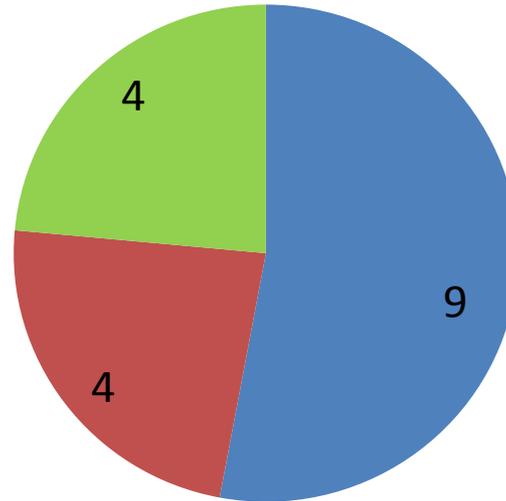
- Used the VHB regularly;
- Found the VHB beneficial and helpful;
- Found the VHB easy to set up;
- Said they were likely to use the VHB in the future and;
- Would recommend the VHB to peers.

# Self-Report

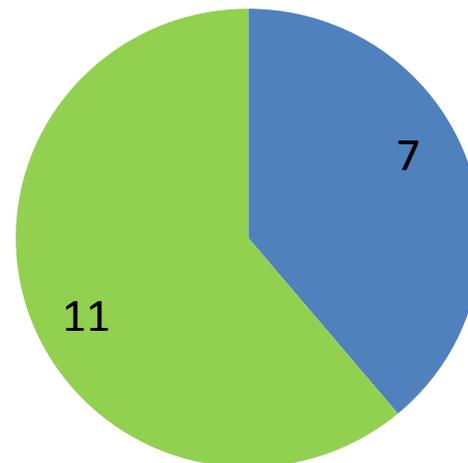
## Reported Preferences between VHB and PHB

Compared to the Self-Soothing Box or Physical Hope Box,

- a) Twice as many patients preferred the VHB for future use than the PHB.
- b) Some recommended using both VHB and PHB as a complementary combination
- c) None (0) of the patients would recommend the PHB alone to fellow veterans or SMs
- d) 38.8% (7) would recommend the VHB alone
- e) 61.1% (11) would recommend the VHB and PHB in combination.



- Prefer VHB alone for future use
- Prefer PHB alone for future use
- Prefer Combination of VHB & PHB for future use

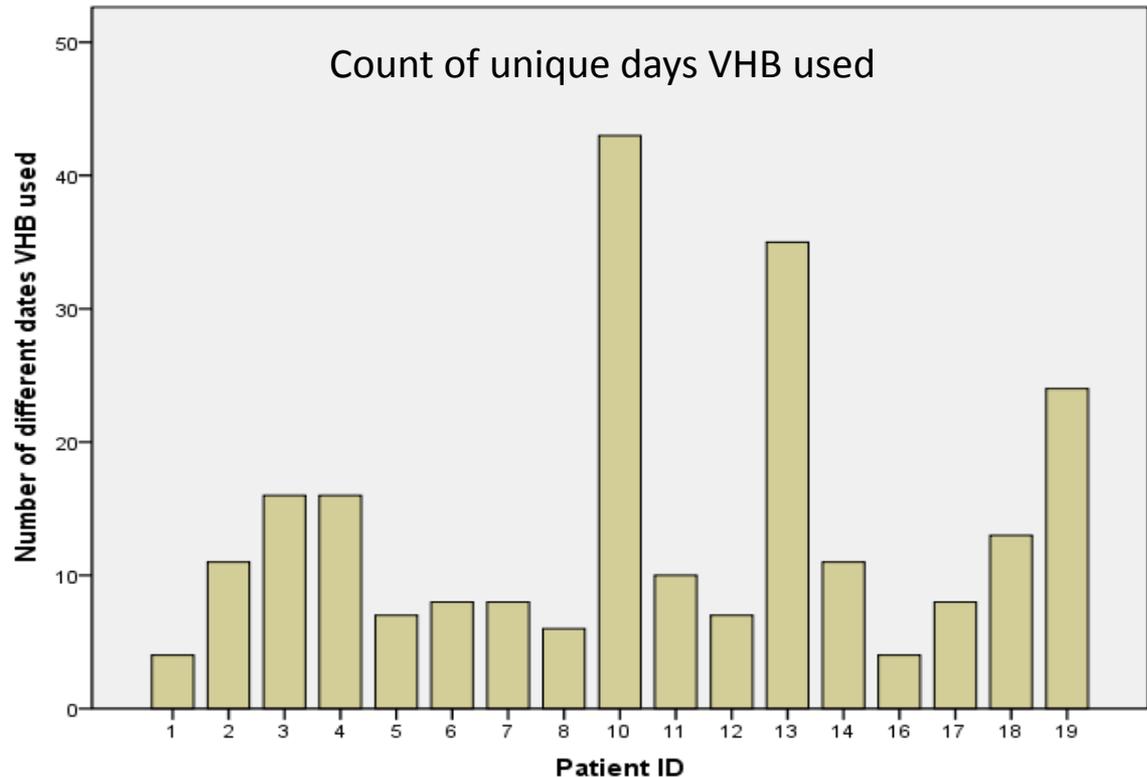


- Would recommend VHB alone to fellow SM or Vet
- Would recommend PHB alone to fellow SM or Vet (none)
- Prefer Combination of VHB & PHB for future use

# Brief Summary of Pilot Study Results

## Patients added new material to the VHB

- 483 Photos
- 328 Quotes
- 184 Music files
- 74 Contacts
- 40 Coping Cards



Of 17 patients, VHB used on average more than 13 separate days (mean=13.58) away from the clinic – ranging from a minimum 4 different days to as many as 43 different days.

