

MOUNTAINBURG PUBLIC SCHOOLS

In Arkansas' Most Scenic School District

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November 6, 2019

Tracy Webb, Director of Charter Schools
Four Capitol Mall
Little Rock, AR 72201-1019

RE: Charter Authorizing Panel Hearing

Dear Tracy Webb:

On behalf of the district we appreciate the Charter Authorizing Panel's support of our work by giving us an opportunity to go back and reframe our vision for our conversion charter, and to provide more information, research, and support for the proposal. The process has given us the chance to shift our focus from the actions and initiatives we envision to accomplish the vision, and clarify the framework for our desired school:

Mountainburg Middle School Brain Academy will provide a personalized learning environment that ensures

- Learners have agency to set their own goals for learning
- Learners create a reflective process during their journey to attain these goals
- Learners have flexibility enough to take their learning outside the confines of the traditional classroom

Additional information requested by the Charter Authorizing Panel members is included in the supporting document. Please contact me ifl can be of more assistance.

Sincerely,



Dr. Debbie Atwell
Superintendent

Brain Academy Questions and Clarification for Nov 6, 2019

1. Why is a conversion charter needed to accomplish the goals?

Mountainburg Middle School Superintendent and Principal presented three priorities of the Brain Academy Middle School. We are proud of the work we have already accomplished, and wanted to share all that we are doing. The three priority innovations we shared with the authorizing panel were:

1. *A Culture of Academic Growth* through PLC, R.I.S.E., and PLTW. **We do not need a conversion charter for these innovative initiatives.** We know there are ways in which waivers would support our efforts, but realize we could also accomplish these things (to some degree) without a charter.
2. *A Culture of Self Efficacy* through Brain Breaks and “Personal Trainers”. **We DO need a conversion charter for this innovation** because we need a waiver that allows us to change the way we cover the physical education standards. Currently, our 5th and 6th grade students receive 40 minutes of PE once a week, or 24 hours per year. Our vision is to support physical health and movement on a more regular and persistent basis by scheduling five 10 minute blocks every single day; or 148 hours per year. We are not eliminating PE requirements, but increasing the time our students spend being physically active. All in an effort to solve issues that young students in our school, and across our nation are struggling with:
 - a. increases in behavior referrals
 - b. a general decrease in health and wellness habits
 - c. a dependance on digital devices to entertain rather than being physically active
 - d. decrease in academic achievement due to student motivation and lack of self efficacy
3. *A Culture of Success* through Focus 3. **We do not need a conversion charter for this innovation.** We believe in building a positive, student-empowered program as a foundation for Brain Academy’s success, but it can be accomplished without any waivers.

We request conversion charter status to gain flexibility and autonomy that allows use of the existing and limited resources of faculty, staff and time in unique ways to accomplish our goals. Being able to embed PE creates flexibility in the staffing assignments to offer more access to choice like PLTW courses and targeted interventions for math, literacy, personal fitness, etc. Waivers for flexible schedule, class size, and teacher load allow us to offer personalized learning opportunities based on student need rather than building a traditional schedule working around constraints.

2. How will you measure if brain breaks/ physical activity will improve academics?

We will monitor academic achievement through 4 week learning cycles within our PLC process, and by using multiple measures including formative and summative assessments, discipline referral data, and observational data on levels of student engagement.

We will monitor student physical activity and fitness goals in the same way; through 4 week "Student Performance Reports"



Student Performance Report

	Completed	Remaining	GOAL
Academic Growth	27	73	100
Physical Fitness	25	75	100
Citizenship Growth	20	80	100

Week One



	Completed	Remaining	GOAL
Academic Growth	51	49	100
Physical Fitness	51	49	100
Citizenship Growth	20	80	100

Week Two



	Completed	Remaining	GOAL
Academic Growth	89	11	100
Physical Fitness	89	11	100
Citizenship Growth	20	80	100

Week Three



3. Provide a greater focused and detailed strategy for the brain break.

Working Schedule

Students will begin in homeroom for goal setting. They will have blocks of time scheduled for core instruction, five ten minute breaks for physical activity, and a block of instructional time for personalized learning based on personal goals, interested and needs.

