

RESEARCH ARTICLE

“Happy, Healthy, and Smart”: Student Responses to the Walking Classroom Education Program Aimed to Enhance Physical Activity

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ABSTRACT

BACKGROUND: Over 1 in 3 children in US schools is overweight or obese; thus, most teachers believe physical education and activity are necessary K-12 components. One potential avenue to infuse physical activity (PA) in educational settings is integrating in classrooms based on learning objectives and academic outcomes. In this study, we examined student emotion through the use of the Walking Classroom (WC) learning platform.

METHODS: Students from 9 fourth- and fifth-grade classrooms (N = 100) in 1 North Carolina county participated in 10 separate focus groups related to their engagement in an active education program. Discussions centered on how engaging in a short bout of PA during a WC podcast impacted students' overall educational experience. Data analysis included open in vivo manual coding methods resulting in major themes and visual word-clouds.

RESULTS: Students reported feeling happy, healthy, educated, smart, and excited while walking and learning. Afterwards, students discussed feeling strong, relaxed, energized, happy, and alert. On days students were not able to do a walk, they reported feeling mad, bored, sad, sleepy, and tired.

CONCLUSION: Offering active learning appears to result in students feeling happier, healthier, and smarter.

Keywords: physical activity; elementary school; child health; academic performance; child emotions; the walking classroom.

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Historically, physical education (PE) has been a staple of K-12 curricula in the US local legislation determining the type of activity and time allotments required for students.^{1,2} However, since the passage of the No Child Left Behind Act (NCLB) in 2001, PE programs have experienced decreased funding and resources, as more time and effort has been reallocated to mathematics and science.^{1,3}

Today more than 1 in 3 K-12 children is overweight or obese,⁴ which has steadily and significantly increased since NCLB.⁵ Because physical activity (PA) is one way to combat weight gain, integrating PA into classrooms has been promoted by professionals due to its potential positive impacts on both health

and learning. Given the priority placed on academic achievement and the need to increase students' PA, programs and interventions with potential to support both are endorsed.

Learning and Physical Activity

Aerobic PA affects the hippocampus, a small organ inside the brain containing memory and learning systems. The hippocampus strengthens with aerobic activity, which positively influences the ability to remember, learn, and focus.^{6,7} PA, when coupled with learning offers an opportunity to move throughout lessons, which allows for learning to occur via direct experience and interaction with intellectual, social,

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and physical environments.^{8,9} Supporting this notion, Raley and Hagerman¹⁰ found that when coupled with learning, PA not only increased students' muscle mass, but also heightened brain function. A growing amount of research supports learning through PA, particularly regarding academic behaviors (ie, time management and time on-task), cognitive skills (ie, attention and memory retrieval), and academic achievement (ie, grade point average (GPA) and standardized test scores).¹¹

Multiple interventions and meta-analyses support the notion that PA leads to positive academic behaviors in students, including on-task behavior.¹²⁻¹⁶ Specifically, the Physical Activity Across the Curriculum¹³ and Energizers¹⁵ programs implement PA into core content. Additionally, PA integration in the classroom may increase lesson engagement while decreasing disruptive classroom behaviors.^{11,16-18}

Cognitive skills are also positively impacted by PA, and multiple studies demonstrate that classroom interventions involving PA increase students' executive functioning, concentration, and memory.^{6,10,19-22} For example, Pesce et al.²³ found that memory recall was enhanced for groups of elementary students who exercised either via aerobic circuit training or team games, but recall suffered for the students in the control group that did not exercise prior to their recall test. Additionally, students who participated in PA were better able to recall more recently learned words, potentially shortening the consolidation time needed for long-term memory storage.²³

Students' academic achievements are also positively influenced via PA. PA is associated with higher standardized test scores and GPA^{13,24-26}; however, these outcomes tend to be long-term measures rather than short-term measures such as a classroom tests or quizzes. Studies examining short-term outcomes have found positive associations with increased academic achievements. Following 10- and 20-minute bouts of PA, Howie et al.²⁷ discovered that fourth- and fifth-grade students demonstrated improved performance on math fluency tests and operational digit recall. Similarly, another randomized study found a positive association between movement breaks and math and reading achievement scores in third- through fifth-graders.²⁸ The body of literature exploring the impacts of PA in educational settings has grown in recent years; however, little research has assessed students' emotions when participating in these classroom PA interventions.

