Promising Technologies: Systems and Models of Deployment

A Broad View of the Field

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Disclosure

Affiliated with small business that develops and licenses technology-based behavioral health therapeutic tools (HealthSim, LLC)
Promise of Applying Technology to Behavioral Health

• The digital landscape of Internet and mobile technologies has transformed our society, (e.g., in finance, retail, travel, and social relations).

• Technologies can also enable new models of behavioral health care both within and outside of formal systems of care, while increasing the quality and reach of care and reducing costs.

• They may include applications for clinical populations (e.g., substance use, mental health, medication-taking) as well as prevention/wellness promotion (e.g., “quantified self movement” of behavioral tracking to increase self-knowledge via data)
Promise of Applying Technology to Health

- Technology offers considerable promise for impacting the spectrum of health and wellness, ranging from assessment, prevention, treatment, recovery support, and care coordination

  - **Assessment and Monitoring Tools:** increase standardization and accuracy of data collection, in a wide array of settings, in real time

  - **Interventions:** e.g., prevention interventions; behavior therapies; self-learning and self-management tools (skills training, goal setting/tracking, behavior change)

  - **Therapeutic support for individuals, families, and clinicians**

  - **Engage consumers and a care network of their choosing (e.g., decision support systems, social media)**

  - **Expand reach of clinicians**
Promise of Applying Technology to Health

• **Reach:** Offer great promise for enabling the widespread dissemination of evidence-based interventions targeting health behavior.

• **Quality:** Deliver care with fidelity, ensuring delivery of empirically-supported care

• **Personalization:** Responsive to each individual’s profile of needs, preferences, culture, level of cognitive functioning, etc.

• **Engagement:** Offer the potential to enable individuals (and optionally an extended support network) to play leading roles in their own care management.
Promise of Applying Technology to Health

• Enable **on-demand access** to “just in time” therapeutic support via electronic devices, delivered anytime/anywhere

• Can **prevent costly escalation** of health-related problems and unnecessary healthcare utilization.

• **Reduce stigma and barriers/disparities** in access to care endemic to many traditional care models

• **Increase service capacity of systems of care** (ability to treat a much larger number of clients with the same number of clinicians)

• Considerable **population-level significance** due to the large unmet behavioral health needs
Access to the Internet and mobile devices has been growing at extraordinary rates.

Over 90% of individuals worldwide have access to mobile phone services, totaling about 6.8 billion mobile phone subscriptions worldwide.

There are over 1.4 billion smartphones in the world, and smartphone access is expected to triple globally to 5.6 billion by 2019.

Internet and mobile access is also high and growing among even the most traditionally underserved and vulnerable populations.
Research has demonstrated that technology-based behavioral health tools (if developed well and in collaboration with the target audience):

- Can be highly useful and acceptable to diverse populations
- Have a large impact on health behavior and health outcomes
- Can produce outcomes comparable to, or better than, clinicians
- Increase quality, reach, and personalization of care
- Can be cost-effective
- Can be responsive to individuals’ health behavior trajectory over time
Prevalence and Significance of Behavioral Health Disorders

Mental health and substance use disorders are common

- Approx. 1 in 4 to 1 in 5 adults are diagnosable with >1 mental health disorders
- Approx. 1 in 10 adults are diagnosable with >1 substance use disorders

Persons with behavioral health disorders are among the most frequent and costliest utilizers of health care services.

- Overall annual economic cost of mental health disorders estimated at over $300 billion (increased from $35 billion in 1996)
- WHO estimates that mental illness accounts for more disability in developed countries than other groups of illnesses (including cancer and heart disease)
The Role of Behavioral Health in Chronic Disease Management

Behavioral Health Disorders are highly prevalent among Clinical Populations with Chronic Physical Health Conditions (approx. 133 million Americans, accounting for over 75% of health care costs)

- e.g., Persons with diabetes have 40-72% incidence of depression; 50% incidence anxiety

All chronic physical health conditions diseases require health behavior change, and the course and treatment of chronic diseases are frequently complicated by behavioral health problems

- Lower quality of life, poorer response to treatment, worse medical and psychiatric outcomes, higher mortality and higher costs of care.

