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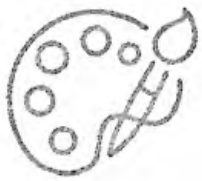

Introduction

Play. It makes the world go 'round. We often hear "Play is the language of childhood." And it is. Children develop their cognitive, motor and learning skills through play beginning in the first few months of life. Playing within a safe, secure relationship helps children develop not only their developmental skills but also their sense of security, mastery, confidence and independence.

Play is the foundational activity that brings humanity together. Since the beginning of time, even before we humans spoke, we played. We played with sound, we played through nonverbal gestures and we played with movement in order to grow together as social beings (Lieberman, 2013).

When people learn that I am an educator in child brain development they often ask me, "What's the one thing I can do to help my child develop to his fullest potential?" Although there are many critical factors such as good quality nutrition (free of pesticides, herbicides and added hormones), emotional attunement and physical safety, once those "Top 3" are met, I suggest to parents that they get down on the floor and play with their children. "Play now, play later, play more."

Even in this digital era, one in which Dr. Hilda Kabali at the Einstein Medical Center in Philadelphia reported that 1 in 3 American children under age one have played with a tablet or smartphone, play remains at the heart of our cognitive, motor and social interactions.

This book, *70 Play Activities For Better Thinking, Self-Regulation, Learning and Behavior*, is all about play. How to play, when to play, where to play and with what to play. These activities grew out of our clinical and educational work with over 2000 children in the past 30 years. The activities in this book are created with the brain in mind. They are specifically designed to improve thinking, self-regulation and learning by applying neuroscience to clinical practice.

Let's Talk About You

If you are a clinician or teacher working with children who have difficulty with attention, concentration, distractibility, planning, organization, goal-setting, time management, task initiation, task completion, impulse control, mood management or inhibition you spend a good deal of your time helping children develop strategies to help them succeed. You hold team meetings, write IEP goals, perform task analysis and look for innovative ways to enhance children's skill sets.

There may be many times when you search online or in books for activities that will help you meet the needs and treatment goals of the children with whom you work. This book is designed to be that resource for you. It's the book you open when you are planning for the next session or series of sessions with a specific child, group of children or even an entire class.

I like to think of this book as an inspiring recipe box. Instead of seeing every activity as cast in stone, think of them as "jumping off points" for your own creativity. Change them around, improve them and use them to meet the practical considerations of your own office or classroom. Where we provide you with worksheets, words and activities, you are free to create your own. We encourage you to involve the children.

I have a little story about that. In our first two books, *The Family Coach Method* and *Bloom: 50 Things To Say, Think And Do With Anxious, Angry and Over-the-top Kids* with Wendy Young, we have a feelings identification and mood management activity called Anger Mountain. I have used this activity for at least 10 years, and children love it.

One day as I was using Anger Mountain, the child with whom I was playing said, "Hey, Dr. Lynne, Anger Mountain is upside down. You have the explosive moments at the top of the mountain but the area to write in is the smallest. Actually, the bigger parts of the mountain should be at the top, because my explosions are HUGE!" I told him he was absolutely correct and I went home that evening and remade Anger Mountain. I encourage you to do the same with the activities in this book. Make them as individualized and specific as you desire or as the children need.

Children Love to Teach

We also do another thing with the children with whom we work that I wish to mention at the outset. Sometimes I am working with a child and when I say, "Shall we act this out," or "Play this out," or "Make a game out of this," we often do. As an example, Sun Salutation was created by myself and two gifted children whom I saw for years. When the children change, improve or even create a completely new game, sometimes I say, for example, "Janie, that is so terrific, I can see how many children would be helped by this activity. Shall we name it, then when I help other children, you will know that you are helping in spirit as well." Many of the children with whom I work have seen many therapists. They have had substantial difficulties for a long time. When we take the time to say, "Hey this is such a great idea, we could help a lot of kids with this activity," the children often feel appreciated, honored and celebrated. Further, the children are taken out of the role of patient, one they have occupied, perhaps for too long, and they climb into the role of mentor, teacher and helper. This can be a rewarding experience for a child who has been working hard to develop new thinking, feeling and doing skills for many years.

