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Behavioral Health Tech Review

National Center for Telehealth & Technology (T2) | t2.health.mil

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QUARTERLY NEWS HIGHLIGHTS

MOBILE APPLICATIONS

5 reasons why you can't ignore mobile health in 2014

More people are searching for health information online every year. Patients are empowered by the surplus of information available to them from their fingertips. But what many health care brands fail to take into account is the significant volume of traffic that comes from mobile devices. Unfortunately, few health care providers' websites are prepared to support this mobile traffic.

http://www.healthcarecommunication.com/Main/Articles/5_reasons_why_you_cant_ignore_mobile_health_in_201_11871.aspx#

Five key trends for mHealth and telehealth in 2014

In 2014, as mHealth shifts into the mainstream, healthcare organizations will need to be able to understand and accept patient-provided data in a large-scale way. What are the five areas to watch for when investigating ways to leverage telehealth and mobile data?
http://ehrintelligence.com/2013/12/19/five-key-trends-for-mhealth-and-telehealth-in-2014/

Workplace health and wellness goes digital

It's no surprise that the majority of Americans' New Year's resolutions involve losing weight, exercising more and reducing stress. What might be more surprising is that they want their bosses to help them. Those findings, part of a national survey of employees conducted late last year by Keas, fall right in line with the trend of collaboration between health plans and employers. But for every company that launches a healthy workplace initiative, several more simply give up when the lunchtime employee walks dwindle to a few participants. The answer? Keas CEO Josh Stevens thinks it lies in apps and wearable devices.
http://www.mhealthnews.com/news/workplace-health-and-wellness-goes-digital

VIRTUAL APPLICATIONS

Virtual Worlds Are Real

Ever since virtual worlds and online games emerged in the mainstream consciousness around 2005, the media has insisted on framing them as escapist fantasies. But avatars have consequences offline. No wonder U.S. intelligence agencies are looking into them.

Five incredible ways Oculus Rift will go beyond gaming

In depth From medicine to military applications

Virtual reality extends further than you can imagine, to tangible, real world applications. Movies are one example, but there are plenty more. Here, TechRadar takes a look at the most exciting and intriguing non-gaming uses for the Oculus Rift see what else lies in the future of virtual reality.
http://www.techradar.com/us/news/gaming/5-incredible-ways-oculus-rift-will-go-beyond-gaming-1220211

POSITIVE ACTIVITY JACKPOT

Positive Activity Jackpot (PAJ) 2.0 is a mobile application designed to build resilience and overcome depression. PAJ automates and simplifies Pleasant Event Scheduling and can be used in conjunction with Behavioral Activation given by a clinical provider.

The newly released PAJ 2.0 simplifies and streamlines the user's experience. PAJ's new interface makes it easier to increase the amount of positive activities your patient can participate in and pair it with a local option.

What's New:

- Revised and simplified tutorial
- Streamlined functionality
- Create "groups" for activity invitations
- Enhancements to the augmented reality viewer

This application allows for a much more convenient method of utilizing Pleasant Event Scheduling therapy with your patients. Many patients who are being treated with this therapy may find the traditional methods of finding activities to be a barrier in and of itself; however with PAJ, exploring pleasant events is much easier and quicker.

More information about this application can be found here.

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The "Behavioral Health Tech Review" is published quarterly by the National Center for Telehealth & Technology (T2) to inform senior military leaders, healthcare providers, and T2 collaborators about existing and new innovative technologies which support the treatment of behavioral health patients. For more information about "Behavioral Health Tech Review" or to submit a story idea or comment, please e-mail us at AskUs@t2health.org or connect on Facebook and Twitter.

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TELEHEALTH

Will 2014 be the year telehealth comes of age?

With the strain on acute hospitals – be it in overstretched A&E units, cancelled operations, bed blockers or hospital-acquired infections, top of the wish list for many will be telehealth and telecare. Yes, we've heard it all before, but perhaps this truly will be the year that telehealth comes of age.

http://www.theguardian.com/healthcare-network/2014/jan/21/2014-telehealth-comes-of-age

