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Research Article

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Endless Rope Upends Discipline in Middle School: Hemispheric Regulation for Joy!

Kieran O'Mahony[1*], Hesha Agarwal[2], Callista Levy[3], Manjula Veeranna[4], Sharon Kamas[2], Jessilyn Ellenson[5], Jagoda Kozlowska[2], and Kristi Hayes[2]

[1]The Institute for Connecting Neuroscience with Teaching and Learning
[2]Dedoose Research Affinity Cohort
[3]Salve Regina University, Dept of Ed
[4]The Institute for Cognitive and Learning Science, Bangalore IN
[5]California Adventure Camps

[*]**Corresponding author:** Kieran O'Mahony, Email: kieran@icntl.org

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Abstract

This study describes an early-morning before-school intervention for elementary and middle school children in a typical school district in the Western US. Research questions were operationalized to investigate if a deliberate neuro-based practice could affect children's social, emotional and academic outcomes during the subsequent school day. Early morning child 'carers' who were not trained as educators in traditional teacher education academic programs did receive just-in-time coaching for a cognitive approach that sought to take care of the attending children in the roughly two-hour timeframe between being dropped off by guardians and when formal school began. Their 'big picture' training was centered on the emergent knowledge that neuroscientists now profess that "neuroplasticity" is overthrowing the centuries-old notion that the human brain is immutable. Even non-specialists can affect meaningful and long-lasting change for young lives. Subjects consisted of up to 60 children (mean age 9.1 years), who were signed up for early-morning activities before school because parental or guardian needs were to be met. The study was an opportunistic quasi-experimental design that served a population in daily need. A mixed method analysis described a complicated social setting that spilled over from home life, into school life, and included a multiplicity of interactions with peers that had the potential to affect social behavior, mental wellbeing, and academic performance. Findings highlight meaningful outcomes in behavior and academic competence resulting from cognitive neural approaches that appeared to influence social, emotional, and academic success for participating elementary and middle school children. In particular, this paper explores the outcome in relation to precision physical application that targeted hemispheric awareness, which appeared to directly impact children's capacity for self-regulation and improved mental wellbeing. This study strongly suggests that brain-based cognitive training can be used to architect healthy learning brains with increased joy filled and academic outcomes for children.

Keywords: *intrinsic epistemic rewards, upregulating right hemisphere, purpose, behavior.*

1. Introduction

All children are hardwired to learn [1,2]. So why are scores from the annual Nation's Report Card as seen through the National Association of Educational Progress (NAEP) data each first day of October so dismal? Furthermore, why are they falling year-over-year in the past 20 years? [3-5]. In this study, we describe 'Ascend', an early-morning before-school program that instantiated an attraction-orthogonal solution for children, parents and educators. Early morning mentalistic 'scaffolds' heralded an immediate and long-lasting 'attraction' status within the school population, such that word-of-mouth rapidly increased student intake—in the first-year attendance increase 5X due to word of mouth. There is strong evidence that children who experience a warm sense of connection emanating from adult 'attentional caring' together with a co-created 'neural-enriched' environment are amenable to intentional predictability, consistency, and kindness [6,7]. The orthogonal nature of the program emerged out of a deep-seated perception that anything to do with school was formal and difficult-children, parents and even teachers quickly realized that trainee camp counsellors could achieve in a two-hour early morning program what very few could imagine prior to the experience itself.

Informal focused activities set in motion in one room of any formal education establishment are *ipso facto* overshadowed by behaviorist paraphernalia and imagery. Consequently, these same children encounter anxiety [8], and stress [9], and anticipatory social evaluative threat [10] by simply being on the premises, and by transitioning to formal classrooms after breakfast each day. This is true, even when formal school was preceded by an early-morning 'safe' landing [11]. For most of these children, life at school was no different from life at home—stressfully repulsive where physical and emotional survival was a real challenge. The Skinnerian punishment routines prevalent in the formal school day produced an orthogonally reactive conclusion due to repressive two-dimensional rest-of-day 'cat-and-mouse' behavioristic regimes, which were embraced by most of the teaching staff and reinforced by guardians/parents [12,13]. True to covert curricular approaches of a reward and punishment regimen, daily detention episodes were enforced in a carefully designed euphemistically labeled 'Success Center'. All children who were committed to the 'Success Center' were very aware that they were being punished, that they were being deprived of privileges that other children could avail, and that they were being forced to 'catch up' on academic subjects that caused them even more stress.

This unambiguous attraction-orthogonal tension was purposefully made visible with fun activities in the Ascend Room 134 and assiduously defused through attentional priming that was calculated to improve children's (i) mental acuity, (ii) mental wellness, and (iii) mental processing. A successful co-creation of learning spaces is well documented as the *raison d'être* and genius of successful teaching [14,15]. From a 'learning brain' point of view, school comes down to each child's ME, HERE, NOW [6], where a struggling child can stay engaged if it is about me, about me right here, and about me right here and now. For success navigating a child's developing brain, that same neural pre-requisite for endurance can be subrogated to a child's existential needs so that all learners can not only survive but, indeed, thrive [16].

