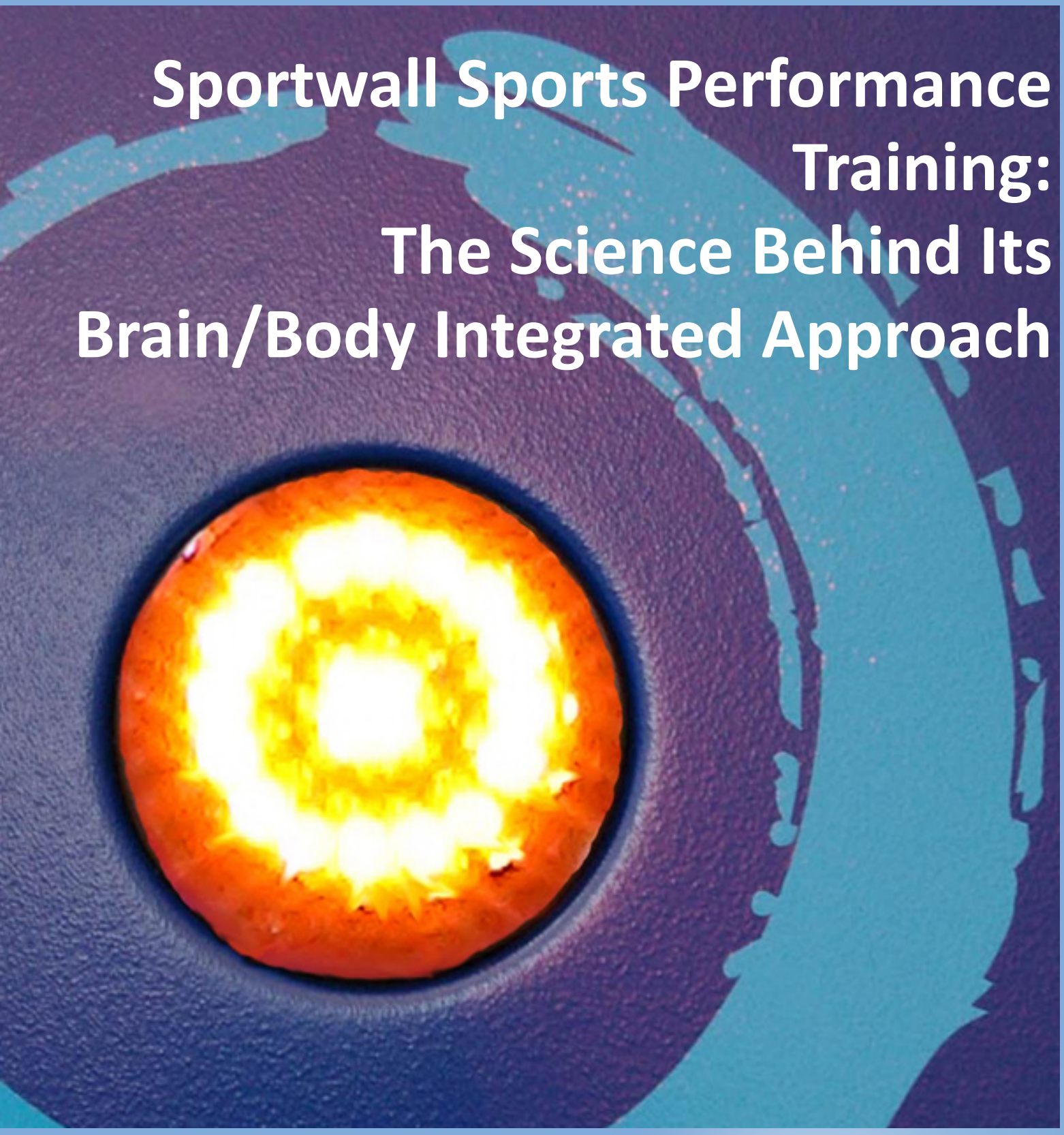
Sportwall Sports Performance Training: The Science Behind Its Brain/Body Integrated Approach



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"If people will take a good look at the *XerPro* they'll see the wave of the future. *XerPro* absolutely correlates perfectly with what you are trying to do in match play and that's very important for high performance training. With the *XerPro* players are getting cardiovascular fitness, sports training and they're having fun at the same time! Believe me when I say you've never experienced anything like this before. The *XerPro* is truly a blast!"