8:00 - 8:10	Homeroom
8:10 - 8:35	ELA Block
8:35 - 8:45	Dragon Fitness Training
8:45 - 9:10	ELA Block
9:10 - 9:20	Dragon Fitness Training
9:20 - 9:45	History Block
9:45 - 9:55	Dragon Fitness Training
9:55 - 10:15	History Block
10:15 - 10:50	R.I.S.E. Block
10:50 - 11:25	Lunch & Recess

11:25 - 12:05	Science / PLTW Block
12:05 - 12:15	Dragon Fitness Training
12:15 - 12:45	Science / PLTW Block
12:45 - 1:35	Math Block
1:35 - 2:15	Student Performance Block
2:15 - 2:55	Student Performance Block
2:55 - 3:34	Student Performance Block

4. Confirm if a conversion charter is needed to accomplish the goal of Brain Breaks and additional physical activity.

Yes, we believe a conversion charter is needed to provide the flexibility and personalized learning opportunities and innovations we strive to offer give the needs, interests and constraints of our faculty and resources. We do need a waiver from physical education standards, flexible schedule, teacher class size, teacher load, and minimum planning time to be able to create the schedule and culture necessary for this to take place.

5. Provide supporting data for both brain breaks and physical activity's impact on student achievement.

Physical Activity Guidelines for Americans provides evidence-based recommendations for adults and youth age 3 through 17. Each day youth age 6 through 17 need at least 60 minutes of moderate-to-vigorous activity to attain the most health benefits from physical activity. Most activities can be aerobic, like walking, running, or anything that makes their hearts beat faster. They also need activities that make their muscles and bones strong, like climbing on playground equipment, playing basketball, and jumping rope (Physical Activity Guidelines, 2018).

In response to the question of whether or not other schools in Arkansas were utilizing these approaches, we spoke to **Dr. Crystal Beshears, PhD, Office of Innovation for Education, University of Arkansas, Fayetteville**. The Office Of Innovations conceded that while there is little research or data from schools in the state examining the impact physical activity of academics, but they did provide a research article that states the emphasis on physical activity is missing in charter schools across the nation. ***Charter schools across the nation have neglected promotion of physical activity*** (Kahan, McKenzie, and Khari, 2019).

"Physical activity (PA) is essential to growth and development of children and adolescents and their current and future health (2018 [Physical Activity Guidelines Advisory Committee, 2018](#)). As well, there is growing evidence that PA contributes to improved academic behavior and achievement ([Centers for Disease Control and Prevention \[CDC\], 2010](#); [Donnelly et al., 2016](#)). Prominent health entities ([Institute of Medicine \[IOM\], 2013](#); [United States Department of Health and Human Services, 2008](#)) recommend that children accrue at least 60 min of PA daily. Unfortunately, most children fall short of this target ([Fakhouri et al., 2014](#); [Troiano et al., 2008](#)).

Schools are a key venues within the U.S. national strategy to increase PA ([Centers for Disease Control and Prevention, 2013](#), [Centers for Disease Control and Prevention, 2014](#); [IOM, 2013](#); [NPAPA, 2016](#); [Rasberry et al., 2015](#)), especially because they are attended by most children for extended periods and offer diverse PA opportunities (e.g. physical education (PE), recess, classroom breaks, before- and after-school programs). National bodies have suggested that half of children's recommended daily 60 MVPA minutes be accrued at school ([CDC, 2013](#); [IOM, 2013](#)). To meet this goal, a whole-of-school approach, frequently referred to as Comprehensive School Physical Activity Programs (CSPAP), has been recommended ([Centers for Disease Control and Prevention, 2013](#), [Centers for Disease Control and Prevention, 2014](#); [IOM, 2013](#); [Rasberry et al., 2015](#))."

Dr. Beshears did state there is much research supporting the benefits of meeting the needs of the whole child to support their academic success, as well as benefits to academic learning through personalized learning and flexibility in schools. The Office of Innovations has recently conducted a case study that

hasn't been released yet, but findings show favorable results in schools with flexibility in how they structure learning, and those taking a personalized approach to learning.

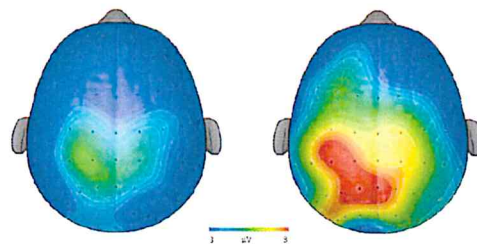
Researching the members of the Physical Activity Guidelines Advisory Committee lead us to Dr. Charles Hillman, who served on the advisory committee. In personal correspondence, **Dr. Charles Hillman, committee member and professor of psychology and Director of the Center for Cognitive & Brain Health at Northeastern University**, provided the following infographics and manuscript. In his correspondence Dr Hillamn stated, ***“There is a wealth of information regarding the benefits of short bouts of physical activity on brain health, cognition, and academic achievement.”***

He also suggested we contact David Lubans at the University of Newcastle in New South Wales, Australia to find out more about their Burn 2 Learn curriculum, which is designed to incorporate 10 min or less of high intensity interval training in the classroom. “Their work is really innovative and has found improvements in physical health as well as cognitive function (through collaboration with our lab). (Hillman, November 4, 2019, personal correspondence).