2. Theoretical Framework

Lateralization is a key aspect of how human brains function, allowing for specialization that enhances cognitive efficiency [17]. It refers to the specialization of certain functions in either the left or right hemisphere, impacting cognitive processes such as language, spatial awareness, and emotional recognition. These processes are foundational for learning spaces where children are expected to access, process, and comprehend large bodies of new information.

Cognitive neuroscientists explore the complexities of this phenomenon, revealing more about how student brains process information and interact with the world around them. Understanding these dynamics can lead to better educational practices and adaptive approaches for better classroom outcomes [6]. The question remains however: in today's fast-paced teaching and learning environments -- how many teachers think about lateralization as they prepare lessons, implement course material and assess students on their progress? In particular, how many teachers are aware that speech is predominantly a left-hemispheric phenomenon while interpretation and understanding are equally important on the right hemisphere Broca's and Wernicke's areas.

To make matters worse, many teachers believe that children are either 'left brained' or 'right brained' meaning that some children have 'learning styles' associated with whether they are 'logical' or 'arty'. As evidenced by many research scientists in this field, the idea of being "left-brained" (logical) or "right-brained" (creative) is an oversimplification [18-20]. It has been well established that while certain functions are lateralized, both hemispheres work together for most cognitive tasks. For example, while the left hemisphere may handle grammar, the right hemisphere contributes to understanding tone and emotional context in language. Table 1. *Key Contrast: Left Hemisphere vs. Right Hemisphere* summarizes three important educational functions—Motivation, Emotion, and Language.

Table 1: Key Contrast: Left Hemisphere vs. Right Hemisphere.

Function	**Left Hemisphere (GO)**	**Right Hemisphere (STOP)**
Motivation	Approach, reward-seeking	Withdrawal, threat avoidance
Emotion	Positive affect, verbal expression	Negative affect, nonverbal processing
Language	Speech, grammar, logic	Tone, sarcasm, emotional prosody

In any typical classroom in America the following dynamic could be found -- for roughly 90% of learners, the left hemisphere houses Broca's area for speech production and Wernicke's area for language comprehension.[1] This has come about through evolutionary pressure for efficient communication through bundling language production with fine motor control involving mouth and tongue movements and breath taking [21]. Specialization in one hemisphere reduces signal delay and avoids interhemispheric transmission challenges that occur in large-brained mammals like humans. In their investigations, scientists agree that finely detailed, time-critical neuronal computations (i.e., tasks that strain the capacity of the corpus callosum and hence could not be handled by just the larger fibers) would be performed more quickly via shorter and faster intrahemispheric circuits [22], and thus align with a high degree of hemispheric specialization.

Moreover, in classrooms across America, it becomes clear that educators would be well served by a deep understanding of the design of language learning systems; that the left hemisphere caters via sequential processing to excel at syntax and grammar, while the right hemisphere views language through a holistic lens and consequential emotional qualia. A child in a stressful classroom, unable to access the right hemisphere (since the left is dominant), will typically lose their ability to interpret a teacher's (i) tone of voice and (ii) fail to recognize with any accuracy facial expressions and body language [23]. If a student thinks (even if the thoughts are erroneous) that 'teacher doesn't like me…' that child will be unable to learn the lesson that the teacher expressly desired to be learned [24]. Figure 1: *Left Right Hemispheric Differences*, highlights that the left hemisphere enables humans to 'apprehend' the world around us, while the right hemisphere enables us to 'comprehend' that same world [23]. Put simply, the *raison d'être* of the left hemisphere is very different from that of the right. The left hemisphere wants to get power, to control, to grab, to manipulate. Meanwhile, the right hemisphere wants to understand and comprehend the world. The left hemisphere is black and white, either this or that. It cannot tolerate ambiguity. The right hemisphere says, "It's not so simple, there might be something else going on here?"

[1] Exception: In roughly 30% of left-handers, language is RH-dominant or bilateral.

