

Imagine HEALTH: Randomized controlled trial of a guided imagery lifestyle intervention to improve obesity-related lifestyle behaviors in predominantly Latino adolescents

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BACKGROUND

- Hispanic/Latino adolescents suffer from a high prevalence of overweight and obesity, as well as a high prevalence of obesity-related co-morbidities such as pre-diabetes, metabolic syndrome, and type 2 diabetes.
- Previous intervention strategies have not addressed the role of chronic stress in the development of obesity-related morbidities, nor have they utilized integrative, mind-body modalities to reduce chronic stress as part of an integrative approach to obesity prevention and/or treatment
- Our previous pilot RCT showed that a 12-week lifestyle intervention in obese Latino teens using Interactive Guided ImagerySM (GI) acutely reduced salivary cortisol and reduced sedentary behavior¹

PURPOSE

To determine the effects on lifestyle behaviors of a 4-arm, 12-week lifestyle intervention

- Hypothesis: Participants receiving lifestyle education *plus* guided imagery (GI) would show greater improvement in dietary intake and sedentary behavior than those receiving lifestyle education alone

METHODS

- Detailed clinical trial protocol has been previously published²
- Participants:** 232 inner city high school students (154 F/78 M; age 16.4±0.6; 94% Latino; 40% obese/overweight)
- Randomized** – 12-week after-school intervention; 4 intervention arms
 - Control (C = non-intervention)
 - Lifestyle (LS): experiential nutrition and physical activity education (Two 75-min after-school sessions/week)
 - LS + Stress-reduction guided imagery (SRGI) (Three 75-min sessions/wk)
 - LS + Lifestyle behavioral guided imagery (LBGI) (Three 75-min /wk)

Guided Imagery Council: 12-Week Curriculum

Week	Stress Reduction Guided Imagery		Lifestyle Behavior Guided Imagery	
	Session Title	GI Content	Session Title	GI Content
1	Stress Reduction 1: Relaxation Breathing	Mindful focused breath	Stress Reduction 1: Relaxation Breathing	Mindful focused breath
2	Stress Reduction 2: Relaxation Breathing and Progressive Muscle Relaxation (PMR)	Following focused breath, relaxation of muscle groups in conjunction with breath, progressing from head to toe	Stress Reduction 2: Relaxation Breathing and Progressive Muscle Relaxation (PMR)	Following focused breath, relaxation of muscle groups in conjunction with breath, progressing from head to toe
3	Stress Reduction 3: Relaxing Place Image	Following focused breath and PMR, exploration of an image of a place that represents just comfort and relaxation	Stress Reduction 3: Relaxing Place Image	Following focused breath and PMR, exploration of an image of a place that represents just comfort and relaxation
4	Stress Reduction 4: Relaxing Place Image; Conditioned Relaxation	Repeat of relaxing place imagery, followed by a second imaginal exploration of relaxing place after only 3-focused breaths (conditioned relaxation)	Stress Reduction 4: Relaxing Place Image; Conditioned Relaxation	Repeat of relaxing place imagery, followed by a second imaginal exploration of relaxing place after only 3-focused breaths (conditioned relaxation)
5	Stress Reduction 5: Conditioned Relaxation; Self-led imagery	Repeat of 3-breaths to relaxing place; Students begin to lead each other in relaxing place imagery exercise	Lifestyle Behavior 1: Hunger-Fullness Image	Imagery of a symbol that represents the state of fullness and hunger, to use as an aid in portion control
6	Stress Reduction 6: Self-led imagery	Repeat of 3-breaths to relaxing place; Students lead each other in relaxing place imagery exercise	Lifestyle Behavior 2: Healthy Eating Image	Imagery of oneself eating healthily
7	Stress Reduction 7: Inner Advisor Image	Imagery of, and dialogue with, an Inner Advisor figure to obtain guidance to meet life stressors.	Lifestyle Behavior 3: Inner Advisor Image	Imagery of, and dialogue with, an Inner Advisor figure to obtain guidance to eat more healthily
8	Stress Reduction 8: Self-led imagery; Rewriting imagery; Self-compassion	Participants rewrite relaxing place imagery script in their own words and lead each other in the exercise	Lifestyle Behavior 4: Physical Activity Image	Imagery of oneself participating in physical activity
9	Stress Reduction 9: Inner Advisor Image	Imagery of, and dialogue with, Inner Advisor figure to obtain guidance to improve stress management practices	Lifestyle Behavior 5: Inner Advisor Image	Imagery of, and dialogue with, an Inner Advisor figure to obtain guidance to increase physical activity
10	Stress Reduction 10: Inner Warrior Image	Imagery of, and dialogue with, an Inner Warrior figure to elicit ways to overcome stressful life challenges	Lifestyle Behavior 6: Inner Warrior Image	Imagery of, and dialogue with, an Inner Warrior figure to elicit ways to overcome challenges to eating healthily and being active
11	Integration 1: Future Life Imagery	Imagery of life in future living according to the principles of healthy living learned in program	Integration 1: Future Life Imagery	Imagery of life in future living according to the principles of healthy living learned in program
12	Integration 2: Self-Compassion Imagery; Program graduation	Imagery of self-compassion as continue forward with goals of developing healthy lifestyle behaviors	Integration 2: Self-Compassion Imagery; Program graduation	Imagery of self-compassion as continue forward with goals of developing healthy lifestyle behaviors

