



**Aroostook County WittFitt Pilot Project Report
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Summary:

Objective. WittFitt is an intervention designed to promote wellness in the classroom and enhance academic performance through active sitting and active learning, building on the positive relationship between physical activity and academic achievement. This study measures the impact of the intervention on students' attentiveness and posture in class, with supplemental evidence of handwriting and academic testing.

Methods. Students sat on the stability ball as a classroom chair for four months. Students were tested before (chair) and after (ball) the intervention on three classroom behavior tests: squirminess, task level, and posture.

Results. Findings show that the students' squirminess, task level, and posture all significantly improved after switching from a chair to a ball. Students report overall satisfaction with using balls as chairs.

Conclusions. This study shows that incorporating physical activity into the classroom environment is a realistic and beneficial measure that can lead to positive effects in academic performance and wellness.

Background:

Maine's northernmost county, Aroostook County, is the state's largest county and one of its most rural. Compared to the state of Maine's median annual household income of \$46,807, Aroostook County's median annual household income of \$35,999 is significantly less than the state median (OneMaine Community Health Needs Assessment, 2010). In Aroostook County schools, 54.6% of students receive either free or reduced lunch (Maine Department of Education, 2012). In addition to Aroostook County's rural environment and low median income, the 2010 OneMaine Community Health Needs Assessment found that Aroostook County has the highest percentage of overweight high school students of any county in Maine. Furthermore, the OneMaine Community Health Needs Assessment found that Aroostook County has the highest prevalence of adult asthma among Maine counties and the second highest prevalence of heart disease among Maine counties (OneMaine Community Health Needs Assessment, 2011).

Overweight and obesity is a serious public health concern not just in Aroostook County, but across the nation (U.S. Department of Health and Human Services, 2001). In the state of Maine, a 2011 youth health surveillance study recorded 23% of kindergarten students and 24%

of fifth grade students as obese. Including students who were also overweight, Maine's study showed that 38% of kindergarten and 44% of students in fifth grade were either overweight or obese (Maine Department of Health and Services & Maine Department of Education, 2011). Childhood obesity is a predictor for weight issues in adulthood; children who are obese after the age of six are 50% more likely to be obese as adults (Whitaker et al., 1997). Furthermore, obese children face increased risks for many chronic and mental health conditions such as heart disease, diabetes, bone and joint problems, asthma, sleep apnea, cancer, social and psychological issues such as peer problems and poor self-esteem, and depression (Bray, 2004; Dietz, 1998; Freedman, Dietz, Srinivasan, & Berenson, 1999; Loth, Mond, Wall, Neumark-Sztainer, 2011; Must, Jacques, Dallal, Bajema, & Dietz, 1992).

One aspect of combating childhood obesity is physical activity. Schools provide a unique opportunity for children to meet the physical activity recommendation of 60 minutes per day through physical education classes, recess, and other physical activity breaks, yet there are still plenty of chances to integrate more movement within the classroom during the school day. In Maine, a typical 2nd grade student receives an average of just 36 minutes per week of physical education (Maine Department of Education, 2010). Schools are also challenged with the task of improving standards-based test scores, which leads to an increase in instructional time for Mathematics, English, and Science. Physical education classes, recess, and other physical activity breaks are often decreased or eliminated to make up this time (U.S. Centers for Disease Control and Prevention, 2010).

Interestingly, there is considerable evidence that physical activity can help improve academic performance. Studies have shown a positive relationship between increased fitness levels and improved motor skills and academic achievement as well as measures of cognitive

skills and attitudes. Research has shown that physical movement can affect the brain by increasing blood flow, oxygenation, growth of nerve cells in the hippocampus (the center of learning and memory), development of nerve connections, and the density of the neural network. These physiological changes in the brain have been linked to improved attention, information processing, and storage and retrieval (U.S. Centers for Disease Control and Prevention, 2010).

Given that physical activity has been shown to improve not only physical health, but academic performance as well, recent research has focused on incorporating movement into the classroom. One intervention to increase active learning is to replace classroom chairs with stability balls. Stability balls are inflatable exercise balls constructed of soft plastic with diameters ranging from 35 to 75 centimeters. The benefits of sitting on stability balls include improved posture that leads to increased blood flow to all parts of the body, particularly the brain, which enhances attention and concentration. Other benefits of using stability balls are strengthened core and back muscle groups, improved balance and coordination, and improved posture and body alignment (Witt, 2001). Studies of stability ball implementation in classrooms have found that when students are given the opportunity to move, their ability to pay attention increases (Kilbourne, 2009; Gamache-Hulsmans, 2007). Furthermore, it has been found that stability balls can have the greatest impact on on-task behavior for the children with significant attention and hyperactivity concerns (Fedewa & Erwin, 2011).