Student Emotions and Physical Activity in the Classroom

Emotions are natural states of mind stemming from situations, relationships, and mood. They have been described as "a subjective state, often accompanied by a bodily reaction (eg, increased heart rate) and an

evaluative response, to some event."²⁹ (p. 61) They represent reactions to stimuli, complemented with the person's feeling of how the stimuli fits within their environment. Emotions not only influence a variety of cognitive processes, but also play a crucial role in encoding and retrieving information.³⁰ Additionally, PA is associated with increased positive emotions and mood^{31,32} and adaptive responses such as problem solving.^{33,34} Positive emotions may foster student engagement and therefore influence student learning outcomes and achievement,³⁴ while students showcasing negative emotions are disengaged with course material and have lower GPAs.³⁵

Most studies on PA in classrooms focused on behavioral engagement and academic achievement, not student emotions toward these interventions.³⁶ One study on short classroom activity breaks with elementary students showed a higher positive affect following activity.³⁶ The aforementioned studies offer important insights into the role of emotions in engagement and learning, however, more research is needed to fully understand how PA and programs such as the Walking Classroom (WC) influence emotion and learning in K-12 students.

The Walking Classroom

The WC, an educational program developed by an experienced fifth-grade teacher concerned with the growing lack of opportunities for student PA during the school day, was developed to provide an opportunity for student exercise without sacrificing instructional time. The Walk, Listen, and Learn program designed for students was considered a success in the developer's classroom—she observed noticeable improvements in her end-of-grade scores along with attitudes about learning and exercise, and the students who were struggling made the most notable gains.³⁷ Today, the WC is a nationally recognized, award-winning, in-school PA, and obesity intervention that works to improve health literacy and build core content knowledge while addressing different learning styles.³⁷

Previous program assessment conducted by the WC has provided a clear picture of increases in student PA, feelings of teacher appreciation and efficacy as a teaching tool. Additionally, student self-reports have shown the program's impacts on the student learning process, attitudes toward learning, mood, and concentration.³⁸ The current study built upon this research by collecting student data on emotional responses to the program through in-depth focus group discussions, addressing both gaps in previous WC evaluation literature.

Purpose

This study was grounded in kinesthetic learning research centered on the idea that learning

happens from the feet up.³⁹ Three decades ago, Gardner and Hatch⁴⁰ described multiple intelligences and how their core components meshed with education and learning. At that time, there were 7 types of intelligences: logical-mathematical, linguistic, musical, spatial, bodily kinesthetic, interpersonal, and intrapersonal. Bodily-kinesthetic intelligence can be described as the ability to control one's body movements and handle objects skillfully.⁴⁰ Since that time, a plethora of research has been conducted specific to kinesthetic learning determining that movement positively impacts learning through enhanced brain function, increased circulation, refocused attention, and increased motivation, among others.³⁹ Thus, the purpose of this study was to test the kinesthetic learning theory on student emotion through the use of the WC learning platform. Specifically, we the addressed following research questions:

- How does the WC affect student attitudes toward learning during and after the instruction?
- How does physical inactivity during the school day affect student attitudes toward learning?
- How do students believe having PE or another type of exercise during school every day would affect them?

METHODS

Participants

The target population was students from WC veteran teacher-adopters accessed through 1 North Carolina county where most fourth- and fifth-grade teachers had access to the WC material. We contacted 41 teachers from 6 schools, and 9 teachers from 4 schools agreed to participate in the study. This facilitated access to 327 fourth- and fifth-grade children, of whom 100 were included in the focus group discussions. The focus groups were held in April 2018 during lunch, and the same research team conducted each of the 10 focus groups. Students were selected via convenience sample based on empty seating at the lunch table. The lead-researcher sat down in an empty seat, and the nearest 10 students were invited to participate in the focus group discussions. This method was selected as to not disrupt the normal flow of the school day.

