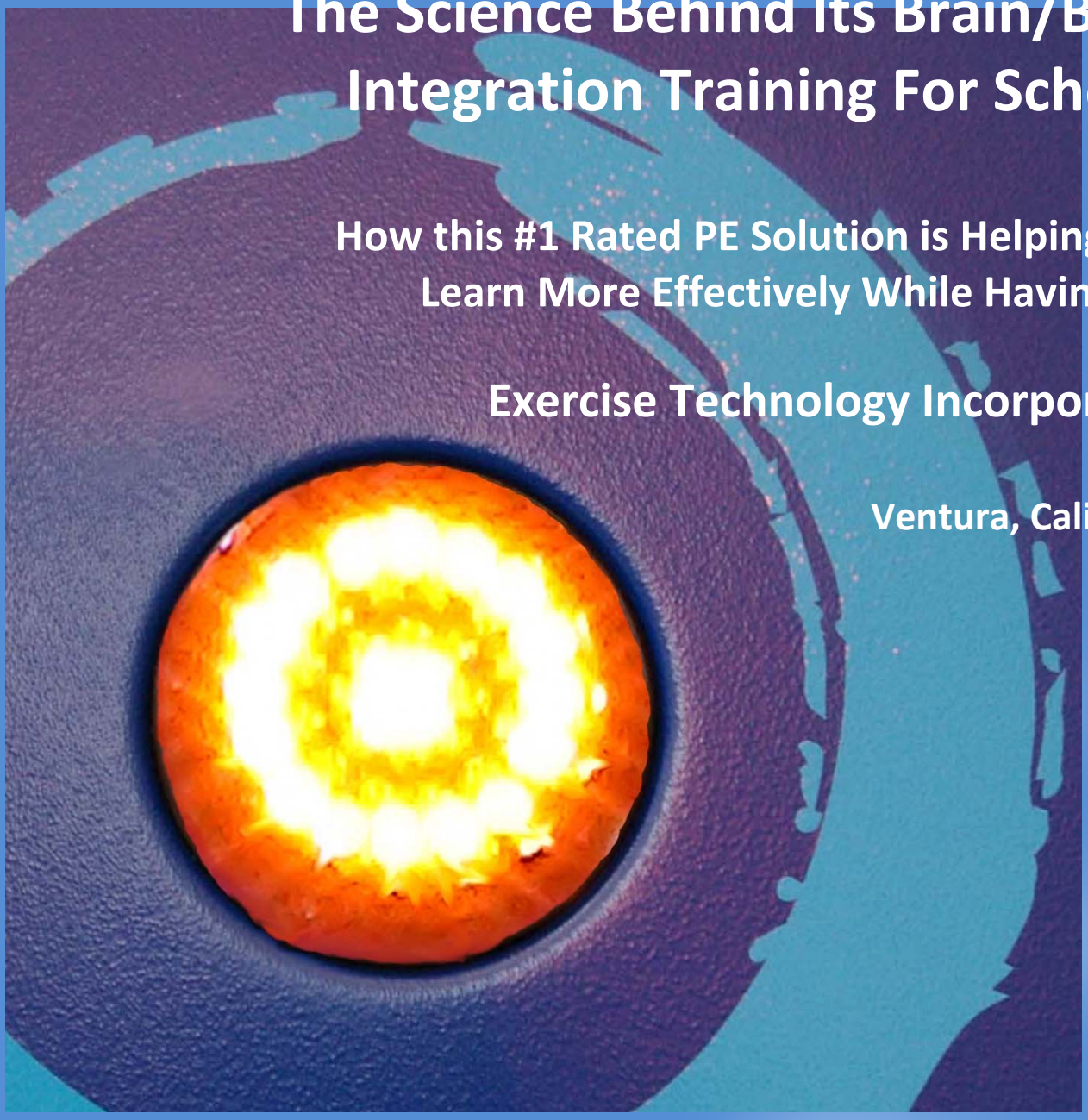
Sportwall Fitness Effects: The Science Behind Its Brain/Body Integration Training For Schools



How this #1 Rated PE Solution is Helping Kids Learn More Effectively While Having Fun

Exercise Technology Incorporated

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Sportwall Fitness Effects: The Science Behind Its Brain/Body Integration Training for Schools

How this #1 Rated PE Solution is Helping Kids Learn More Effectively While Having Fun

University Researchers Rated Sportwall #1 in User Enjoyment and Energy Expenditure[1]

Introduction

"Play is the work of children. Through play, children learn about themselves and the world around them."[2]

Sensory integration is the organization of sensation for use. Our senses give us information about the physical conditions of our body and the environment around us. Sensations flow into the brain like streams flowing into a lake. Countless bits of sensory information enter our brain at every moment, not only from our eyes and ears, but also from every place in our bodies. We have a special sense that detects the pull of gravity and the movements of our body in relation to the earth.