# Brief Summary of Pilot Study Results

## Feedback & Testimonials

**Patients overwhelmingly positive and enthusiastic. Detailed descriptions of how VHB was used as coping tool.**

- *“Controlled breathing helps me to relax. Pictures remind me that I have a reason to stay on the earth”*
- *“Quotes keep me thinking about who I am and gave me positive messages. Coping cards reminded me that it is ok to not be perfect”*
- *“Helped to soothe when thought about cutting. Was distracting until felt better”*

**MH Providers also very complimentary: VHB helps structure in-person sessions, has broad benefits across multiple disorders.**

- *“I think VHB could be used both therapeutically or more generalized to other vets. I found it seemed beneficial to those who used it and were engaged with it, not just those with suicidal ideation – good for distress tolerance in general.”*
- *“Lots of disorders could benefit, like PTSD, depression, anxiety – it could be generalizable therapeutically. It’s not so specific that it only works for certain disorders.”*

# Audience Poll

What do you think about integrating technology such as smartphone apps into clinical practice?

- Approve
- Neutral
- Disapprove

# Randomized Clinical Trial

# Specific Objectives

- **Objective:** Assess the impact of VHB on Suicidal Ideation (SI), Coping with Stress, Reasons for Living, and other issues in Veterans in treatment who have been diagnosed at high risk for SI
  - Expand reach of VHB beyond pilot DBT clinic to broader VA MH care
  - Evaluate the impact over time of VHB on symptoms at four discrete measurement points during TAU
  - Compare the impact over time of VHB with TAU enhanced with a printed alternative or analog (ETAU)\*
  - Assess patient experience of VHB: usage, reported usability, perceived benefits, and perceived impact on emotional disequilibrium

\*Printed materials content adapted with permission from “Coping with Suicidal Thoughts,” by Dr. Joti Samra, R. Psych. and Dr. Dan Bilsker, R. Psych. (2007), Consortium for Organizational Mental Health (COMH; [www.comh.ca](http://www.comh.ca)), Faculty of Health Sciences, Simon Fraser University, Vancouver, BC. Inquiries may be directed to: [comh.ca](http://comh.ca).

# Methods

- **Design:** RCT of VHB vs. enhanced usual care at 4 time points over 12 weeks
- **Measures:**
  - **Baseline, 3, 6 and 12 weeks:** *Beck Scale for Suicidal Ideation (BSS 5-item screener), Brief Reasons for Living Inventory (BRFL) Coping Self-Efficacy (CSE), Self-reported Usage of VHB or TAU Materials (3, 6, 12 weeks)*
  - **Baseline and 12 weeks (Pre-Post):** *Interpersonal Needs Questionnaire (INQ) (-thwarted belongingness, burdensomeness), Columbia Suicide Severity Rating Scale (C-SSRS 2 items- aborted and interrupted attempts), Cohen Perceived Stress Scale (PSS)*
  - **12 Weeks (Post):** *Usability, Usage, Benefits, Structured Interview*
  - **Throughout:** *VHB Electronic Usage Log*
- **Analysis:** Longitudinal mixed effects regressions, generalized estimating equation models (GEE), descriptive

# Changes to VHB post-pilot

- Coping Cards section renamed "Coping Tools"
- Activity planner moved from Distract Me to Coping Tools
- Added three Guided Meditations to Relax Me
- Developed printed Clinician and User Guidelines
- Made some features or instructions on app more obvious or clearer
- Technical: better reliability and security through updates

# Treatment conditions: ETAU

## Coping with Suicidal Thoughts

### How can I better understand my suicidal thoughts?

Some problems and experiences, especially around for a long time, can leave you feeling overwhelmed. At these times, you may think of suicide as the only option left. You may think about suicide as an emotional pain.

People who kill themselves often think that their problems are unbearable and can't be fixed. They feel like their situation will change. Their emotions are so strong that it becomes harder to trust, or to think about the future. When you are thinking about suicide, it is important to connect with available love and support. Remember that you can't stand another minute, but you can stand another day. Remember that feelings (e.g., grief, anger, sadness) especially at this intense level, don't last forever. Remember that suicide can become very strong, especially if you use drugs or alcohol. It is important to not use drugs or alcohol if you feel hopeless or are thinking about suicide.

Some of the thoughts you may have are:

- believing there are no other options
- Sensing your family or friends would be better off without you;
- Thinking you've done something so bad that suicide is the only option;
- Experiencing unbearable pain that you think will go on forever;
- Wanting to let your loved ones know how much you hurt;
- Wanting to hurt or get revenge on someone.

Your feelings of pain are very real. However, there is hope. With the help of professional family and friends, you can learn about what you are feeling and how you can change or manage it.

This document is not a substitute for professional help. This handout has been adapted from Dan Bilsker, R. Psych. (2007), [www.comh.ca](http://www.comh.ca).

Veterans

## Coping with Suicidal Thoughts

### What can I do to learn more?

#### Useful Phone Numbers (24 hrs/day, 7 days/week)

National Crisis Lifeline: **1-800-273-TALK** or **1-800-273-8255**  
(Press 1 for the Veterans Crisis Hotline)  
National Hopeline Network: **1-800-SUICIDE** or **1-800-784-2433**  
Substance Abuse Treatment Referral Line: **1-800-662-HELP** or **1-800-662-4357**  
Defense Centers of Excellence Outreach Center: **1-866-966-1020**

#### Other Useful Phone Numbers

Dep't of VA Vet Center Call Center: 1-877-WAR-VETS  
Mental Health America: 1-800-969-6642  
Alcoholics Anonymous: 1-212-870-3400  
Narcotics Anonymous: 1-818-773-9999  
Problem Gambling Confidential Helpline Network: 1-800-522-4700  
Substance Abuse and Mental Health Services: A Health Information Network: 1-877-726-4727

#### Useful Websites

Veterans Crisis Line Website: [www.veteranscrisisline.net](http://www.veteranscrisisline.net)  
American Association of Suicidology: [www.suicidology.org](http://www.suicidology.org)  
National Center for PTSD: [www.ptsd.va.gov](http://www.ptsd.va.gov)  
Afterdeployment.org: [www.afterdeployment.org](http://www.afterdeployment.org)  
Military Mental Health: [www.militarymentalhealth.org/](http://www.militarymentalhealth.org/)  
Substance Abuse and Mental Health: [www.samhsa.gov/](http://www.samhsa.gov/)  
Suicide Prevention Resource Center: [www.sprc.org/](http://www.sprc.org/)  
National Institute of Mental Health: [www.nimh.nih.gov](http://www.nimh.nih.gov)  
National Alliance on Mental Illness: [www.nami.org](http://www.nami.org)  
Make the Connection: Shared experiences and support for Veterans: [www.maketheconnection.net](http://www.maketheconnection.net)