Nine of the focus groups were with different classes, with 1 class participating in 2 focus groups on different days. The total sample included 43% (N = 43) boys, and 57% (N = 57) girls. In 2 of the schools (5 classes), PE was offered 2 days per week for 30 minutes. In 1 school (2 classes) it was offered 1 day per week for 45 minutes, and in 1 school (2 classes) where the fifth-graders were divided by sex, boys had PE 2 times per week for 50 minutes, and girls had PE once per week for 50 minutes. Children within the sample

schools were largely from low-income families. The average percentage of students eligible for subsidized lunch within the 4 schools was 81.25% with 2 of the schools at 99%. These sample schools were also lower-performers academically, with a 4-school average of 40.75% of students meeting end-of-grade (EOG) reading proficiency standards as measured by the North Carolina EOG tests, with the school reading proficiency averages ranging from 28% to 52%. This population was selected because it is representative of the grantee population of WC users as the organization prioritizes high poverty and low-performing schools when it donates program material. We collected data from teachers who consented and from youth who provided parent consent and personal assent.

Procedures

Intervention description. The WC podcasts are ~20-minute content-based audio lessons provided by way of individual WalkKits (audio devices with ear buds) for students to listen to as they walk briskly (preferably outside). The podcasts include content aligned to the Common Core State Standards with focus areas of language arts, social studies, and science. In addition to the focus-subject of the podcast, each includes a health literacy message (eg, vitamins, hydration, cardiovascular fitness) and a character value (eg, reliability, humor, confidence). Detailed lesson plans contain objectives, discussion questions, visual supplementary material, and comprehension quizzes for each podcast, so that when students return from their walk, the content can be reviewed and synthesized. Given that the target population included veteran teacher-adopters, and focus groups took place in April, each of the students in the population were very familiar with the WC as it was a regular part of their curriculum with classroom usage ranging from once per month to twice per week.

Semi-structured interview guide. The researchers used a semi-structured focus group interview style with a set of prepared questions which acted as a guide for the discussions.⁴¹ We asked 3 key questions of every child: (1) What are your feelings while walking, listening, and learning? (2) What are your feelings after walking, listening, and learning? (3) Describe your feelings on days without a walk or PE. The semi-structured format also allowed for interjections and additional probing questions as appropriate. The flow of the discussion was primarily driven by the participants who were encouraged to talk openly and freely about whatever they viewed as important.⁴²

Data Analysis

Data from the lunchroom discussions were organized and coded by 2 researchers utilizing open in-vivo manual coding methods.⁴² Emergent themes were

Table 1. Student Feelings While Walking, Listening, and Learning

	Percent	N
Happy, excited, enthusiastic	35	33
Smart, intelligent, educated, knowledgeable	22	21
Healthy, good, better	18	17
Calm, peaceful, relaxed	14	13
Alert, energetic, awake	9	9
Sleep/do not want to walk	2	2
N = 95		

compared and linked together through axial coding and the researchers then re-reviewed each response and independently coded the narratives utilizing the finalized code. Inter-coder agreement on the full body of analyzed data was 96.8%, yielding a Krippendorff's alpha of 0.954. Finally, word-clouds were generated utilizing one-word summaries of student responses to demonstrate the main emergent themes, with larger words representing common themes within the discussion.⁴³