Billie Jean King, Winner of 20 Wimbledon Titles

Sportwall Sports Performance Training: The Science Behind Its Brain/Body Integrated Approach

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

Introduction

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.[2] These interactive video or electronic games PROMISE whole body player movement similar to that of "real-life" exercise participation, but it is questionable whether many of those on the market actually do so. This paper will document how Sportwall products can fulfill this promise and, in addition, can contribute to highly effective training of athletes.

While the Sportwall XerPro and XerTrainer are recognized as two of the original, most enduring concepts in the category of exergaming, they differ significantly from other modified video games. Instead of simulating play, they engage players in a real kinesthetic experience with dynamic, integrated, multi-planar athletic movement using actual sporting equipment. The result is a powerful combination of both functional training AND sports specificity training in one multi-sensory system. (See the next section for details.)

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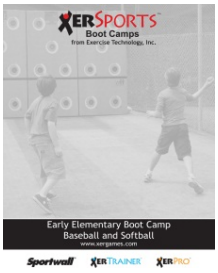
Success in play is measured by the ability of participants to keep the game in play as a result of real athleticism rather than emulated movement called for in other exergames. The original concept behind the creation of Sportwall was to create fun, short, fast moving full-body games that engage maximum intensity and focus with results measured via electronically generated scores and rewarding sounds. Today, this approach continues to incentivize repeated play until mastery at increasing levels of overall performance and sport specific skill.

This concept has evolved into a wide range of applications, from training high performance athletes to providing highly engaging, brain integrated, physical exercise for children with special needs. This enormous flexibility is one of the most unique aspects to Sportwall programming. Coaches and Trainers are free to choose from a wide array of drills/plans for every sport and sector of the community. See our web site for curriculum options: www.xergames.com/solutions/athletictraining.



Sportwall Conditioning for Mind and Body-How it Works

Exploring how Sportwall engages both sides of the brain requires a close look at how the programming engages players in a battle of strategy, conditioning and technique in a fully integrated brain/body game based on physical movement and performance usually at a higher level of intensity than the natural game.

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.[3] Thus, multisensory training protocols can better approximate natural settings and are more effective for training athletes.[3]

Sportwall programs are fitness training products for all ages and ability levels, in which 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 real sports 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 the following:

- Encouraging team 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 sporting goods (not simulated)
- Requiring high levels of attention and focus for success (staying consciously "in-the-now")
- Engaging in cognitive decision making under pressure
- Delivering an explosive resistance and high intensity interval training

Sportwall's brand of functional training 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.

Sportwall's brand of functional training 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.

Rapid movements of objects which take place in sport place a great demand on our visual system. The athlete must quickly integrate, interpret and develop a plan of action based upon the information received by their visual system. How efficient the athlete becomes at this process can ultimately influence the athlete's sport skill acquisition and overall success during play. The Sportwall gaming system encourages development of the higher level visual acuity and motor processing required for skill acquisition during sport specific activities.

Research has also shown the addition of explosive resistance training and high intensity interval training, such as Sportwall's, to a generally low intensity training program will produce substantial gains in performance.[4]

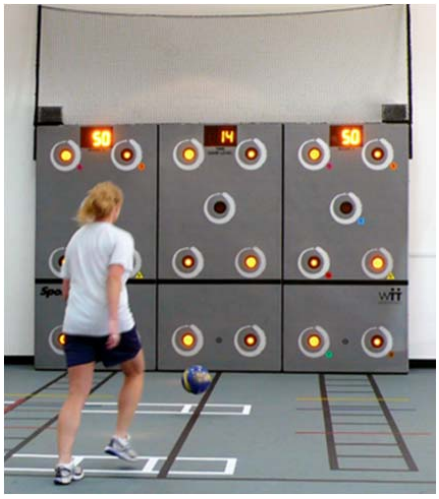
Brain Plasticity – Physical Exercise Stimulates Cognitive Capacity

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.

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

In his groundbreaking book, *Brain Longevity,*[5] Dr. Dharma Singh Khalsa, M.D., 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".[5] 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.[6]



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.

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.[5] It may slow the onset of degenerative brain diseases like Parkinson's syndrome.[5]

Harvard psychiatrist John Ratey, refers to BDNF as "Miracle-Gro for the brain."[7] He calls BDNF "a crucial biological link between thought, emotions, and movement." So how do you get more BDNF?