With this research in mind, Healthy Aroostook, a program of Aroostook County Action Program (ACAP), undertook a pilot project with WittFitt stability balls to incorporate movement into classrooms in Aroostook County. This pilot was grant funded by United Way of Aroostook with evaluation support from The Aroostook Medical Center (TAMC), Eastern Maine Healthcare Systems (EMHS), and United Way of Aroostook. WittFitt is a program specifically

designed for classrooms and its mission is to educate children and adults about the importance of proper posture, active sitting, and strengthening of muscles used in daily activities while fostering a wellness climate in each classroom. WittFitt encourages “learning in motion” and emphasizes the incorporation of health and wellness into the school day (Witt, 2001).

Methods:

Healthy Aroostook, a project of ACAP, implemented a WittFitt pilot project in Aroostook County during the 2011-2012 school year. Initially, the intent was to implement the WittFitt pilot in one elementary school, one middle school, and one high school each in Southern, Central, and Northern Aroostook County. Participation in the pilot was offered to *Let’s Go!*-participating schools. Sixteen classrooms submitted proposals and all were funded; 13 classrooms from seven different school districts completed the pilot project. Eight of the 13 classrooms were elementary classes, four were from middle schools, one was high school level, and three classrooms did not complete the pilot. The students who participated in this pilot ranged from six to 18 years old.

Before WittFitt balls entered the classrooms, teachers received a WittFitt teacher’s manual and participated in a two-hour telephone training session with Lisa Witt, the founder of WittFitt. In the manual and the training, teachers were introduced to WittFitt’s mission, the concept of active sitting and learning, how to prepare students for the balls to enter the classroom, how to measure students for a customized fitting ball, and maintenance of the balls, among other things. Following the training, teachers measured their students and ordered balls for their entire classroom, including themselves. Using the WittFitt curriculum, teachers prepared their students for the balls to enter the classroom; proper posture, safety, and active learning were

discussed with the students before the balls arrived. Consent given by parents/guardians allowed students to participate in the pilot project.

Tools for the pilot were based on WittFitt assessments and modified by the project coordinators to fit this specific project. The project coordinators sent the tools with instructions to the teachers via email and the teachers were given two weeks to complete and return the documents. Project coordinators offered technical assistance calls to support the teachers with any questions they had about the tools.

Measures for this intervention compared students' performance while sitting on chairs to students' performance while sitting on balls. Teachers assessed each student's squirminess, task level, and posture while sitting on a chair and then again after four months of sitting on the ball. Teachers also made notes in an observation log for each student while sitting in chairs and after two and four months of sitting on the balls. Students were given a survey about their comfort, ability to pay attention, ability to move, posture, and the noise level of the class while sitting in chairs. Another survey was administered after four months of sitting on the ball and asked students about their comfort, listening, task level, behavior, grades, classroom noise level, and if they liked using the ball as a chair. Other assessments included standardized testing scores and handwriting samples from before and after the intervention plus a parent survey about any changes they noticed in their child after sitting on the ball. Classroom teachers completed a survey about their experiences with WittFitt as well.

Table I. Data collected to evaluate student performance with the balls (n=237 students, n=13 teachers).

Instrument	Number of Complete Responses	Rate
Student opinion surveys	Pre: 228	Pre: 96.2%
	Post: 165	Post: 69.6%
Teacher assessment of students	224	94.5%
Teacher observation log	Representative	
Standardized test scores	137	57.8%
Handwriting samples	Representative	
Parent opinion surveys	99	41.7%
Teacher opinion surveys	9	69.2%

Findings:

Student Opinion

Quantitative findings were derived from the student surveys and the teachers’ assessment of students. In the survey students completed about classroom chairs, students agreed that they were able to pay attention in class but were undecided (neither agreed nor disagreed) that they were comfortable in their chairs, able to move without bothering others, able to sit up straight, and that the noise level in their class was quiet (mean, n=228). The students’ comfort while sitting in chairs received the lowest overall rating on the survey. Representative survey comments from students include:

- *The chairs are too hard; they make my back hurt.*
- *I am able to concentrate but it is kind of hard because the chair is uncomfortable and very hard. It doesn’t help my posture either; hard to sit up really straight.*
- *My butt hurts every night. I can never get comfortable. I get distracted by people tapping or anything.*

- *I am comfortable in the chair at first but after awhile I get annoyed sitting in it.*