That is really what it all comes down to. **When we play activities, such as the ones in this book, we hope the children experience a feeling of growth, competence and celebration for their hard-fought efforts. They deserve it!**

Where It All Began

When I reflect, I think this book started in 1972 on the playground of Hubbard Woods Elementary school where I discovered I was good at "Jacks." As a somewhat shy little girl, I was not at the top of the social hierarchy in elementary school. But that all changed one day when I beat a super popular third grader at Jacks. Ah, the power of games. All of a sudden I shot up to head honcho, lead Jacks player and future playologist.

Fast forward to 1984 when I was earning my master's degree in physical education at the University of Southern California. I know, not such a sexy degree. Now they call it kinesiology or neuroscience; that would have been cooler. But the 80s being what they were, big hair, Madonna and all, that was what I earned, a master's in PE with a specialization in sport psychology.

Well, I kind of lucked out because in 1984, the Olympics were held in Los Angeles. And we sport psychology types were called upon to conduct imagery work with some of the Olympic athletes. So, at 6 o'clock in the morning, I'd head out to the track, swim stadium or baseball field and walk nervous athletes through the mental game of imaging the ideal pole vault, the fastest race, the winning moment and the like. Imagery worked and that was just the beginning.

Through my valued relationship with The National Head Start Association in 2007, I was introduced to SparkePE.org. I took their early childhood training two-day course and observed that playing with balls, hula-hoops and polyspots truly engaged the bodies and minds of children. As a pediatric psychologist, I began to incorporate movement and play into my sessions with children who carried diagnoses of ADHD, anxiety and learning disabilities. As we played to develop better sustained attention, impulse control, problem-solving and self-regulation, it was apparent that we could really improve children's thinking, motor and self-regulation skills by integrating what we knew in pediatrics, occupational therapy, music therapy, art therapy and PE. Thus, the evolution of this book.

Enterprise Skills

While studying research on executive function, mindfulness and self-regulation skills, it has often struck me that the activities we do in our practices enhance Life Skills, but not only that. The skills we teach are a different kind of skill; they are almost "future skills."

I was having a difficult time finding the word that described the skills I thought we were building with children in our offices. I even asked a group of colleagues I once invited to my home to brainstorm for Marlaine Cover's Parenting 2.0 Leadership Initiative about the most essential ways in which education needs to evolve in order to better meet the needs of students in this era, "What are the skills of the future called?"

Then, one day, I was talking with parenting author Sue Atkins, from the United Kingdom, and she said, as she often does, "I have a colleague I wish to introduce you to." Her name was Lorraine Allman of Enterprising Child, a business skills learning program in England. And right then, like a lightning bolt from the sky, I knew "Yes, that is it! We are teaching children Enterprise Skills." The skills needed to be a successful social being in a time when interpersonal, problem-

solving and thinking skills are needed to such a degree that one is competent enough to plan for, prepare for and succeed in jobs that have not been created, with technology that does not yet exist and in a social and academic world that will be very different for the next generation when compared with what it is today.

So when you read the activities in this book and I reference some of the specific, neuropsychologically-oriented skills each activity might be well-suited to improving, think Enterprise Skills, not only executive function and self-regulation. Remain broad minded, creative and flexible, then these activities will really help the children with whom you work because you will bring your "whole self" to the moment knowing that you are not simply meeting a treatment goal. You are helping a child to become healthy, happy, competent, whole and enterprising.

What This Book Is and What It Is Not

***70 Play Activities* is a book written for clinicians, teachers and parents eager to introduce more interactive play into the lives of the children with whom they work and whom they love.** The tenor of this book is predicated on the Bloom collaborative philosophy Wendy Young and I wrote about in *Bloom: 50 Things To Say, Think and Do with Anxious, Angry and Over-The-Top Kids*. The Bloom mindset is what helps these activities be effective. Our interactions with children throughout *70 Play Activities* are kind, cooperative and caring. When we move from a punitive or corrective stance to one of partnering in problem-solving, respecting the authentic viewpoints and experiences of the children, and partnering with the children, learning and behavioral improvements evolve naturally. Thinking and self-regulation skills include the mind-body relationship, the impact of relational connections on learning and the relational context of growth and development. Improving thinking skills exists within relationships; this is where the growth takes place.

