Using Ecological Momentary Assessment to Examine Perceptions of Safety, Aesthetics, and Physical Activity in Adults

Genevieve F. Dunton, PhD, MPH
Christina Younan, B.S. Candidate
Yue Liao, MPH
Keito Kawabata, B.A.
Donna Spruijt-Metz, Ph.D
Stephen Intille, Ph.D
Mary Ann Pentz, Ph.D

Perceived Environmental Features and Physical Activity

- Vegetation/Greenness (Tilt et al., 2007; Sugiyama et al., 2008)
- Aesthetics (Inoue et al., 2011; Saelens et al., 2011)
- Safety (Zoellner et al., 2012; Tucker-Seeley et al., 2009)
- Garbage/Physical Disorder (Corseuil et al., 2011)
- Traffic Volume ([NS] Hoehner et al., 2005; [NS] McGinn et al 2007)

Methodological Limitations

- Assessments not conducted in the target settings
- Multiple micro settings condensed into one rating
- May assess settings that are never or not regularly encountered
- Recall errors or reporting biases
- Perceptions of settings may differ when perceiver is physically active versus inactive
- Use of settings is not measured

Ecological Momentary Assessment (EMA)

- Real-time responses in naturalistic settings
- Can simultaneously measure:
  - 1) Specific location (e.g., backyard, trail, sidewalk)
  - 2) Perceived characteristics (e.g., safety, traffic)
  - 3) Behavior (e.g., sports/exercise, eating)
- Ecologically valid
- Less recall bias

Study Objectives

1) To determine whether perceived vegetation, traffic, safety, and litter/garbage are associated with physical activity levels in those settings.

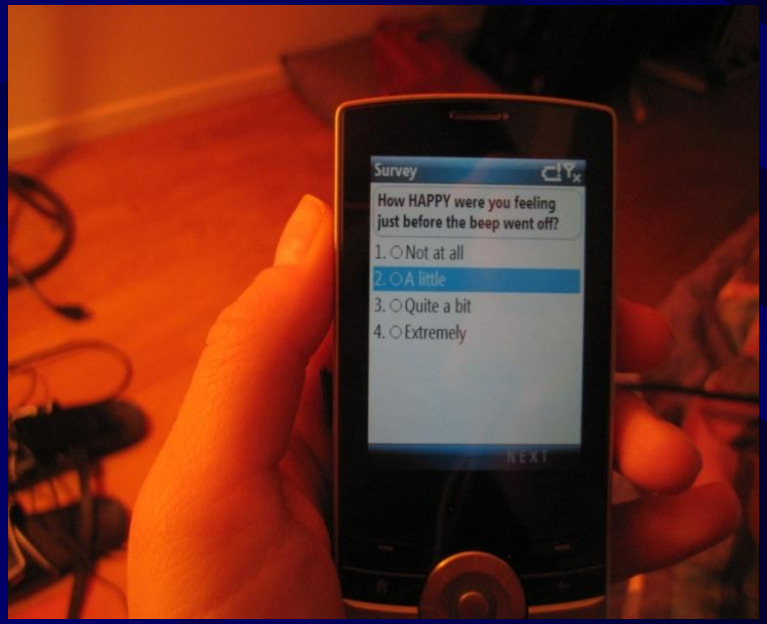
2) To determine whether these associations between environmental perceptions and physical activity differ for males versus females.

Participants

N	59
Age	M = 39.9 (SD = 9.8) (range: 27-73 years)
Sex	74% Female
Ethnicity	33% Hispanic 29% White/Caucasian 24% Asian 7% African-Am. 7% Other
Income	26% ≤ $40,000 26% ≥ $100,000
Weight Status	56% Overweight/Obese

EMA Equipment

- Mobile phone (HTC Shadow, T-Mobile)



EMA Prompting Schedule

- 32 prompts occurred across 4 days (Sat-Tue)