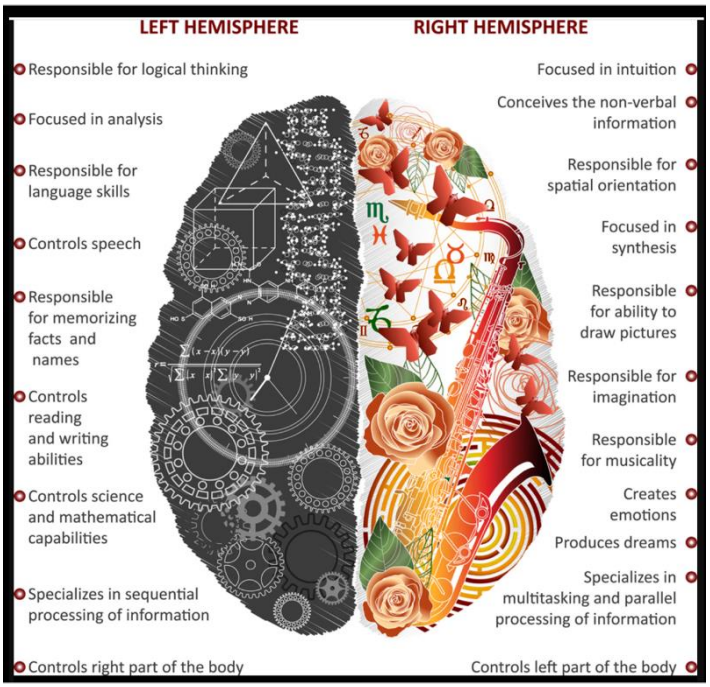


Figure 1: Left Right Hemispheric Differences.

In the classroom the typical educator, unaware of the functional distribution of key learning and other social and emotional mental capacities of their children, is basically driving 'blind' within a limited light-cone of operation. Instead of seeking solutions for unexpected behavior in a cognitivist framework informed by hemispheric contingencies, they are banging their heads against the proverbial wall, while the same sad children are sent to the 'success center' or the principal's office day-after-day.

2.1. Exercise and Brain Development

Children are not small adults; they are growing beings whose early lived experiences result in architecture of mature minds and bodies. As a species, we are volitional, goal-directed, and sentient; we, nevertheless, distinguish between adults and children with specific and dedicated programs of preparation for adulthood. For adults, any form of climbing is a full-body exercise that improves muscular strength, endurance, coordination, agility, stamina, and proprioception. Children, who are living through critical physical, intellectual, and psychomotor developmental plateaus, will experience that physical exercise in a multiplicity of ways. In schools, these outcomes can be enhanced with activation of intrinsic epistemic motivation.

Intentional combination routines of physical activity contribute to the overall school experience - an assortment of important 'small-motor' and 'regulatory' skills that are essential for architecting the child's brain for immediate and long-term success. For instance, when 'pulling' fifty feet of rope, children are challenged to continually output energy and effort while focusing on the 'present' and generating tangible results toward a classroom goal – all contributive constituents that enhance embryonic minds.

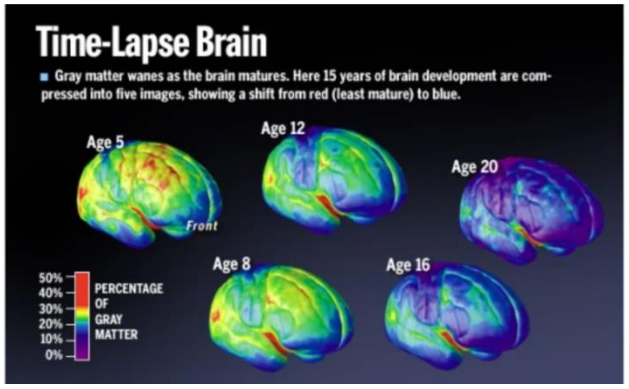


Figure 2: Time-Lapse Brain.

As shown in Figure 2. *Time-Lapse Brain*, the human brain reaches its adult volume by age 10, but the neurons that make that up continue to change for years after that. Schools are ideal learning spaces to deliver experience-dependent interactions that define a malleable brain.

Only about 80 percent of the brain is developed in adolescence. The largest part, the cortex, is divided into lobes that mature from back to front. The last section to connect is the frontal lobe which is responsible for cognitive processes such as reasoning, planning, and judgment. Normally this mental merger is not completed until somewhere between ages 25 and 30.

Precision routines using physical activities like Endless Rope affect plasticity and cognitive processing, which results in behavior that guides a child toward social success. At this stage in a child's development, pruning of unused and overabundance of synapses is accomplished by 'experience-driven' proficiencies [25]. This process of overproduction of synapses and subsequent synaptic reduction are essential for the flexibility required for adaptive capabilities of a developing mind [26]. Pathways that are activated by the environment are strengthened while others that go unused are eliminated. In this way, the networks of neurons involved in the development of behavior are fine-tuned and modified for success [27]. Trauma,

stressors, and tensions associated with survival in a post-pandemic twenty-first century world make it very pertinent to bolster mental wellness, psychological safety, and sense of belonging by architecting neural structures that support a child's wellbeing and true potential [28].