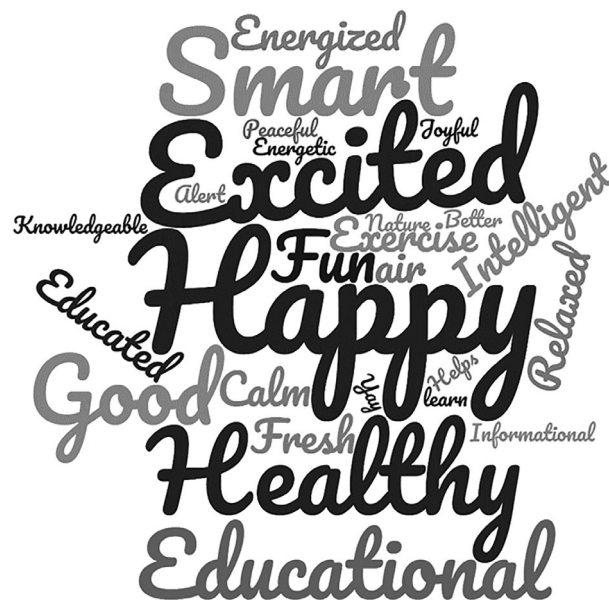
RESULTS

Physical Activity and Attitudes toward Learning

Students were asked: "When you go for a walk and listen to a podcast, how does it make you feel?" Just over one third of respondents (N = 33) mentioned being happy, excited, or enthusiastic about being able to move. A fifth-grader mentioned: "It makes me happy on the inside. I get really excited because we can move around because we sit *a lot* in school" (Participant 30). The next most common narrative expressed by students about how they felt while walking, listening, and learning was that they felt smart, intelligent, educated, and knowledgeable (22%; N = 21). "I feel educated - like one of the people I see going for a jog and listening to music" (Participant 12); "I feel intelligent. I get to learn a lot of cool things while I am moving!" (Participant 60); "I can learn so much more because I learn better listening instead of reading, and it's fun" (Participant 10). Students also expressed feeling healthy (18%; N = 17); calm, peaceful, and relaxed (14%; N = 13). "I love feeling the air on my face and breathing fresh air" (Participant 22); "I feel peaceful because you get to take a quiet walk and see nature" (Participant 31). Table 1 and Figure 1 depict the complete array of themes.

Following this discussion, students were prompted to share how they felt in the classroom after walking, listening, and learning. The most common feeling reported by students was that they felt strong and healthy (24%; N = 22). "My body feels healthy and glad it got to go for a walk because I have energy all the time except when I'm in the classroom"

Figure 1. Students' Feelings While Walking, Listening and Learning



(Respondent 7). "I feel strong - like I can do anything" (Respondent 80). "I feel like I got some abs" (Respondent 19). "I feel like I lost a lot of pounds" (Respondent 12). The next most common theme related to how the students felt after listening to a WC podcast while walking included expressions of intelligence and knowledge gained. The students were confident and excited they learned something new and proud they were ready to express this new knowledge: "I feel excited that I'll get 100% on the quiz because I listened to it" (Respondent 61). "I have more knowledge in my head" (Respondent 44). "I feel more educated and strong at the same time" (Respondent 17). "Makes me want to learn more things - makes me feel a little bit happy" (Respondent 12). The third most commonly expressed theme included students feeling awake, alert, and energized (22%; N = 20). A complete list of themes are listed in Table 2. Several of the narratives expressed the refreshing method of educational delivery—that it did not feel like instruction. For example, Respondent 40 said he feels "happy because we didn't have to do work and we just got to walk down the halls." Similarly, "I have released energy. I might be a little tired, but I can write down notes to study because I got to learn about things I couldn't have learned about in the classroom" (Respondent 68). Themes are displayed in Figure 2.

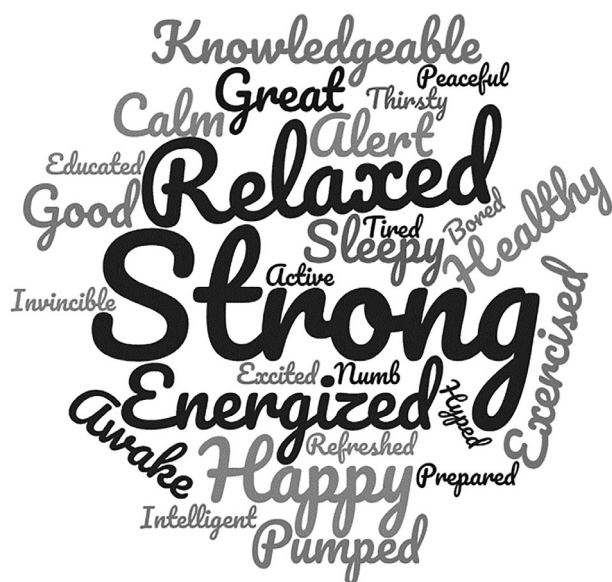
Physical Inactivity and Attitudes Toward Learning