Ecological Momentary Assessment Prompting Schedule

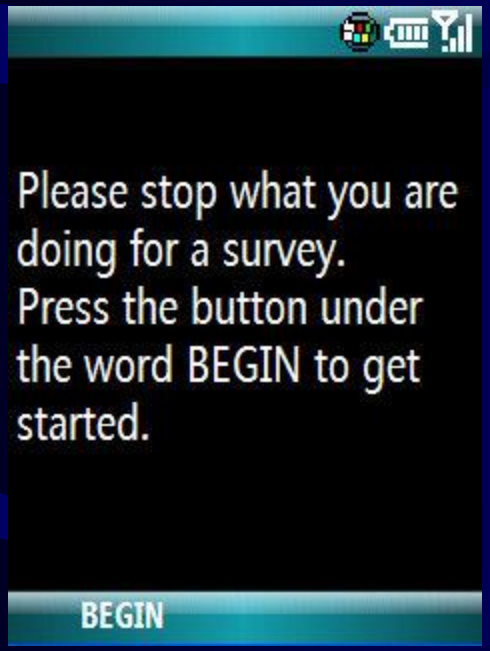
Day	6:30-6:45am	8-10am	10am-12pm	12-2pm	2-4pm	4-6pm	6-8pm	8-10pm
Saturday	X	X	X	X	X	X	X	X
Sunday	X	X	X	X	X	X	X	X
Monday	X	X	X	X	X	X	X	X
Tuesday	X	X	X	X	X	X	X	X

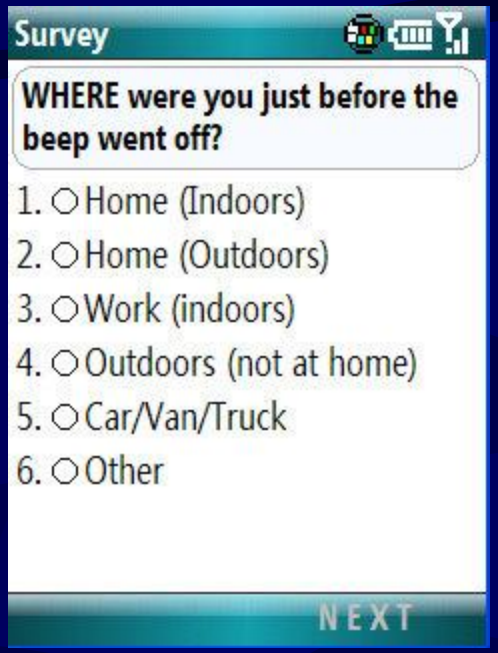
Note: Question sequences are prompted at a random time within each interval.