#### Books

- **Courage After Fire: Coping Strategies for Troops Returning from Iraq and Afghanistan and Their Families.** Armstrong, Keith; Best, Suzanne; and Domenici, Paula (2006). Ulysses Press: Berkeley, CA. eulon Press.
- **The Power of Resilience: Achieving Balance, Confidence, and Personal Strength in Your Life.** Brooks, Robert and Sam Goldstein. (2003). Chicago: Contemporary Books.
- **Once a Warrior—Always a Warrior: Navigating the Transition from Combat to Home—Including Combat Stress, PTSD, and mTBI.** Hoge, Charles (2010). GPP Life.
- **After the war zone: A practical guide for returning troops and their families.** Friedman, Matthew; Stone, Laurie (2008) De Capo Press.
- **Down Range: To Iraq and Back.** Cantrell, Bridget; Dean, Chuck (2005). Wordsmith Pub.
- **War and the Soul: Healing Our Nation's Veterans and Their Families from Post-Traumatic Stress Disorder.** Tick, Edward (2005). Quest Books.

## Safety Plan

It is recommended to have a trusted family member, friend, or professional help you to develop a safety plan. If you have thoughts of hurting yourself, start at Step 1. Go through each step until you are safe. Remember: Suicidal thoughts may seem like they will last forever. With support, they will usually pass. When they pass, you can put problems that have contributed to you feeling so sad to rest. You may feel now will not last forever. It is important to get help and support. You can get through this difficult time by focusing on the things you can do to focus and think clearly when you feel suicidal, and in places where you can easily use it, such as your home.

## Feelings?

## Meditation and Mindfulness

**Meditation** and **mindfulness** are not new concepts. Meditation is a state of resting while remaining awake and alert. Your body has an instinctive ability to meditate.

You don't have to be religious or spiritual to practice mindfulness. Research shows meditation and mindfulness have a positive impact on health including:

- Treatment of Post-Traumatic Stress Disorder (PTSD) symptoms
- Improved mental health
- Enhanced pain tolerance
- Reduction in depressive symptoms
- Reduction in stress

### Meditation and mindfulness

are techniques in which a person becomes intentionally aware of their present thoughts and actions.

**Meditation** comes in a variety of forms. You can practice meditating by counting to ten while you practice deep breathing. Breathe in deeply, then count off each time you exhale. This will help you focus your thoughts and rid yourself of distractions. By focusing and living in the present moment, those who practice meditation begin to see life more clearly.

**Mindfulness** is an activity that can be done anytime. You focus on what is happening in the moment, while paying attention to your self-talk. It's possible to be mindful of the sensations in your feet while walking, or the sound of the wind in the trees, or the feeling of soapy water while doing dishes. Pay attention to your self-talk: "I wish I didn't have to walk any further, I like the sound of the leaves rustling, I wish washing dishes

dry out my skin," and so forth. Once you notice your self-talk, you can remove any judging thoughts that are a part of it. For example, "washing dishes: boring" may become "washing dishes: washing dishes." Two things to remember:

1. Any activity done mindfully is a form of meditation.
2. Mindfulness can be done anytime.

Try practicing meditation or mindfulness for a few minutes each day. Pick a quiet place. It's usually necessary to practice for a few weeks before feeling the benefits.

# Preliminary Findings

# Sample: Veterans enrolled with SI in 11 MH clinics: Baseline demographic characteristics of VHB and ETAU treatment groups

	VHB (n = 58)	ETAU (n = 60)
Age (M, SD)	46.8 (13.9)	48.4 (14.2)
Female (%)	37.9	25.0
White, not Hispanic (%)	70.7	73.7
4-year college degree (%)	31.0	25.0
Former branch of Service (%)		
Air Force	17.2	13.3
Army	41.4	40.0
Marine Corps	13.8	13.3
Navy	20.7	28.3
Coast Guard/Multiple/Unknown	6.9	5.0
Former rank/grade (%)		
E1-E4	62.1	70.0
E5-E9	32.8	25.0
Officer	5.2	3.3
Missing	0.0	1.7
Ever deployed (%)	53.5	56.7
Operation Desert Storm	8.6	8.6
OEF/OIF/OND	20.7	20.0
Vietnam	8.6	8.3