Active classroom deployment promotes intentional and informed development of a child's neural processes that are experience-dependent and centered on both physical and mentalistic practices [29,30]. These support Brain Derived Neurotrophic Factor (BDNF), as well as myelination processes, which strengthen healthy synaptic circuitry [31]. Teachers witness sensory and motor areas of a child's brain come online for healthy engagement and agency in their personalized living experiences. Mental wellness and human potential are profitably tied to intentional experience-dependent routines that enhance a teacher's capacity to co-regulate with every child as they embrace confidence and joy throughout their life trajectory [11,32].

3. Research Question

Will a twenty-second physical activity that is explicitly intentional about tamping down the left- while up-regulating the right-hemisphere, delivered first thing during a before-school informal child-minding program affect school age children's ability to survive and thrive during the subsequent full day of formal school?

This study was operationalized by measuring the up-regulation activity against disciplinary punishments as seen in formal school. How often were children sent to detention or to complete schoolwork in the success center—both activities that the children judged to be distasteful and stressful.

4. Methodology

A mixed method was used to analyse data that were collected during a normal school year in the US. We describe a high-level schematic, shown in Figure 3: *Mixed Method Model - Ascend*, depicting two types of data represented in this study [33]. Quantitative data relating to attendance, gender, age, and self-report scores on child mental wellbeing are embedded within a qualitative corpus of interviews, video transcripts, participant-created artifacts, photographs, and field notes.

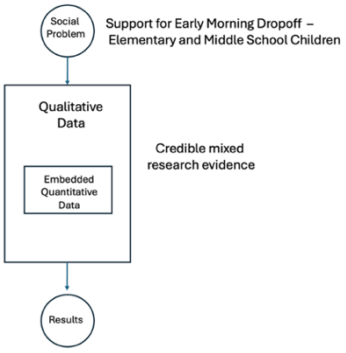


Figure 3: Mixed Method Model - Ascend
Source: *Dedoose 2024, Ascend Early Morning Dropoff Program*

Files were transcribed and validated for accuracy, completeness and rigor. Codes were assigned from the Brain-Based Solutions code book. An example entry in the Code Book is shown in *Figure 4: Code Book Example for Mixed Methods Study Ascend*.

Coders divided field notes and transcripts equally after training. All data were imported into a web-based mixed methods data analysis tool called Dedoose, (2024). Interrater Reliability was calculated using Cohen's Kappa = 0.84.

Theme	Sub-Theme	Code	Code Name	Abbrev	Code Definition	Code Description
Expertise						
	Behaviorist		2-Dimensional	2-Dim	Systemic	Rewards and punishmetn thinking system based on a behaviorist model of classroom management.
		Routine	Pseudoscience	Ps	Active	Beliefs mistakenly represented as being based on the scientific method.
			Clipping	CL	Token Economy	A system of public shaming that quaickly and widely makes visible when a child has been bad or good.

Figure 4: Code Book Example for Mixed Methods Study Ascend
Source: Dedoose 2024, Ascend Dataset

4.1. Grounded theory

Grounded theory was used to explain apparent changes over time and involved both inductive and deductive ideations. Theoretical explanations were grounded in empirical reality to reflect relatable and valid data [34]. This team of researchers who were participant observers in the Ascend early-morning project discussed a set of goals that aligned with making sense of outcomes. For instance, rather than being interested in how frequent a behavior was, they asked probing questions about the meaning of that behavior [35].

5. Discipline Issues

Room 134 was a busy place each morning, with at least five times more children than adults. Approximately 80% of the children were chosen on the understanding that they could better be prepared for school by partaking in early-morning adult monitoring. From the parent/guardian viewpoint, children's daily disruptive/disturbing behaviors could be curtailed, even curbed, by attendance in an early morning enrichment program.

At first, maladaptive disruptive behaviors, anxiety, antagonistic, and aggressive encounters that are commonplace in formal school tended to spill-over into early morning activities so that Ascend para-leads experienced turbulent outbursts, and contentious—even chaotic—moments throughout the first and second month. In the beginning, they were quick to respond with typical curtailment methods, which they resurrected from their own school days -- heavily weighted with techniques involving rewards for doing good, and punishments for not doing good.

A mentalistic approach delivered via just-in-time cognitive capsules helped change what was occurring on the front lines. Token economies were replaced with constructs like autonomy that delivered opportunities for mastery. With every new success, para-leads enhanced their cognitive toolkit so that the

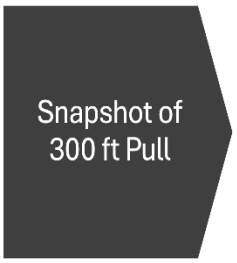
early-morning program began to seem very different from formal school. The children rallied to the new regimen and change became evident.