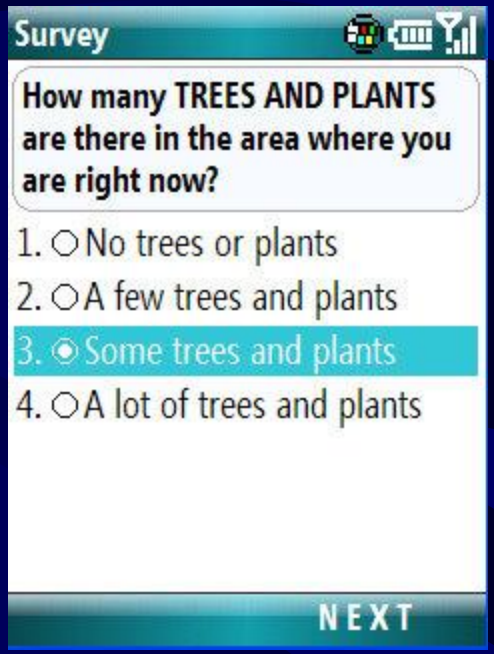
EMA Protocol

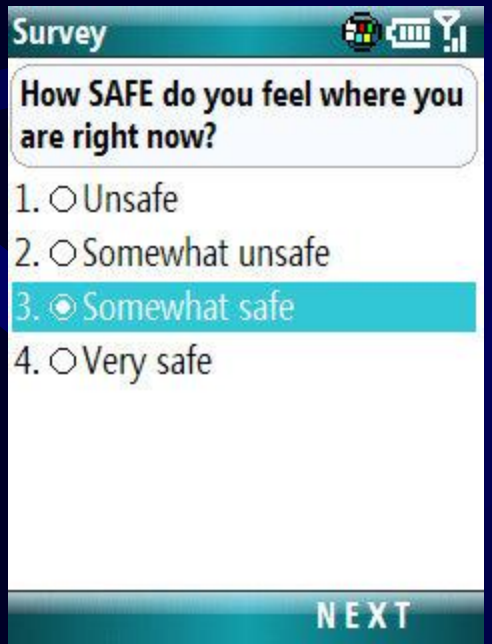
- Up to 2 reminder prompts after 3 min for missed and unfinished entries.
- Phone required nightly charging.
- One contact call and one reminder text from project staff on Mon or Tue.
- Study hotline available for technical problems.
- Participants paid up to $50 ($18 for returning phone and $1 x 32 for each complete survey)

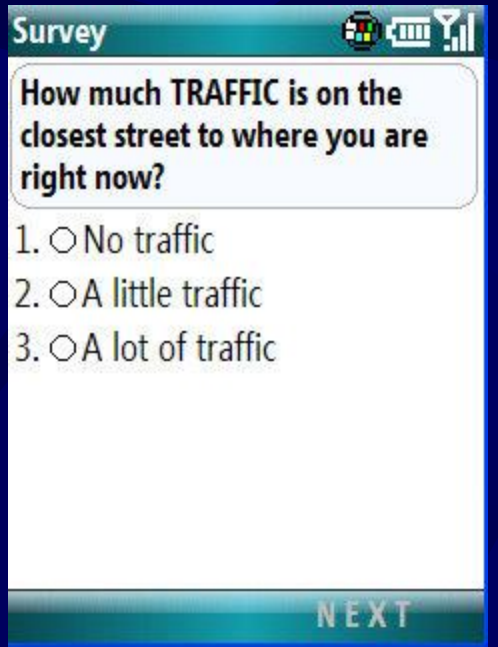
EMA Items


Please stop what you are doing for a survey. Press the button under the word BEGIN to get started.
BEGIN


Survey
WHERE were you just before the beep went off?
1. Home (Indoors)
2. Home (Outdoors)
3. Work (indoors)
4. Outdoors (not at home)
5. Car/Van/Truck
6. Other
NEXT


Survey
How many TREES AND PLANTS are there in the area where you are right now?
1. No trees or plants
2. A few trees and plants
3. Some trees and plants
4. A lot of trees and plants
NEXT


Survey
How SAFE do you feel where you are right now?
1. Unsafe
2. Somewhat unsafe
3. Somewhat safe
4. Very safe
NEXT


Survey
How much TRAFFIC is on the closest street to where you are right now?
1. No traffic
2. A little traffic
3. A lot of traffic
NEXT


Survey
How much LITTER OR GARBAGE is on the ground where you are right now?
1. No litter
2. A little litter
3. Some litter
4. A lot of litter
NEXT

Accelerometer

- Actigraph GT2M.
- Time-stamped and linked with EMA data.
- Outcome variable: Total steps in the 15-min. of EMA prompt

