TECHNOLOGICAL INNOVATIONS FOR THE REMOTE MONITORING OF SMOKING AMONG ADOLESCENTS AND EMERGING ADULTS

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SCTR Scientific Retreat on Tobacco Related Research
10/30/2014
Scientists Consider Repurposing

By JOHN MARKOFF  OCT. 22, 2014

IBM'S WATSON IS LEARNING ITS WAY TO SAVING LIVES

A FEW YEARS AGO, IBM'S NEW COMPUTER WATSON IS POISED TO CHANGE THE WAY WE THINK ABOUT MEDICINE, FINANCE, AND WORK.

By ION GERTNER

A prototype robot developed by engineers leads a new field of "robotics ergonomics."
Technology and Health

Grow Together

A family of products that helps you keep track and gain insight about your and your baby’s health.
“The problem [with wearables]: The hype is years ahead of the market. Big and unresolved questions remain about pricing (too high), battery life (too short), utility (too limited), looks (too ugly) and privacy (too scary).”

— Forbes, Connie Guglielmo and Parmy Olson
Technology and Health Research

• Disconnect between industry and academia
Technology and Smoking

- Technology integration has the potential to improve prevention, screening, and treatment strategies
  - New tools for screening within healthcare settings
  - Expanded reach of interventions
  - Increase engagement and efficacy of interventions
  - Unobtrusive and continuous monitoring
    - “Automated hovering” → Real-time monitoring of behavior during everyday activities (Asch et al., 2012)
Smoking and Relapse

- The majority of adult smokers start prior to the age of 18 (US HHS, 2012)
- High relapse rates among adolescent and emerging adult smokers attempting to quit
  - Approximately 4-6% of quit attempts are successful (Chassin et al., 2000; Staton et al., 1996; Zhu et al., 1999; Sussman et al., 2006)
  - 56% relapsed with 1 month (Bancej et al., 2007) and 66% relapsed within 1 week (Wong et al., 2011)
- Not much is known about the relapse process in this population (Mermelstein, 2003)
- Understanding relapse is essential to improving smoking cessation outcomes among this population
- This is a group that shows greater tech utilization (Lenhert et al., 2010; Zickuhr et al., 2011)
Technology and Smoking: Remote Monitoring

mPuff: Automated Detection of Cigarette Smoking Puffs from Respiratory Motion

A Wearable Sensor System for Cigarette Smoking

EDWARD SAZONOV, PH.D., PAULO LOPEZ-MEYER

Article

Laboratory Validation of Inertial Measurement Unit Cigarette Smoking Arm Movement

Bethany R. Raiff, Çağdaş Karataş, Erin A. McElwain
Technology and Smoking: Remote Monitoring

Jesse Dallery
University of Florida
Remotely Monitoring Smoking

Aims of the current research:

- Extend Dallery’s CO monitoring submission system to a mobile platform
- Combine the biochemical verification of smoking through breath CO with ecological momentary assessment (EMA) to capture more detailed information regarding relapse in adolescents/emerging adults (EMA + CO system)
- Demonstrate feasibility and acceptability of the EMA + CO system through qualitative and quantitative methods (Experiment 1)
Study Design

- Ad-lib status
- Quit status
- Lapse and relapse status
App Features:

- Android and iOS platforms
  - For download on a user’s personal smartphone
  - 88% of cessation trial participants own smartphones

- Dynamic programming
  - Can switch between smoking and non-smoking status (based on biochemical verification)
  - Can intervene if no responses are made

- Geospatial coordinate data capture at time of app events
CO Sample Submission

Now, it’s time to leave a breath CO sample using your monitor.

Please connect the CO monitor to the phone and get ready for your sample.

Press READY to start.
Breath CO Monitors

What is available...

Prototype...available any day now....
App Features:

- Video capture of CO sample
- Automatic recognition of CO value (through optical character recognition)
- Audio from video sample to ensure sample is being provided
- Facial recognition from video

The more automated features included in the app → the less work for research staff and less chance of ERROR provided

Facial recognition from video
EMA + CO System Development

- Next steps are to finalize development and pilot this system (N=15)
- Encouraged by preliminary acceptability data with representative sample
- Quantitative and qualitative data will be useful in improving this technology
- This system will be constantly evolving to include new features as they become available
Future Research and Application

• Detecting predictors of relapse and developing personalized algorithms for treatment
  • Already being done with alcohol (Gustafson et al., 2014)

• Just in time adaptive interventions based on individual-level predictors of lapse/relapse
  • QuitNinja (Ellen Beckjord, Pittsburgh)

• Extension of this technology to other populations.....

• Endless possibilities for application and implementation
Future Considerations

- What is needed to advance our science and improve our methods?
  - Breaking down silos of research and practice
  - Intellectual property understanding
  - Sharing of code, procedures, etc.
  - Expertise in programming, development, intellectual property, how to make products available to other researchers, working with industry
  - Avoiding the app graveyard....
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• Several ongoing smoking studies at MUSC
• Learn more about the ProjectQuit team
• Like us on Facebook and Follow us on Twitter!
  • https://www.facebook.com/pages/Project-Quit/244008319116403
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References


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