The brain must organize all of these sensations if a person is to move and learn and behave normally. The brain locates, sorts and orders sensations – somewhat as a traffic policeman directs moving cars. When sensations flow in a well-organized or integrated manner, the brain can use the sensations to form perceptions, behaviors, and learning. When the flow of sensations is disorganized, life can be like a rush-hour traffic jam.[3]

Frequent feedback from participants in Sportwall Training have referred to how they experienced greater mental clarity for days afterwards. This seemed to occur regardless of whether the activity involved a fitness class, a boot camp or a sports performance class and regardless of the age or fitness level of the person. Teachers in schools where Sportwall has been used on a regular basis also have reported that students are calmer in the classroom, and one school reported a rapid decline in disciplinary incidents. Some athletes also have reported that after a few weeks of training, the ball seemed to slow down leaving them more time for strategy and technique.

The above observations have prompted us to take a closer look at what our customers in clinical environments are doing with their systems to try to understand why playing on the Sportwall results in improvements in physical performance, mental clarity, and emotional calm. We wanted to understand what is triggering this and where in the body the changes are occurring. While we understood the cardio-vascular consequences of exercise and the effects of endorphin release, we wanted to better understand what is happening in the neurological and endocrine systems as a result of the high demands the Sportwall system place on brain/body integrated performance.

We started out on the basis that we know that students who engage in brain/body learning improve memory retention, reinforce academic concepts, and balance brain chemistry. Research suggests that about 85% of school age students need to engage their bodies actively in the learning process.[4] Research has also revealed that students who engage in exercise enjoy greater retention for up to four hours.[5] The question is, how do we introduce exercise into the learning process and how do we make it appealing for the participants and controllable for the instructors and teachers? Many schools have been looking at Exergaming for some answers.

When the words "exercise" and "gaming" were combined to yield "exergaming", the term was used to describe video games that are also a form of exercise.[6] Beyond repetitive finger movement, these interactive video or electronic games PROMISE whole body player movement, similar to that of "real-life" exercise participation. However, not all exergaming products are equal. The question is whether they can increase energy expenditure and stimulate the brain/body connection enough to be considered a viable adjunct to programs designed for the classroom or gym for PE, Special Education and Adapted PE. This paper documents how Sportwall products deliver on the promise.

There is no doubt that in the same way that inactivity has contributed to obesity, so too is it a significant contributor to the growing numbers of individuals experiencing Sensory Processing Dysfunction. This paper seeks to look at the basic causes of inactivity and explains how Sportwall programming can provide activities that can help in the treatment process, yet be delivered in a group exercise program in both mainstream and clinical environments.

While the Sportwall product line is one of the most enduring concepts in the category of exergame fitness training, it differs significantly from other modified activity promoting video games. Instead of simulating play, Sportwall products engage players in a real kinesthetic experience with dynamic, integrated, multi-planar physical movement using a combination of playground equipment, sports equipment and tools usually seen in physical and occupational therapy and centers. The result is a powerful combination of both functional training AND play-based specificity training in one multi-sensory system. (See the next section for details.)

Success is measured by the ability of participants to keep the game in play as a result of real physical and mental responses rather than emulated movement such as waving a wand, as called for in other exergames. The original concept behind the creation of Sportwall was to create fun, short, full-body games that engage play and focus, with results measured via electronically generated scores and rewarding sounds. Today, with modifications to the programming and equipment used, this approach continues to incentivize repeated play while at the same time increasing the level of participants' mastery.

This concept has evolved into a wide range of applications from sports performance training to providing highly engaging, brain integrated, physical exercise for children and seniors with special needs. This enormous flexibility is one of the most unique aspects to Sportwall programming. Instructors are free to choose from a wide array of curriculum/lesson plans for every sport and sector of the community. See our web site for curriculum options:
http://www.xergames.com/programs/manuals
http://www.xergames.com/programs/bootcamps

The recent trend toward inactivity has impacted both the amount that children exercise AND their desire to exercise. To engage them we focus on providing play-based, fun, interactive activities with immediate feedback incorporating the computer game technology participants already understand and enjoy. Specific training has been developed by qualified occupational therapists for mainstream instructors who are able to take individuals and small groups through programs that deliver quick results.