Daily aerobic exercise is best but including intervals of sprints are even better. 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, the sprinters learned vocabulary words 20 percent faster than non-sprinting exercisers. It seems even a small amount of high-intensity exertion can have a profound effect on the brain.[8]

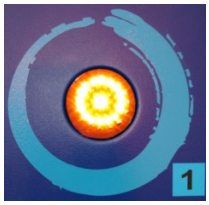
When the brain is engaged by having to make decisions under pressure while playing interactive ball sports, the benefits are enhanced significantly because gross motor skills must be incorporated. Neurons develop only when the player is confronted with a demand for greater efficiency (skill development). 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, more intense, 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 sporting goods 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:

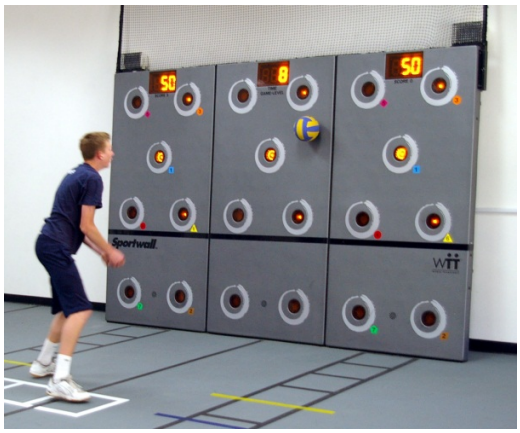
- Memory (Short Term/Long Term)
- Speed, Accuracy, Reaction Time
- Attention/Focus
- Problem Solving
- Cognitive Agility



Sportwall Physical Training for Performance Athletes

In today's competitive sports environments, athletes are continuously seeking ways to improve performance and ultimately gain an edge over the competition. Sportwall programming helps skilled athletes push their limits AND cross train.

The versatility of the Sportwall gaming system allows for the integration of sport specific and cross training activities in one comprehensive product. The most successful athletes regularly train away from their chosen sport in activities that improve the athletic characteristics required. More importantly, seasonal facilities may not be available. Sportwall programming supplies the ideal off-season physical challenges as well as a break from the monotony of sport specific training.



With Sportwall training, even elite athletes can find not only the challenges to strength, power, and endurance that they need, but also the general athleticism required by their sport. Application of speed, agility, strategy, and technique under pressure is also found here. Strong athletes don't win the battles, athletic ones do. Sportwall is the first training system to fully utilize technology to improve conditioning in athletes of all ages and abilities WHILE ALSO improving their decision-making under pressure.

Because the Sportwall XerPro/XerTrainer ramps up its demands in a systematic fashion, it is appropriate for athletes of all abilities and levels of competition. The system challenges professional athletes as far as they are willing to be pushed, yet is accessible to amateurs and beginners. The level of the athlete will determine which training is initiated as well as its specific progression.

Sportwall has the ability to quantify/score the success of individual movements. To an accomplished athlete, an improvement of only one percent can represent a huge competitive gain, but that gain is correspondingly difficult. Accurate scoring/feedback become extremely important when the athlete is digging deep for effort, and the highest levels of motivation are required. Sportwall meets these needs.

The athlete or coach receives accurate assessment and can track progress. Athletic improvement can be accomplished in a systematic and highly engaging format, resulting in the highest level of sports specific endurance.

The thrill of play and competition, balanced with intermittent rest, holds the player's focus on the game and not the length of time spent exercising.

Athletic Training—XerPro/XerTrainer can be utilized to improve:

- First step (reaction) quickness
- Reaction time
- Dynamic balance and postural stability
- Plyometric adaptation in sports specific movements
- Explosive change of direction
- Kinetic chain linking and complex movement patterns

Brain Speed: Delivering the Edge in High Performance

Elite athletes are superior in three main areas: strength, skill, and speed. Strength training should be general and focus on maximizing cardiovascular and muscular capability. Skill training is functionally specific; practice makes perfect only if one practices perfectly.

Speed is what truly separates the elite athlete from the good athlete -- not sprint speed, but rather information processing speed, also called reaction speed, or the recognition of stimulus and the ability to react quickly and EFFICIENTLY to that stimulus. Efficiency also depends on peripheral awareness and visual memory. It is recognition of patterns, memory, and mental preparation combined with the ability to apply strategy and technique under pressure.

For years, coaches have searched for the "ultimate tool" for speed development. Physical speed is the manifestation of what goes on in the athlete's mind before he reacts. Mind speed is the essence of greatness. 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.[9]

Sportwall training enables athletes to merge the mental and the physical. It continually pushes the athlete to higher levels of intensity, which in turn pushes performance by the neurological system. Regular use will literally improve the speed at which the mind functions.

How?