5.1. Endless Rope

It became clear by end of the first quarter that the pace of change was too slow and persistent anti-social behavior threatened to derail the entire project. Consequently, a novel *Endless Rope* intervention was initiated at the end of November 2023. It was obvious to the adults in the room that the children appeared to be showing up in the early morning already primed for chaos and disruption. Home life, navigating the exigencies of identity, anxiety and survival in constant 'hostile' environments (home and school) resulted in reactive outbursts that were negatively aligned with learning and socializing. In addition, the children seemed hyper-connected to screen-persistence, which highlighted disassociation with decreased focus, poor attention, and limited resilience.

The solution sought to tamp down left hemispheric activation (sense of self, survival, and competition) by increasing equally innate affinity for empathy, creativity, and spatial reasoning. Figure 5. *Snapshot of 300 ft Pull* is an example of the enthusiasm that children experienced as they competed with fun to increase their skill with speed and accuracy. Pulling with both hands was effective. Children became engaged and the attention persisted for the duration of the length of pull desired. Standing firm, focusing on the rope, checking the clock to gauge the speed of the activity and assessing the competitive acuity of the effort were important multi-tasking portions of the physical motivation that activated each child's brain—cerebellum, occipital, small motor parietal, planning predicting PFC and articulatory Broca's and Wernicke's area of the temporal lobe. This was a win-win situation—a whole brain event that was impelling and fun for the children, while meaningful and functional for teachers.

After some discussion, the team opted to engage this activity as a fun way to tamp down the left hemisphere and co-incidentally up-regulate the right. With a mind to the obvious lack of right brain activation in the early morning behavior that was causing stress for everyone, the idea was to engage empathy, non-judgment, collaboration, and pronounced willingness to question before exploiting, the team decided on 50 feet left hand only. They were careful to explain to the children what they were thinking, why it might work, and how it would help them to survive and even thrive in formal school after the morning program each day. The children were immediately all in. They wondered if 50 feet was even enough. But it mattered less about the amount as about the intention. Para-leads implemented a right hemisphere up-regulation by enacting a simple 50-ft rope pull (typically for 15-20 seconds) using left hand only. See Appendix 1. Ascend Children exploring the Endless Rope machine at the School Gym.



Date: 8/23/2023			
Student	Distance (FT)	Time (Seconds)	Avg. Speed
M	300	43	6.976744186
D	300	43	6.976744186
R	300	48	6.25
R	300	53	5.660377358
S	300	55	5.454545455
Li	300	57	5.263157895
E	300	59	5.084745763
B	300	62	4.838709677
H	300	63	4.761904762
T	300	64	4.6875
C	300	69	4.347826087
Z	300	69	4.347826087
Li	300	70	4.285714286
E	300	81	3.703703704
S	300	81	3.703703704
P	300	84	3.571428571

Figure 5: Snapshot of 300 ft Pull.
Source: Dedoose 2024, Ascend Dataset

To everybody's surprise, the outcome was immediate and long-lasting. Children could see in their own data that the roughly 15 seconds it took to pull 50 feet each morning affected their attitude in the morning program and seemed to help self-regulate in formal classroom so that they began to discuss the fact they hadn't been to 'Success Center' for ages. Both the research team and formal schoolteachers also noticed an immediate and lasting change in discipline data. One classroom teacher, who didn't know anything about the Ascend program was aware that somebody was taking care of some children early in the morning before school began sent the following message to the early morning people.

"I don't know who you are or what you are doing, but please keep doing it. The children are so different—happy and engaged in my social studies class because of their early morning care." (Formal school Teacher.)

We know that in the quantitative world the plural of anecdote is not data, yet in the world of a faculty room public opinion, where statements of frustration or surprise break through a wall of resentment or fear, such a qualitative positive pronouncement regarding a child who might be struggling with self-regulation can be lifesaving. It can mean the pivot point where a child finds a solution to grades or figures out on their own how to manage difficult life journeys that involve jealousy, anxiety, rage, or Facebook FOMO.

In Figure 6, *Ascend Discipline in a Cognitive Model*, we highlight a steep decline in discipline infractions relating to In-School Detentions and Compulsory visits to the Success Center.