The activities in this book were mostly created with children as we played in our offices, in schools, on playgrounds, on tennis courts and more. We are super fortunate because, when I told Rebecca Comizio, a talented school psychologist in Connecticut, about *70 Play Activities*, she generously shared many of the executive function activities she uses weekly with children at The Stanwich School. The Musical Thinking sections were further inspired by Nacho Arimany, whom I met through my kind colleagues Alex Doman and Sheila Allen of Advanced Brain Technologies. My deepest gratitude to my creative colleagues, Megan Garcia, Wendy Young, Megan Hunter and to you, for continuing to help these activities adapt and evolve to suit the needs of a broad range of children in diverse settings worldwide.

Although the activities in this book are empirically informed, they are not evidence-based. The activities are a creative response to the current research in kinesiology, occupational therapy, cognitive science, physical therapy and speech language therapy. The activities are not a formal "brain training program." They are designed to augment current treatment protocols and educational programming. *70 Play Activities* provides the clinician, educator or parent with creative activities to enhance thinking, self-regulation and learning skills through play.

For programs that address a variety of brain functions such as auditory processing, working memory, attention, speech, language and more, you might wish to research PREP, Cogent, Bright Start, Cogmed, Lumosity, Bal-A-Vis-X, BrainWare Safari, The Listening Program, inTime, Meludia, Lindamood-Bell, MC2, neurofeedback, Tools of The Mind, The Eaton-Arrowsmith Program, Social Thinking, 360 Thinking and Zones of Regulation.

These programs vary as to research support. Some are clinical in nature; others have case study data such as The Listening Program, Bal-A-Vis-X, BrainWare Safari and MC2. Still others such as PREP, Cogent, Tools of the Mind, Activate, Cogmed and The Eaton-Arrowsmith Program have been subject to peer-reviewed scientific study. Research findings vary as to efficacy.

It is best to read and understand the research supporting any activity-based program you utilize. Some people whose work might interest you include Leonard Koziol, J. P. Das, Carl Haywood, Nacho Arimany, Alex Doman, Sheila Allen, Howard Eaton, Barbara Arrowsmith-Young, Stacey Shoecraft, Suzy Koontz, Jean Blaydes-Madigan, Ross Greene, Martin Fletcher, Judy Willis, Tosca Reno, Donna Wilson, Eric Jensen, David Nowell, Sarah Ward, Leah Kuypers, Adele Diamond, Ann Alexander, Michelle Garcia Winner, Anita Werner, Zolton Dienes, Lev Vygotsky, and Alexander Luria.

How to Use This Book

Throughout *70 Play Activities* there are many choices of activities. It's important to try to match the activity not only with the child's developmental level and skill set but also with their current level of scaffolded skills. In order to make every activity a pleasant and useful learning experience, it's important to consider the student's current level of learning ability.

Most of the activities are generally applicable to children ages 6 to 12, but we have worked with clients ages 4 to 72. Remember, all of these activities provide an opportunity for a valuable learning experience. **The activities are designed to be playful, fun, creative and flexible.**

Additionally, many of the activities are hands-on activities; we want the child to interact with you, with other children or their family members as they are doing these activities. And we want them to think in adaptive ways about how to change, modify, improve or personalize the activities so that they can enjoy them even further.

When a child has a choice in selecting or modifying their activities, their personal involvement increases, improving their motivation and their learning. Therefore, include the children as much as possible not only in the choice of activity but also in the application of the activity.

When a child moves from doing an activity to teaching another how to do it, cognitive functions such as successive processing, inhibition, narrative language, organization and planning are all utilized. So think, create, write, draw, play to your heart's content.

Many of the activities are written in a format similar to the SPARKPE curriculum. For these activities, you might wish to copy the page and use it like a lesson plan. Other activities are in a more narrative format or there might be a graphic for an activity with just a touch of editorial. Where appropriate, in some activities, we have written a few of the executive function skills we

Where the Science Meets 70 Play Activities

If you have attended a professional training on executive function in the past 10 years, you have heard researchers and educators speak about executive function skills as cortical in nature – that is, residing in the frontal lobes of the brain. There are many studies on the role of the prefrontal cortex in the development and utilization of executive function skills.