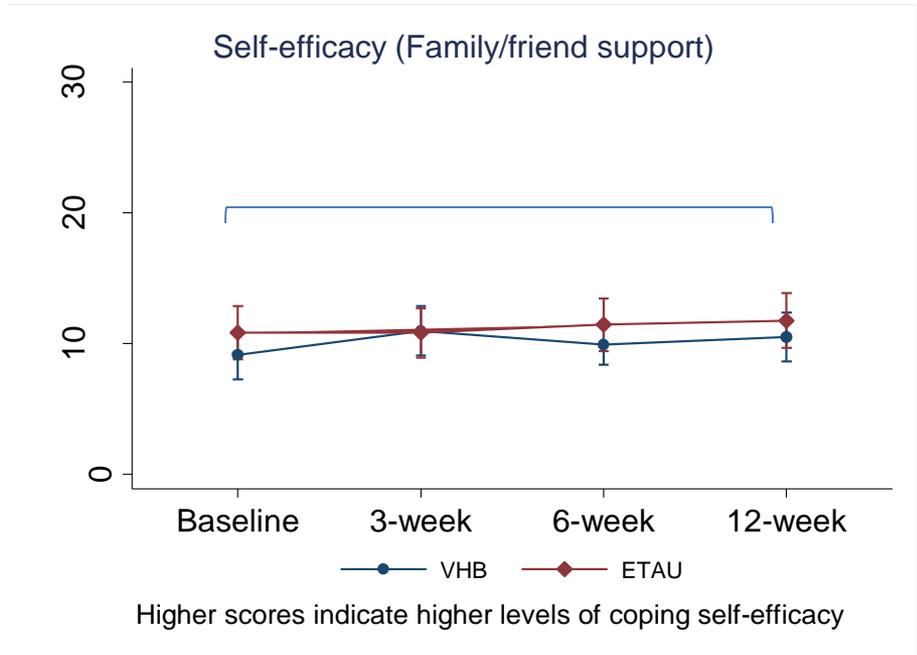
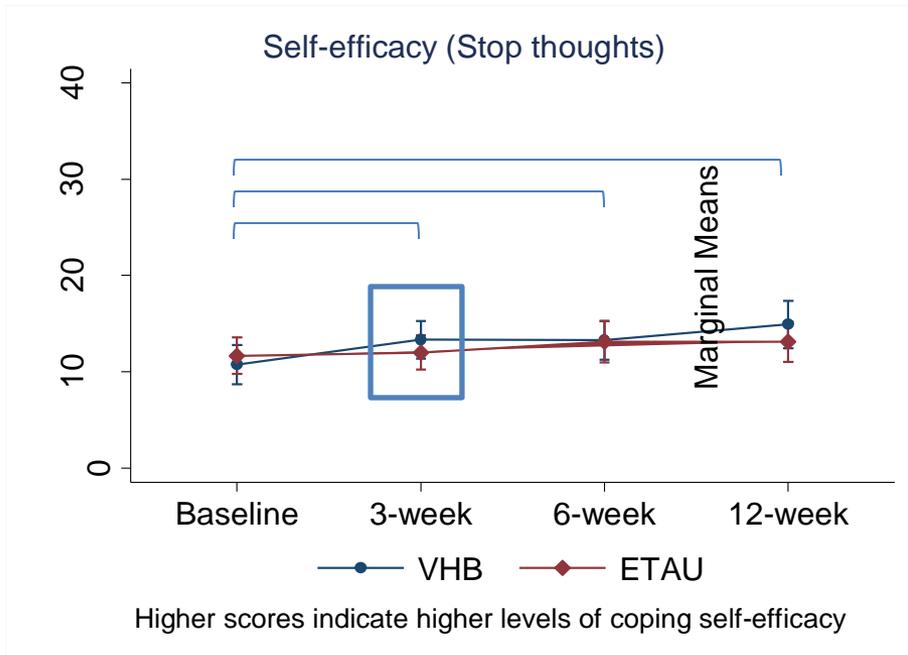
# Baseline measures

Measure	VHB Mean (sd)	eTAU Mean (sd)
Coping Efficacy (Possible range 0-10)	3.2 (1.90)	3.4 (1.99)
Stop unpleasant emotions and thoughts	2.7 (1.99)	2.9 (1.90)
Get support from friends and family	3.1 (2.42)	3.6 (2.65)
Use problem-focused coping	3.7 (2.32)	3.8 (2.17)
Reasons for Living (Possible range 1-6)	3.1 (1.00)	3.1 (1.10)
Responsibility to family	3.7 (1.70)	3.7 (1.84)
Child-related concerns	4.5 (1.84)	4.1 (1.79)
Fear of suicide	2.6 (1.51)	2.5 (1.39)
Fear of social disapproval	2.4 (1.66)	2.2 (1.35)
Moral objections	2.4 (1.64)	2.6 (1.78)
Suicidal Ideation (Possible range 0-10)	3.3 (2.59)	3.5 (2.88)

# Follow-up Rates

- 3 Weeks: 94.9%
- 6 Weeks: 90.7%
- 12 Weeks: 89.9%

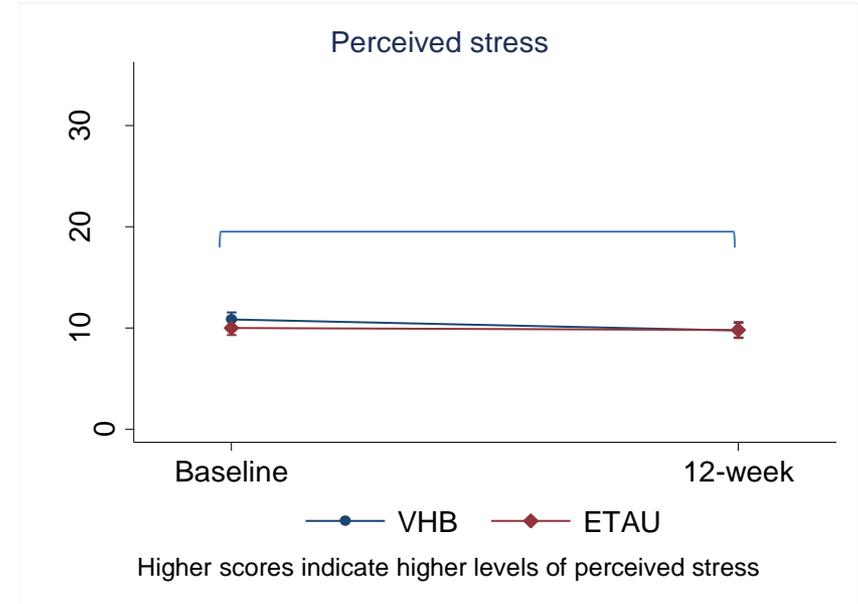
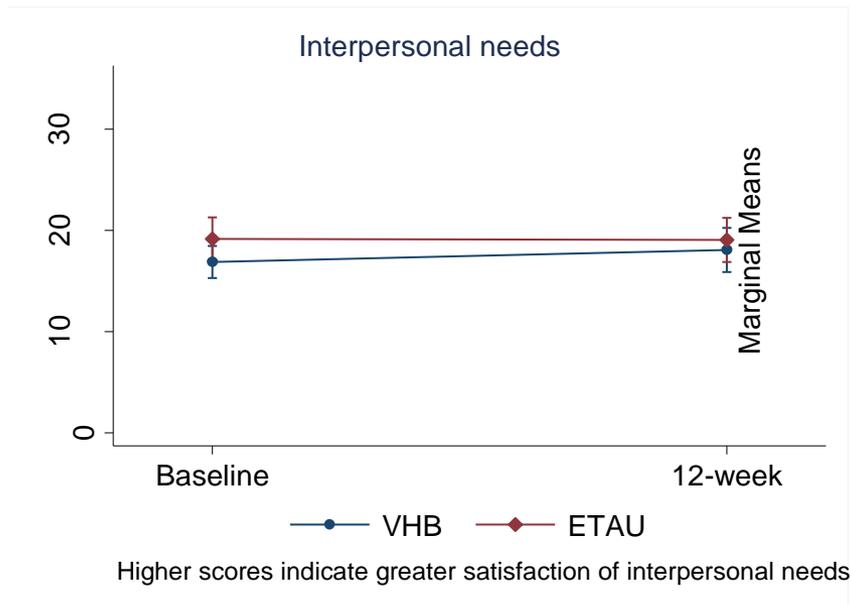
# Impact on Symptom Change: Coping Self-Efficacy