Guided imagery Council: Group GI delivered in facilitated group process - “council”³.

Conduct of council:

- Group sits in a circle, minimizing hierarchy
- 1 person speaks at a time using a designated object (i.e. “talking piece”) to focus the discussion.
- Speak intentionally, “from the heart”. with brevity and clarity;
- Listen actively, “from the heart”.



Outcome Measures: Baseline and post-intervention (3-months)

- Sedentary Behavior (by accelerometer)
- Dietary Intake (by diet recall), adjusting for overweight status

Statistical analyses:

- Intention to treat (ITT), across-group differences at 12-weeks.
- Ad hoc Sensitivity analysis: outcomes for only adherent participants (adherence = attendance of >75% of intervention sessions)

RESULTS

Fig 1: Consort Diagram

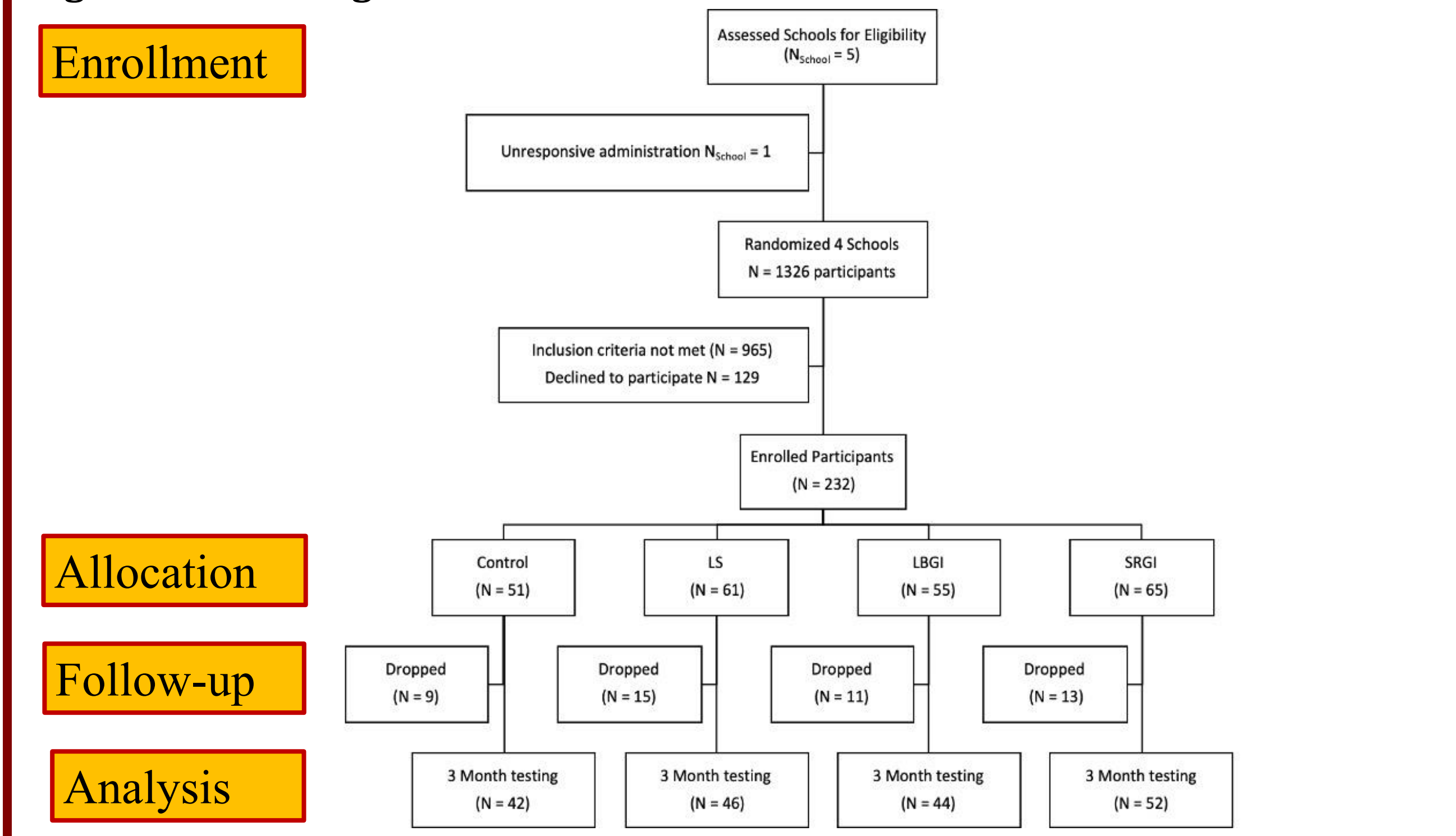


Table 2: Intent-to-Treat Dietary and Sedentary Behavior Outcomes

		Baseline Mean ± SD	3 Months Mean ± SD	N	Change Mean ± SD	Estimated Marginal Mean (95% CI)	P-value