Global Telehealth Market Set to Expand Tenfold by 2018

El Segundo, Calif. (Jan. 17, 2014)—The global telehealth market is expected to grow by more than a factor of 10 from 2013 to 2018, as medical providers increasingly employ remote communications and monitoring technology to reduce costs and improve the quality of care, according to IHS Technology (NYSE: IHS). Worldwide revenue for telehealth devices and services is expected to swell to $4.5 billion in 2018, up from $440.6 million in 2013, based on data from an IHS report entitled "World Market for Telehealth – 2014 Edition." The number of patients using telehealth services will rise to 7 million in 2018, up from less than 350,000 in 2013

http://press.ihs.com/press-release/design-supply-chain-media/global-telehealth-market-set-expand-tenfold-2018

INNOVATIVE TECHNOLOGY FOR HEALTHCARE

Healthcare Innovation in 2014

Over the course of 2014, there will be a common thread emerging from the various solutions being tested – EMRs, PCMH, ACOs, and any other in-vogue healthcare trends will all place innovation front and center in trying to crack the healthcare code. And sitting clearly at the center of innovation, technology and healthcare is telehealth – a solution custom designed for the challenges facing our nation.

http://federaltelemedicine.com/?p=1677

I've Seen The Future Of Health Tech And It's Going To Improve Your Life In 2014

Thanks to extraordinary demand for gadgets that make us healthier, stronger, and smarter, the technology industry is putting some serious brain power behind the next generation of wearable health devices. Over the next year, a torrent of new devices is hitting the market to provide automated elite coaching, a pocket-sized clinical lab, and your own personal assistant.

http://techcrunch.com/2014/01/11/ive-seen-the-future-of-health-tech-and-its-going-to-improve-your-life-in-2014/

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Mobile App Behavioral Health State-of-the-Research Report

Research Studies

2013

Ahtinen, A., Mattila, E., Valkkynen, P., Kaipainen, K., Vanhala, T., Ermes, M., ..., & Lappalainen, R. (2013). Mobile mental wellness training for stress management: Feasibility and design implications based on a one-month field study. Journal of Medical Internet Research, 1(2), e11. doi: 10.2196/mhealth.2596

- **Findings**: Stress levels were significantly reduced from pre-app use to post-app use (20 days), and report of life satisfaction was significantly increased.

Ainsworth, J., Palmier-Claus, J., Machin, M., Barrowclough, C., Dunn, G., Rogers, A., ..., & Lewis, S. (2013). A comparison of two delivery modalities of a mobile phone-based assessment for serious mental illness: Native smartphone application vs. text-messaging only implementations. Journal of Medical Internet Research, 15(4), e60. doi: 10.2196/jmir.2328

- **Findings:** Those using mobile app had a greater number of completed data points (questions completed), and SMS reply took 4.8 times longer to complete questions than smartphone app.

Bardram, J. E., Frost, M., Szanto, K., Faurholt-Jepsen, M., Vinberg, M. & Kessing, L. V. (2013). Designing mobile health technology for bipolar disorder: A field trial of the MONARCA system. In CHI '13: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (pp. 2627-2636). New York, NY, USA: ACM. doi: 10.1145/2470654.2481364

- **Findings:** Participants were more apt to use the app than the paper-based assessments

Ben-Zeev, D., Kaiser, S. M., Brenner, C. J., Begale, M., Duffecy, J., & Mohr, D. C. (2013). Development and usability testing of FOCUS: A smartphone system for self-management of schizophrenia. Psychiatric Rehabilitation Journal, Advance online publication. doi: 10.1037/prj0000019

- **Findings:** All participants were able to learn to successfully use the app for schizophrenia symptom management. However, usability testing showed that abbreviations (such as "meds") and longer words (such as "environment") were difficult to understand, but great value was seen for images and visual aids.

Bush, N. E., Skopp, N. A., Smolenski, D., Crumpton, R., & Fairall, J. (2013) Behavioral screening measures delivered with a smartphone 'app': Psychometric properties and user preference. Journal of Nervous and Mental Disease, in press.

- **Findings:** Smartphone versions of behavioral screening measures were found to be highly psychometrically reliable and to perform as well as paper and computer versions.

*Chittaro, L., & Vianello, A. (2014). Computer-supported mindfulness: Evaluation of a mobile thought distancing application on naïve meditators. International Journal of Human-Computer Studies, 72(3), 337-348. doi: 10.1016/j.ijhcs.2013.11.001

- **Findings:** The mobile app was significantly preferred over traditional and computerized methods of teaching and using mindfulness techniques.