The following sections describe Sportwall's impact on learning, fitness, motor skills, mood, and brain activity of its players.

Sportwall Conditioning for Mind and Body--How it Works

When it comes to localizing and tracking moving objects, it is likely that the human brain evolved to develop, learn, and operate optimally in multisensory environments.[7] Thus, multisensory training protocols used by Sportwall can better approximate natural settings and are more effective for learning.[7] Programs are designed for all ages and ability levels. Visual, auditory, and physical tasks are integrated in performing the motor skills required. These protocols, with their profound and SIMULTANEOUS brain/body stimulation, are the key element that differentiates a functional training program from a general conditioning program.

This unique form of exergaming stimulates greater input to the proprioceptors of the motor system, and with it, greater subsequent refinement of movement patterns. The resistance and motor patterns encountered by the use of playground equipment creates more dynamic neuromuscular control in a functional setting of play.

Sportwall programs are specifically designed to stimulate the body and the brain concurrently. This is accomplished by:

- Encouraging individual or group participation and engaging sustained focus with short-attention grabbing computer games that are played sequentially to pursue mastery of skills and score
- Providing full body exercise by stimulating the hands, feet, eyes, ears, and vestibular system (stimulating the proprioceptive input to the motor and vestibular systems) in playing real games with real equipment (not simulated)
- Requiring attention and focus for success (staying consciously "in-the-now")
- Engaging in cognitive decision making under some level of pressure
- Delivering a cardiovascular workout in a game format

"Functional Training" is used by physical therapists as a comprehensive form of rehabilitation to return patients to daily living activities, as well as competitive sports by using movement in multiple planes while weight bearing. In contrast, "Strength Training" might use a weight machine, bands, or free weights and usually focuses on a uni-planar, one joint motion to build muscular strength.

Sportwall's brand of functional training (also during weight bearing) uses a variety of activities that can focus on the core/torso, agility, speed, balance, flexibility, power, and strength while SIMULTANEOUSLY developing high levels of

neuromuscular efficiency. This process of engaging the hands, feet, ears, and eyes develops not just eye/hand, but visual-perceptual motor skills.

As seen in the next section, the added element of integration of the right and left brain hemispheres has been documented to enhance brain plasticity as well as whole brain thinking, cognition, attention, and focus for learning. In short, Sportwall has been proven to help in the classroom too.

Sensory Processing Dysfunction Now Identified in Growing Numbers of Children

Sensory Processing Disorders (SPD), which affect children entering public schools from kindergarten, are conservatively estimated at 5.3% and may be as high as 13.7%.[8] In addition, the prevalence of Sensory Over-Responsivity (SOR) in elementary school age children is estimated at 16% according to one study.[9] In any case, this is clearly now a mainstream issue.

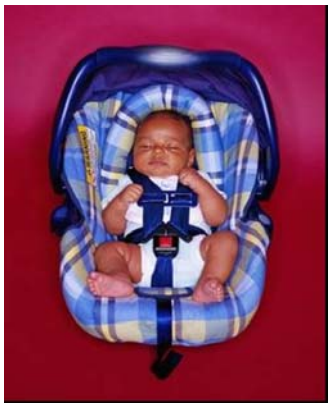
We have come to discover that movement is essential to promoting neurological development. The lack of natural developmental movements such as months of crawling, or free outdoor exploration and activity, has resulted in a population that increasingly lacks the necessary neurological stimulation. Numerous studies have now revealed the importance of movement to the development of the brain and emotional intelligence.

If multifaceted stimulation does not occur, normal development is stymied and appropriate adaptive responses are not achieved. As a result, mental, physical, and emotional development, as well as behavior is impacted negatively. More profound issues in neuromuscular and visual-perceptual-motor development become likely.

Far too many children are being diagnosed and treated for ADD, ADHD, and Dyslexia. Dr. Gary Polan has treated many patients diagnosed in this group of disorders, who can be helped without drugs.[10] Many of these children are likely demonstrating the symptoms of an under-developed or under-stimulated neurological system. Long-term administrators in occupational therapy environments have repeatedly commented on how effective the Sportwall programs are at helping children to essentially "re-wire" their brains.