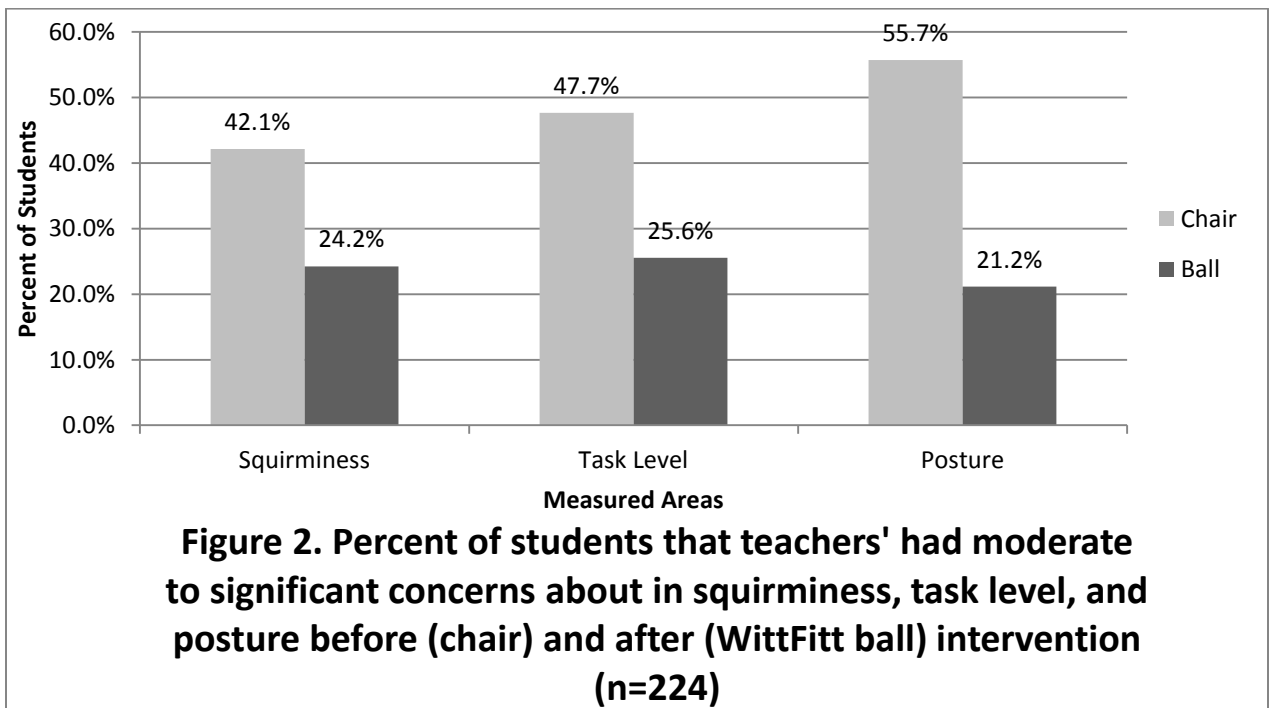
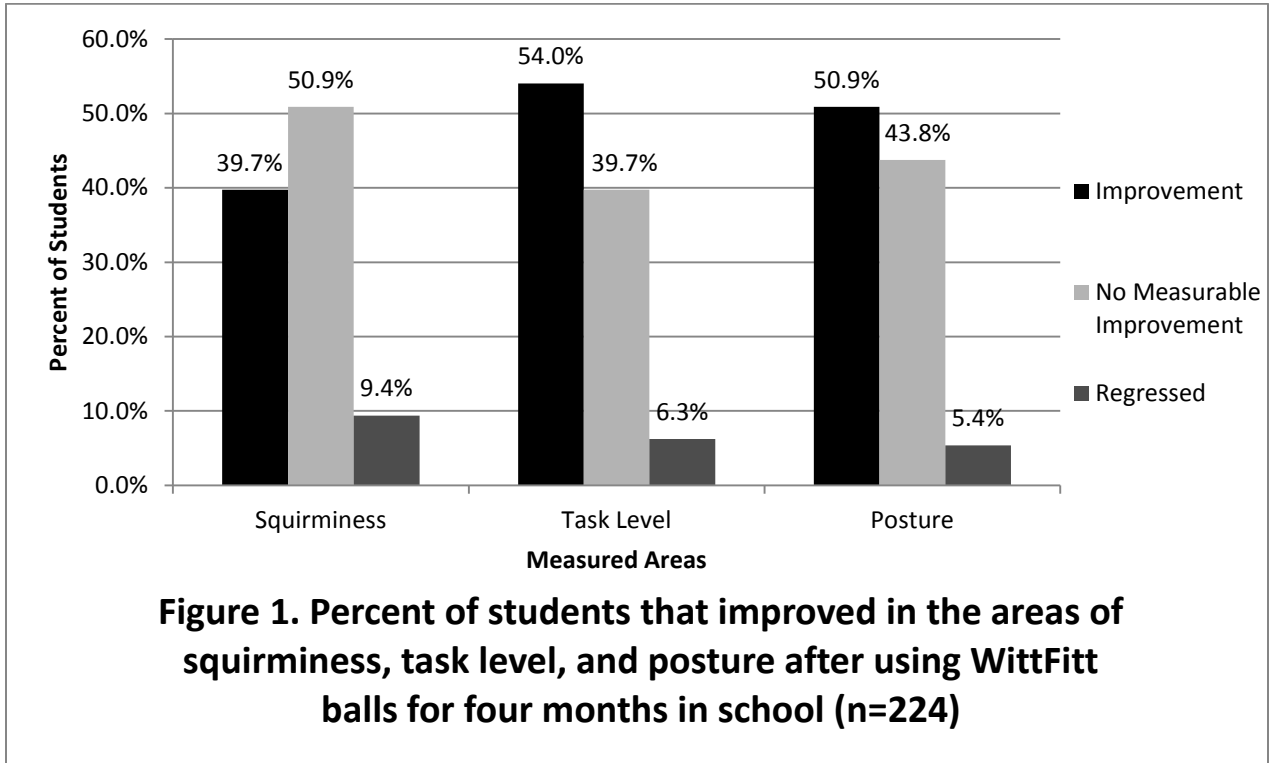
When students were surveyed about sitting on balls, they agreed that they liked using the ball as a chair, the ball is more comfortable, they listened better while on the ball, finished work best while on the ball, behaved better while on the ball, and received better grades while on the ball. Students were undecided about whether the room was quieter with the balls (average, n=165). 76% of students agreed or strongly agreed that they liked using the ball as a chair and 75% of students agreed or strongly agreed that the ball is more comfortable than a chair. Representative survey comments from students about sitting on balls include:

- *The ball was way more comfortable than the chair.*
- *It helps me sit up straighter.*
- *I like my ball. The ball helps me. The ball makes me smarter.*
- *My back doesn't hurt anymore.*
- *I like my ball so much because I can write better.*

Teacher Assessment and Observation of Students

Teacher assessment of students on chairs versus balls allowed for direct comparison of pre- and post-intervention measures of squirminess, task level, and posture. Measurable improvement in squirminess was seen in 39.7% of students (Figure 1). There was a significant difference in students' squirminess levels before and after the intervention (paired t-test, <0.001). There was also a significant difference in students' task level and posture before and after the intervention (paired t-tests, <0.001). Over half the students participating in the pilot showed measurable improvement in task level and posture; 54.0% of students showed improvement in task level and 50.9% of students had improved posture (n=224). Furthermore, the percent of students with whom teachers' had "moderate" to "significant concerns" in squirminess, task level, and posture decreased after the intervention (Figure 2). The greatest decrease occurred in

the category of posture, with teachers having “moderate” to “significant concerns” about 55.7% of students before the intervention and concerns about only 21.2% of students after the intervention.



The teacher observation log also provided some valuable anecdotal evidence for the changes seen in students over the course of the WittFitt pilot project. Examples are shown in Table II below.

Table II. Sample comments from the teacher observation logs for students while sitting in a chair, on the ball after two months, and on the ball after four months.

Student	Chair	Ball 2 months	Ball 4 months
A	Up and down out of her seat	On task, focused—less out of seat time	Continues to be focused and works to please
B	Sits on foot	Much improvement	Great focus, attentive
C	Straight posture/easily distracted/poor handwriting	In control, focused during math test, good posture but not consistent	Improved posture and handwriting; stays engaged and on task
D	Hard time staying on task/often tired	Good posture, focused, on task, slight bounce	Excellent posture, engaged; slight bounce—very comfortable
E	Doesn't get work done	Work is being completed more often	Great focus, real improvement in grades and homework completion; bounces in a strange way
F	Focus and is social/talkative	Focus is better, still social	Talkative but has a medium attention span; works hard; wants to do well
G	Feet wiggle constantly	Bounces constantly but pays attention	Bounces all the time but stays more focused

Academic Performance and Handwriting

Each classroom submitted fall and spring standardized testing scores to attempt to gauge the impact sitting on the balls had on students' academic performance. The majority (80.3%) of students improved their test score over the course of the year, 7.3% received the same score, and 12.4% scored lower (n=137). On the whole, teachers stated that their students' academic performance remained the same or improved after integrating balls into the classroom. Two-

thirds of teachers agreed that their students actually finished work better while sitting on balls and 44% agreed that students received better grades while sitting on balls. No teachers reported significant regressions in work completion or performance by their students.