Yet, in the past five years, advances in research, using technology such as functional magnetic resonance imaging and diffuse tensor imaging, have brought to light the relationship between the cortico-cerebellar, cortico-striatal and cortical-thalamic loops in relation to improvements in thinking skills and self-regulation. These loops are neural pathways that connect relevant parts of the brain for brain function and communication (Mathai & Smith, 2011). The role of the limbic system and cerebellum in thinking and self-regulation has become a central point of interest (Koziol & Budding, 2009; Koziol, 2014; Ito, 2011).

As Koziol (2014) reports, the cortico-basal ganglia and the cerebro-cerebellar circuitry systems are fundamental to cognitive and behavioral control. The basal ganglia anticipate and guide implicitly learned behaviors. The responses of the basal ganglia are central to the reward outcome systems within the brain. The cerebellar-cortical network anticipates and integrates information from the sensorimotor system, our initial feedback system within the brain. Behaviors are adapted and changed based on the feedback systems within the vertical integration. These vertically organized systems, operating together, represent the underpinnings of cognitive control. Cortical control is a whole brain response, not simply the response of one part of the brain. The brain works more like an orchestra than simply a section of instruments.

When we consider brain anatomy, we recognize the importance of the integration of the cortical and subcortical structures of the brain in learning and behavior. We need to keep front of mind that the higher level cognitive systems rest on the subcortical structures, including the limbic system and the cerebellum. Proper integration is needed for high-quality learning. As the phylogenetically older of the brain systems, the cerebellum precedes the prefrontal cortex, in the automaticity of learning and behavior. Both are stored in and mediated by the cerebellum. In fact, when we teach a new skill

discuss with the children in the section called "skill sets." We do not overwhelm the children by naming all the skill sets, we simply choose one or two to talk about at a time, as we play the activity.

For every activity you are free and encouraged to adapt them to your child, client, students or setting. Further, I hope these activities will inspire you to create your own. Children love making up activities and doing so, by itself, is a great executive function development process.

We have found that some exercises, particularly when they include movement, are easier to understand when you can see them. Therefore, we have made videos of many of the exercises. They can be found on Dr. Kenney's YouTube Channel http://bit.ly/Bloom4

Finally, we now know from brain research that a lot of learning and storing of information happens during rest. So we need to strike an appropriate balance between learning activities and calming activities, quiet learning activities and active learning activities, so that the children have moments of time between activities during which their brains and their bodies can quietly rest for optimal learning and behavioral change.

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to a child, such as how to read simple phonics, at the point where that skill is so well known that it is automatized, the prefrontal cortex fires much less because less information needs to be processed by the cognitive control system. Further, working memory is less taxed when skills are automated, freeing up the prefrontal cortex to process more difficult scaffolded information. The layering of behavior and learning begins with automaticity. I observe that when large motor rhythm is well established before the introduction of a new behavioral or academic skill, the large motor rhythm exists as a platform on which the more highly scaffolded cognitive skills can rest.

I believe that two precursors to learning and behavioral change that will be further studied in the near future are rhythm and timing. While we often begin the discussion of reading with phonics and the conversation regarding numeracy with symbol-quantity match, I have seen in hundreds of children that when we begin teaching self-regulation, cognitive control, behavioral intention, reading and math with predictable and consistent motor rhythm and timing, the children's abilities to execute higher order behavioral and academic tasks improve exponentially. Why is this? Because motor rhythm and timing are precursors to behavioral and academic learning. Further, patterning which is a central element of learning, coincides with tempo, rhythm and timing in both reading and math (Center on the Developing Child, 2015).

Research now suggests that motor movement-based activities, rhythm and timing open the neural pathways in the cortico-striatal and cortico-cerebellar loops within the brain. These pathways enhance the connections and communication between the limbic, cerebellar and executive function systems. These neural pathways are central to brain organization and brain function as it relates to thinking, self-regulation and learning.

The relationship between gross motor skills, executive function, and academic achievement in children inspires clinicians to creatively incorporate art, music, movement, and play into their daily practice. Current research supports the budding relationship between movement and cognition in fostering executive function skills, self-regulation, and prosocial behavior. Yet the research is not so advanced as to study the complicated intersection of motor movement activities, cognitive control and learning. There is some research that studies:

- Exercise and cognition
- Physical activity and academic achievement
- Physical fitness and academic achievement
- Motor output timing and ADHD
- Motor output timing and grammar
- Computer exercises to improve memory
- Music, cognition and academic performance

We look forward to seeing more specific research on the role of gross motor movement, rhythm, and timing as the field of neuroscience grows.