*New this quarter

Updated: 4-Feb-14

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Dennison, L., Morrison, L., Conway, G., & Yardley, L. (2013). Opportunities and challenges for smartphone applications in supporting health behavior change: Qualitative study. Journal of Medical Internet Research, 15(4), e86. doi: 10.2196/jmir.2583

- **Findings**: Study findings suggested that young, currently healthy adults have interest in apps that attempt to support health-related behavior change. Accuracy and legitimacy, security, effort required, and immediate effects on mood emerged as important influences on app usage.

Elison, S., Humphreys, L., Ward, J., & Davies, G. (2013). A pilot outcomes evaluation for computer assisted therapy for substance misuse - an evaluation of Breaking Free Online. Journal of Substance Use, Advance online publication. doi: 10.3109/14659891.2013.804605

- **Findings**: Significant (baseline to follow-up) improvement in perceived ability to control cravings and maintain abstinence for those who used the website and accompanying app.

Forchuk, C., Rudnick, A., Hoch, J., Godin, M., Donelle, L., Rasmussen, D., ..., McKillop, M. (2013). Mental Health Engagement Network (MHEN). International Journal On Advances in Life Sciences, 5(1 and 2), 1-10. doi:

- **Findings**: Patients were generally comfortable using iPhones to record mental health information. Hypothesis of RCT is that overall quality of life will improve.

Kristjansdottir, O. B., Fors, E. A., Eide, E., Finset, A., Stensrud, T. L., van Dulmen, S., ..., & Eide, H. (2013). A smartphone-based intervention with diaries and therapist-feedback to reduce catastrophizing and increase functioning in women with chronic widespread pain: Randomized controlled trial. Journal of Medical Internet Research, 15(1), e5. doi: 10.2196/jmir.2249

- **Findings**: Intervention group reported statistically significant less catastrophizing than control group, and results remained significant at five-month follow-up.

Lappalainen, P., Kaipainen, K., Lappalainen, R., Hoffren, H., Myllymaki, T., Kinnunen, M.-L., ..., & Korhonen, I. (2013). Feasibility of a personal health technology-based psychological intervention for men with stress and mood problems: Randomized controlled pilot trial. Journal of Medical Internet Research, 2(1), e121. doi: 10.2196/resprot.2389

- **Findings**: Depressive and psychological symptoms decreased for the intervention group.

Norberg, M. M., Rooke, S. E., Albertella, L., Copeland, J., Kavanagh, D. J., & Lau, A. Y. S. (2013). The first mHealth app for managing cannabis use: Gauging its potential helpfulness. Journal of Addictive Behaviors, Therapy, & Rehabilitation, Advance online publication. doi: 10.4172/2324-9005.S1-001

- **Findings**: Participants were generally satisfied with the app and were happy with the ease of ability to monitior goals and elicit insight and motivation to reduce cannabis use.

*Osmani, V., Maxhuni, A., Grünerbl, A., Lukowicz, P., Haring, C., & Mayora, O. (2013). Monitoring activity of patients with bipolar disorder using smart phones. ACM Proceedings of International Conference on Advances in Mobile Computing and Multimedia: MoMM2013. Vienna: ACM.

- **Findings**: Analyzing the smartphone activities of patients with bipolar disorder found that there is a greater significant correlation between episodes and individual daily intervals of activities than between episodes and overall activity levels.

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Palmier-Claus, J. E., Rogers, A., Ainsworth, J., Machin, M., Barrowclough, C., Laverty, L., ..., & Lewis, S. W. (2013). Integrating mobile-phone based assessment for psychosis into people's everyday lives and clinical care: A qualitative study. BMC Psychiatry, 13(1), 34. doi: 10.1186/1471-244X-13-34

- **Findings**: Participants who used the app were compared to participants who used an SMS-based style of assessment and symptom tracking. Those who used the app reported three positive themes: 1) appeal of usability and familiarity, 2) acceptability, validity, and integration into domestic routines, and 3) perceived impact on clinical care. Also, repetitiveness of questions via SMS was a barrier for long-term adoption in control group.

Pelletier, J.-F., Rowe, M., Francois, N., Bordeleau, J., & Lupien, S. (2013). No personalization without participation: On the active contribution of psychiatric patients to the development of a mobile application for mental health. BMC Medical Informatics & Decision Making, 13(1), 78. doi: 10.1186/1472-6947-13-78

- **Findings**: Pilot to test app was conducted with the Beck Depression Inventory-II to understand how feasible a self-report app was to use in psychiatric outpatient clinics. Most patients (90%) had no difficulty in understanding the app and 97% had no difficulty with using the app.