Similarly, pre- and post-intervention handwriting samples were submitted. Teachers reported very noticeable improvements in their students' handwriting when sitting on the balls and parents also spoke positively about visible changes in their child's penmanship.

Parent Opinion

Parent surveys were either distributed by the School Health Coordinator, *Let's Go!* Champion, or mailed home. The parent survey asked how much information the child has shared with the parent about the use of the stability ball as a chair in the classroom and it asked for comments about attitude toward school, posture, and handwriting. The majority of parents (68.7%) said that their student shared "some" to "a great deal" of information about WittFitt stability balls with them (n=99). Parents report the following about their student's attitude toward school:

- *Yes he is trying harder to learn and concentration seems better*
- *Was positive before and remains so*
- *Enjoys being in class a lot more*

Parents also provided feedback on changes in their student's posture:

- *Yes, sits and stands taller*
- *She is more concerned with posture*
- *Sits straighter than before less backache complaints*

Parents saw changes in their student's handwriting as well:

- *It has become neater*

- *A little improvement—readable*
- *Yes, taking a little more time*

Teacher Opinion

Teachers responded to a 14 item survey about their experiences with the WittFitt pilot in their classroom. Fifty-six percent of teachers reported using the stability balls for physical activity breaks with their students at least once a day; activities included stretching and breathing exercises, core exercises, and brain gym activities. When asked to evaluate students on the ball versus in a chair, all of the teachers agreed or strongly agreed that their students had better posture while sitting on the balls. The majority (78%) of teachers also agreed that their students had better handwriting while sitting on the balls. When asked to list the benefits of having balls in the classroom, the top responses were: increased student attention and focus, improved core strength, better posture, improved handwriting, and increased interest and motivation. Teachers stated that challenges of having the balls in the classroom included: noise and disruption (often attributable to the squeaks of the balls on tile floor), lack of space, maintenance and adjustments to balls, and inappropriate use of the balls by students. In the 2012-2013 school year, two-thirds of teachers surveyed were still using the balls in their classroom (n=9).

Conclusion:

The findings from this study show that integrating movement into the school day can have a positive impact on the classroom atmosphere and foster an active learning environment vital to combating childhood obesity in schools. The WittFitt approach led to excitement and enthusiasm for developing wellness classrooms that supported the incorporation of physical activity into the school day and helped facilitate changes to the environments of schools. Since children spend so much of their time in school, this setting has a lasting influence on a child's behaviors.

The study findings support the hypothesis that physical activity in the classroom can increase focus, attention, and a positive attitude, all of which are beneficial in an academic setting. Students and teachers alike had high levels of satisfaction with the introduction of WittFitt balls into the classroom and teachers and parents saw marked improvements in many students' squirminess, task level, and posture.

There is evidence to suggest that there are benefits to the WittFitt program in classrooms and this study could lay the groundwork for larger, more extensive studies. Furthermore, the cost of the pilot project per student was a one-time investment of \$46.09, making this a relatively low cost intervention that has the potential to benefit not only student academic achievement, but also health and wellness. Recommendations for future study include: a more narrowly-focused yet larger study with elementary-aged students since they remain in the same classroom all day; a study that more closely tracks and examines the physical benefits of sitting on a stability ball; and a study that compares the standardized test performances of students who sit in chairs to students who sit on balls.

Limitations:

Limitations of this pilot project centered on implementing a school-based intervention in classrooms across a large and rural county. Specifically, due to limited resources of staff training, it was not possible to assess participant fitness such as flexibility, balance, and strength. Another limitation was the response rate and completeness of surveys and assessments, a common challenge in school-based surveys. The parent surveys had a very low response rate, most likely because of the methods of distribution. Student attrition for this pilot was 94% and one of the most common reasons students did not complete the pilot was because they moved out of the school district.

Some of the younger students appeared to struggle with the format of the pre- and post-intervention surveys that were administered, making it difficult to appropriately interpret their meaning. The academic and handwriting measures used were also difficult to objectively assess since they were quite variable and thus difficult to compare. Furthermore, data was not collected on a control group of students that sat in chairs for the entire year. Without a control or comparison group, it is not possible to attribute any student's academic performance to the use of a stability ball.

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