Students were asked: "On days when you don't do a walk or have PE, how do you feel?" Student narratives

Table 2. Student Feelings After Walking, Listening, and Learning

	Percent	N
Strong, health, invincible	24	22
Ready for learning, prepared, knowledgeable, intelligent	23	21
Awake, alert, energized, pumped, excited	22	20
Relaxed, peaceful, calm, refreshed	17	15
Happy, good, great	13	12
Tired, sleep, bored, thirsty	8	7
N = 97		

Figure 2. Students' Feelings in the Classroom After Walking, Listening and Learning

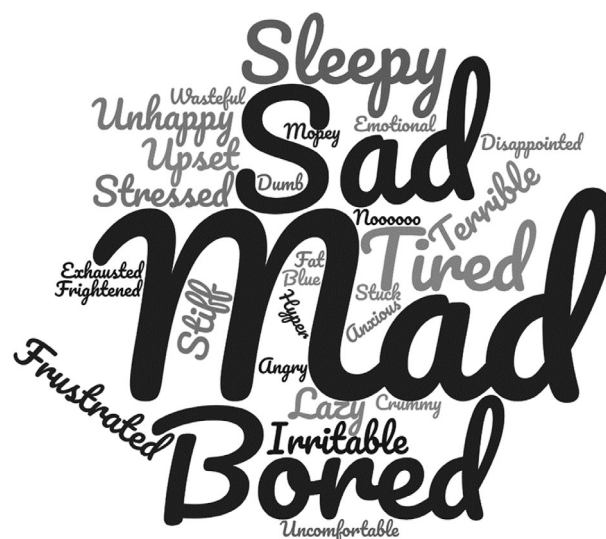


within this section of the focus group provided insight into physical inactivity and attitudes toward learning. Over half of the students (51%, N = 46) expressed feelings of sadness, disappointment, or anger when they were not able to participate in a walk, listen, and learn instructional segment during their day. Examples of this sentiment are as follows: "I just want to cry" (Respondent 20); "I'm sad because I don't get to exercise" (Respondent 71) "I'd be upset because we didn't get to have any fun in school" (Respondent 26). Others discussed mounting anxiety and frustration that they are not able to move their bodies (12%, N = 11): "It's really hard to concentrate" (Respondent 59); "I feel stressed, because I might have stuff built up in my body but I have to wait to do it" (Respondent 3). Others expressed feeling physically uncomfortable or stiff (7%, N = 6): "I feel like I'm stiff and my body can't move" (Respondent 17); "I feel like my gut is growing because in school you barely move around. I want to move my legs!!"

Table 3. Student Feelings on Days Without a Walk or Physical Education

	Percent	N
Sad, unhappy, disappointed	29	26
Mad, angry	22	20
Sleepy, tired	12	11
Bored	10	9
Uncomfortable, stiff	7	6
Fat, lazy	6	5
Dumb, losing knowledge	2	2
N = 90		

Figure 3. Students' Feelings in the Classroom on Days When They Did Not Walk or Have Physical Education



(Respondent 91). Table 3 and Figure 3 display the emerging themes.

Student Perceptions of Physical Activity During School

Students were asked to explain how they believed having PE or another type of exercise during school every day would affect them. Most responses were positive, reflecting a belief that if they were able to have structured PA throughout the day they would be happier (28%, N = 28), healthier (26%, N = 24), and smarter (21%, N = 20). Examples of these expressions included: "I'd be so strong and my body would be so healthy" (Respondent 33); "It would make me even smarter because I'd get to learn and have fun" (Respondent 14); "I would feel so happy because I'd get skinnier" (Respondent 63); "That would make me so happy - it would be the best thing ever" (Respondent 19). Eleven percent of the respondents (n = 10) expressed hesitation and feelings that every day might be too much: "I think we'd get too skinny" (Respondent 21); "I'd be exhausted...plus, I don't

want to look like a bodybuilder!” (Respondent 95); “I think we should just do 2-3 times a week, because our muscles might hurt” (Respondent 91). Finally, some (7%, $N = 6$) expressed relief and a sense of peace at the idea “You’d get to relax your mind, and that would feel really good” (Respondent 19). “It would be a relief - we’d get to move and have fun instead of just sitting there all day every day” (Respondent 12).