Dr. Hillaman provided a recent study that indicated moderate bouts of aerobic exercise improves behavioral, neurocognitive, and scholastic performance in children with ADHD, as well as healthy match control children. Greater performance in reading and arithmetic were observed following exercise in both groups. (Pontifex, Saliba, Raine, Picchiatti, and Hillamn, 2013.)

FIGURE 2 Composite Attentional Allocation of 20 Students Taking the Same Test

These two brain images, taken from the top of the head, represent the average amount of students' neural activity during a test following sitting and walking for 20 minutes. The color blue represents lower neural activity, while the color red denotes higher brain activity in a given region.



After 20 minutes of sitting quietly After 20 minutes of walking

Image courtesy of Charles Hillman, University of Illinois at Urbana-Champaign

Why should we teach physical literacy in schools?



90% of children in the U.S. are educated within the public education system

Children are in school for approximately

35 hours per week and

36 weeks per year



A well-rounded education must include physical literacy!

How does physical education contribute to physical literacy?

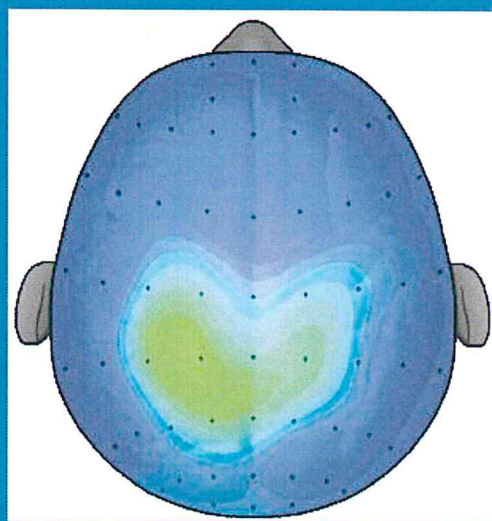
Physical education class develops skills that are directly linked to physical literacy such as running, catching, and throwing. PE allows students to learn these skills, practice learned skills, and ultimately show mastery of learned skills. By developing, practicing, and mastering skills, students additionally develop confidence in their abilities, find participation more enjoyable, and are more likely to participate in physical activity in the future.



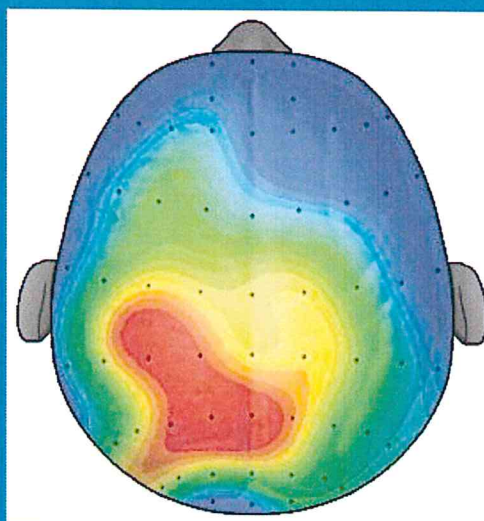
Amy Prior, Gray Stone Day School
(Misenheimer, North Carolina)

Research has shown:

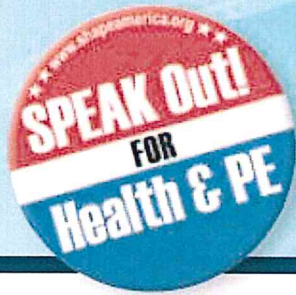
- Decreasing (or eliminating) the time allotted for physical education in favor of traditional academic subjects does not lead to improved academic performance
- Regular physical activity and physical fitness are associated with higher levels of academic performance
- Increasing the number of minutes students spend per week in physical education will not impede their academic achievement
- Physical activity is beneficial to general cognitive functioning



Brain after sitting quietly



Brain after 20-minute walk



PE + Health = Student Success

BENEFITS OF HEALTH & PHYSICAL EDUCATION TO STUDENTS

- ★ Positive relationship with **academic achievement** and **test scores**
- ★ Positive association with **attention, concentration,** and **on-task behavior**
- ★ Encourages **lifetime healthy habits**
- ★ Strategy for **reducing childhood obesity**
- ★ Reduces **discipline referrals** and **participation in high-risk behaviors**

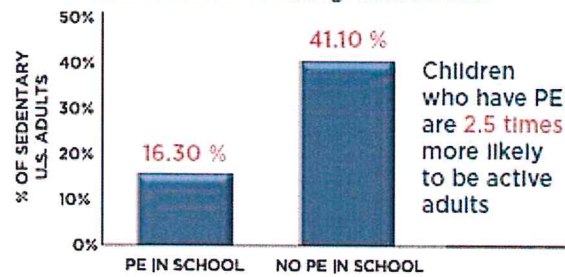
SCHOOLS CAN INFLUENCE HEALTHY BEHAVIORS

80% of students believe that PE is important to their overall school experience.



