



Effectiveness and Suitability of Dynamic Standing Desks in Elementary School

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Introduction

- The U.S. obesity rate in children has nearly tripled, representing an immediate public health crisis¹
- Children spend 50-70% of their time sitting in the classroom and sedentary behavior has been linked to poor self-esteem, satisfaction, academic performance, and cognition²
- Providing movement opportunities via dynamic standing desks (DSDs) may decrease sedentariness and improve students' active engagement in school. However, DSDs are only feasible if acceptable to teachers and students
- Aim: This study investigates: 1.) relationship between students step change and academic engagement as a group, 2.) teachers' influence on use of DSDs as assessed by students' step change in their classroom, 3.) teachers' experiences of implementing DSDs in their classrooms.

Research Design & Methods

Study Design: Quasi-experimental, mixed methods one group pretest-posttest

Participants: 68 (3, 4, 5 graders), & 7 Teachers Focus Group

Data Analyses: Paired sample t-test; One-way ANOVA; Linear regression; Qualitative coding

Mark an X on the line to describe how much you are feeling each of these experiences.

Right now I am enjoying learning
A little _____ A lot

Right now I am focused/paying attention to my classwork
A little _____ A lot

Right now I am trying hard to complete my work
A little _____ A lot

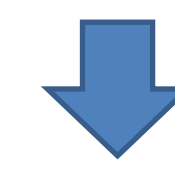
Engagement Survey

Administration: During independent writing time by staff member for 5 days pre- and post-ACE

Scoring: Measured distance from left anchor to X mark, transformed into percentages



Beginning of semester: Students wore pedometers and completed engagement surveys for five consecutive days



Intervention: Installed dynamic standing desks with pendulum footrests in classrooms for every student & provided resources for teacher-led movement breaks. One stool provided/every two desks.



End of semester: Students wore pedometers and completed engagement surveys for five consecutive days. Teacher were asked about their experience and perspective on the implementation of DSDs into their classroom

Results

Physical Activity

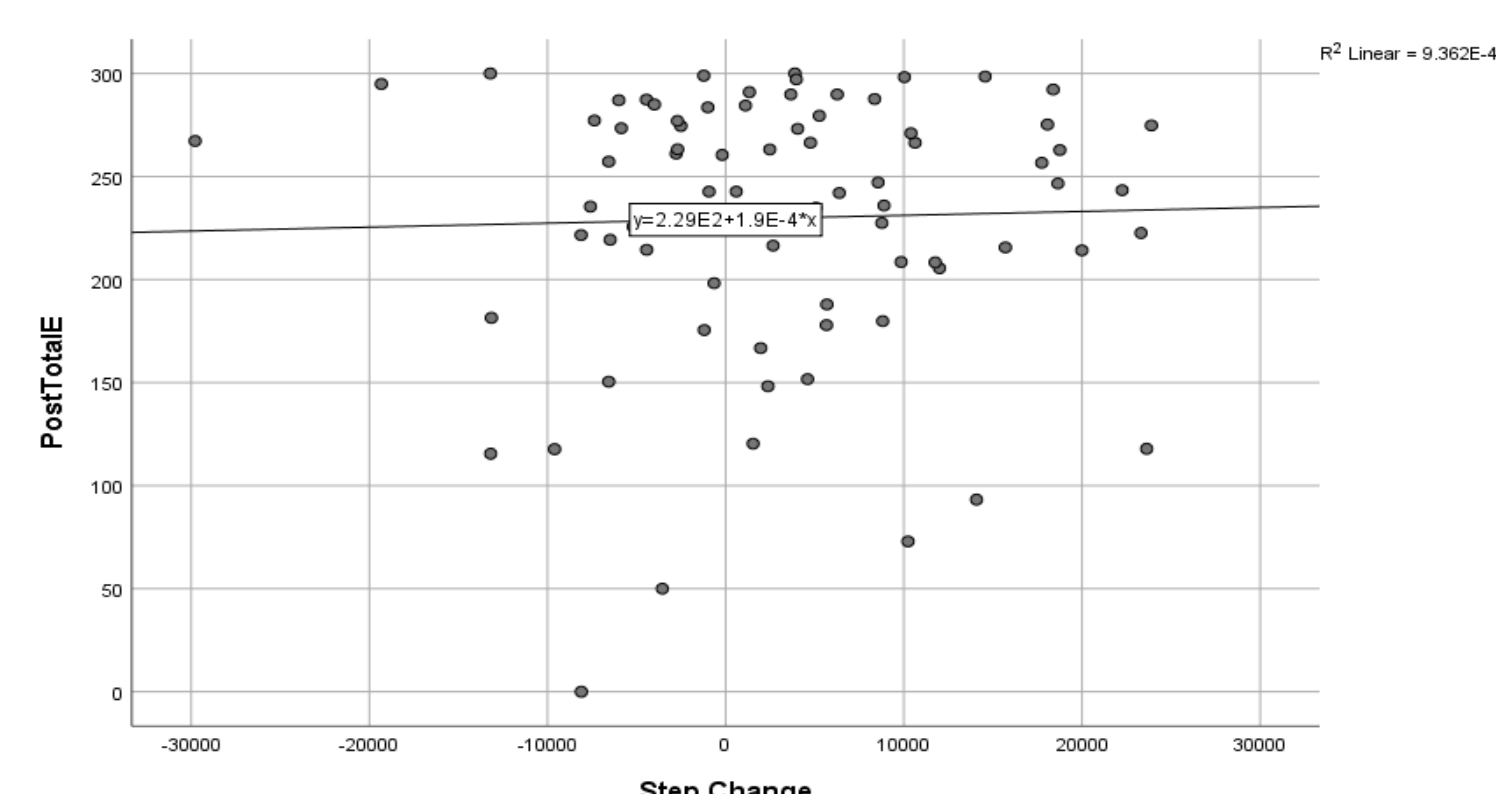
Paired Samples Test Pre-Post Steps							
Paired Differences							
95% Confidence Interval of the Difference							
		Mean	Std. Deviation	Std. Error	Lower	Upper	Sig. (2-tailed)
Pair 1	PostTotalWeekly - PreWeeklyTotalSteps	3400.57	10005.92	1213.39	978.62	5822.52	2.80 67 .007