## Statistical Significance

- Improved Coping (Thoughts) from Baseline at all time points ( $p_{3\text{ week}} = .009$ ,  $p_{6\text{ week}} = .001$ ,  $p_{12\text{ week}} < .001$ )
- Improved Coping (Enlisting support from family/friends ) from Baseline at 12 weeks ( $p = .032$ )
- VHB higher Coping (with unpleasant emotions and thoughts) at 3 weeks than ETAU ( $p = .039$ )

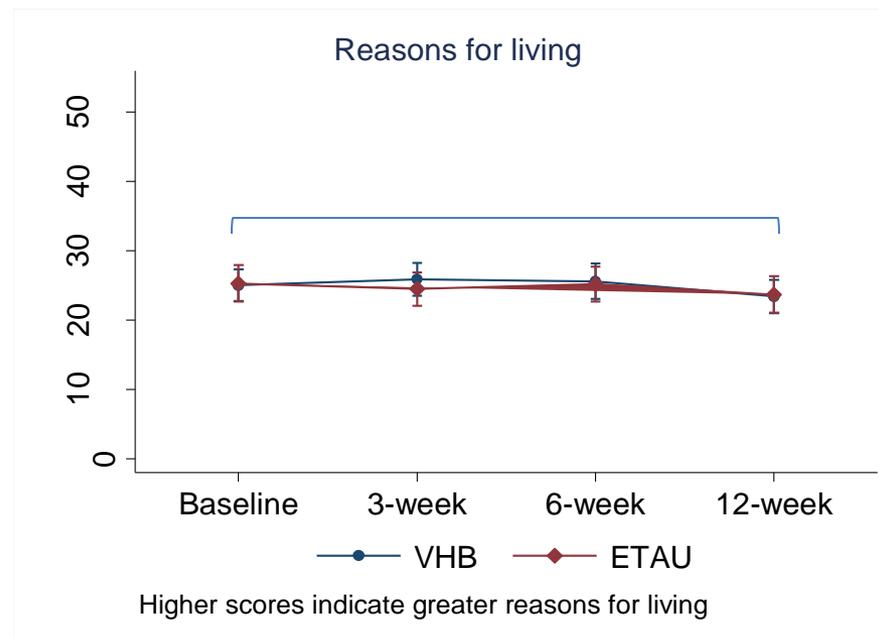
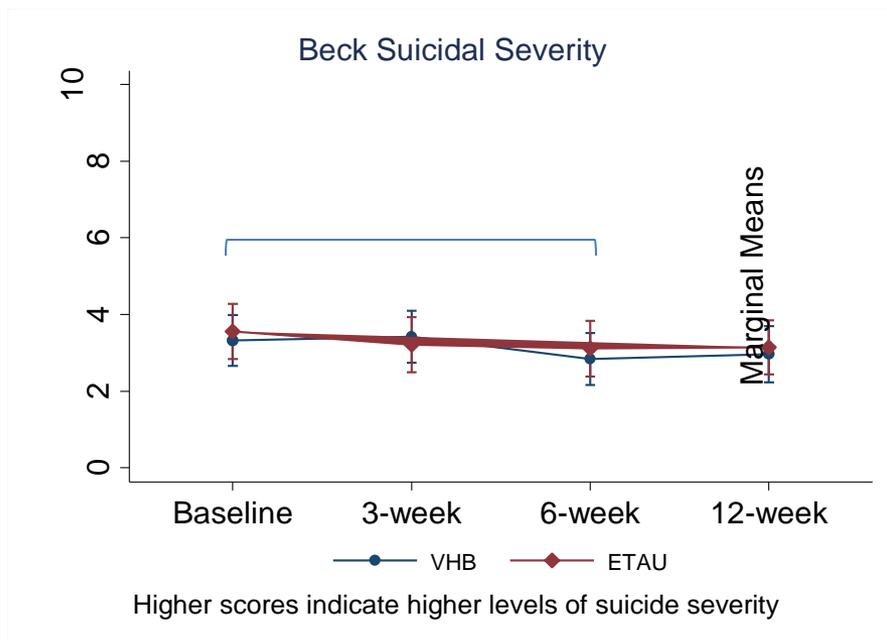
# Impact on Symptom Change: Belongingness & Perceived Stress



## Statistical Significance

- No differences between VHB and TAU
- No difference over time in thwarted belongingness
- Both groups: Less perceived stress from Baseline at 12 weeks ( $p = .042$ )