DISCUSSION

A large snapshot of the word-clouds provided in the various figures suggests that the feelings students have from engaging in WC podcasts are collectively positive emotions, which is consistent with that of other research findings.³¹ The majority of students indicated that they felt happy (35%) and intelligent (22%) while they walked and learned via listening to the podcasts. These results are supported by previous research with adolescent students in which positive emotions were associated with greater student engagement and adaptive coping.³⁴ Adaptive coping can be described as beneficial or healthy means for confronting problems such as sleeping, planning, exercising, and talking. To our knowledge, no qualitative data describing children’s feelings during or after classroom PA breaks have been reported in research, so this was the first study to focus on the emotions elicited from the walking intervention.

After completing the podcasts, the student emotions shifted to feeling fit (24%), intelligent (23%), and alert (22%)—all positive emotions, yet distinct from those indicated during the WC podcasts. These findings are slightly different from those in other research related to emotions following PA bouts. Those studies showed associations with PA and improved positive mood such as joy or happiness³³ and decreased negative moods such as confusion, anger, and tension,³² but they were conducted with adults. Youth from the current study tended to recall having these feelings more during the PA as opposed to after. In previous studies, participants were not asked to indicate their emotions during the activity, so mood during and following PA is an area that should be further examined.

There were a few students ($N = 8$), however, who did not indicate positive emotions upon completing the walk and learn. They revealed they felt lethargic afterwards. It would be interesting to have a gauge on these particular students’ emotions pre- and post-activity, as it is atypical to feel bored after moving.⁴⁴ Vlachopoulos et al.⁴⁵ conducted a study with adolescents in which they ran 400-m or completed a health-related fitness test during PE. Results showed that those who exhibited task goal orientation and believed in their own success were more likely to have a positive effect. Additionally, those who felt they were internally responsible for

their success had more positive emotion; thus, perhaps the students in the current study who indicated they were bored or lethargic after the activity did not believe they had much control over the outcome of their time engaged in the walk to learn activity. It is possible that some sort of simple intervention such as helping students set a task-related goal (with regard to the amount of walking they do during the podcast or with the amount of content they learn while doing it) may help increase their positive affect.⁴⁵ The overall findings from the current study are similar to previous research indicating PA is positively associated with mood/emotions.^{31,32}

When students did not participate in PA during the day, they expressed negative emotions, such as feeling unhappy (29%), cross (22%), lethargic (12%), and uneasy (12%). We know that emotions impact self-regulated learning and motivation, which in turn, affect academic achievement.⁴⁶ It makes sense that students with negative emotions often become disconnected with the content and end up with lower grades.^{34,35} Therefore, if PA and/or movement positively influences children’s emotions, while inactivity negatively influences their emotions, it seems rational for teachers and administrators to do their best to incorporate movement during learning time for youths.

Further research on emotion shows how different types of positive and negative emotions can impact learning differently. For instance, negative emotions classified as high in motivational intensity such as disgust narrow a person’s focus, while negative emotions low in motivational intensity such as sadness broaden it.⁴⁷ Therefore, specific type and intensity of emotions influence learning differently. Thus, to find more specific links between PA, emotion, and student learning, future research should examine particular positive and negative emotions and how strong the individuals were feeling those emotions in order to establish more robust findings and connections. Valiente et al.⁴⁸ (p. 7) suggest that “not all emotions are likely to relate to achievement the same ways or for the same reasons.”

As a whole, students believed PE and PA affected their emotions by making them feel cheerful (32%) and fit (27%). Whereas this question was not specifically related to the WC podcast intervention, the responses were similar in nature to the questions directed at feelings while learning through activity and feelings immediately following learning through activity.

