Spring 5-1-2024

The Moderating Effect of Socioeconomic Status and Walkability on the Efficacy of Physical Activity Interventions

Analisa Vavoso
vavoso@chapman.edu

Vincent Berardi
Chapman University, berardi@chapman.edu

Marc A. Adams
Arizona State University

The Moderating Effect of Socioeconomic Status and Walkability on the Efficacy of Physical Activity Intervention Strategies

Analisa Vavoso, Vincent Berardi, Ph.D., Marc A. Adams, Ph.D.

Background

Physical activity is essential for health and lowers the risk of many diseases, however a majority of Americans do not meet nationwide physical activity standards.

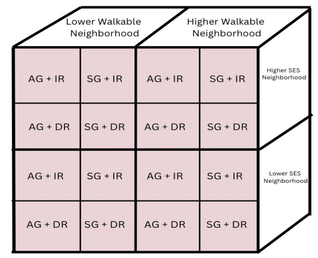
Objectives

To better understand how neighborhood income and walkability characteristics impact the effectiveness of various goal and reinforcement intervention strategies

Methods

- 512 insufficiently active, healthy adults in the WalkIT Arizona trial (PI Adams)
- Prospectively recruited participants based on neighborhood walkability and SES
- Participants wore accelerometers for one year with moderate to vigorous physical activity (MVPA) measured every minute
- MVPA goals assigned and assessed on a daily basis
- 2x2 Design - Goals: **Adaptive (AG)** - based on previous 9 days vs. **Static (SG)** - 30 min/day
  - Reinforcement: **Immediate (IR)** - immediate reward for goals met vs. **Delayed (DR)** - reward @ 2-month intervals for participation
- Goal/Reinforcement X Walkability/SES interactions modeled with multiple linear regression and hierarchical linear regression

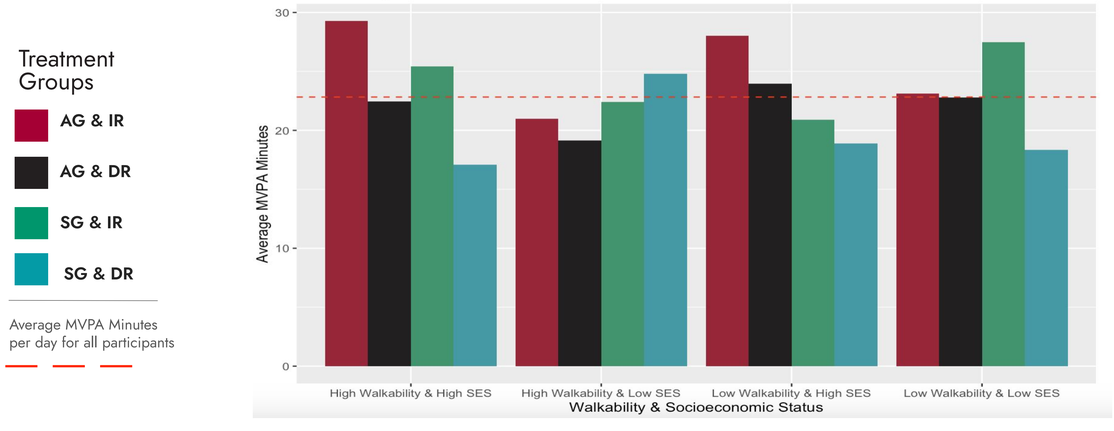
Static goals and delayed reinforcement is a differentially optimal intervention strategy for participants living in low SES and high walkability environments.



Results

- Each neighborhood walkability/SES quadrant level and intervention group interaction was statistically significant.
- Results were qualitatively different in the high walkability/low SES group, where the most MVPA was seen for the SG/DR intervention, while the least was observed for AG/DR (β = 5.66 , p < .001).

Linear Regression Predicted MVPA



Linear Mixed Effects Regression

	B	SE	p
Walk/Income Quadrant (ref = High Walk/High SES)			
High Walk/Low SES	-8.07	3.764	**0.033**
Low Walk/High SES	-1.49	3.794	0.70
Low Walk/Low SES	-7.67	3.995	0.06
Study Group (ref = AG/IR)			
AG/DR	-5.71	3.787	0.13
SG/IR	-4.48	3.790	0.24
SG/DR	-11.70	3.793	**0.002**

	B	SE	p
Walk/Income Quadrant * Study Group (ref = High Walk/High SES * AG/IR)			
High W/Low SES*AG/DR	4.01	5.38	0.46
Low W/High SES*AG/DR	1.55	5.38	0.77
Low W/Low SES*AG/DR	7.35	5.69	0.20
High W/Low SES*SG/IR	5.20	5.35	0.33
Low W/High SES*SG/IR	-2.93	5.39	0.59
Low W/Low SES*SG/IR	9.93	5.70	0.08
High W/Low SES*SG/DR	14.76	5.41	**0.007**
Low W/High SES*SG/DR	3.16	5.39	0.56
Low W/Low SES/*SG/DR	9.00	5.70	0.11

Moderate to Vigorous Physical Activity Summary

	High Walkability High SES	High Walkability Low SES	Low Walkability High SES	Low Walkability Low SES
AG & DR	22.45	19.14	23.95	22.79
AG & IR	29.27	20.97	28.01	23.10
SG & DR	17.08	24.80	18.90	18.36
SG & IR	25.43	22.40	20.91	27.48
Avg. of MVPA *(Mins)*	23.52	21.83	23.04	22.87

Least MVPA — **Greatest MVPA**

***AG** - Adaptive Goals, **SG** - Static goals, **MVPA** - Moderate to Vigorous Physical Activity, **IR** - Immediate Reinforcement, **DR**- Delayed Reinforcement*

Conclusions

- In neighborhoods with high walkability and high socioeconomic status (SES), adaptive goals coupled with immediate reinforcement led to the highest daily moderate-to-vigorous physical activity (MVPA) levels, while static goals with delayed reinforcement resulted in the lowest MVPA.
- Conversely, in high walkability and low SES neighborhoods, static goals with delayed reinforcement were most effective in promoting MVPA, contrasting with other neighborhood types.
- These findings can be used to customize future physical activity interventions so that intervention strategies are most appropriate for participants' demographic/environmental setting.