Aims: This presentation will provide an overview of considerations for evaluation of wearable, mobile, and smart home sensor technologies to support behavior change in relation to Two Minds Theory. Sensor data from the HomeSHARE infrastructure project will be presented as illustrative examples (NSF Award #s: 1629202, 1629468, 1625451, and 1629437).

Background: Digital health is a concept that has emerged with the advent and widespread availability of consumer-grade “smart technologies”. These technologies are typified by onboard sensors that measure a range of behaviors and allow sharing of data for research or health-related purposes. Technologies can be broadly classified as “smart home” (home-installed activity or door sensors), “mobile” (smart phone or tablet), or “wearable” (e.g.: wrist-worn actimeter, sleep monitor, heart rate monitor, or continuous glucose monitor). While these technologies hold great opportunity to measure Intuitive-level responses and deliver tailored messages for behavior change using Two Minds Theory, their function and acceptability must be understood before their potential can be realized in research and everyday life.

Methods: Since 2013, we have evaluated three smart home platforms and numerous mobile and wearable technologies through lab- and field-based tests for function, acceptability, cost, and implementation factors. Starting in April 2018, we deployed four continuing field tests of smart homes in conjunction with smart watches and mobile self-report apps in Colorado (n = 2) and Indiana (n = 2). In September 2018, we deployed the first 2 of 30 smart home/wearable packages with older adults enrolled in a study using a biobehavioral mobility monitoring protocol.

Results: Lab- and field-based deployments have resulted in a set of evaluation considerations for all technologies and an evaluation framework that can be used to assess wearable sensors for TMT-based studies. Field tests have yielded data management and analytic methods to visualize real-world smart home data. Figure 1 shows data from a 2-person test home, averaged over July 2018 by hour of day, where one resident routinely spends time in the kitchen in the early morning and activity spikes in the afternoon when both residents are home from work. All field test and live participant technology installations will continue to collect sensor data as new homes are added.

Implications: Smart home, mobile, and wearable sensor technologies have great potential to support studies informed by Two Minds Theory through objective measurement of Intuitive-level responses. However, selection of these devices is contingent not only how they can support the constructs of a theory but also on an understanding of how they will function and be perceived in real-world settings. Our framework can help researchers make these decisions.