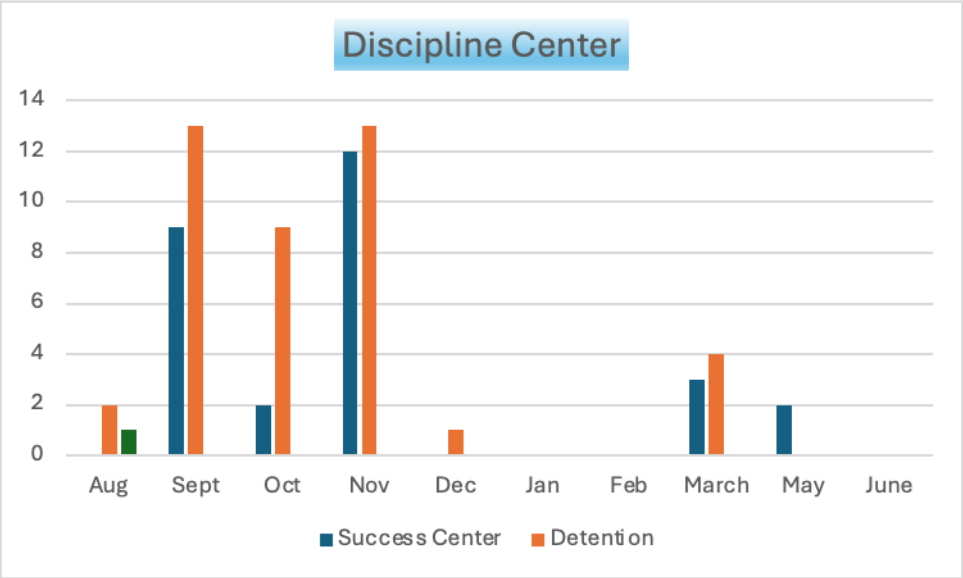


Figure 6: Ascend Discipline in a Cognitive Model.
Source: (Ascend ER Dataset)

6. Results - Quantitative

First, we describe findings that include all children of the Ascend program. Tests were performed at the beginning and the end of the academic year in Mathematics for 32 students who shared the same grades (6 – 8). Due to some students missing the tests, we show results for 26 students with scores for both tests in mathematics and 24 students in Advanced Reading. For each subject, a paired t-test was performed to compare test scores before and after implementation of the Ascend program.

6.1. Mathematics

Ascend children's mathematics scores were analyzed with data from the formal school system. We found a moderate to large effect (Cohen's d = 0.59), at a significance level of 0.05, and a power of 0.82. Power being above the typically accepted 0.80, suggests that even a sample size of 26 students is sufficient to make some generalizations around the success of the program. In addition, a t-statistic of 3.0063 and a p-value of 0.0059 is evidence that the Ascend program had a statistically significant improvement in student mathematics scores.

6.2. Discipline

Monthly detention counts were tracked for Ascend students in grades 6-8, compared to non-participating peers in the formal school system. Using a large effect (Cohen's d = 1.5), a significance level of 0.05, and a power of 0.92, we conducted an independent t-test to compare the monthly detention counts for both groups. With a t-statistic of -4.6325 and a p-value of 0.00021, the Ascend students had statistically significant fewer detentions. From this, we conclude that student participation in the before-school Ascend Program had a meaningful impact on behavioral improvement beyond the early-morning intervention site that spilled over into formal school each day and lasted throughout the year.

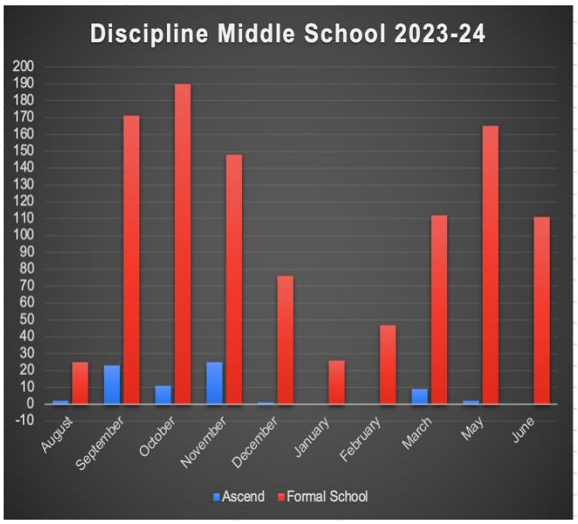


Figure 7: Ascend Discipline in a Cognitive Model.

7. Discussion

The introduction of a prescribed physical activity focused on upregulating a child's right hemisphere signified a dramatic reduction in need for disciplinary interventions. This was directly attributed to a physical 50-foot 'left-hand-only' pull on Endless Rope that precipitated a general empathic aptitude with follow-on long-term purposeful engagement.

The small uptick of behavioral discipline issues in the month of March was explained by two interrelated events that directly impacted the children and their subsequent need for disciplinary oversight. (i) The program grew rapidly, and new para-lead hires brought the traditional model of rewards and punishments with them. This had an immediate revert to previous behavior impact on the children. (ii) Para-lead original (trained) individuals were pulled away for a week to staff an outdoor one-week program at the other end of the State. In other words, the children were left in the care of neophytes who undid all the good work that had been accomplished since November the previous year. As soon as the competent para-lead team returned, the children again adapted to the co-created environment with ease and success.

On the other hand, formal school discipline issues persisted throughout the year… and got worse coming upon the 'lazy days of summer' and stressful end of year competition. As shown (color red) in the formal school setting non-Ascend children obeyed a typical progress indicating breakdown of discipline-beginning with few issues, showing increased incidents through October; reduced problems over the holidays and new year; and finally, (as described by teachers) wheels coming off the wagon by May.