Sedentary Behavior (minutes)	Control	1085.5 ± 106	1099.4 ± 122.4	40	18.7 ± 102	31.5 (-17, 80)	
	LS	1079.2 ± 100.2	1084.1 ± 136.9	41	-0.1 ± 101.2	13 (-35.5, 61.4)	0.54
	LBGI	1053.3 ± 75	1052.1 ± 204.6	34	7.4 ± 204.9	-3.1 (-56.4, 50.2)	0.28
	SRGI	1084 ± 114.2	1061.8 ± 150.1	34	0.6 ± 129.8	3.5 (-45.9, 52.9)	0.37
Healthy Eating Index	Control	50.9 ± 11.3	49.7 ± 10.2	31	-2 ± 9.8	-3.2 (-7.3, 1)	
	LS	52 ± 10.1	54.7 ± 10.5	34	3.5 ± 11.6	3.5 (-0.6, 7.6)	0.02
	LBGI	49.9 ± 11.4	53.4 ± 10.2	23	2.5 ± 13.8	2 (-2.9, 6.9)	0.08
	SRGI	52.5 ± 10.5	53.4 ± 12.0	31	-0.7 ± 13.8	0.3 (-3.8, 4.4)	0.19

- No group differences in other dietary intake (Calories, Carbs, Fat, Protein, Glycemic Index)
- Ad hoc analysis: LS and SRGI groups showed higher percentage of participants decreased sedentary behavior than would be expected (p=.035)
 - % of subjects with decreased sedentary behavior: C 33%, LS 62%, LBGI 29%, and SRGI 54%

Table 3: Adherent* Participants (Sensitivity Analysis) Dietary and Sedentary Behavior Outcomes