Stimulation – A key Requirement for Healthy Neurological Development

Movement is essential to maintaining physical and emotional health. Unfortunately, the past two decades have witnessed a drastic reduction in physical movement in industrialized countries especially in the early years. One example of this at the earliest ages is stiff safety car seats. While they have come a long way to protect infants/toddlers while driving, they now convert to home carriers. The home carriers then slip into high chairs, the ultimate convenience for parents.



The neurological system is primitive at birth and while loaded with stem cells that provide the potential for a healthy neurological system, it will only develop with stimulation and when demands are made on it.

What most parents don't realize is that hours a day in these devices prevent some spinal, neurological, and muscular development which babies and toddlers depend on to learn to lift their own heads

and manipulate the curvature of the spine in a wide variety of postures. A child subjected to the discomfort of the floor will attempt to lift his/her head and roll in order to respond to stimuli. These are all critical movements that jump-start stem cells into creating the neurons needed for physical movement. Scientists have not focused much on the link between this early suppression of movement and the huge numbers of children being diagnosed with Sensory Processing Disorders, but it makes sense that if a child is sitting comfortably in a chair for hours where there is no incentive to move, this must have an impact on the development of the neurological system.

Early Inactivity Tied to Low Academic Performance

What are the results of the above changes in childcare?

Some researchers who study the underlying causes of under-performance in children, such as Dr. Alweena Zairi, believe these practices effect pre-school neurological development and the academic potential of children by the time they start school.[11] Teachers are finding they have to deal with a growing number of children suffering from numerous conditions born out of a childhood of inactivity.

The XerPro/XerTrainer has been designed to help with these issues by providing equipment located in a safe space for group exercise, and based on engaging activities and games geared for children raised on technology. Since 2003, professional treatment centers have been using the Sportwall systems to treat a range of neurological disorders. Some are mentioned later in this document.

Brain Plasticity – Physical Exercise Stimulates Cognitive Capacity

Brain research strongly supports the link between movement and learning. The brain and the body's movement and learning systems are interdependent and interactive. For example, motor development provides the framework that the brain uses for academic concepts.

Children who have developed fine motor skills through daily exploration and manipulation of a wide variety of objects also possess the cognitive foundations necessary to build academic success.[12] Neuro-imaging techniques are revealing that certain motor tasks activate not only the motor but also the cognitive areas of a child's brain.[12]

The body's vestibular system controls balance and spatial awareness which facilitates the student's ability to place words and letters on a page. Tracking specific patterns with the whole body (using a noodle, ball, or hands in some of the games) promotes the brain's ability to encode symbols. According to Neurokinesiologist Jean Blaydes Madigan,

> About eighty-five percent of school age children are predominately kinesthetic learners. Using movement in the learning process helps many children retain and retrieve information more efficiently. Physical activity prepares the brain for learning by providing a healthier body/brain that works more effectively. All things being equal, healthy active students can learn better. [4]

Of course, these physiologic principles apply to adults too. In his groundbreaking book, Dr. Dharma Singh Khalsa, reports, "several researchers revealed stunning evidence that powerfully supports the efficacy of exercise in achieving and maintaining optimal mental function in people of all ages."[13] He also

reports that exercise, when it is combined with thinking, is most valuable because it grows the largest number of dendritic connections.

Increasing evidence suggests that the brain operates in many ways like a muscle – atrophying from disuse and increasing capacity with active use, even late in life. This is the "use it or lose it" adage espoused by Dr. Joseph Jankovic, professor of neurology and director of the Baylor College of Medicine Movement Disorders Clinic in Houston.[14]

The brain thrives on stimulation. Unlike other organs that wear out after a certain number of years the brain becomes sharper the more it is used. Physical exercise can increase cognitive capacity just by driving blood and oxygen to the brain.

Motivation to play for long periods occurs as a new score is established every few minutes.

Strong evidence suggests that exercise stimulates production of neurotrophic factors (also called brain-derived neurotrophic factor or BDNF), which helps repair brain cells, prevent cognitive decline improve learning and promote mental as well as motor performance.[14] It may slow the onset of degenerative brain diseases like Parkinson's syndrome.[14]

Harvard psychiatrist John Ratey refers to BDNF as "Miracle-Gro for the brain."[5] He calls BDNF "a crucial biological link between thought, emotions, and movement." So how do you get more BDNF?