In *70 Play Activities*, we use the basic component of Musical Thinking, rhythmic movement, as a foundational activity when we teach children new behavioral, self-regulation and academic skills. We then add cognition to the automated motor rhythm to enhance learning and behavior. We often increase the difficulty of the cognitive exercises in a step-wise manner, requiring a bit more of the child, as their experience and learned responses increase. As an example, after we introduce Musical Thinking, we may apply it to learning phonemes, graphemes, phonics, then whole words all the way up

to complete sets of narrative instructions, such as "How to Organize Your Backpack." We have taught children how to maintain their alertness in class, raise their hands to answer a question in a more socially acceptable manner, walk in a line at school and more, using Musical Thinking.

Why Is Physical Activity so Important?

Curiously, the observed decrease in opportunities for movement and exercise in children over the past decade has coincided with an increasing body of literature that shows that motor development, movement and exercise facilitate thinking and learning.

In the "Shape of the Nation" report in 2012, it was noted that 46 states required mandatory physical education classes for at least some grades. Recently my colleague, Paul Rosengard, past Executive Director for SparkPE.org, informed me that only six states mandate PE in every grade. Although many of us never liked "dressing out," for PE, for many children their PE class is one of the primary opportunities they have to move within a school day. Although there is no federal mandate for PE classes in school, the U.S. Department of Health and Human Services Physical Activity Guidelines for Americans recommends that children and adolescents (ages 6–17) engage in 60 minutes or more of physical activity daily, including aerobic, muscle strengthening and bone strengthening exercises.

If you have ever used a pedometer, FITBIT® or app to track your daily exercise, you know that simply walking around your home or office, doing your daily chores or running your children between activities earns you anywhere from 800–3,000 steps per day, depending on how active you are. But when you add 45–60 minutes of aerobic exercise to your day, that often adds 3,000–5,000 to your total steps. Try it, you will see. You often hear that we need to take 10,000 steps per day for health benefits, and it is true there are research studies that show overall health improvements in several populations when one moves 10K steps per day, but even 7,000–8,000 per day is likely to improve your health.

Why do we need to get moving and even start counting? Because movement and exercise build your brain and body. When you move you increase the circulation of oxygen throughout your body, including your brain. Oxygen facilitates thinking. Exercise has been shown to improve blood circulation, reduce diabetes, improve heart health, lessen depression and reduce anxiety. Further, exercise may improve brain myelination, neural connections and neurotransmitter function.

Neurotrophins, such as brain-derived-neurotrophic-factor (BDNF), increase with moderate exercise, improving learning, concentration and memory (Griffin et al. 2011; Ratey, 2013). Glial cell-derived neurotrophic factor (GDNF) is currently being studied as well and appears to increase in the spinal cord with exercise, protecting the brain from cognitive declines associated with age (Budni, Bellettini-Santos, Mina, Garcez, & Zugno (2015).). Neurotrophic factors are secreted proteins that display an important role in synaptic and neuronal growth, pruning, myelination, differentiation, and survival of neuronal function.

Physical Activity, Academic Achievement and Cognitive Function

While there are several studies correlating improvement in adult cognition with exercise, relatively few studies have been conducted on children's cognition and exercise. Three review articles illustrate the

variety of research findings: Sibley and Etnier 2003; Tomporowski, Davis, Miller & Naglieri, 2008; and Diamond, 2015.

The relationship between physical activity, academic achievement and cognitive function is generally studied in two broad categories: The benefits of physical activity, fitness or exercise on academic achievement and the impact of physical activity on cognition. The studies vary significantly in design, methodology and subject characteristics. Some studies look at the relationship between overall fitness and academic achievement. Other studies look at the relationship between exercise and cognitive function. For our purposes, achievement is usually measured by report cards, standardized testing or specific test scores. Cognitive function studies are usually more specific and examine aspects of executive function or cognitive control such as planning, working memory or inhibition, often using neuropsychological tests.