Strengths and Limitations

To our knowledge, this is the first study to analyze children’s emotions qualitatively during and immediately following learning while being active

through student voices. For a qualitative study, the participant count was high. Some limitations did exist, however. One, capturing these emotions before students completed the WC podcasts may have helped establish whether any trends existed. For instance, were the students with negative emotions afterwards displaying negative emotions to begin with? In contrast, were there students who exhibited negative emotions before the physically active lessons who felt positive emotions afterwards? Two, identifying specific positive and negative emotions a priori may have helped determine if any particular type of emotion (positive or negative) was a more likely outcome from walking while learning. Three, while focus groups were advantageous in accessing larger groups of students for qualitative data, their nature may have been a limitation in that students may have answered similarly to that of their peers or may have felt uncomfortable or intimidated giving a response in front of others. Individual interviews or seeking written feedback may have revealed different responses.

Conclusion

Use of the WC podcasts was mostly positive in terms of emotions for the children involved. During the activity, they felt cognitive and physical emotions defined as happy, healthy, excited, calm, and smart, to list a few of the specific terms used. Immediately following the activity, they focused more on feelings related to physical emotion (eg, strong, relaxed, energized, awake, healthy, and exercised). In the absence of PA or PE for the day, the children indicated more mental emotions such as feeling sad, mad, bored, or irritable. Although incorporating PA during all aspects of teaching is not feasible, teachers can be encouraged to include it for the positive impact it appears to have on student mood.

IMPLICATIONS FOR SCHOOL HEALTH

Knowing that emotions play a crucial role in encoding and retrieving information,³¹ it is helpful if K-12 educators can incorporate movement for students while they learn in an effort to assist them with better processing content. Findings from our study support this notion and provide evidence that moving and learning should go hand in hand whenever possible. Not only do student emotions seem to be more positive with the inclusion of activity, but also the link between emotions and academic achievement show positive effects as well.⁴⁷

A few suggestions for teachers and staff include:

- Incorporate activity that directly relates to the content, such as doing a specific number of movements (jumping jacks or squats) corresponding

to the correct answer in math. Alternatively, perform an activity (marching) if a statement read by the teacher is true or a different activity (ceiling punches) if the statement is false. This can be used with any content, whether it is math, social studies, science, or language arts.

- Create an active classroom space in which students are able to move sporadically and/or by choice. Beanbags or stability balls can replace some of the standard desk chairs. Rugs or yoga mats may offer spaces for students to read or do some mindfulness activities. Taller tables can serve as standing desks for a change of pace with reading or writing.
- During free reading times, challenge students to walk and read at the same time, in the classroom or outside in an open area.
- Intentionally schedule PA breaks for students throughout the days. The bouts can be brief. These can be led by the teacher, the students, or from someone on the Internet through a video.
- Allow students to talk about and write about their feelings. The release of this information can be a relief and soothing, regardless of whether the emotions are positive or negative. Knowing they have an outlet, even if it is a piece of paper, can help them to reflect on their mood.
- Ask students for input on what makes them happy, excited, sad, and even angry. Then discuss ways school can help and ways peers can help. It is anticipated that PA or exercise will come up in conversation as means for positive emotions, and then follow through with ways students can act on their urges to be active or take breaks.

It was insightful to see such positive emotions result from the WC podcast walks. Perhaps even more surprising was the fact that no positive emotions were expressed by the students on days when they were not given the opportunity to complete the WC podcasts. One would expect at least a few outliers to be happy or content without movement, but that did not occur within this sample of children. As indicated earlier, positive emotions tend to cultivate student participation, interest, and ultimately, student learning, and achievement.³⁴ Thus, we hope teachers will include movement within instructional time, as it can be done without a lot of time or effort in planning or executing. The outcomes for students may pay large dividends with regard to their attitudes and, potentially, their learning.

Human Subjects Approval Statement

Human subjects approval was received from the University of North Carolina institution review board prior to any data collection (IRB 18-0076).

Conflict of Interest

The authors declare no conflict of interest.

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