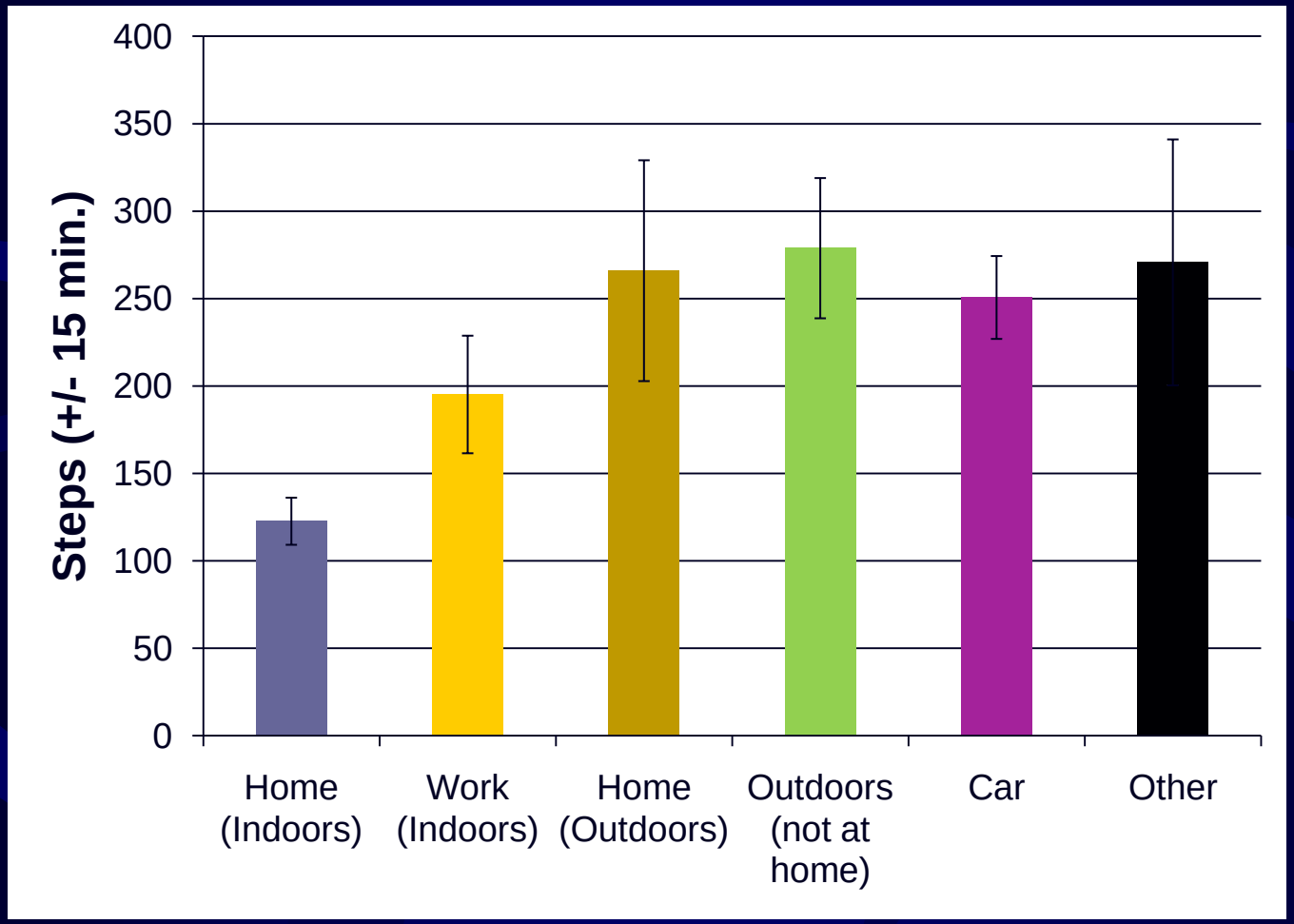
Data Analyses

- SUDAAN 10.0
- Generalized Estimating Equations (GEE) regressions adjusted the SE's for the clustering of EMA observations within each person
- Unit of analysis was the EMA observation
- All models controlled for age, gender, and income
- Predicted marginal means

EMA Compliance and Missing Accelerometer Data

- On average, participants responded to 80% (range 25% - 100%) of EMA prompts.
- Percentage of missing data unrelated to age, sex, income, ethnicity, and BMI.
- Number of steps (15-min.) did not differ for unanswered vs. answered EMA prompts.
- On average, 21% of answered EMA prompts could not be matched due to accelerometer non-wear (more likely at home [indoors]).