Findings from myCollegeOptions/SHAPE America research study (2015): National sample includes 79,498 high school students.

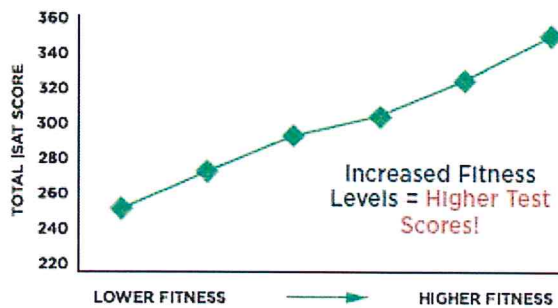
PE In Schools and Long Term Effects



Physical Activity Council. 41,000 Interviews on Sedentary Lifestyles. 2010.

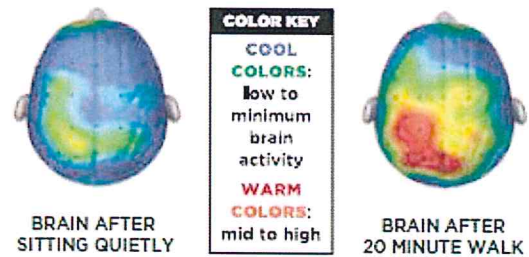
HEALTHY STUDENTS ARE BETTER LEARNERS

Physical Fitness and Achievement Test Performance



Hillman C.H., Erickson K.J., Kramer A.F. Be Smart, Exercise Your Heart: Exercise Effects on Brain and Cognition. 2009

Average Composite of 20 Student Brains Taking the Same Test



Hillman, C.H. The Effect of Acute Treadmill Walking on Cognitive Control & Academic Achievement in Preadolescent Children. 2009



RESEARCH BRIEF

Active Education: Growing Evidence on Physical Activity and Academic Performance

INTRODUCTION

One in three kids in the United States is overweight or obese. Obese youth have elevated risk for health problems like heart disease, type 2 diabetes, high blood pressure, unhealthy blood cholesterol patterns, and other health risks related to cardiovascular disease.¹ Obesity can also have serious ramifications for kids' cognitive development² and affect school attendance.^{3,4}

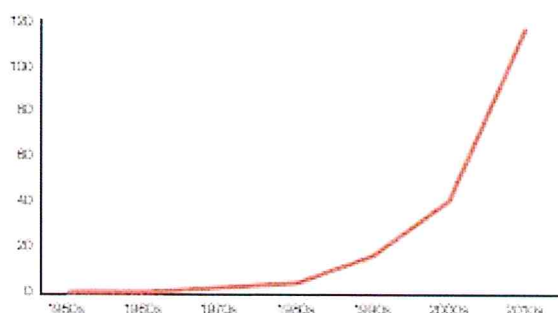
Because children spend so much time at school, schools have a unique opportunity to help children become more healthy and active. The Institute of Medicine has called on school leaders to offer more opportunities for children to be physically active before, during and after the school day.⁵ Further, both childhood obesity and poor academic performance tend to be clustered in schools with a high percentage of lower-income, minority students, creating a student health issue that is especially problematic in those communities.

There is a growing body of evidence indicating that physical activity and fitness can benefit both health and academic performance for children. This research brief reviews published scientific articles that examine how physical activity and fitness may help school-aged children maximize their academic performance. It also provides an overview of the effects of physical activity on the developing brain. Together, the

research indicates that providing physical activity for students is in line with schools' academic mission, and that schools have many opportunities for helping young people to be more active.

FIGURE 1 Growing Evidence on Physical Activity and Academic Performance

This graph indicates the number of published articles each year that examined the relationship between physical activity, physical fitness, and academic performance among children. A meta-analytic review suggests that the effects size of these studies has significantly increased over time.²



KEY FINDINGS

Physical activity can have both immediate and long-term benefits on academic performance. Almost immediately after engaging in physical activity, children are better able to concentrate on classroom tasks, which can enhance learning. Over time, as children engage in developmentally appropriate physical activity, their improved physical fitness can have additional positive effects on academic performance in mathematics, reading, and writing. Recent evidence shows how physical activity's effects on the brain may create these positive outcomes.