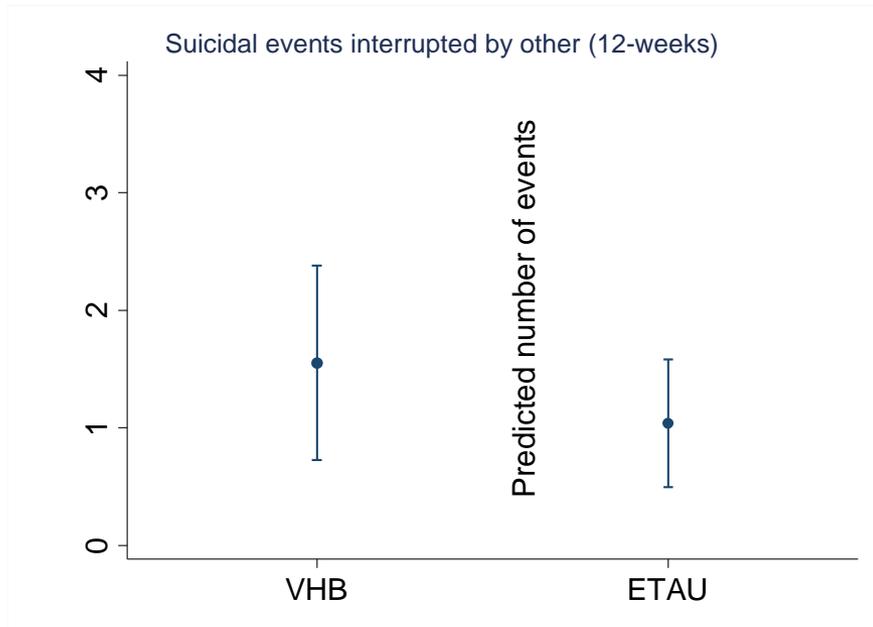
# Impact on Symptom Change: “Suicidality”



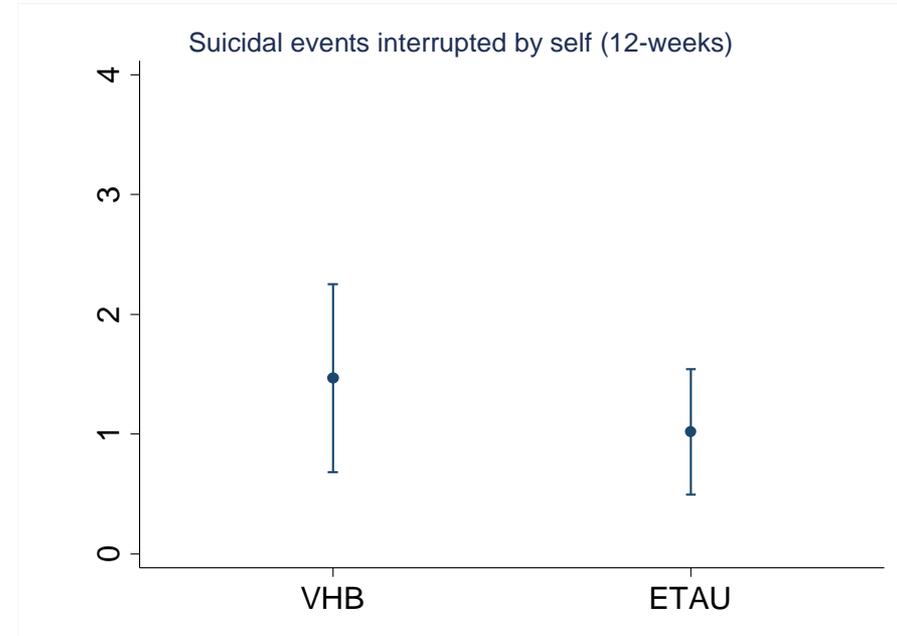
## Statistical Significance

- No differences between VHB and TAU
- Both Groups: Reduced suicidal ideation from baseline to 6 weeks ( $p = .017$ )
- Both Groups: Lower reasons for living from baseline to 12 weeks ( $p = .023$ )

# Impact on Symptom Change: Interrupted Suicidal Events (Columbia)



IRR [VHB/ETAU] = 1.55  
(95% CI = 0.73, 2.38)

