

The Effects of a Drums Alive Kids® Beats Intervention vis a vis Behavior on Children with Developmental Delays

Carrie Ekins¹, Peter R. Wright², Marianne Liebich³,
Jacqueline Wright⁴, Henry Schulz⁵, Dean Owens^{6*}

¹Drums Alive® UG, 86500 Kutzenhausen, Germany

²Department of Sport, Health Sciences & Social Work, Oxford Brookes University, Oxford, UK

³Katholischer Kindergarten St. Theresia, Bochum, Germany

⁴Technische Universität Chemnitz, Saxony, Germany

⁵Chair of Sports Medicine, Technische Universität Chemnitz, Chemnitz, Germany

⁶Embry-Riddle Aeronautical University, Daytona, Florida, USA

Email: *deanowens85@hotmail.com

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Abstract

The purpose of this study was to determine if the Drums Alive Kids Beats intervention could improve behavior in children with developmental delays (DD). The original pilot study that this study on behavior is linked to is titled, “The Effects of a Drums Alive Kids Beats Intervention on the Physical Performance and Motor Skills of Children with Developmental Delays,” which was published in the December edition of the Open Journal of Pediatrics (OJPED, Vol.11 No.4 2021). During the facilitation of said intervention on physical and motor skills, the facilitators noticed unanticipated improvements in behavior, both individually and as a community through better awareness, self-control, self-efficacy, social interaction, and positive energy. Therefore, while maintaining the integrity of the MOT 4 - 6 testing protocols and Drums Alive intervention, a parallel study was conducted to objectively measure six behavioral domains, namely, motivation, impulse control, coordination, concentration, implementation of tasks, and creativity using a self-designed measurement tool with three elements for each domain that was approved by Dr. Heiner Lagenkamp, Department of Sports and Physical Activities, Teaching and Research, Ruhr University, Germany. The 20 participants were German students between 5.10 and 10.2 years of age with no inclusion or exclusion characteristics who were divided into two intervention groups, IG Kindergarten (IG Kinder) and IG Elementary (IG Elem), with varied DD, *i.e.*, transgressive behavior, ADHD, ADD, autism, anger management, visual acuity, self-control, and self-esteem. During the MOT 4 - 6 study and Drums Alive Kids Beats inter-

vention, the facilitators monitored and assessed each participant for pre- and post-performance vis a vis behavior concurrently with physical and motoric skills. As the original study provided statistically significant improvements of between 14% - 24% in physical and motor skill performance with regards to overall scoring and 7 subdivisions of tasks, the results of this parallel study on behavior, with its 6 domains and 18 elements of between 24% - 28%, were even more compelling. The evidence indicated that the Drums Alive Kids Beats intervention with its multidisciplinary approach of music, movement, and drumming, could be used as an effective tool and therapeutic approach to improve behavior in children with developmental delays.

Keywords

Behavior, Multidisciplinary, Music, Movement, Drumming, Motivation, Impulse Control, Coordination, Concentration, Implementation of Tasks, Creativity, Plasticity

1. Introduction

For this study, “developmental delay” was defined as slower to develop characterized by the way a child moves, communicates, thinks, learns, or behaves with others. When more than one of these things is affected, the term “global developmental delay” is used and can be short term, long term or permanent. Some causes of short-term delays are physical illness, prolonged hospitalization, family stress or lack of opportunity to learn. Permanent developmental delays are called “developmental disabilities”, which can be signs of other conditions, such as: cerebral palsy, language delay, hearing impairment, intellectual disability or autism spectrum disorder [1]. Therefore, observing and assessing abilities and skills of every child is an indispensable foundation for planning, implementing, and shaping developmental processes which result in continuous, individual, and optimum support specific to unique personal needs and abilities [2]. In this context, although a myriad of authors has conducted studies on PA-intervention effects on children with intellectual delays that focused on physical outcomes such as cardiovascular capacity, muscle strength, and balance, research on the effects of PA programs on psychosocial development of children with ID has been sparse [3]. On a positive note, in the last decade researchers have shown more interest in investigating PA in relation to ID because children from all around the world show developmental delays and/or disorders in many different areas that impact self-confidence, social competence and self-esteem, which directly affects behavior and self-efficacy [4]. To that end, physical educators have long held the view that early interventions are essential to aid social and emotional development in children with ID. Hellison and Templin suggest that psychosocial behaviors of students can be changed gradually through a structured physical activity (PA) program that includes the tools to help develop self-control, respect for the rights and