- e.g., when depression co-occurs with diabetes, health care costs increase by 50-75%.
Under the Affordable Care Act (ACA), health care settings that have traditionally focused on physical health conditions (e.g., primary care) must now also offer care for substance use and mental health disorders.

As a result of this confluence of factors, there is a tremendous and growing need to care for behavioral health care in health care settings that do not currently have sufficient capacity to meet this need.
Unprecedented Opportunities for Effective and Cost-effective Technology-based Solutions

• Technology offers great promise for helping to realize the integration of behavioral and physical health in a manner that increases quality of care while containing costs.

• Mobile communication technologies that embrace the behavioral dimensions of multiple chronic-condition care can dramatically decrease barriers to successful management.

• Health information and communication technologies may transform health care service delivery models.
Implementation of Technology-based Therapeutic Tools

• Technology-based therapeutic tools may be deployed via numerous flexible models (e.g., treatment of substance use disorders).

• They may be used along with more traditional models of intervention delivery (e.g., offered as an adjunct to substance abuse treatment).

• In this “clinician-extender” model, clinicians have the opportunity to extend their reach (e.g., supplement to clinician-delivered therapy, pharmacological treatments, etc.)
Alternatively, these therapeutic tools may replace a portion of typical client-clinician interaction.

- This may allow a treatment program to treat more clients with the same number of clinicians and/or free-up clinicians to have more time to spend with clients in need of more intensive care.
Implementation of Technology-based Therapeutic Tools

• These tools may also be offered as stand-alone interventions.

• This may be particularly relevant in rural or other settings where access to care may be limited or for individuals who do not wish to engage in traditional models of care.

(e.g., 90% of persons with substance use and/or mental health disorders are not in treatment)
The Therapeutic Education System (TES) as an Exemplar

- **Therapeutic Education System (TES)** is an interactive, behavioral therapy intervention for substance use disorders.

- Central focus on skills training (e.g., problem solving, coping, communication, decision-making, stress management, goal setting, managing negative moods) and maintaining healthy, reinforcing activities

- Employs informational technologies of demonstrated effectiveness

- Available on multiple platforms (including web-based desktop computers, Android smartphones, iPhones, iPads, etc.)
Sample Screens from TES

Press the module name below to launch that module.
Module 1: Alcohol, Drug Use and Communication Skills
Module 2: Analyze Your Own Behavior Chain
Module 3: Attentive Listening
Module 4: Challenging Automatic Thoughts
Module 5: Giving and Receiving Compliments
Module 6: HIV and AIDS
Module 7: How to Express Oneself Assertively

Seemingly Irrational Decisions (SIDs)

Behavior Chains
Triggers = Behavior = Consequences

Social and Recreational Activities

In addition, looking at what happens as a result of a specific behavior can help you identify consequences of the behavior, both positive and negative. This may serve to increase or decrease the behavior in the future.

What Have You Decided To Do or Not Do This Weekend?
Findings from Scientific Research

• When TES replaces clinician-delivered behavioral therapy, TES is as effective as evidence-based behavioral therapy delivered by therapists.

• When TES partially substitutes for, or is added as a supplement to, standard community-based behavioral treatment, it improves treatment outcomes (as much as doubles abstinence rates).

• TES has been shown to be cost-effective and reduce downstream medical costs.
Partial Replacement Model in Specialty Addiction Treatment – Efficacy Trial

- A NIDA-funded randomized, controlled trial (n=135)
- TES is as efficacious as comparable evidence-based, clinician-delivered therapy and better than standard treatment in promoting objectively-verified drug abstinence among individuals in outpatient buprenorphine treatment (Bickel, Marsch et al., 2008)
NIDA-funded trial (n=160; 12 month evaluation) demonstrated TES enhances abstinence rates in outpatient addiction treatment when TES substitutes for part of standard counseling (Marsch, 2013).