Pramana, G., Parmanto, B., Kendall, P. C., & Silk., J. (2013). The SmartCAT: An mHealth platform for ecological momentary intervention (EMI) in child anxiety treatment. University of Pittsburg Press, Advance online publication.

- **Findings**: Pilot to test app was conducted with the Schedule for Affective Disorders and Schizophrenia for School-Aged Children-Present and Lifetime version (KSADS-PL). Patients and providers reported that they had no difficulty with using the app. Authors report that this is the first study to examine the feasibility of using a therapist-assisted app with children to reduce anxiety symptoms.

*Proudfoot, J., Clarke, J. Birch, M. R., Whitton, A. E., Parker, G., Manicavasagar, V., ..., & Hadzi-Pavlovic, D. (2013). Impact of a mobile phone and web program on symptom and functional outcomes for people with mild-to-moderate depression, anxiety and stress: A randomised controlled trial. BMC Psychiatry, 13, 312-324. doi:10.1186/1471-244X-13-312

- **Findings:** The intervention group showed significantly greater improvement in symptoms of depression, anxiety and stress, and in work and social functioning relative to both control conditions at the end of the seven-week intervention phase (between-group effect sizes ranged from d = .22 to d = .55 based on the observed means).

Repetto, C., Gaggioli, A., Pallavicini, F., Cipresso, P., Raspelli, S., & Riva, G. (2013). Virtual reality and mobile phones in the treatment of generalized anxiety disorders: A phase-2 clinical trial. Personal and Ubiquitous Computing, 17(2), 253-260. doi: 10.1007/s00779-011-0467-0

- **Findings:** Those who used virtual reality (VR) therapy with the app had a significant reduction in anxiety self-report, compared to those in VR therapy who did not use the app.

Watts, S., Mackenzie, A., Thomas, C., Griskaitis, A., Mewton, L., Williams, A., & Andrews, G. (2013). CBT for depression: A pilot RCT comparing mobile phone vs. computer. BMC Psychiatry, 13(1), 49. doi: 10.1186/1471-244X-13-49

- **Findings**: Both iOS app and website significantly reduced depression symptoms.

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*Wiarda, N. R., McMinn, M. R., Peterson, M. A., & Gregor, J. A. (2013). Use of technology for note taking and therapeutic alliance. Psychotherapy. Advance online publication. doi: 10.1037/a0035075

- **Findings**: No significant differences were found on the Session Rating Scale between therapists who used paper and pencil, a laptop, or an iPad for taking session notes.

2012

Luxton, D. D., Mishkind, M. C., Crumpton, R. M., Ayers, T. D. & Mysliwiec, V. (2012). Usability and feasibility of smartphone video capabilities for telehealth care in the U.S. Military. Telemedicine and e-Health, 18(6), 409-412. doi: 10.1089/tmj.2011.0219

- Active-duty service members using the iPhone's FaceTime mobile app for brief telemental health sessions were comfortable with the small screen size (resolution and clarity) and ergonomics.

2011

Burns, M. N., Begale, M., Duffecy, J., Gergle, D., Karr, C. J., Giangrande, E., & Mohr, D. C. (2011). Harnessing context sensing to develop a mobile intervention for depression. Journal of Medical Internet Research, 13(3), e55. doi: 10.2196/jmir.1838

- **Findings**: Accuracy rates for the ecological momentary intervention were up to 91%; participants showed reduced depressive symptoms and satisfaction with the app.

Gay, G., Pollaki, J. P., Adams, P., & Leonard, J. P. (2011). Pilot study of Aurora, a social, mobile-phone- based emotion sharing and recording system. Journal of Diabetes Science and Technology, 5(2), 325-332.

- **Findings**: Users reported more emotional awareness and increased comfort in socially expressing emotions (sharing of emotions with others).

Reid, S. C., Kauer, S. D., Hearps, S. J. C., Crooke, A. H. D., Khor, A. S., Sanci, L. A., & Patton, G. C. (2011). A mobile phone application for the assessment and management of youth mental health problems in primary care: A randomised controlled trial of mobiletype. BMC Public Health, 12(1), 131-144. doi: 10.1186/1471-2296-12-131

- **Findings**: Users of the app mobiletype reported increased emotional self-awareness; participation in the RCT led to enhanced general practitioner mental health care at post-test and improved mental health outcomes.