feelings of others, participation, and effort, caring and helping, and self-direction [5]. A similar view was shared by Wright and Sugden, who stressed that a structured PA program is not only about physical training but should also consider students' cognitive, emotional, and social development; and, in the process of learning fundamental movements, games and sportive skills, the participants should learn about positive social behaviors such as taking turns, cooperation, and fair play. In addition, Wright and Sugden believed that "learning to move" and "moving to learn" complement each other and are equally important in providing the desired outcomes of physical education and structured PA programs [6]. Incorporating research-based cognitive challenges into a PA program through plasticity-based exercises can stimulate cortical processing and encourage a multi-sensory experience for a better transfer of information between the right and left hemispheres, called, "hemispheric convergence." This improved processing can result in greater executive function and enhanced critical thinking, which is essential for learning, memory, and increased capability for following commands and directions, processing information, logic, reason, and social interaction [7]. In order to capitalize on these capabilities and maximize the benefits of a program, specifically for the diverse ability population, a multi-disciplinary approach has garnered positive results when used as the foundation of an effective program that promotes physical, mental, and emotional well-being. Amnon Gimpel, Ph.D., suggested that a multi-disciplinary approach will not only contribute to a happier, more confident child, but also build a more flexible, sophisticated brain that allows for enhanced social skills and memory development [8]. Dr. Carla Hannaford, a neurophysiologist, claims that kinesthetically based protocols help people become self-actualizing, fully developed learners who will look for opportunities to creatively express their thinking processes through movement, rhythm, music, and academic exploration. Children with or without developmental delays progress through active and creative engagements with their environment; thus, it is critical to design proper protocols using music integrated with singing, free play, dance, movement, and role play opportunities in order to develop creative patterns of thought and action [9]. Lastly, the importance of drumming cannot be overstated. Remo Belli, said, "It's time to stop thinking of the drum as just a musical instrument. Start thinking of it as a unifying tool, a wellness tool, and an educational tool" [10]. Karl Bruhn, known as the "Father of the Music-Making and Wellness Movement," said, "without the obstacle of a challenging learning curve, group drumming offers an enjoyable, accessible and fulfilling activity from the start for young and old alike." He continues, "from exercise, nurturing and social support, to intellectual stimulation and stress reduction, group drumming ignites creative expression that unites our minds, bodies and spirits! Therefore, drumming could be used as a medium to introduce a wider population to exercise and other therapeutic protocols" [11]. Recent research, regarding drumming as exercise, has been made accessible over the past few years by classifying it as an aerobic and sometimes anaerobic activi-

ty [12]. Physical exercise is not only vital for overall health and wellness, but it also has positive effects on concentration, memory, and classroom behavior and, has a reducing effect on self-stimulators and negative emotional behaviors in children [13]. Hence, most forms of drumming offer opportunities for nonverbal communication and a unique potential as a universal intervention method; especially, if combined with music, exercise, drumming, or as a sportive activity.

2. Methods and Materials

Intervention: The intervention included specific Drums Alive approved handclapping games, choreographies, movement patterns, drumming exercises, speech patterning and modeling. Participants used equipment consisting of an exercise stability ball and holder, drumsticks, and a musical CD labeled Drums Alive Kids Beats, vol 1. that had varying, cultural drumming patterns and time signatures that were integrated into the daily morning and/or afternoon PA class schedule of events and conducted twice a week for 45 - 60 minutes for one month. The facilitators used the equipment in conjunction with a combination of routine physical fitness exercises, *i.e.*, jumping jacks, etc., as well as fun, research-based beat keeping drumming exercises on a stability ball, choreographies that focused on crossover, up and down, back to front, and side to side movements to emphasize fine and gross motor skills, jumping ability, balance, proprioception, spatial awareness, hand to eye coordination, rapidity of movement, and movement dexterity and behavior. The participants were allowed to fully understand the movement and skill requirements as well as the behavioral expectations; and, if necessary, take “time out” to decompress from an event that may have caused overstimulation which resulted in the participants being able to govern the speed at which they participated, responded, and developed. The official testing time for the pre- and post-intervention was 20 to 25 minutes, however, participants often took longer due to the considerable number of skills, especially with children who had more profound DD. Additionally, due to competing class schedules, some participants completed the interventions and testing in the morning and some in the afternoon, which could have affected the outcomes due to differing energy levels, and proximity of lunch. Future research studies should try to maintain consistency for the time of day unless that is part of the intervention and desired testing guidelines.