A similar effect observed in CTN Trial.
Partial Replacement Model in Addiction Specialty Treatment – Effectiveness Trial

• Data from the same trial showed that participants with low cognitive functioning, high anxiety, high ambivalence about treatment and heavy alcohol use at treatment entry had better outcomes when receiving TES as part of treatment vs. standard treatment.

• Technology-based interventions may be useful in minimizing the impact of specific risk factors on treatment outcome.

(Acosta, Marsch et al., 2012; Kim et al., Under Review)
Multi-Site Evaluation of TES in prisons: Comparative Effectiveness

- Employed random assignment of male and female inmates with substance use disorders (N=513) to (E) TES (N=258), or (C) Clinician-Delivered Care (N=255) across 10 sites in 4 research centers linked to the NIDA-funded CJDATS network (in CO, WA, PA and KY).

- The prospective, longitudinal study design consisted of three assessment points — baseline and 3- and 6- months post prison release.
Criminal Activity

Percent

Baseline | 3MPP | 6MPP
--- | --- | ---
82 | 40 | 38
79 | 38 | 38

E-TESS
C
Example of a Mobile Psychosocial Intervention as an Adjunct to Care

Random assignment of 50 new intakes in outpatient addiction treatment to: (1) standard care or (2) mobile phone/web-based psychosocial treatment for 12 weeks

The mobile intervention demonstrated good feasibility and acceptability: Participants typically maintained their mobile phones for the duration of the treatment, used the mobile program and reported high levels of acceptability of the program (e.g., how useful, how easy to use, etc.).

Qualitative data indicate that several participants reported using the mobile phone-based intervention during times of heightened risk for drug use.
Treatment Retention
Mobile Psychosocial Treatment
(Chi-square = 4.7; p=.031)

Percent Retained

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<th>Mobile Intervention</th>
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<td>84%</td>
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Objectively Measured Opioid Abstinence Mobile Psychosocial Treatment

(t (48) = -1.97; p= .055)
Implementation Science Study- Integrating Treatment of SUDs into Primary Care
(with David Gustafson, PhD)

• Evaluating a technology-based addiction/treatment recovery support system within FQHCs

• Focus on integrated care using personalized technology-based therapeutic support system available on mobile devices and care coordination with FQHC clinicians

• Focus largely on organizational-level outcomes
Opportunities in Technology Development

• Ensuring clinical considerations drive how technology is employed

• Breaking down siloed, disorder-specific approaches to the development of technology-based health systems

• Engaging consumers as the main driver of development (e.g., to provide greater patient choice and access; greater engagement in their own health and greater opportunity to engage an extended support network)

• Employing fundamental mechanisms of behavior change in the development of technology-based interventions

• Systems that learn; new level of “personalized medicine”
Opportunities for a Science-Informed Strategy for ‘Scaling up’ the Application of Technology to the Transformation of Health Care Systems

Opportunities in Evaluation

- Opportunities within domains of measurement, experimental design, data analytics, and data visualization

- Comprehensive focus on service delivery models and accompanying payment models concurrently (e.g., obtaining data from all relevant stakeholders)

- Importance of an interdisciplinary team to inform adoption and sustained implementation (e.g., experts in clinical care, health economics, financing, technologists)

- Understanding trajectories of consumer engagement (e.g., consumer “adherence” vs. strategic episodic use)

- Models that enable ongoing evaluation and rapid iteration in real-world implementation efforts
Opportunities for Models of Deployment:

• Technology as Clinician-Extender via a “Prescription” Model (e.g., Opportunity for Increasing Reach and Service Capacity)

• Stepped Care models with centralized technology support banks

• Technology Solutions Direct to Consumer

• Technology as Minimally Disruptive Health Care (to reduce burden of illness as well as burden of treatment)

• New Academic-Foundation-Commercial-Government Partnerships

• Opportunities for Global Health