Figure 7: *Ascend Discipline in a Cognitive Model* compares early morning Ascend students versus same grade students who only attended formal school.

A question that both parents and educators sought clarification on, is associated with the cognitive mentalistic activation of 15 seconds left-hand rope pull. Would it be just as effective in a traditional learning space where educators were 'stuck' on implementing a strict punishment regime that is occasionally tempered with token economy rewards and body language that stratifies? The answer depends on whether the teachers were willing to explore their own cognitive spaces – be willing to pull 50 feet of rope in 12 seconds and experience the shift in their own attitude towards life, children, and teaching. A school that is 'stuck' on PBIS, IEPs, MTSS and TOKEN ECOONOMIES will not have much success using a left-hand tamping down left hemisphere and up-regulating right hemisphere if they are not willing to risk a full commitment (as did Ascend) to a cognitive approach. We suggest that this very question be the next topic for exploration in a follow up study.

8. Limitations

It should be noted, that although these results showed significant improvement in scores for all subjects in the early morning Ascend program, we acknowledge limited external validity. The small size of the sample limits the ability to generalize to a wider population and increases the chance of outlier influence. The findings, while promising, highlight the need for further studies with larger sample sizes to establish more definitive and reliable results.

9. Conclusion

This finding paves the way for further exploration and encourages researchers to examine the rich tapestry of human behavior, uncovering more clues about the complexity of inter and intra-hemispheric preponderance with middle school children with regard to their behavior. Children were very pleased with themselves. The school-based Success Center—a disciplinary detention site for children who displayed behaviors deemed not conducive to learning—highlighted a sharp drop in numbers associated with Ascend children after the New Year.

These results coincided with an intentional shift in method to a physical activity using Endless Rope that was designed to tamp-down a child's left hemisphere (while simultaneously up-regulating the right-hemisphere). It appears that this alone was successful in adjusting all subsequent behavior. Future research is suggested to explore this approach further by shifting the focus to the formal school setting where discipline issues persist with children who are perpetually in a behaviorist system and with no or very little exposure to cognitive approaches.

Acknowledgment

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References

1. Davidson, R. J., & McEwen, B. S. (2012). Social influences on neuroplasticity: Stress and interventions to promote well-being. *Nature Neuroscience*, 1-7. Retrieved Jan 1 2018, from.
2. Doidge, N. (2007). *The Brain that Changes Itself*. Penguin, London, UK.
3. Coulson, A. J. (2013). New NAEP scores extend dismal trend in US Education productivity. *CATO at Liberty, Cato Institute*.
4. NAEP. (2019). *Scores have Flat Lined for 30 years*. D. o. Education.
5. Schaffer, G. (2022). *Multi-Tiered Systems of Support (A Practical Guide to Preventative Practice)*. Sage.
6. O'Mahony, K. (2023). *The Brain-Based Classroom Practical Guide; Regulate Relate Reason*. Brain-Based Solutions.
7. O'Mahony, T. K., & Veeranna, M. (2023). It's not magic, it's science: Brain-based methods prevail no matter what. *Education and Society*, *VOl. III, October 2023* (Special Issue - 1).
8. McEwen, B. S. (2009). Understanding the potency of stressful early life experiences on brain and body function. *Metabolism PubMed*, *57*, S11-S15.
9. Boyce, T. (2016). Differential Susceptibility of the Developing Brain to Contextual Adversity and Stress. *Neuropsychopharmacology*.
10. Woody, A., Hooker, E. D., Zoccola, P. M., & Dickerson, S. S. (2018). Social-evaluative threat, cognitive load, and the cortisol and cardiovascular stress response. *Psychoneuroendocrinology*, *97*, 149-155.
11. Cassidy, T. (2024). Soft Start. In K. O'Mahony (Ed.), *The Neural Teaching Guide: Authentic Strategies from Brain-Based Classrooms*. Routledge, An Eye on Education Book.
12. Bennett, A. J., Lesch, K. P., Heils, A., Long, J. C., Lorenz, J. G., Shoaf, S. E., Champoux, M., Souomi, S. J., Linnoila, M. V., & Higley, J. D. (2002). Early experience and serotonin transporter gene variation interact to influence primate CNS function. *Molecular Psychology*, *7*, 118-122.
13. Boyce, T. (2014). The lifelong effects of early childhood adversity and toxic stress. *Pediatric Dentistry*, *36*(2), 102-108.
14. Gallagher, A., & O'Mahony, T. K. (2023). Neural substrates of behavior: A case study in 1st grade. Learning and the Brain Conference, San Francisco, CA.
15. Hunter, J. (2022). Engaging Middle School Children: Practical Considerations. In K. O'Mahony (Ed.), (On line discussion group ed.). Neural Education Implementation Workshop: Brain-Based Solutions.
16. Boyce, W. T. (2018). *The Orchid and the Dandelion: Why Some Children Struggle and How All Can Thrive*. Knopf Doubleday Publishing Group.
17. Berninger, V. W., & Richards, T. L. (2002). *Brain Literacy for Educators and Psychologists*. Academic Press.
18. Dekker, S., Lee, N., Howard-Jones, P., & Jolles, J. (2012). Neuromyths in Education: Prevalence and Predictors of Misconceptions among Teachers. *Frontiers in Psychology*, *3*.

