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Efficacy of alternative seating on attention, in-seat behavior, and occupational performance in children with Attention Deficit Hyperactivity Disorder

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INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is a condition characterized by attention difficulties, hyperactivity, and impulsivity that impacts approximately 11% of school-aged children in the United States.[1] Difficulties with attention hinder a child's ability to learn and participate in daily school activities or "occupations," leading to an increased incidence of repeated grades, behavioral problems at school, and placement in special education classrooms.[2] As the incidence of ADHD diagnosis continues to increase by approximately 5% per year,[3] there is a need for interventions to support children's occupational performance at school, which begins with students' ability to pay attention and stay in their seat when needed in the classroom.

Research indicates that children with ADHD often demonstrate sensory-processing difficulties that contribute to challenges with occupational performance at school.[4] Occupational Therapists (OTs) use sensory-based interventions in school-based settings to help children modulate their sensory input in order to improve their attention, in-seat behavior, and occupational performance.[5,6] Alternative seating is a sensory-based intervention that is often utilized by OTs with the intent to encourage students to be physically active and meet their own sensory needs in an appropriate manner while in the classroom.[7,8] This alternative seating may be in the form of a therapy ball, therapy cushion, or various other seating modifications.[7] Therapy balls are becoming an increasingly common alternative seating strategy used in public schools;[9] however, the research on their effectiveness is limited. There is some evidence suggesting that the use of therapy balls increases attention, in-seat behavior, and occupational performance when used by students with ADHD.[9,10]

TEXT BOX 1

Alternative seating: a sensory-based intervention that is often utilized by OTs with the intent to support a child's sensory needs in an appropriate manner while in the classroom.[7,8]

***Attention Deficit Hyperactivity Disorder* (ADHD):** a condition characterized by attention difficulties, hyperactivity, and impulsivity.[1]

***Sensory-based intervention*:** interventions designed to provide individualized sensory input to help an individual regulate their responses to sensory stimulation in the environment.[6]

***Occupational performance*:** the ability to carry out developmentally appropriate roles, routines, and daily tasks. For the purpose of this review occupational performance is measured by academic performance.

Currently, there is one systematic review conducted by Gochenour and Poskey[7] that synthesize current research evidence regarding alternative seating for students with attention difficulties. A limitation of this review, as noted by the authors, is a lack of a consistent definition of attention difficulty in the studies they included. A systematic review focused on a specific, well-defined diagnosis will better contribute to practice

recommendations since these recommendations will be tailored to a clear and comprehensive understanding of the child's attentional and occupational challenges. The review also included studies of children with autism spectrum disorder (ASD).[7] While those with ASD may also have difficulties with attention, in-seat behavior and occupational performance, the underlying mechanism yielding these symptoms may be different than in children with ADHD. Thus, alternative seating may not work in the same way for children with ASD as it would for children with ADHD.[7] Thus, a systematic review is needed to examine the evidence from all current studies regarding alternative seating on improving attention, in-seat behavior and occupational performance in students with ADHD to increase evidence-based practice in the field of occupational therapy.

METHODS

An *a priori* protocol was developed by six reviewers before conducting this systematic review to foster its validity (Appendix 1). The protocol outlines all the steps and details needed to plan a systematic review before its execution. It includes the PICO question, search strategies for each database, inclusion criteria, and search methodology. The protocol was followed closely by the six reviewers (the first six authors) to identify, appraise, and synthesize all relevant published studies.

Search strategy

The systematic search for all relevant studies was conducted in February 2019 using the following databases: CINAHL, OT Seeker, OT Search, Pubmed, PsychINFO, and Google Scholar. Table 4 provides the search terms (i.e. combination of keywords and subject headings) used to conduct the search within each electronic database (Appendix 1).

Two reviewers independently searched the databases and applied inclusion criteria to the titles and abstracts of each study retrieved. When the relevance of the article was uncertain, the inclusion criteria was applied to the full text of the article. Reviewers of Google Scholar predetermined that they would terminate their search once they reviewed 50 consecutive articles that did not meet inclusion criteria. The reviewers' reasoned Google Scholar is a database that sorts by degree of relevance, so it is likely that any studies following the 50 excluded articles would also be excluded.