Movement specialist M.A. Greenstein, Ph.D., in a Q & A session on Facebook, wrote that exercise is "important for generating blood and oxygen flow. This results in neurotransmitter release which has been shown to boost strength of synaptic bonding, stimulating glial cell activity for information flow."[10]

The faster an athlete's mind works, the slower the game appears, leaving more time to apply strategy and technique. That is what is meant by 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, cardiovascular exercise can help to grow the area of our brain that creates new memories—the hippocampus."[8] She notes the work of Harvard psychiatrist Dr. John Ratey, who says that 20-30 minutes of cardiovascular exercise enables more "fruitful synaptic bonding."[7]

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. This is how Sportwall activity promotes whole brain thinking.

Sportwall's Balanced Programming: Key to Performance & Adherence

Learning how to be part of a team as a valued member raises confidence and a sense of self-esteem.

While even mild exercise will have a positive effect on our neurochemicals, exact effects vary with the severity of exertion. While exercise at very high intensity and long duration can cause adrenalin levels to become elevated while serotonin levels drop, as long as the body is not over stressed the more demanding the exercise, the better the chances of increasing serotonin production.

Sportwall's interval training (short-burst-short-rest) regimen, when delivered to groups, is an excellent way to achieve the balance needed to optimize results without over-producing adrenaline or under producing serotonin. Intensity is balanced with recovery during a thirty to sixty minute workout. This may explain why schools that have adopted the Sportwall programs are noticing a significant reduction in aggression and out-of-school suspensions.[11]

Interval training is now well documented to hold the key to maximizing performance. The body must rest (also called compensation) following a period of activity in order to replenish its biochemical sources of energy. Too much stress without recovery increases risk of injury and burnout. Too much rest without stress will lead to atrophy and weakness. Balancing stress and recovery is essential to increasing performance and adherence.

All Sportwall training programs utilize this method of training, which is a key to its superior adherence and performance results, especially among at-risk populations. Inactive people often report that pain is the greatest barrier to adopting an exercise regime. Sportwall's format of short/intense games, followed by short rest in preparation for the next turn, is believed to be a key factor in successfully encouraging individuals to conquer this "pain barrier."

The thrill of play and competition, balanced with intermittent rest, holds the player's focus on the game rather than the length of time spent exercising. Add the neurochemical release of "happy hormones" and the drudgery of regular exercise is replaced with the pleasure that play brings.

Summarizing Sportwall's Value

While it may be argued that many of the components discussed in this document can be fulfilled with other programs and training equipment, there is nothing that compares with the Sportwall XerPro and XerTrainer in several areas, a fact which should be critical to consumers.

First, 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.

Second, 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.

Third, and most importantly, these are programs which have mainstream appeal. They break through the social barriers and gender stigma found in regular sports. They even engage the traditionally inactive.

Because the structure of the programming involves multiple short games played in teams, there are no permanent winners. Instead, the chance for everyone to succeed is repeated every couple of minutes which incentivizes continual pay. Often, educators have to "pull the plug" to end play.

Since groups can play together or one team can play against another, a high level of camaraderie is quickly built. The combination of rapid skill development along with social connection leaves players inspired with a sense of belonging after each class.

A special note to older generations--today's computer gamers sense no barriers to overcome as they see Sportwall activity as a game rather than a workout or something done only by athletes. In this way, Sportwall eliminates the "jock" stigma to exercise. Similar to other three-dimensional electronic engineering puzzles, "nerds" like it too.

Fourth, 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. For example, seniors can use them in the mornings, youth in the afternoons, and adults and athletes in the evenings. 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.

Fifth, 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 sports training, group exercise classes, or personal training sessions. Using our drills initially provides a feel for how the process and results come together.

Finally, Score Tracking: An effective way to ensure sustained use is to incorporate score tracking and team competitions. This can be done in two ways: by using the score tracking charts or by encouraging players to post their scores on a social networking site (such as Facebook) along with a video clip of the play to validate the authenticity of the score.

Facilities can either dedicate their own page to tracking scores or they can use the company's official score tracking site. Some facilities also hold competition days where teams challenge each other for the high score of the day in a particular game. Since games average sixty seconds, it is easy to get a lot of action happening quickly.

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.

"In our research, the Sportwall did everything else the other exergames could do, but the intensity level from the interval training, camaraderie, and team work stood out. Even those who were waiting for a turn were jumping up and down yelling and encouraging the others. Fit and less fit children played together." (personal communication, Bruce Bailey, Ph.D., Assistant Professor, Exercise Sciences, Brigham Young University. July 2011.)

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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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