Process for quantifying barriers

1. The score progression over an average 24 hour period  
2. Insights from a 7 day running snapshot into specific barriers to healthy behavior (ie access to healthy food, exercise, etc)  
**3. Interaction of biometrics with score to get deeper insights into relationship between biometric patterns and other items**

Put together database of grocery stores, fast food, parks, bars, crime stats (characteristics to track - name, lat/long, NIMBY or YIMBY)

The goal is to devise an aggregate scoring system for an area that indicates environments supportive vs deterrent of healthy behavior change

Ideas:

Behavioral Risk Score (scale of 1-150); indicates total behavioral risk based on presence of barriers

Broken down by area (social, psychological, environmental)

Metrics within each area:

Social – Availability of grocery stores, gyms, and other YIMBY locations

Psychological – Availability of bars, fast food, and other NIMBY locations

Environmental – Time spent in areas with Air pollution above x% and water pollution above x%, average commute time, Violent crime rate, noise pollution

Score calculated from 00:00:00 to 23:59:59, with a rolling 7 day average for the actual display score

Score is totalled for each individual area and totalled to get total score

Each area has a maximum 50 points, with each individual metric possessing a max number of points that will be totalled up to the maximum of 50. YIMBY is calculated in the reverse for the Social area, where the patient starts with the max score, and every YIMBY detected is subtracted.

Each NIMBY location adds 5 points, while each YIMBY location will subtract 5 points. Therefore, this algorithm is only concerned with the first 10 YIMBY and NIMBY locations a patient is exposed to.

Each environmental metric has a maximum of 10 points, calculated based on the relationship between a threshold value of the metric and life expectancy

**Noise**  
55 db as the noise threshold (binary) - above that level, maximum score for noise variable (modified by fraction of 24 hour day patient is exposed to that pollution), below that level, no score. Score is either 12.5 or 0  
  
if user is in area with more than 55db for more than 6 hours, score 12.5; else 0  
  
  
**Water**  
We still need to find a study on the relationship between water pollution rate and life expectancy.  Scoring to be similar to either air pollution (if we can identify a relationship) or noise (where we only know of a specific threshold above which life expectancy declines). Total score is some fraction of the max score of 12.5

**Homicide Rate Score**

Where Y is county homicide rate and X is national homicide rate, and L is the life expectancy adjustment

(Y-X)\*0.08 = life expectancy adjustment

Score = L1 \* (fraction of day in County 1) + L2 \* (fraction of day in county 2)...Ln \* (fraction of day county n)

if Score is less than or equal 0, 0 points

if 0 < Score < 0.1 , 3 points

if 0.1 < Score < 0.3 , 6 points

if 0.3 < Score < 0.3 , 9 points

if 0.5 < Score , 12.5 points

**Air Quality Score**

Where Y is the county air quality and X is the EPA standard, and L is the life expectancy adjustment

(Y-X)\*0.035 = L ... L is totaled for every county in which user goes

Score = L1 \* (fraction of day in County 1) + L2 \* (fraction of day in county 2)...Ln \* (fraction of day county n)

if Score is less than or equal 0, 0 points

if 0 < Score < 0.25 , 3 points

if 0.25 < Score < 0.5 , 6 points

if 0.5 < Score < 0.75 , 9 points

if 0.75 < Score , 12.5 points

Example:

If a patient in the course of a day has GPS patterns that either place them inside or within 10 meters of 6 YIMBY locations, and we give each metric 5 points, their score for Social Barriers would be 20 = 50max – 6 \* 5pts

If they encounter 5 NIMBY locations, their score for Psychological Barriers would be 25 = 5pts \* 5

If they spend more than X hours in an area with very high violent crime, but otherwise unpolluted they would get say 30 points for Environmental Barriers score.

Their total score would be

20 + 25 + 30 = 75 out of 150

We could then present to the clinical user the specific metrics that influenced the score in each barrier category – ie (patient spent more than X hours in a high violent crime area, was only exposed to a few YIMBY locations, etc)