3. Discussion

As stated, the original pilot study, titled, “The Effects of a Drums Alive® Kids Beats Intervention on the Physical Performance and Motor Skills of Children with Developmental Delays,” was conducted only to determine if the Drums Alive® Kids Beats intervention could provide statistically significant improvements to physical and motor skill performance on participants with Developmental Delays (DD) using the Dusseldorf Motoric Testing model (MOT 4 - 6). This model has been used as a standard school entry examination and therefore indispensable in curative education as a diagnostic tool for children with motor

deficits. Due to unexpected improvements in behavior demonstrated by the IG Kinder and IG Elem participants early in the intervention, a parallel study was conducted in conjunction with the study on physical skill improvements to measure six behavioral domains. The MOT 4 - 6 model of 18 skills, pre- and post-test protocols, time allocated to conduct the intervention and testing, and room size were not altered. In addition, there was no attempt to amend the protocols to shift the focus of the study to strictly behavioral components. On the contrary, the facilitators monitored and documented the improvements in behavior throughout the original intervention on physical improvement and motoric skills using a measurement tool that provided a standardized method of grading motivation, impulse control, coordination, concentration, implementation of tasks, and creativity. The elements used to measure each of the six domains of behavior were limited to three, for a total of 18, in order to limit the scope of the grading criteria and yet capture the measurement of the specific domain (**Table 1** & **Table 2**). The method used by the facilitators to record the participants was to use a single, double, or triple letter “x” to indicate the level of improvement, *i.e.*, “x”—minor improvement, “xx”—moderate improvement and “xxx”—major improvement. The scoring consisted of converting the x into a numerical value of x = 1 points, xx = 2 points, and xxx = 3 points and then determining the average by dividing each participant’s total score by the number of domains, which were six. The maximum overall score a participant could receive was 18 (6 domains of behavior × 3 max points), and the minimum score was 0.

3.1. Results of the Behavior Assessment

The total score, percent improvement and average for the overall, IG Kinder and

Table 1. Domains and selected subcategories used to measure changes in Behavior.

Motivation	Impulse Control	Coordination	Concentration	Implementation of Tasks	Creativity
Intrinsic Motivation	Stimulus Interference	Balance	Awareness of Situation	Process	Imagine
Self-Determination	Decisional Impulsivity	Timing	Dividing Attention	Expand	Think
Self-Efficacy	Behavioral Inhibition	Integration	Focus	Analyze	Develop

Note: The measurement tool used to score changes in behavior was designed and approved by Dr. Heiner Lagenkamp, Department of Sports and Physical Activities, Teaching and Research, Ruhr University, Germany who selected the domains and subcategories to use as the basis for grading for this study.

Table 2. Participants (Age, Weight, Height, Avg, Std Dev).

Group	Num of subjects	Age (Years)	Avg	Std Dev	Weight (Pounds)	Avg	Std Dev	Height (Inches)	Avg	Std Dev
IG Kinder	10	5.10 - 6.6	5.89	0.59	42.32 - 70.32	48.33	8.29	42.91 - 51.18	46.58	2.65
IG Elem	10	6.6 - 10.2	7.83	1.11	45.85 - 127.64	65.58	23.75	44.09 - 51.18	51.41	3.75

Note: Participants’ developmental delays were diagnosed as transgressive behavior, ADHD, ADD, autism, anger management, visual acuity, self-control, self-esteem.

IG Elem were as follows: Overall: 209 - 264 points (plus 26.31%, 10.97 - 12.60), IG Kinder: 98 - 126 points (plus 28.97%, 9.80 - 12.60), and IG Elem: 111 - 138 points (plus 24.32%, 11.10 - 13.80) (**Figure 1**).