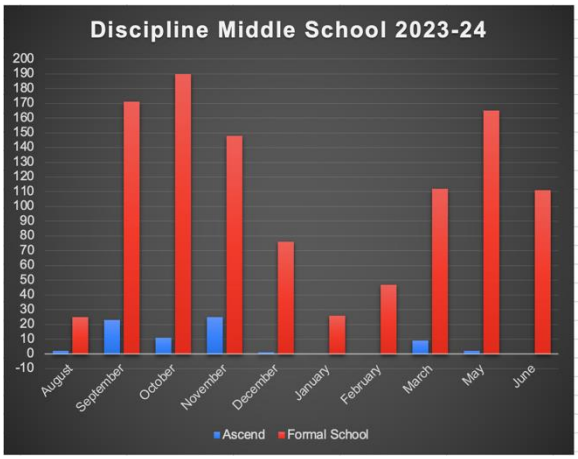
19. Tokuhama-Espinoza, T. (2011). *Mind, brain and education science: A comprehensive guide to the new brain-based teaching*. W W Norton & Co Inc.
20. Wanjek, C. (2013). Left brain vs. right brain: It's a myth, research finds. *Life Science, Health*. Retrieved August 2016, from
21. Abotiz, F., & Montiel, J. (2003). One hundred million years of interhemispheric communication: the history of the corpus callosum. *Brazilian Journal of Medical and Biological Research*, *36*(4), 409-420.
22. Ringo, J., Doty, R., Demeter, S., & Simard, P. (1994). Time Is of the Essence: A Conjecture that Hemispheric Specialization Arises from Interhemispheric Conduction Delay *Cerebral Cortex*, *4*(4), 331-343.
23. McGilchrist, I. (2012). *The Master and His Emissary: The Divided Brain and the Making of the Western World*. Yale University Press.
24. Immordino-Yang, M. H. (2016). *Emotions, Learning, and the Brain: Exploring the Educational Implications of Affective Neuroscience*. W W Norton & Co.
25. Fields, D. (2011). Change in the Brain's White Matter. *300*(6005), 768-769.
26. Medina, J. (2008). *Brain Rules: 12 principles for surviving and thriving at work, home and school*. Pear Press.
27. Johansen-Berg, H., & Duzel, E. (2016). Neuroplasticity: Effects of Physical and Cognitive activity on brain structure and function. *Nueroimage*, *131*(Editorial), 1-3.
28. Guariso, A., & Nyquist, M. (2023). The impact of the COVID-19 pandemic on children's learning and wellbeing: Evidence from India. *Journal of Development Economics*.
29. Boyce, W. T., & Ellis, B. J. (2005). Biological sensitivity to context: An evolutionary-developmental theory of the origins and functions of stress reactivity *Developmental Psychopathology*, *17*(2), 271-301.
30. Immordino-Yang, M. H., & Fischer, K. W. (2010). Neuroscience Bases of Learning. In V. G. Aukrust (Ed.), *International Encyclopedia of Education* (3rd ed., pp. 310-316). Elsevier.
31. Kennedy, M. (2016). Well-Timed exercise might improve learning. *Reuters*.
32. Lomo, T. (2024). Long-Term Potentiation: The Accidental Discovery. *Wiley online Library: Hippocampus*.
33. Salmona, M., Lieber, E., & Kaczynski, D. (2020). *Qualitative and mixed methods data analysis using Dedoose: A practical approach for research across the social sciences*. Sage Publications, Thousands Oaks, California.
34. Corbin, J., & Strauss, A. (2015). *Basics of qualitative research:Techniques and procedures for developing grounded theory* (4th ed.). Sage, Thousands Oaks, CA.
35. Lareau, A., & Shultz, J. (1996). Introduction: The longest journey begins with one step. In A. Lareau & J. Shultz (Eds.), *Journeys Through Ethnography: Realistic accounts of fieldwork* (pp. 1-8). Westview Press.

Appendix 1

Children from Ascend exploring the Endless Rope machine at the school Gym

The Two-Hand Pull – exploring the equipment
Source: Endless Rope Ascend Data

Example of a child under supervision pulling 50 feet of rope with left hand only.



The Left-Hand Pull
Source: Endless Rope Ascend Data