Keynote: Community-Based Sensing, Activity Recognition, and Behavior Change Techniques

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Abstract—**In this keynote, I will present a new perspective on wearable sensing to enable community-based behavior change to promote improved health and well-being for an individual belonging to the community. These emerging ideas are grounded in planning activities for Project Healthy After Childbirth (HATCH), which seeks to develop an intervention to promote physical activity, breastfeeding, and sustained abstinence from smoking among postpartum, low SES women through a smart and connected community. We envision an intervention facilitated by wearable devices and the Internet of Things (IoT) that enables:**

- **the study of physiological, social, and environmental conditions that influence these 3 cancer-preventative behaviors,**
- **the study of community-based behavior change techniques (BCTs) to motivate cancer-preventative behaviors in a way that considers interactions of smoking, breastfeeding, and physical activity,**
- **the creation of an adaptive, community-based BCT recommendation framework that applies to interactive, related cancer-preventative behaviors and is sensitive to physiological, social, and environmental conditions, and**
- **an intervention that is implemented using the adaptive BCT recommendation framework.**

I. TALK OVERVIEW

Reducing postpartum smoking relapse would significantly improve both women's and children's health and can be directly linked to cancer prevention. Many existing smoking cessation and abstinence programs consider smoking in isolation of other behaviors. However, evidence shows that smoking abstinence is one of several cancer-preventative behaviors, including breastfeeding and physical activity, that interact with and impact one another for postpartum women who quit smoking while pregnant. These interlinked cancer risk behaviors are disproportionately represented among those of lower socioeconomic status (SES), contributing to health inequalities.

Through the proposed planning activities for Project Healthy After Childbirth (HATCH), we seek to develop an intervention to promote physical activity, breastfeeding, and sustained abstinence from smoking among postpartum women through a smart and connected community. We envision an intervention facilitated by wearable devices and the Internet of Things (IoT) that advances:

- the study of community-based behavior change techniques (BCTs) to motivate cancer-preventative behaviors in a way that considers interactions of smoking, breastfeeding, and physical activity among postpartum, low SES women who quit smoking while pregnant, and

- the development of an adaptive, community-based BCT recommendation framework that applies to interactive cancer-preventative behaviors and considers physiological, social, and environmental conditions.

Key to our proposed solution is the observation that communities contribute to the larger social, cultural, and environmental conditions that influence behavior. We contend that the active participation of communities can support behavior change. As such, we aim to design a novel intervention that will use embedded and wearable sensors and social media data to monitor, detect, and influence not just the activities and behaviors of postpartum women, but also of their local, in-person support networks (e.g., household members), remote, in-person communities (e.g., neighbors and friends), and remote, virtual communities (e.g., social networks).

II. BIOGRAPHY

Dr. Jamie Payton is an Associate Professor and Chair of the Department of Computer and Information Sciences at Temple University. Her research interests include pervasive computing systems for smart health and well-being, broadening participation in computing, and evidence-based approaches to improving computer science education. She is the Director of the STARS Computing Corps, an NSF BPC Alliance that aims to develop college students and faculty as leaders who take action to broaden participation of underrepresented groups in computing; since 2006, STARS has engaged over 2500 college students in near-peer outreach projects, providing computer science learning opportunities to over 140,000 K12 students. As a co-founder of the International Conference on Research on Equity and Sustained Participation in Engineering, Computing, and Technology (RESPECT), Payton has helped to establish a scholarly venue that bring together researchers in computer science, education, learning sciences, gender studies, sociology, and related fields to disseminate and promote interdisciplinary research on broadening participation in computing. She is also the creator of the Mobile Application Development for Investigators (MAD Investigators) program, which leverages her research in crowdsensing to introduce middle school students to STEM concepts, and the Director of an NSF-funded Research Experiences for Undergraduates (REU) program on Pervasive Computing for Smart Health, Safety, and Well-being.