1. Regular participation in physical activity has academic performance benefits.

- A research project conducted with 24 elementary schools, called *Physical Activity Across the Curriculum (PAAC)*, showed that adding sessions of physical activity to a school curriculum could have long-term benefits, such as improved academic performance. When comparing improvement in standardized test scores over three years, schools were stratified and randomly assigned to receive physically active lessons did 6 percent better than their peers who had received the same lessons in a seated, inactive manner.⁷
- A recent review of 39 studies on the mental and intellectual benefits associated with school-based physical activity programs found that the greatest effects were seen when children engaged in aerobic physical activity, like jogging in place, rather than resistance activities, like push-ups or sit-ups.⁸ The same review showed that children who were physically active in small groups (10 to 30 children) showed greater improvements than those in large groups (30 or more children) or very small groups (1 to 2 children). This finding is important when developing policy focused on class size.
- A study of 267 Canadian children in 4th and 5th grade who were enrolled in ten different schools found a link between physical activity and standardized test performance. The schools were clustered and randomly assigned to participate in a physical activity program (*Action School in British Columbia*) delivered by teachers. Children who were academically performing below their grade level and assigned to the physical activity program were more likely to increase performance on standardized tests than students who did not participate in the program and just continued their usual practice.⁹
- Over one school year, children who played active video games like *Dance, Dance, Revolution* during recess experienced more improvements in both physical fitness and academic performance in math than students who participated in traditional recess.¹⁰
- Several studies show that vigorous physical activities, like running and playing tag, may have larger effects on academic performance than lower-intensity activities.¹¹⁻¹³
- Eleven- and 12-year-old students participating in physical education lessons, including fitness stations and team games at varied intensities, were compared with students who sat for the same amount of time.¹² Children who participated in the physical education lessons demonstrated recall of a greater percentage of vocabulary words on a memory task, before and after class discussions (delayed recall of the same words), than the sedentary students. These findings suggest that participating in physical activity during physical education lessons may facilitate immediate and delayed memory.
- A study of 115 adolescents showed that active lessons requiring more coordination (e.g., balancing, reacting, adjusting, and differentiating) were associated with better concentration on academic tasks than traditional physical education lessons focused on team sports.¹⁴

- Although academic achievement test scores were not directly related to enrollment in high school physical education, female students who both enrolled in physical education and participated in vigorous physical activity lessons had significantly higher grades than students who were not engaged in any physical education lessons.¹⁶
- Among 5,316 students in grades K through 5, the frequency and duration of physical education class were positively associated with standardized test performance among girls but not boys. This relationship may have been attributed to a lower baseline level of fitness for female students, which shows that the girls may have had more to gain from physical education participation.¹⁷

2. Single sessions of physical activity can enhance attention and memory.

Immediately after just one session of physical activity, children can increase their attention and memory, and reduce inappropriate behavior, such as being unfocused and causing others to become distracted.¹⁷

- A review of 19 articles about classroom physical activity breaks revealed that teachers are willing to integrate physical activity into grade-level-specific lessons, and they are capable of doing so. In general, physically active lessons including physical activity breaks resulted in a 13 percent increase in the total amount of physical activity per week and a 20.5 percent reduction in time spent on non-academic tasks, such as helping students transition to a new activity and classroom management.
- In that review, studies also reported quantified pre- and post-improvement in academic achievement, such as a 20-point gain on the Florida Comprehensive Achievement Test and increased percentile ranks on the Texas Assessment of Knowledge and Skills.¹⁸
- A developmental study that examined physical activity and academic performance revealed that when students were randomly assigned to either sit in the classroom or do brick walking before a test, 4th grade students who were active outperformed their seated peers on the Woodcock Johnson Test of Concentration, but the same effects were not observed among 2nd- or 3rd-grade students.¹⁹
- When comparing students in randomly selected classrooms that offered one 10-minute Energizer physical activity break daily for 12 weeks with those in classrooms that did not, the Energizer group was significantly more active and exhibited a higher frequency of on-task behaviors.²⁰

3. The effects of physical activity on brain health may explain improvements in academic performance.

Brain processes such as directing one's attention, switching attention between tasks, and moving information from short- to long-term memory are necessary actions for learning. Recently, scientists have been examining the underlying brain functions that may explain some of the immediate and more gradual academic benefits of physical activity.

- After waking on a treadmill for 20 minutes at a moderate pace, children responded to test questions (in the content areas of reading, spelling, and arithmetic) with greater accuracy, and had a more intense response within the brain, than children who had been sitting (see Figure 2). Further, children who walked for 20 minutes performed better on reading comprehension than those who sat for a similar length of time. Following physical activity, children also completed learning tasks faster and more accurately, and were more likely to read above their grade level.²¹

FIGURE 2 Composite Attentional Allocation of 20 Students Taking the Same Test

These two brain images, taken from the top of the head, represent the average amount of students' neural activity during a test following sitting and walking for 20 minutes. The color blue represents lower neural activity, while the color red denotes higher brain activity in a given region.

