Using a Fitness Tracker to Predict Automatically Reinforced Problem Behavior

Blake Crosby (presenting author)

Halie Tumbleston

ABX Solutions, LLC

Abstract

Smart watches can serve as fitness trackers that monitor body temperature, heart rate (HR), muscle motion, and other health data. Automatically reinforced problem behaviors with heightened states of physical activity (e.g., self-injurious behavior) may correlate with increased HR. Similarly, elevated HR could be predictive of problem behavior before it occurs. In this study, a fifteen year old male with autism who has a history of automatically reinforced problem behavior was given a Fitbit watch with a HR monitor. An online form collected information about each incidence of the subject's problem behavior from parents, teachers, and other caregivers. The time and duration of each problem behavior was plotted to overlay time series data of the subject's HR to look for correlations between the two. The reported time period of a problem behavior overlapped with a HR greater than 100 bpm on 65.6% of episodes. HR greater than 100 bpm preceded the onset of problem behavior on 46.8% of episodes. The study suffered from problems with the Fitbit battery and reliability of the reported onset/offset times. Future studies could determine if a self-monitoring intervention could help caregivers implement antecedent strategies to deter potential problem behaviors before they arise.

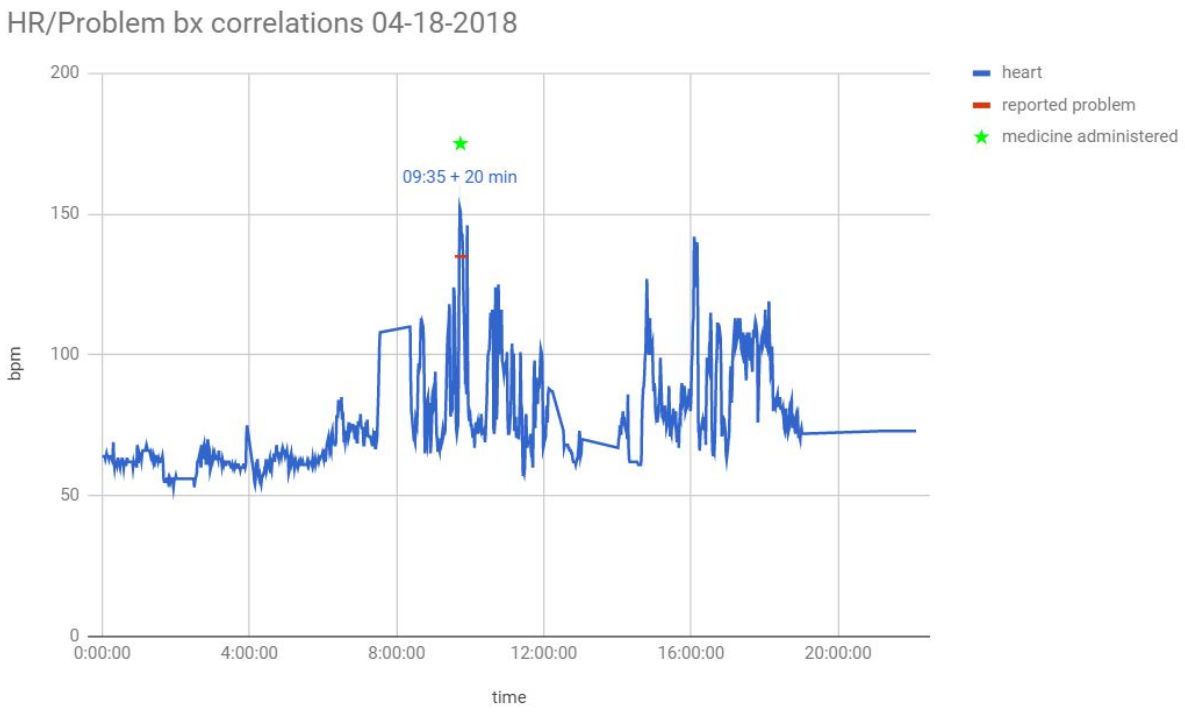

Figure 1. Example of daily data collection showing heart rate versus time of day in blue. Incidents of problem behavior are shown as red horizontal lines with the length corresponding to the duration of the episode. These incidents are also annotated with text giving the onset time of the problem behavior followed by its duration. A green star annotation was also used when the subject's emergency medication was administered.