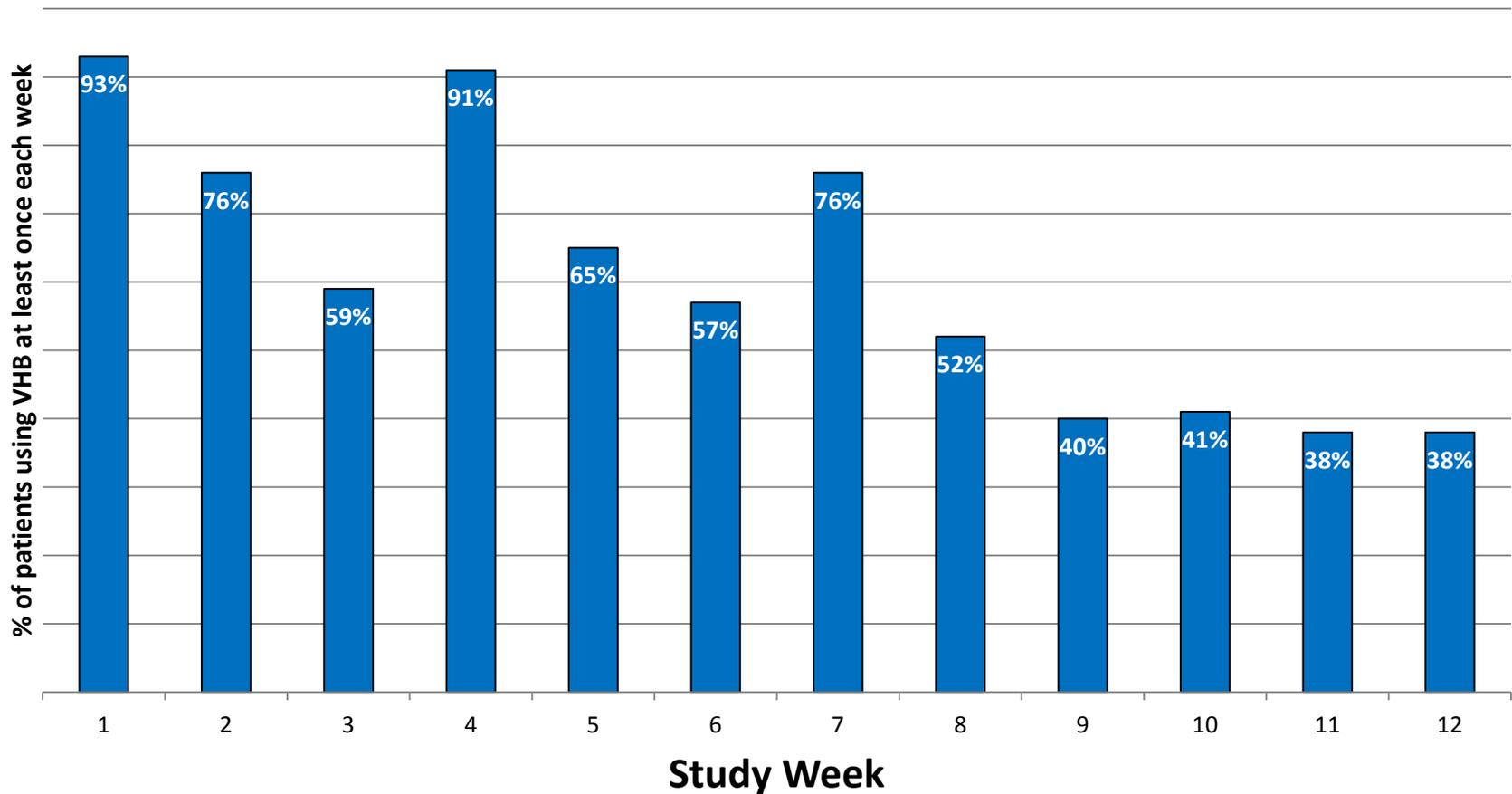


IRR [VHB/ETAU] = 1.44  
(95% CI = 0.69, 3.02)

No significant differences

# Objective VHB Usage

% of VHB users per study week (N=58)



# VHB Satisfaction

## **Nearly all participants had positive feedback about VHB:**

- *“I really think it's very helpful. It's a good resource especially for people to keep to themselves.”*
- *“It's nice to have everything in one spot. The fact that it's easy to use, when you're feeling funky it doesn't take a lot of thought.”*

## **Participants identified numerous benefits of VHB:**

- *“When I would remember it, it was almost like a relief because I knew it would pull me out of the space I didn't want to go.”*
- *“Get my mind off suicide and get my mind off the things that were bothering me.”*
- *“Just the fact of having it with me provided a really good outlet and I had it on me most of the time.”*

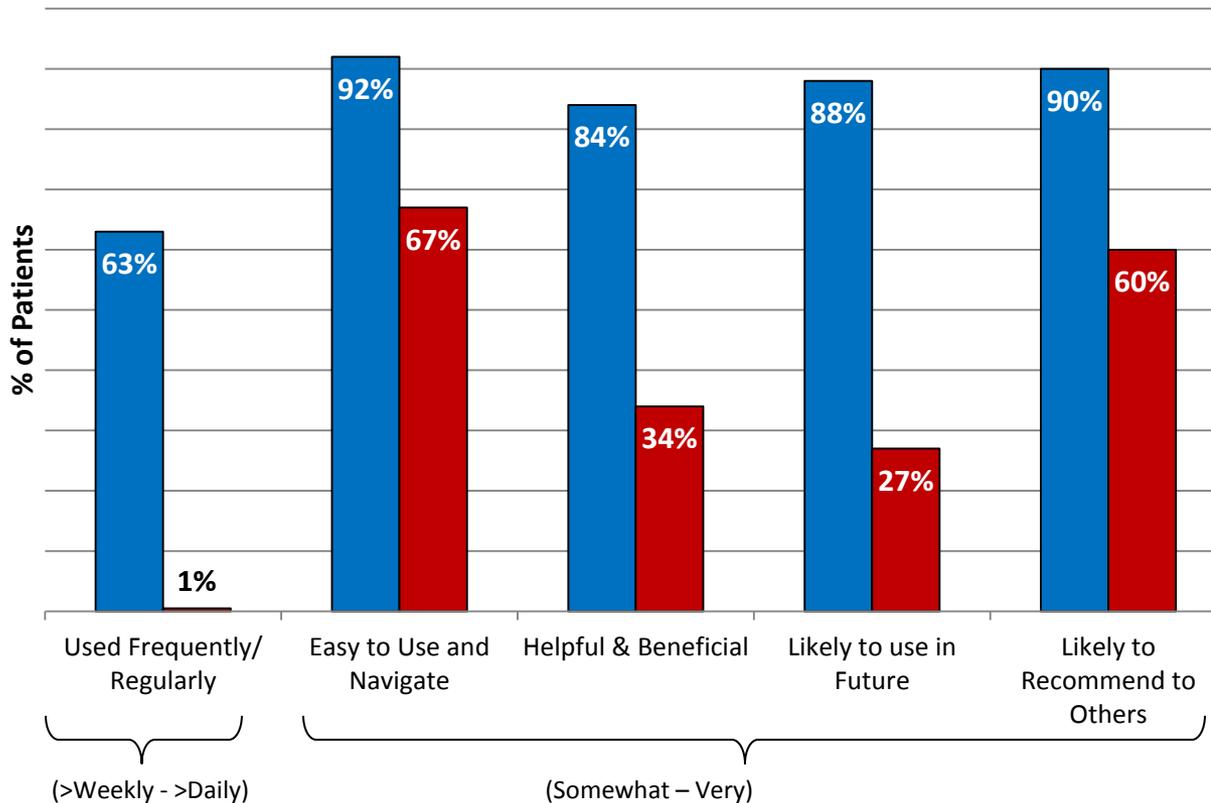
## **MH Providers enhanced use of VHB:**

- *“He pulled up a seat next to me and we both looked at the app together. He was really good about giving me ideas for coping skills to put in my coping card. I got a better list because I was working with him otherwise I wouldn't have come up with all the ideas myself.”*

# Usability & Benefit

## Week 12 Patient Feedback

■ VHB (N=49) ■ ETAU (N=55)



## Reasons for Using VHB

1. Feeling Distressed (69%)
2. Emotions Overwhelming (57%)
3. Relaxation, Distraction, Inspiration (51%)
4. Felt like hurting myself (31%)
5. Other  
*(Health needs, Felt couldn't stand this anymore, Thought this would never end, Couldn't breathe, Exploration, Adding content, Showing it to others)*