Daily aerobic exercise is good, but including intervals of sprints is even better. This is exactly what we do with Sportwall training. In a recent German study volunteers who did two 3-minute sprints separated by 2 minutes of lower intensity during the course of a forty-minute treadmill session demonstrated higher increases in BDNF than non-sprinters. Not only that, but the sprinters also learned vocabulary words 20 percent faster than non-sprinting exercisers. Evidently, even a small amount of high-intensity exertion can have a profound effect on your brain.[15]

When the brain is engaged by having to make decisions under pressure while playing interactive ball sports, the benefits are enhanced significantly because gross motor skills must be incorporated. Neurons develop only when the player is confronted with a demand for greater efficiency (skill development). As far as the brain is concerned, if you need a skill, you develop it only when you are confronted with the need, and then practice performing it.

The XerPro/XerTrainer makes training more fun while taking the brain-body connection to a level beyond typical sports in that the games are short, specific, and tuned to the appropriate level of difficulty until the player is ready for the next. Motivation to play for long periods occurs as a new score is established every few minutes.

Unlike other computer simulated games where a player holds a device and pretends to play by waving it around, the XerPro/XerTrainer engages the whole body in a real-play game with real sports equipment where the hands, feet, eyes, ears, and vestibular system are all involved in the activity. This produces a computer-generated score, which measures actual athleticism, cardiovascular fitness, and intellectual agility.

The value of the computer-generated games is that successive demands at each level of difficulty are randomly produced. This requires the player to stay "in-the-now," ignoring any internal or external

distractions, in order to prepare for the next challenge. Profound focus on the present allows the XerPro/XerTrainer programming to target development of all five core brain areas:

- Memory (Short Term/Long Term)
- Speed, Accuracy, Reaction Time
- Attention/Focus
- Problem Solving
- Cognitive Agility

Proprioception: A Key to Healthy Brain Body Integration

Proprioception is the inner sense of body awareness allowing a person to know where the parts of the body are in space without having to look. Unlike the six exteroceptive senses (sight, taste, smell, touch, hearing, and balance) by which one perceives the outside world, proprioception is a distinct sensory modality that provides internal feedback on the status of the body. It is the sense that indicates whether the body is moving with required effort, as well as where the various parts of the body are located in relation to each other.[16]

This is the sense that allows a person to run up a flight of stairs without looking at their feet. Without this sense, people would not even be able to walk without watching where they put their feet. Sportwall Programming excels in its ability to sharpen proprioception as all of its training components bring together a demand on the player that is driven by intention and supported by the body's multi-sensory response to that demand at a higher pace than normal.

Proprioceptive Dysfunction

Proprioceptive Dysfunction is when the proprioceptors are not receiving or interpreting input correctly and manifests itself as clumsiness, lack of coordination, and difficulty performing common daily tasks and activities, which result in the following clinical signs of proprioceptive dysfunction:

- difficulty with motor planning
- difficulty with execution of planned movements
- difficulty with grading movement
- difficulty with postural stability[17]

Proprioceptive Dysfunction, Self-Esteem and Behavior in Children

Proprioceptive dysfunction, and the associated struggles and challenges faced by those who suffer from it every day, plays havoc on self-esteem. This can then result in behavioral issues which stem from the attempts to divert attention away from areas of inadequacy, thus entangling the two and making it difficult to identify what is neurological and what is behavioral. As children try to avoid looking bad for their inadequacy they frequently over-compensate by acting-out to avoid being teased. For many, negative attention is better than shame, while others become shy and afraid to try anything new.

The key point is that the downward spiral driven by low self-esteem must be reversed with success earned from real performance starting with the type of "baby steps" which are easily accomplished on the Sportwall.

Sportwall's Brain/Body Integrated Training Stimulates the Re-wiring Process

According to neurologist Dr. Carla Hannaford in her book *Smart Moves,*

> Research indicates that when both eyes, both ears, and both feet are being equally used, the corpus callosum (responsible for whole brain processing) orchestrating these processes between the right and left hemisphere becomes more fully developed – cognitive function is heightened and ease of learning increases.[18]

Sportwall training provides this level of stimulation and enables individuals to merge the mental and the physical while continually pushing them to higher levels of accomplishment, which in turn pushes demands on the neurological system to rewire itself more efficiently. Regular use will literally improve the level at which the mind and body function competently together.

How?

In a Q & A session on Facebook, movement specialist M.A. Greenstein, Ph.D., wrote that exercise is "important for generating blood and oxygen flow. This results in neurotransmitter release has been shown to boost strength of synaptic bonding, stimulating glial cell activity for information flow."[19]
The faster the mind works, the more time seems to slow down, leaving more time to apply to conscious decision making as opposed to constant thoughtless reaction to stimuli. That is what athletes refer to as being in the "zone" or what sport psychologists call the "flow."