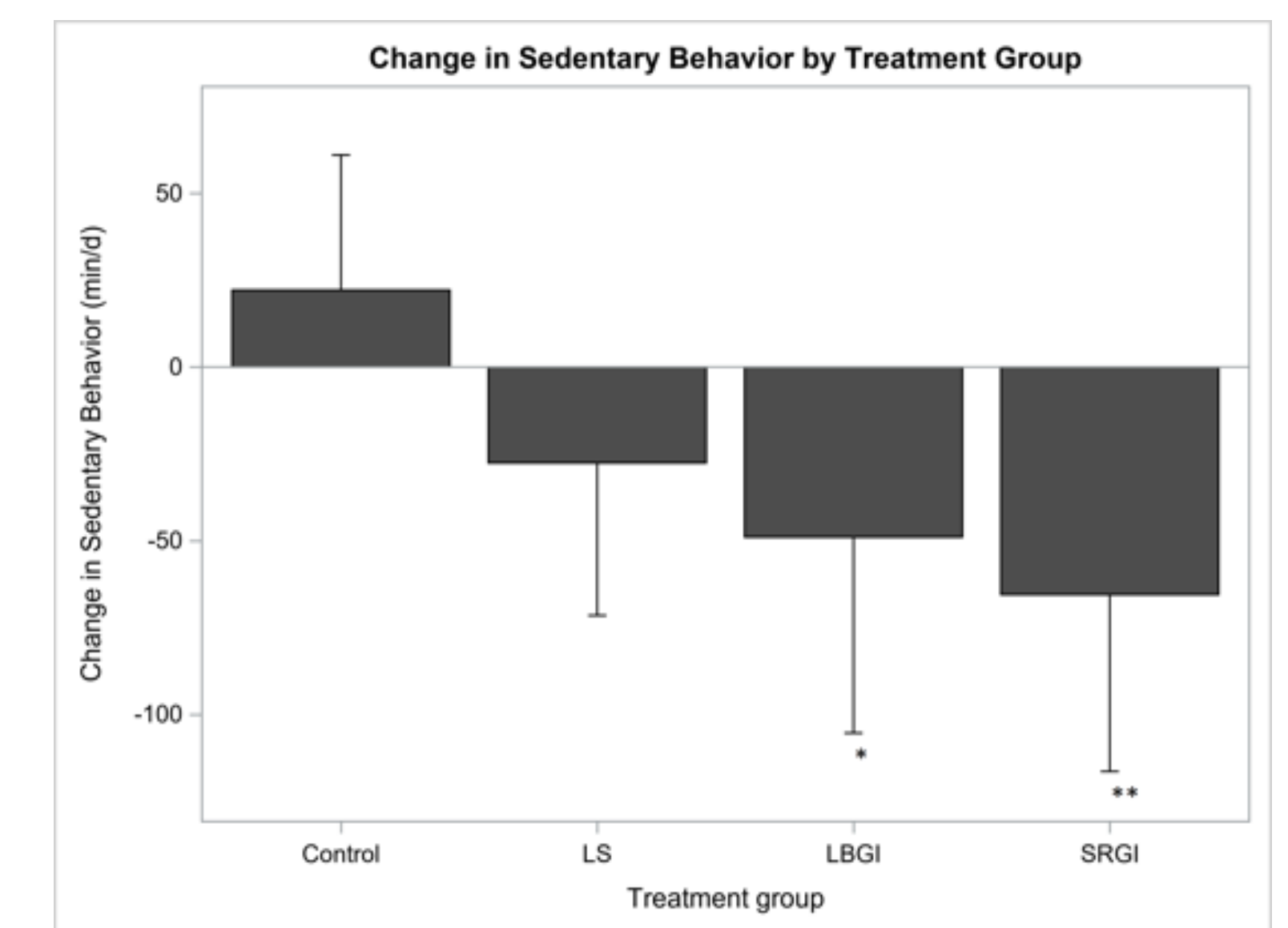
		Baseline Mean ± SD	3 Months Mean ± SD	N	Change Mean ± SD	Estimated Marginal Mean (95% CI)	P-value	Cohen d
Sedentary Behavior (min/d)	Control	1085.5 ± 106	1099.4 ± 122.4	40	18.7 ± 102.1	22.1 (-16.7, 61)		
	LS	1063.4 ± 79.9	1043.2 ± 108.5	30	-25 ± 97.2	-27.6 (-71.5, 16.3)	0.07	-0.41
	LBGI	1022.3 ± 66.4	985.4 ± 165.4	17	-39.3 ± 168.1	-48.9 (-105.3, 7.5)	0.04	-0.59
	SRGI	1047.9 ± 81.3	989 ± 95.1	21	-64 ± 88.8	-65.5 (-116, -14.6)	0.004	-0.73
Healthy Eating Index	Control	50.9 ± 11.4	49.7 ± 10.2	31	-2 ± 9.8	-2.7 (-6.7, 1.4)		
	LS	52.1 ± 9.6	55.9 ± 9.9	27	4.5 ± 11.6	4 (-0.3, 8.4)	0.02	0.59
	LBGI	53.4 ± 13.2	53.8 ± 11.4	13	1.7 ± 16.9	1.4 (-4.6, 7.3)	0.26	0.36
	SRGI	54.5 ± 10	56.1 ± 12.8	19	1.1 ± 15.3	3.4 (-1.7, 8.4)	0.05	0.54
Glycemic Index	Control	59.3 ± 4.1	58.6 ± 5	30	-0.7 ± 6	-0.3 (-2, 1.3)		
	LS	58.6 ± 4.5	58.4 ± 4.3	26	-0.1 ± 5.8	-0.2 (-2, 1.5)	0.95	0.02
	LBGI	57.4 ± 5.3	54.4 ± 3.5	13	-3.7 ± 5.6	-4.1 (-6.7, -1.6)	0.01	-0.84
	SRGI	58.5 ± 5	56.1 ± 4.3	17	-2.4 ± 5.6	-2.5 (-4.7, -0.3)	0.12	-0.48