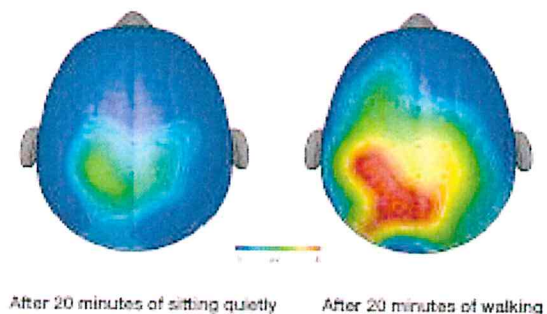
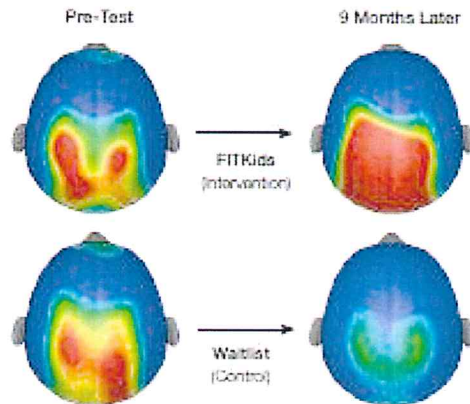


Image courtesy of Chelsea Himmel, University of Illinois at Urbana-Champaign

- Children ages 7 to 9 were randomly assigned either to a waitlist or to participate in FITKids, an afterschool program providing 70 minutes of moderate-to-vigorous physical activity per weekday for nine months. At the end of the study, children who participated in FITKids showed greater improvements in aerobic fitness,²² decreases in percentage of body fat,²³ and increases in working memory²⁴ than children on the waitlist (see Figure 3).

FIGURE 3 Impact of Afterschool Physical Activity Program on Children's Neural Activity

This graphic illustrates the differences in children's average amount of neural activity at the beginning and after nine months of participating in an afterschool physical activity program. The images, taken from the top of the head, use blue to represent low neural activity and red for high brain activity.



Hillman et al. (2008). *Neuroscience*, 155, 1044-1054.

- Physically fit children demonstrate memory and efficiency of the brain (i.e., by allocating more working memory to complete a given task) through two learning strategies: relational memory, which involves remembering objects by using a cue, such as turn left after you pass the school,^{25, 26} and working memory, which involves moving information from the short- to long-term memory.²⁷ This is important because children use relationships, such as understanding that “three groups of three” and “three times three” are both math facts with the same answer, to remember and recall information.
- Physically fit children have larger hippocampal volume²⁸ and basal ganglia.²⁹ Both of these brain structures have been associated with learning in children.

CONCLUSIONS

Regular participation in physical activity and higher levels of physical fitness have been linked to improved academic performance and brain functions, such as attention and memory. These brain functions are the foundation for learning. Long-term studies have demonstrated that increases in physical activity, resulting from greater time spent in physical education, were related to improved academic performance. Even single sessions of physical activity have been associated with better scores on academic tests, improved concentration, and more efficient transfers of information from short- to long-term memory. Children participating in physical activity are better able to stay focused and remain on task in the classroom, thus enhancing the learning experience.

Physical education is an opportunity for all children to be physically active and improve aerobic fitness. Given the demonstrated academic and health benefits, providing physical education—150 minutes for elementary school children³⁰ and at least 225 minutes for secondary school children among all grade levels—as a part of the 60 minutes of daily moderate-to-vigorous physical activity recommended by the *Physical Activity Guidelines for Americans*,³¹ is a justifiable use of valuable school time. Developing or refining policies or regulations relating to physical education is a logical first step to make this requirement a reality. However, the policies must be implemented and enforced consistently to ensure students experience the benefits of physical education.³² One study suggested that the greatest cognitive benefits from physical education resulted when physical education classes were scheduled during the early or middle part of the day, not at the end of the day.³³ Making physical education the centerpiece of the school day may improve physical health and, in turn, maximize a child's potential to be academically successful.³⁴

It is incumbent on schools to maximize students' potential to learn. Accordingly, educators need to have the resources, support, training, and skills to provide a variety of physical activity opportunities for children. Educators, administrators and parents should thoughtfully integrate physical activity across the curriculum throughout the school day to facilitate learning for all students. Experiences such as biking and walking to school, playing at recess, engaging in active classroom lessons, and participating in a quality physical education program may increase the odds of children and adolescents forming lifelong habits for learning and for positive behaviors.

It is important to note that though a vast majority of the studies show benefits of physical activity and fitness on children's academic achievement, some studies show no effects—but very few studies show any negative effects. Thus, it is reasonable to recommend increased physical activity at school as an evidence-based strategy to improve academic performance. Several questions remain to be answered, such as the optimal type, intensity, and timing of school physical activity; how effects might vary for younger compared with older students; and whether similar benefits are documented for students of all income levels, races and ethnicities, and academic abilities. While waiting for studies to answer these questions, current evidence provides a strong rationale for more action to provide physical activity throughout the school day for all students.