# Summary:

## VHB vs. ETAU- Self-Report

- **VHB vs. ETAU Follow-up Questionnaires :**
  - Two thirds of the 49 VHB patients reported that they used the VHB regularly. Only 3 of 55 patients reported using the ETAU materials regularly
  - One fourth more patients reported that the VHB was easy to use than patients reporting on the ETAU materials
  - Nearly three times as many patients described the VHB as helpful and beneficial than did patients reporting on the ETAU materials
  - More than three times as many patients said they would use the VHB in the future than did patients reporting on the ETAU materials
  - Almost one-third more patients said they would recommend the VHB to others than did patients reporting on the ETAU materials

# Summary:

## VHB as Value-Added Tx Intervention

- **Symptom change over time?**  
Various modest (but statistically significant) improvements over time for VHB and ETAU in coping self-efficacy, suicidal ideation, perceived stress. Lower reason for living between baseline and 12 weeks
- **Value-added effect of VHB vs. ETAU on symptoms?**  
Almost no differences between arms in standardized outcomes
- **Restoring equilibrium?**  
Patients reported using the VHB as per design (when feeling distressed, when emotions were overwhelming, when they felt like hurting themselves, for relaxation, distraction, and/or inspiration)

# Preliminary Speculation

*Findings support VHB as useful accessory to primary treatment but not as intervention in own right*

- **VHB intended as accessory to treatment for use as needed rather than to permanently change state.**
- **Impact of VHB may be transitory and may not coincide with fixed measurement points- no long term stability in symptom changes attributed to VHB- for example, no sustained and enduring state of improved SI caused by VHB. According to patient feedback and previous usage data VHB impact more likely “as needed”.**
- **VHB designed primarily to restore stability/homeostasis rather than decrease enduring stresses**

# Translation into practice

# Since Pilot

- 1. Release:** Revised production VHB released as free app to Android and IOS marketplaces March/April 2014.
  - Mean approx. 4,000 downloads/month in 2015, >54,000 downloads to date
- 2. Marketplace:** Unprecedented flood of positive endorsements from downloaders. Testimonials of benefit from providers and patients.



# Translation into Practice: Downloads & User Guides

- Android

<https://play.google.com/store/apps/details?id=com.t2.vhb>

- IOS

<https://itunes.apple.com/us/app/virtual-hope-box/id825099621?mt=8>

- Downloadable Clinician and Patients Use Guides

<http://www.t2health.org/apps/virtual-hope-box>

<http://www.t2health.dcoe.mil/apps/virtual-hope-box>

**Paper of pilot results** : Bush NE, Dobscha SK, Crumpton R, et al. A Virtual Hope Box Smartphone App as an Accessory to Therapy: Proof-of-Concept in a Clinical Sample of Veterans. *Suicide & Life-Threatening Behavior*. 2014. DOI: 10.1111/sltb.12103

Android



IOS



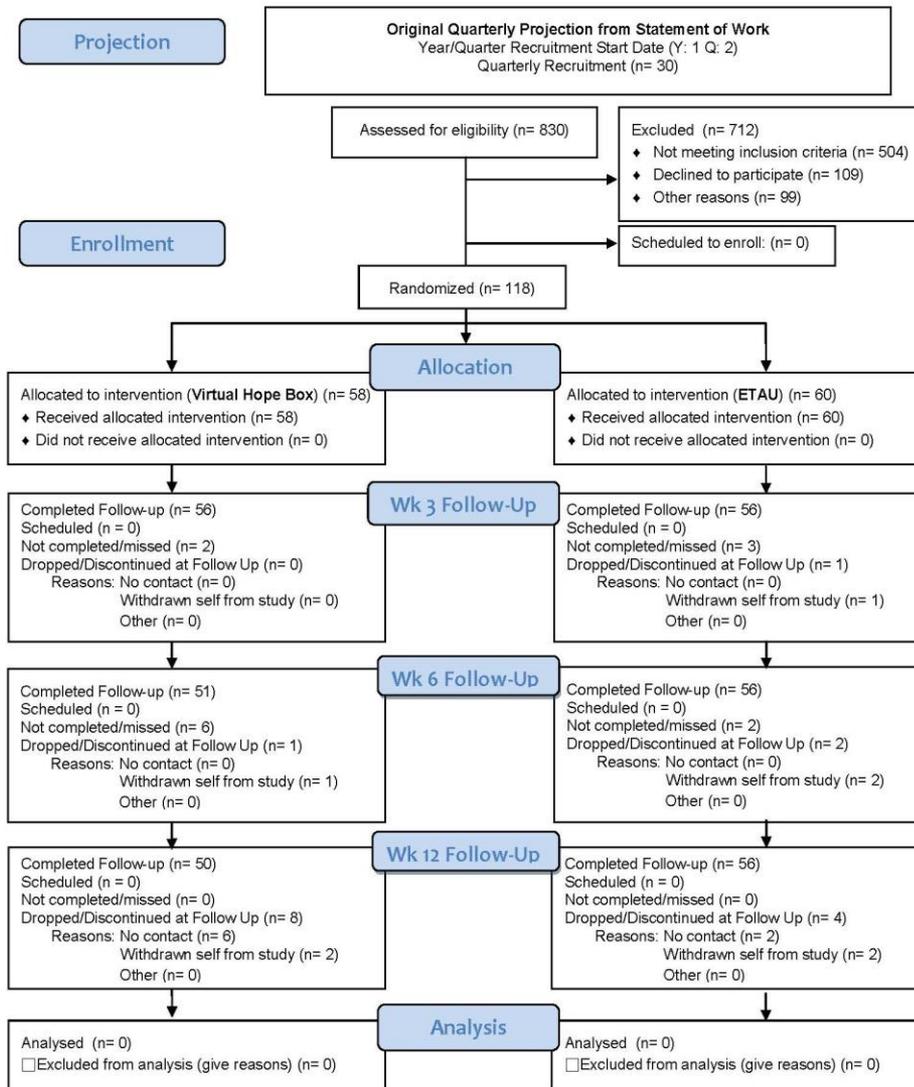
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# Questions?

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# Consort



NOTES: provide any additional comments