Sportwall programs accomplish this by encouraging right and left brain intelligence and balance. They coax the player to perform movements that develop the corpus callosum: the super highway of connective motor and sensory axons that connects the two hemispheres of the brain.

Dr. Greenstein writes, "There is an important correlation between the use of spatial intelligence and long term memory. Movement and cardiovascular exercise can help to grow the area of our brain that creates new memories: the hippocampus."[9] She notes the work of Harvard psychiatrist John Ratey, who says that 20-30 minutes of cardiovascular exercise enables more "fruitful synaptic bonding."[5]

In fact, movement is essential to the development of all four lobes of the brain. As activity in all lobes of both hemispheres increase with movement, more dendritic connections form, myelination increases, and those dendritic connections extend across the corpus callosum.

The better the connection between hemispheres, the more intelligently we are able to function. Maximum proficiency at critical thought, or skilled movement, requires peak activity of both hemispheres. Sportwall activity helps to promote this type of whole brain thinking.

Sportwall Programming Promotes Social Integration

It is likely that Sportwall provides both genders and overweight children a chance to contribute more subtle physical and mental attributes such as alertness, intelligence, precision, coordination, quickness, empathy, and even leadership to their team. A sense of belonging mixed with accomplishment is undoubtedly a potent concoction at this age when future activity patterns are being created. This would explain a preference for Sportwall as it appears to provide these children a unique stage to perform.

Sportwall programs develop social skills and interpersonal cooperation through social interaction in a spirit of fun. Opportunities to work together as a team create an environment where participants develop and enhance concepts such as inclusiveness, cooperation, and mutual support. In this respect, Sportwall programming certainly distinguishes itself among its competition in terms of socialization.

Learning how to be part of a team as a valued member raises confidence and a sense of self-esteem. Instead of only one winner, with Sportwall training there is a new winner every few minutes, so players have numerous opportunities to improve their scores, and experience the feeling of success.

Perhaps more importantly, the Sportwall system provides an easy way to recover and rededicate in the face of a loss, a task often more difficult on the playground. For children and adolescents who experience this type of discrimination, Sportwall programming may very well feel miraculous.

<u>Opening the Doors to Participation in Sports</u>

> "Many schools, gyms, community centers, and hospitals include (Sportwall's) digital target games that challenge players on speed and motor skills as they throw a ball allowing for sports simulation games that allow users to feel like they're playing games such as soccer, tennis or baseball."[20]

Sportwall is a perfect match for any participant. It is an opponent that never misses and always plays the ball back at the speed and direction directed by the player. Changes in feedback and response are instant. Since most systems are installed in a fairly confined space, required skills to maintain play develop rapidly. The temptation to drive up scores and continue play is irresistible. It invisibly pushes levels in player strategy, focus, power, precision, balance, and footwork which are skills transferrable to sports.

Beyond enhancing these natural skills, the system promotes an intrinsic human need, dare we say even "a love for movement." Body and brain find a concert of new confidence, which in turn fosters a strong desire to pursue life-long physical activity, a desire that may not have happened otherwise.

On the playground, self-esteem frequently hangs on a child's ability to throw and catch a ball. Yes, it is a primitive measure of social acceptance among children who MIGHT be picked to a team. We continually observe children previously marginalized to the sidelines being integrated back into playground activity just weeks after Sportwall practice because the system provides a more protected, unintimidating environment at their school. For this purpose, the versatility of the system is essential.

Treating Childhood Motor Delays, Autism, ADHD/ADD, LD, and Obesity at Fitness for Health, Rockville, MD

Fitness for Health (FFH) is a state-of-the-art fitness facility specializing in programs for children with coordination and motor delays, ADHD/ADD, LD, weight management, and self-esteem issues. "Parents can't drag their kids away from video games," says Marc Sickel, the founder of Fitness for Health in Rockville, Maryland. He continues:

> I thought there had to be a way to tap into that obsession—especially if it could help children with special needs. We have devised creative ways to utilize the Sportwall to meet the needs of our population which include the goals of increasing motor planning and processing, multi-planar movement, improving academics, increasing tracking abilities, and cardiovascular endurance.
>
> Here are some examples of how FFH programming is applied to the Sportwall XerPro:
>
> For sport specific activity to improve processing, motor planning, and athletic skills, FHF places letters of the alphabet above or below each light, incorporating word games. Players use ball throwing, kicking, or even tennis groundstrokes for accuracy while spelling. This improves tracking and processing for an athlete and adds an academic component for children.
>
> Multi-plane skills are often trained on the XerPro game level 4-2. Here, children raise their arms to "knock the lights out" as they move right to left with sliding steps across the panels, then left to right to return. The next level of complexity adds the feet to "knock the lights out" which are located below waist level.
>
> After that, children are asked to use the right hand to hit a light to the left and vice versa. Then the feet are similarly asked to cross the midline. Simultaneous centralizing movement can be added by having the participant use both hands to hit a light. All sports require upper and lower extremity movements in single and multiple planes. XerPro's forte is adding difficulty that the player actually enjoys with sounds for scoring.
>
> The "Tic-Tac-Toe" game allows for increased cardiovascular endurance. At the same time, it forces the child to make fast decisions pushing their processing abilities. For more intensity, FFH uses game 4-1 for 30 seconds with a weighted ball to ramp up cardiovascular endurance and motor planning.

A medicine ball is placed 20 feet away from the center of the left wall panel, and a spot is marked 20 feet away from the center of the right wall panel. The player runs up hits lights out, runs to the ball, picks it up and carries it to the other spot, puts it down, runs up and hits another light, and continues the pattern until the time runs out – usually 30 second intervals. That is pretty strenuous!

FFH uses a fascinating exercise to improve memory, recall, focus, and visual spatial awareness. Laminated cards of photos of the Sportwall with different light patterns are used. The child views the card for 3-30 seconds (depending on their level). Then using game 4-1, the child must recreate that pattern from memory during the game.

This is only one example of the system's versatility, in software engineering terms an attribute of "open architecture" which allows educators to innovate.

"Far too many children are being diagnosed and treated for ADD, ADHD, and Dyslexia. Unfortunately, many of these children may be simply demonstrating the symptoms of an under-developed or under-stimulated neurological system."

Sportwall programming certainly helps develop fundamental sports skills, visual spatial awareness, tracking, motor planning, processing, cardiovascular endurance, and more. Still, we feel the system's capabilities have yet to be fully explored.[21]

Sportwall XerTrainer in Developmental Optometry

Eighty percent of an individual's information is obtained through vision. Nearly everyone is born with the potential for good eyesight.[10] Most do not realize that, like any muscular skill, all visual skills are learned. We have learned to see, just like we learn all other skills. Astonishingly, "even the most elite athlete can learn to see better," says Dr. Gary Polan.

Dr. Polan, a pioneer in the field of Developmental Optometry, is based in Pacific Palisades, CA. He has been using the Sportwall XerTrainer in his office since 2004. He explains,

I have used the XerTrainer as an integrative tool as a part of my visual/perceptual vision therapy (VT). Younger patients with deficiencies in laterality, directionality, gross motor, visual-motor organization, and visual-motor integration are targeted for training on our XerTrainer. Patients with these diagnoses often exhibit isolated symptoms including poor handwriting, letter and number reversals (often referred to as dyslexia), and poor eye-hand coordination.

Patients with visual tracking problems (pursuits and saccades) can also benefit from our XerTrainer. Typically, two 120-second consecutive runs are performed. Patients are urged to improve upon their first score.

Most of the procedures are done with hand hitting rather than ball hitting as this allows for a quicker integrative response to achieve desired therapeutic goals. Laterality/directionality patients are instructed to use left hand on left side and right hand on right side lights. Crossovers are not permitted.

More difficult levels are used as patients improve. "Find the Tune" is a good exercise for multi-sensory integration training, namely visual-auditory processing. All serious vision therapists would benefit from XerTrainer in their office. XerTrainer has become a useful and fun tool for patients with specific visual perceptual deficiencies. In fact, patients often ask if XerTrainer is going to be part of their vision therapy session for the day.[10]

Sportwall programming certainly helps develop fundamental sports skills, visual spatial awareness, tracking, motor planning, processing, cardiovascular endurance, and more.

Cambian Education, the largest provider of specialized residential education and care for young people with Autism and Asperger Syndrome in the UK, has invested in Sportwall in each of their facilities.