* Adherence data (% of participants in each group with 75% attendance)

- A priori adherence goal was 80%
- Adherence by Group: Overall 42%; LS 52%; SRGI 37%; LBGI 33%
 - Absolute number of sessions attended not different by group
 - LS 13.3±7.6 of 24; SRGI 16.7±11.9; LBGI 17.6±11.3

RESULTS Continued

Figure 2: Change in Sedentary Behavior



Bars: Mean ± SD; P-value vs Control: * p<.05; ** p<.01

DISCUSSION & LIMITATIONS

- HEI improved most in LS group, in contrast to our hypothesis that GI would augment the didactic education, suggesting that the Imagine HEALTH didactic lifestyle curriculum alone can increase healthy eating habits in this population.
- Among adherent participants:
 - Decrease in sedentary activity greatest in SRGI > LBGI > LS (Figure 2), conforming to our hypothesis that GI would augment outcomes from the lifestyle program alone.
 - Reduced glycemic index in both LBGI (d=.84) and SRGI (d=.48), but not LS, also in line with hypothesis. Reduced glycemic index has been shown to reduce BMI in obese adolescent and is useful in diabetic populations.
- Mechanism by which GI improves lifestyle behaviors is unclear. SRGI may teach teens to balance and center → improved behavior choices.
- Poor intervention adherence is major limitation: most participants did not receive intended “dose” of GI, thus unable to interpret negative findings.
 - Primarily due to large study burden (2-3 after-school sessions per week) and multiple conflicting after-school activities and school schedules
 - GI and nutrition sessions were favored over physical activity sessions
- Health behavior change is not linear. Possible that seeds of change planted during the 12-week intervention may bear fruit in the future. Follow-up analyses planned.

CONCLUSIONS

- This report on the primary lifestyle behavioral outcomes from the Imagine HEALTH intervention RCT showed modest improvement in eating habits, in particular the Healthy Eating Index, and reduced sedentary activity.
- Guided imagery seemed effective in amplifying the role of didactic lifestyle education for some of these outcomes, in particular sedentary behavior and dietary glycemic index. Both of these could be useful in treating either obesity or type 2 diabetes.
- Outcomes were similar between LBGI and SRGI, indicating no benefit to the more complex behavioral imagery of LBGI over more simple SRGI
- Future similar interventions must account for the difficulties encountered in delivering such a complex, holistic intervention to an adolescent population.
- Finally, a fuller understanding of the outcomes of this intervention awaits secondary analyses that may disclose some outcomes not apparent from the initial ITT analysis utilized in this report.

Acknowledgements

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References

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