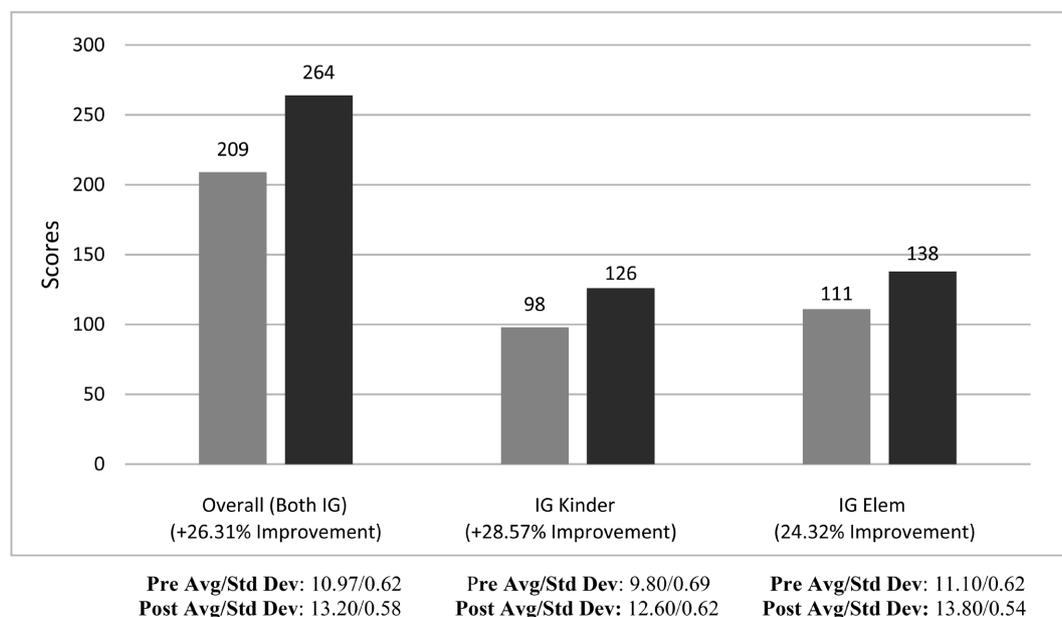
Lastly, although this was a statistical, evidence-based study, randomly selected observations and subjective statements from the participants, parents and teachers that articulated the feelings during the intervention were considered worthy of mention.

3.2. Randomly Selected Facilitator Notes

A 6.2-year-old boy showed that he was well developed in everyday life in a day-care center, except for gross motor activities, but was insecure and had reduced self-esteem. The intervention was intended to improve motor skills and increase his self-efficacy, but also to enable him to improve other skills such as creativity, impulse control, concentration, and the ability to perform tasks in a targeted manner. After the intervention, he was able to carry out the tasks very well, support other participants, felt a lot of joy during the units and increased his score of the motoric test by 6 points (from 22 to 28) and showed an increased self-esteem.

A 5.5-year-old boy often showed cross-border behavior. He only accepted the consequences of his behavior if he was consistently monitored. Positive experiences with an interesting activity and a lot of movement within a group provided him with positive experiences which resulted in an increased ability to keep the rules and improve his abilities, as documented of his motor skills, which improved by 8 points.

A 6.2-year-old girl with triple X syndrome showed reduced self-esteem and



Note: p-values 10 to 0.01 support the minimizing of randomness and arbitrary results.

Figure 1. Results of the Six Domains of Behavior (Overall, IG Kinder, IG Elem).

had difficulty getting involved with new things and often withdrew from activities. During and post intervention documented her improvement in her willingness to participate in groups and an improved desire to adhere to the rules without emotional outbreaks. In addition, the post intervention showed an improvement in her scores from 12 to 20 points.

3.3. Random Statements from the Participants, Parents, and a Teacher

Participants

- The drumming is really great!
- How many times do we have to sleep before we get to drum again?
- Thank you for this beautiful drum time!

Parents

- Our child talks with enthusiasm about drumming.
- My son had tears in his eyes when I told him there is only one more drumming class.
- During the drumming project our home was more harmonious with less fighting and stress.—That’s really crazy!

Teacher

- Teacher: “For about three weeks your son has demonstrated better concentration in the English class, has something changed for your son or you?”
- Mother’s response: “He has been drumming for well over three weeks!”

4. Conclusion

Children with DD often experience difficulty concentrating and engaging in challenges/tasks that can have a negative effect on behavior. The hope of professionals and parents that deal with developmentally delayed children is to find a program that can inspire and ignite a passion for learning that will lead to an improved quality of life. This study was successful in meeting the goals of determining if the Drums Alive Kids Beats intervention could provide an appreciable change in behavior for participants with DD. The protocols included specific Drums Alive approved equipment, games, activities, music, choreographies, movement, and drumming exercises as a way to improve any of the six domains of behavior. The overall results that measured the IG Kinder and IG Elem groups were statistically significant; thus, demonstrated that the Drums Alive Kids Beats intervention was the sole reason for the compelling improvements in behavior and associated awareness, self-control, self-efficacy, social interaction, and positive energy, which could provide a benchmark for future class design, planning and programming for children with DD.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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