Rizvi, S. L., Dimeff, L. A., Skutch, J., Carroll, D., & Linehan, M. M. (2011). A pilot study of the DBT Coach: An interactive mobile phone application for individuals with borderline personality disorder and substance use disorder. Behavior Therapy, 42(4), 589-600. doi: 10.1016/j.beth.2011.01.003

- **Findings**: Use of app resulted in reductions of emotional intensity and urges to use substances. Participants gave high ratings of helpfulness and usability of app.

2010

Morris, M. E., Kathawala, Q., Leen, T. K. Gorenstein, E. E., Guilak, F., Labhard, M., & Deleeuw, W. (2010). Mobile therapy: Case study evaluations of a cell phone application for emotional self-awareness. Journal of Medical Internet Research, 12(2), e10. doi: 10.2196/jmir.1371

- **Findings**: Use of the mobile phone application increased self-awareness and ability to cope with stress. Participants used the mobile app similar to in-person self-reflection methods.

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Research Reviews

2013

Aguirre, R. T. P., McCoy, M. K., & Roan, M. (2013). Development guidelines from a study of suicide prevention mobile applications (apps). Journal of Technology in Human Services, 31(3), 269-293. doi: 10.1080/15228835.2013.814750

- **Findings**: Most suicide prevention apps do not utilize a formal evaluation process beyond the reviews in the mobile app stores. Security, privacy, and confidentiality of information contained within the app are also common concerns. Reviewers also state that many apps are clunky and contain too much text and unusable functions.

*Donker, T., Petrie, K., Proudfoot, J., Clarke, J., Birch, M. R., & Christensen, H. (2013). Smartphones for smarter delivery of mental health programs: A systematic review. Journal of Medical Internet Research, 15(11), e247. doi:10.2196/jmir.2791

- **Findings:** Examination of eight studies showed significant reductions in depression, stress, and substance use. Within-group and between-group intention-to-treat effect sizes ranged from 0.29-2.28 and 0.01-0.48 at posttest and follow-up, respectively.

Fiordelli, M., Diviani, N., & Schulz, P. J. (2013). Mapping mHealth research: A decade of evolution. Journal of Medical Internet Research, 15(5), e95. doi: 10.2196/jmir.2430

- **Findings**: Most published mHealth articles are focused on chronic conditions, and most studies tested basic mobile features (feasibility studies), with very few examining impact of smartphones or interventions.

Gaggioli, A., & Riva, G. (2013). From mobile mental health to mobile wellbeing: Opportunities and challenges. Studies in Health Technology and Informatics, 184, 141-147.

- **Findings**: mHealth apps are advantageous, but have not been subject to rigorous testing.

Mohr, D. C., Burns, M. N., Schueller, S. M., Clarke, G., & Klinkman, M. (2013). Behavioral intervention technologies: Evidence review and recommendations for future research in mental health. General Hospital Psychiatry, 35(4), 332-338. doi: 10.1016/j.genhosppsych.2013.03.008

- **Findings**: Web-based interventions have shown efficacy across a broad range of mental health outcomes; social media such as online support groups have produced disappointing outcomes when used alone; mobile technologies have received limited attention for mental health outcomes; virtual reality has shown good efficacy for anxiety and pediatric disorders; and serious gaming has received little work in mental health.

*Plaza, I., Demarzo, M. M. P., Herrera-Mercadal, P., & García-Campayo, J. (2013). Mindfulness-based mobile applications: Literature review and analysis of current features. Journal of Medical Internet Research: mHealth and uHealth, 1(2), e24. doi:10.2196/mhealth.2733

- **Findings**: While a wide selection of mindfulness-based mobile applications are available to interested people, this study still shows an almost complete lack of evidence supporting the usefulness of those applications. They found no randomized clinical trials evaluating the impact of these applications on mindfulness training or health indicators, and the potential for mobile mindfulness applications remains largely unexplored.

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*Seko, Y., Kidd, S., & Wiljer, D. (2013). Apps for those who help themselves: Mobile self-guided interventions for adolescent mental health. Selected Papers Of Internet Research, 3. Retrieved from http://spir.aoir.org/index.php/spir/article/view/833

- **Findings**: Most of the reviewed studies were pilot tests or case studies with small samples. Most studies, though still at a preliminary stage, reported positive effects of mobile-based tools on user's mental state, such as mitigation of psychological distress and improvements in functional impairment and perceived self-efficacy.

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