Activity Levels by Physical Context

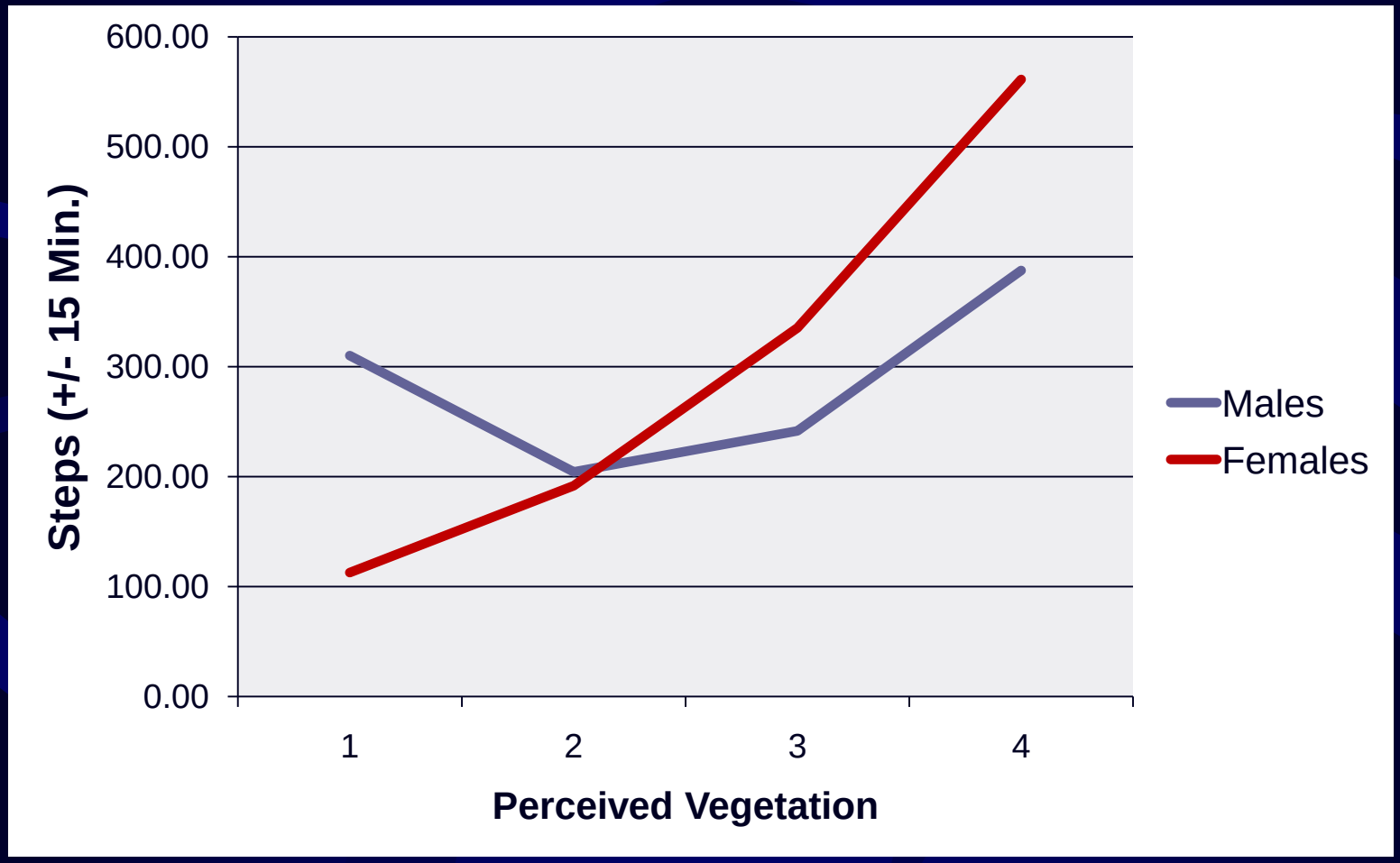


Results of GEE Regression Models Predicting Steps (15 min)