This research brief was written by Darla M. Castell, Elizabeth Glowacki, Joanna M. Barcelona, Hannah G. Culvert & Jungyun Hwang of The University of Texas at Austin. It updates prior evidence on the role of physical activity in academic performance: <http://activelivingresearch.org/active-education-physical-education-physical-activity-and-academic-performance>. Peer reviewers were Joseph E. Donnelly, Ed.D., Professor and Director, Center for Physical Activity and Weight Management, University of Kansas and Sarah M. Lee, PhD, Team Lead, Research Application & Evaluation Team, School Health Branch, Division of Population Health, Centers for Disease Control & Prevention.

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School data supporting physical activity:

In our review of publications and recent books supporting physical activity and academic performance, we found much research in the field by **Dr. John Ratey, Associate Clinical Professor of Psychiatry at Harvard Medical School**. Dr. Ratey is the author *Spark - The Revolutionary New Science of Exercise and the Brain*, (2008)

“There is no question about it now, said John J. Ratey, a clinical associate professor of psychiatry at Harvard Medical School. ***The exercise itself may not make you smarter, but it puts the brain of the learner in the optimal position for them to learn.***” Studies in his book, *Spark*, show a direct link between activity and academics.

In his research Dr. Ratey cites Naperville District 203 in Illinois as a case study in exercise and the brain. The district implemented a physical education program emphasizing fitness over sports. Their students reflect a 3% obesity rate and scored #1 in Science and #6 in math on TIMMS tests in 1999.

Dr. Ratey cites other school studies that support placing PE right before academic classes and scores go up, Ratey (2008) *Spark*.

% Improvement in Algebra Readiness Scores

PE several hours after math = +4

PE immediately before math = +20

Literacy Increases in classes after PE - Grade level equivalency increases

PE several hours before literacy +.9

PE immediately before literacy +1.4

Dr Ratey also cites studies that show college entrance scores increased among students getting the PE program (2008) *Spark*.

Perhaps the most prolific expert and author on the subject is Dr. Eric Jensen, Professor of Human Development and leading national education trainer. Dr. Jensen is author of over 30 books and professional development trainings on using brain research in education, including *Enriching the Brain, How to Maximize Every Learner's Potential*, (2006) and a professional development training series *Does brain research support the use of exercise, movement, and energizers?*

In his synthesis of brain research, Dr. Jensen advocated for support of exercise, movement and energizers for the following reasons:

Exercise increases

- Oxygen
- Glucose
- Brain chemicals such as neurotransmitters and neuromodulators
- Boosts brain cells which = Better cognition

Exercise increases heart rate boosting oxygen to the brain. The brain runs on oxygen and glucose; these two components fuel alertness, supports processing, and enhances memory. Emotions and physical activity stimulate glucose production, which affects memory. (Gore JB, Krebs, DL, Parent MB. (2006)

Glucose is released from dietary sources, experienced from emotions, and from liver when we are physically active. Kids with moderate to severe AD/HD have glucose metabolism deficits and tend to self-medicate with sugar, but physical activity also produces glucose. (Castellanos FX, Acosta MT (2004). The neuroanatomy of attention deficit/hyperactivity disorder.)

Brain chemicals physical activity alters brain chemistry - fun = dopamine; excitement = norepinephrine

- Adrenaline - provides energy
- Noradrenaline - enhances focus
- Dopamine - thinking, working memory
- Cortisol - energy, memory
- Serotonin - attention, mood
- Serotonin - attention, mood
- Glucose - energy, memory formation
- BDNF & NFG - growth factors (Miracle Grow)

All of these are likely to drop with "sit 'n git".

Nutrients - BDNF Brain-derived neurotrophic factor is released when we exercise - Miracle Grow for the brain.

Jensen cites studies that show exercise increases brain cells. (Van Praag et al., 1999 Brown, et al, 2003)

New brain cells produced in 4 week

- With exercise 4,500 new cells
- Without exercise 2,000 new cells

Does physical activity change our brains?