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	660043142.69	4	165010785.67	1.60	.184
Within Groups	7536357759.68	67	103237777.53		
Total	8196400902.37	67			

Statistically significant increase in steps from pre-intervention ($M = 19269.75$, $SD = 6887.63$) and post-intervention ($M = 22670.32$, $SD = 10524$), $t(67) = 2.8$, $p = 0.007$ The eta square statistic (0.10) indicates a **large effect size**. Mean increase in score was 3400.57 steps with a confidence interval between 978.62 and 5822.52.

No statistically significant difference in steps between classrooms $F(4, 76) = 1.60$, $p = 0.184$

Academic Engagement and Step Change



ANOVA ^a					
Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	292.040	1	292.037	.070
	Residual	311633.604	75	4155.115	
	Total	311925.641	76		

a. Dependent Variable: PostTotalE
b. Predictors: (Constant), Step Change

No statistically significant relationship between changes in steps and academic engagement ($\beta = 0.034$, $p = 0.79$). Adjusted $R^2 < 0.01$.

Less than 1% of change in academic engagement scores was attributed to step change

Qualitative Themes

Theme	Example
Increased Physical Activity	"The kids get to stand up and fidget"
Social Skill Development	"There's the social benefit, where they have to advocate for themselves"
Disruption	"There's nowhere in the room, because those desks have a footprint that is probably 25% bigger than a regular desk"
Autonomy	"I like that everybody has their own space"
Ambivalence	"It's a small step in the right direction" vs "It's definitely not a magic pill"

After transcribing focus groups and completing **no line by line coding** in order to identify teacher's perception of the DSDs, researchers identified five major themes: **Increased Physical Activity, Social Skill Development, Disruption, Autonomy, and Ambivalence**

Conclusions & Implications

- Dynamic standing desks** played a large role in the **increase of physical activity**, while individual teachers did not influence changes in physical activity
- Builds evidence that DSDs can be implemented in a wide variety of different settings while retaining potency of physical activity changes
- Implementation of DSDs into the classroom **did not** adversely affect academic engagement of the students
- Teachers opinions of the intervention ranged from neutral to positive, while many saw it as a good opportunity for social learning for their students
- School-based OTs can use **evidence-based interventions to promote better health and participation** in school and daily occupations

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