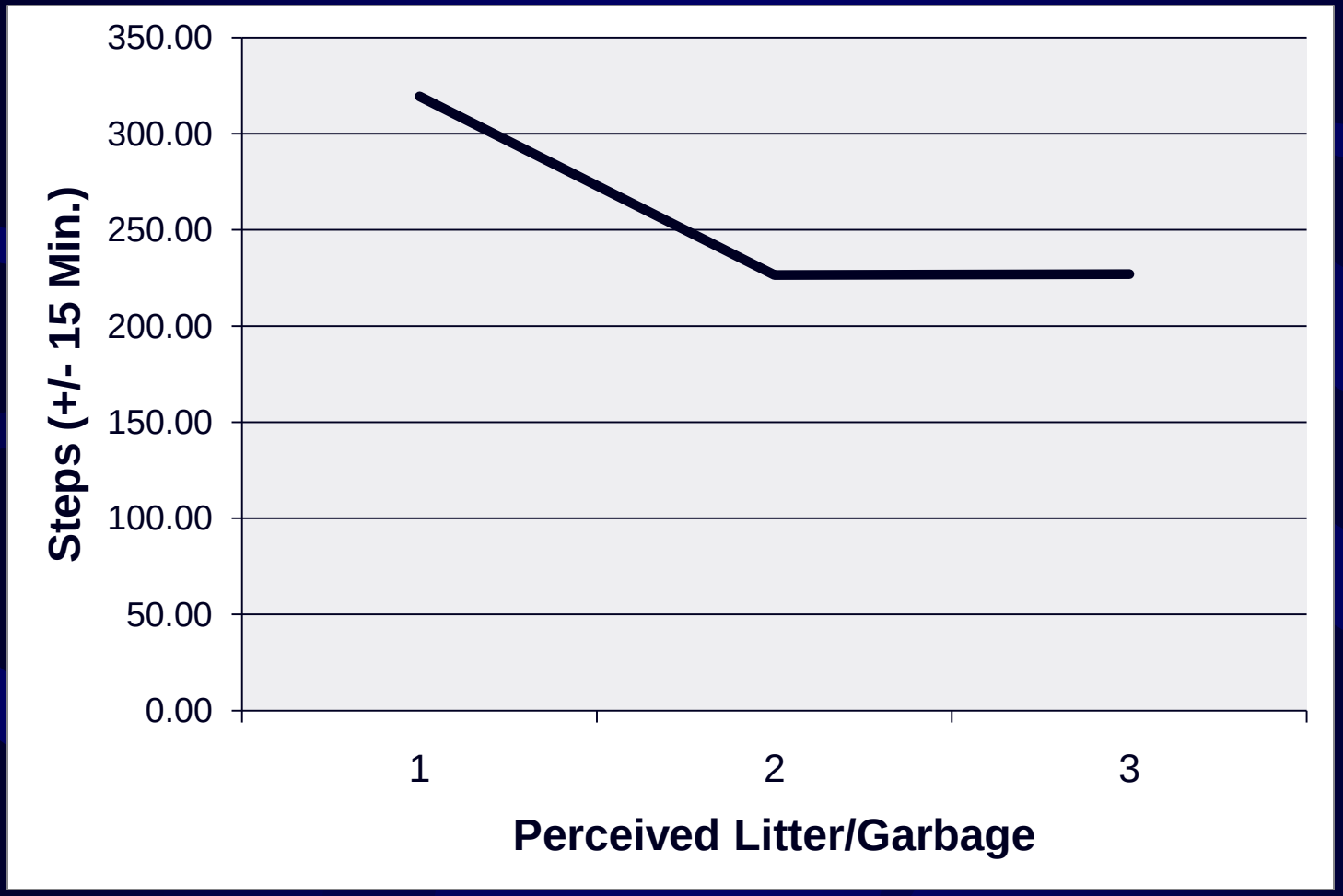
	Main Effect	Interaction By Gender
	β (SE)	β (SE)
Vegetation	77.77** (24.07)	121.47** (38.13)
Safety	21.58 (69.70)	-55.84 (54.51)
Traffic	-40.34 (28.44)	-155.58 (139.13)
Litter/Garbage	-68.55^ (36.81)	34.34 (68.68)

Note. **p < .01, ^p < .10. All models control for age and annual household income

Perceived Vegetation by Gender Interaction for Activity Levels



Association Between Perceived Litter/Garbage and Activity Levels



Conclusions

- Physical activity levels are higher in locations with greater perceived vegetation
  - Rules out “neighborhood third variable problem”
  - Females may have greater preference to be active in greener areas

- Perceived litter/garbage may deter physical activity

Limitations

- Perceptions not assessed during every physical activity episode
- Missing data
- Short monitoring period (4 days)
- 1-item measures
- Statistical power

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