Here is a general summary of the findings to date:

- Physical fitness has been shown in many studies to have broad health benefits for children.
- A positive relationship between physical fitness and achievement has been observed in several studies.
- A positive relationship between physical fitness and some measures of cognition have been observed.
- General physical activity (resistance training, motor skills training, physical education interventions and aerobic training programs) and gains in cognitive function have been reported with low to moderately positive correlations. (Tomporowski et al., 2008; Diamond, 2015).
- Acute physical activity, meaning physical activity in close proximity to the achievement or cognitive measure event, has shown moderately positive correlations (Tomporowski, 2003a; Hillman et al., 2009).
- Physical activity that is paired with specific cognitive tasks shows some merit and is an area researchers have suggested needs more research.
- It is likely that "cognitive exercise" physical movement paired with increasingly complex cognitive demands impacts thinking, self-regulation and learning, specifically when children show initial deficits in related aspects of executive function before the intervention.

Sibley and Etnier (2003) conducted a meta-analysis of the research related to physical activity and cognition in children. At the time, there were only nine peer-reviewed studies using a true experimental design. After a review of 44 studies overall, the authors concluded that there is a positive relationship between physical activity and cognitive functioning in children. Further, they noted cautiously that there is some evidence that physical activity might cause cognitive improvements.

Tomporowski, Davis, Miller and Naglieri (2008) reviewed the research on children's intelligence, cognition and academic achievement and observed a broad range of findings. In general, physical activity was found to have a positive impact on learning in children. According to these authors, research findings suggest that systematic exercise programs may enhance the development of specific types of mental processing.

Researcher Charles Hillman at University of Illinois and his colleagues conducted a series of studies on the relationships between aerobic exercise, cognition and academic achievement. In one study, they examined the relationship between physical fitness and academic achievement in third to fifth graders and observed a correlation between math and reading scores and physical fitness (Castelli et al., 2007). In another study, Hillman, Castelli, & Buck (2005) found that aerobic fitness was positively associated with neuroelectric function and behavioral performance in preadolescent children engaged in a stimulus discrimination task.

Davis et al. (2011) conducted a study on aerobic exercise and executive function in sedentary overweight children and found increased activation in the cerebral cortex after three months of exercise training. Specific gains in mathematics were found in the children who exercised daily for 40 minutes when compared with the children who exercised daily for 20 minutes. The authors note that many questions remain, two are, would the same results hold with lean or healthy children and do the cognitive and academic benefits remain without continued exercise?

According to Dishman et al. (2006), "Motor skill training and regular exercise enhance executive functions of cognition and some types of learning, including motor learning in the spinal cord." "... metabolic and neurochemical pathways among skeletal muscle, the spinal cord, and the brain offer plausible, testable mechanisms that might help explain effects of physical activity and exercise on the central nervous system."

A review of the current literature on the role of acute and chronic exercise on cognitive function suggests more experimentally designed studies are needed.

Motor Development and Cognitive Performance

Current research elucidates our growing understanding of the association between gross motor skill development in the early years with later cognitive performance. This correlation causes one to reflect on the meaning of the relationship between motor development and cognition. Diamond (2000) identified that the critical relationship between motor and cognitive development can be understood when one considers that utilization of the cerebellum and the prefrontal cortex are both necessary for many cognitive functions.

Motor development is an important factor in child development (Bushnell and Boudreau, 1993; Koziol et al., 2014). In the past decade, the relationship between motor and cognitive development has been examined with more frequency. Piek et al. (2008) assessed school-aged children and noted a positive relationship between gross motor skills in the preschool years with later cognitive skills, namely processing speed and working memory in the same cohort in elementary school. Murray et al. (2006) observed a linear relationship between early attainment of the ability to stand in toddlerhood with better cognitive skills in adulthood. Gross motor skill performance at 4 years of age was noted by Son and Meisels (2006) to be positively correlated with better reading and math performance in first grade. Slow motor development in the first year of life was also associated with a smaller vocabulary and slower reading speed in children ages 3–7 (Viholainen et al., 2006).

Cognitive Exercise

Diamond (2015) reviewed the literature on aerobic activity and cognitive performance. Few studies have been conducted on enhancement of executive function through exercise. As it relates to cognition and exercise, we might classify exercise into two categories, simple and cognitive. For our purposes, simple exercise would be aerobic exercise that includes movement with no associated cognitive components, such as running on a treadmill, walking in the park or playing a game of tag.