- It triggers BDNF, growth factors (Kesslak et al. 1998)
- It increases brain cells (van Praag et al., 1999)
- It regulates serotonin (mood, attention, memory, and neurogenesis). (Chaouloff, 1989)
- It raises heart rate (Krock et al., 1992)
- It increases catecholamines (Gillbureg et al., 1986)
- It builds cortical mass (Anderson et al., 2002)
- It enhances cognitive arousal (Saklofske et al., 1992)

Neurogenesis in hippocampus = new neurons are crucial to learning for memory and to protect against depression. Exercise increases neurogenesis, which has been correlated with improvements in learning, mood and memory.(Pereira A. C. et al. PNAS 2007; 1045638-5643 - see slides)

Neurogenesis (production of brand new brain cells) is enhanced by exercise, complex environments, new learning, prosocial contact, nutrition, low stress. It is decreased by distress, inactivity, boredom, depression, poor nutrition, isolation & low social status

Better Achievement and Behavior -Solid PE programs correlated with reduced discipline issues

- Discipline incidents involving violence reduced by 51% with PE program
- Out-of-school suspensions reduced by 60% with PE program

Students with running acquired vocabulary 20% faster. Winter, B. et. al, (2006) High impact running Improves learning. Neurobiology Learn Memory, 2007, May; 87 (4): 597-60

Dr. Jensen synthesises and utilizes this research supporting physical activity, breaks, and energizers:

- Sibley & Etnier (2003) "Significant positive relationship between physical activity and cognition in children."
- Coe et al. (2006) found "higher grades were associated with vigorous physical activity, particularly activity meeting nationally-recommended guidelines."
- Ratey (2008) says, "Strong correlations between physical activity and improved math, literacy and overall achievement."
- Sallis et al (1999) showed that "taking time away from academic courses and replacing it with physical education curricula did not adversely affect academic performance."
- Wittberg, Cotrell, & Northup (2009) "Confirm the association between aerobic fitness and academic performance."

Based on this research Dr Jensen advocates these primary reasons to support physical activity at school:

- It boosts alertness for classroom attention
- It enhances glucose production which enhanced memory
- It build social skills and reduces discipline issues
- It raises "feel good" chemicals which enhance enjoyment of school.

He offers these recommendations for what schools should do:

- Insist on 100 minutes per week or more
- Never use activity restriction as punishment for kids
- Provide school wide exposure in early grades
- Never sacrifice activity for more "drill and kill"
- Provide choice at secondary levels
- Focus on health and long-term enjoyment, not performance.

6. Provide the effective use of teacher time to support this initiative.

We currently provide daily planning and one additional PLC meeting weekly. However, we will need to meet and work with teachers collaboratively with more frequency. Teachers will be scheduled with daily planning periods and meet the minimum minutes per week. We seek the waiver to ensure we are able to meet collaboratively with teachers during those planning periods as needed for PLC work, and collaborative team planning. We may also need to schedule planning in smaller blocks of time.

	Monday	Tuesday	Wednesday	Thursday	Friday
Homeroom	Dragon Coast Setting	Dragon Coast Setting	Dragon Coast Setting	Dragon Coast Setting	Dragon Coast Setting
1st	English 7	English 7	English 7	English 7	English 7
2nd	English 7	English 7	English 7	English 7	English 7
	Planning	Planning	Planning	Planning	Planning
	Team Meeting - Prot. Dev.				Team Meeting - Prot. Dev.
3rd					
4th	English 8	English 8	English 8	English 8	English 8
5th	English 8	English 8	English 8	English 8	English 8
6th	ELA Workshop	PLC	ELA Workshop	ELA Workshop	Writer's Workshop
7th	ELA Workshop	ELA Workshop	ELA Workshop	ELA Workshop	Writer's Workshop
8th	Dragon Reflection	Dragon Reflection	Dragon Reflection	Dragon Reflection	Dragon Reflection

The remaining legal concerns are as follows:

How will you ensure that teachers have adequate planning time with the waivers of duty free lunch, non-instructional duties and planning time?

We do not want to reduce the time teachers get to plan, we do want to increase the time teachers are able to plan and work *collaboratively*. We don't want to break policy by asking teachers to meet together during their "individual planning time". We currently schedule common planning time for teachers, plus one meeting a week for PLC work. We will need to offer more time and support for our teachers during Brain Academy's transition to new teaching strategies and curriculum models.

The lunch duty waiver is not essential in the success of Brain Academy, but would allow us some flexibility if the need was there. These would be occasional things that we would envision for the purpose of teachers offering student exploration or study time. For example, it would be nice for a teacher to have the ability to offer 15 minutes of their lunch to sit with students who are finishing up a PLTW project or activity. Similarly, if a teacher wanted to sit and eat their lunch in the library while students come in and read or have a lunch/study hall. We seek flexibility to allow our teachers to offer personalized learning opportunities.

How will you accommodate SPED & 504 students with all of the physical activity, so that those students will benefit from the brain break?

Students with SPED and 504 will participate with fitness breaks with the same frequency and amount of time. Learning teams will develop personalized learning opportunities and equivalent activities for

students with accommodations for students with 504 plans or IEP's will be developed to allow personalized plans of action and support.