Clare Stockley, Cambian PE Programs coordinator, states:

> We chose the Sportwall because it's versatile, straight forward, and a great way of delivering PE through ICT (Information and Communication Technologies) We use the Sportwall from ages 9-19 and they all love it as it's just as much a fun game as a good workout.
>
> As our students have Autism Spectrum Disorders (ASD) they're not always willing to join in with team games, but the Sportwall is the ideal medium for them to compete against each other without direct interaction. They can play easily by themselves, but also in small groups without feeling stressed. It engages the students and allows them to think about what they're doing. They develop body awareness and problem solving skills when deciding how to reach each light in sequence at different heights.
>
> The students particularly enjoy throwing things at the lights, which again is great for coordination and developing reaction times. It provides a sensory dimension to the lesson and students can be creative with it. One student likes to play it in the dark so that the lights are even brighter. The Sportwall is ideal for children with ASD's as it enables them to learn by direct experience. The instructional cues are visual, decreasing the human element, which also helps the students to learn.[22]

Sportwall Training on Mood: A Natural Alternative to Anti-depressants

Sportwall's XerGames training is often presented in play format that appeals to those who traditionally do not want to exercise or play sports. This makes it a critical tool to reach the enormous numbers impacted by technologies that encourage a sedentary work and life styles.

According to the Harvard School of Public Health, inadequate physical activity/inactivity is now rated as the FOURTH leading cause of preventable death in America.[23] It is worth noting that this preventable cause of death was ranked above high blood sugar and high LDL cholesterol.

A routine of exercise to elevate mood and assist learning is best addressed in our youth. For Elaine Alexander of the Kansas City School District, the XerTrainer does just that. She says, "Our students absolutely love the XerTrainer." She continues, "They ask to play on it and the whole class's demeanor changes to one of total cooperation when they know we are going to work with the XerTrainer. If we need to change from another activity to the XerTrainer, we never hear any complaints. We find the XerTrainer can be adapted to almost any skill we are teaching. We believe the XerTrainer is the most motivating piece of equipment we have in our program!"

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Craig Rupert, principal of Kansas City's Woodland Elementary School, says, "PE4Life has had a tremendous influence on the lives of our students. It's not just the increased levels of fitness we are seeing in our kids which has everyone excited. Students are also more motivated throughout the day, their enthusiasm is way up, and discipline issues are way down." [24]

Due to the neurochemical response, many researchers have concluded that we can control mood through exercise and thereby dramatically impact human psychological health. In addition to its massive appeal to at-risk populations, the following section explores how Sportwall's "short-burst-short-rest" style of interval training programs can:

- release endorphins which lift mood,
- stimulate the elimination of adrenalin and cortisol, thus improving the sense of well-being, and
- increase naturally the production of neurotransmitters (building blocks of hormones) such as serotonin, norepinephrine, and dopamine (known as "the happy hormones").

Summarizing Sportwall's Value as a Provider of Sensory Processing Integration Training for Mainstream Participants

While it can be argued that many of the components discussed in this document can be fulfilled with other programs, Sportwall excels in the following areas:

The programming is extremely diverse. It can be tailored to all population groups from children with special needs, both boys and girls, elite athletes, and seniors. Sportwall has the support of educators and researchers for every cohort group mentioned.

The programming does not discriminate with regard to skill level as it meets players at their own abilities. Each player will find it easy to prepare the system for his or her level.

What is remarkable to me is that kids intuitively begin using the equipment without much direction. These products speak their language! And more so, that language is spoken clearly to kids of all types, ages, backgrounds, gender and ability.
Ron Germann, Manager
The Summit Family Fitness Center
Temple, Texas

Installation convenience: Since the programming is so diverse, facilities have preferred to install the systems in general purpose rooms where everyone can have access to them, rather than dedicating them to a room for a particular group. An added advantage is that when not in use the systems take up only 4" of depth on a wall, which also helps alleviate the need for a dedicated room.

Instructional growth: When instructors fully engage with the wide range of programming available, they begin to create their own

routines and programs. This is when a level of excitement ignites and true believers are born as they discover the limitless possibilities of Sportwall programming. Passive supervisors often become inspired physical educators.

We have developed a wide variety of program manuals designed to get instructors started in their own field of interest, whether for Special Education and Adapted PE, sports training, group exercise classes, or personal training sessions. Using our drills initially provides a feel for how the process and results come together.

In our experience new ideas quickly emerge as instructors find themselves easily adapting drills to achieve their desired results. We encourage instructors to share ideas on our blog, http://www.xergames.com/blog/ or on Facebook, http://www.facebook.com on Sportwall XerGames**.** This way, resources available to both new and experienced users will grow continually.

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Evidence in this document has been gathered from scientific research, interviews with medical/science professionals, and experienced observations by seasoned trainers who have worked with the Sportwall products and programs in their facilities during the past seven years.

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