Each reviewer produced a list of articles that met inclusion criteria for their assigned databases, resulting in a total of two lists per database. Reviewers compared results, and discrepancies were resolved through a consensus process with a third reviewer as needed. A final list of all included articles across all databases was created after all reviewers came to a consensus. The flowchart summarizes the results of the search and application of the inclusion criteria (Figure 1).

Inclusion criteria

Articles were considered for review if they met the following **inclusion criteria**: (1) individuals were diagnosed with ADHD by a physician or psychologist; (2) participants experienced an intervention of alternative seating; (3) primary outcomes of the study included attention, in-seat behavior and occupational performance; (4) study was written in the English language; (5) study was published in a peer-reviewed journal; and (6) study was quantitative in nature. Studies were excluded if they met the following **exclusion criteria**: (1) participants were under the age of 3 years or over the age of 21 years or, and (2) data could not be extracted for individuals with ADHD only. Table 3 provides the justification for predetermined inclusion criteria (Appendix 1).

Review process

As shown in the flowchart, five articles remained after inclusion criteria were applied and reviewers came to a consensus (Figure 1). Adhering to the search protocol, two independent reviewers appraised the quality of each article using predetermined criteria appropriate for the study level of evidence (Appendix 1). *Quality of evidence* refers to the methodological rigor (e.g. were assessors blind to conditions, how were biases avoided) while *level of evidence* denotes the study

design itself (e.g., a randomized control trial study has higher rigor than a single-case design study).

TEXT BOX 2

***Statistical significance*:** is hypothesis testing that determines the probability of an effect of an intervention within a population versus no effect on the same population.[11]

Quality of evidence: reflects the extent of reviewers' confidence that the estimates within the study are adequate to support a clinical decision.[12]

***Clinical significance*:** If the change from the intervention was large enough to create a meaningful impact in the client's life.[13]

MDD: the difference between the mean of a treatment and the control that needs to exist for an effect to be detected.[14,15]

effect size: The extent of the difference between groups, such as between the control and treatment groups. Effect can also be the number of participants needed for the study to repeat the results.[16]

***GRADES*:** formal process of assessing quality of evidence in systematic reviews and to develop evidence-based recommendations.[17]

***Level of evidence*:** to indicate the possible validity of a study based on the study design.[18] The Sackett Level of Evidence Pyramid was used.[19]

***Subject headings*:** indexing of terms used by databases. MeSH terms are a specific type of subject heading used by MEDLINE/PubMed.[20]

The two reviewers compared their independent ratings of the quality of evidence of each study. Discrepancies between reviewers were resolved by discussion with a third reviewer as needed, until a consensus was reached. The quality of evidence ratings for each included study is compiled in Table 5.

The two reviewers also worked independently to summarize the objective information from each study to create the *descriptive table of individual studies*, and then came to a consensus. Table 6 includes information about the population, intervention, relevant outcomes, tools used, results data, and the statistical and clinical significance of the data (statistical and clinical significance; Text box 2). When clinical significance was not reported in an article, reviewers calculated, when possible, the minimally detectable difference (MDD; Text box 2). Using the descriptive table of individual studies, practice recommendations for clinicians were generated using a modified version of the Grading of Recommendations Assessment, Development, and Evaluation System (GRADES; Text box 2). [17]

RESULTS

Through the database search, 22 studies were retrieved for this systematic review. Of the 22 studies, five met the predetermined inclusion criteria. Figure 1 provides a flow chart which outlines the study identification process. Each of the five studies was then independently appraised by two reviewers for methodological quality and level of evidence. The five studies utilized a variety of designs ranging in level of evidence from low to high, including two single case designs (SCD),[9,21] one randomized controlled trial (RCT),[22] and two quasi-experimental group studies.[5,10] A summary of the descriptive data for each individual study is located in Table 6.

Three of the identified studies possessed a high quality of evidence. These studies included two SCDs[9,21] and one RCT.[22] The group continuous time series by Fedewa and Erwin[10] and the non-equivalent groups design study by Wu and colleagues[5], however, were evaluated and deemed to be of low evidence quality. Table 5 provides information regarding the quality of evidence for each study. The included studies measured the change in three outcomes: attention, in-seat behavior and occupational performance.

Attention

Two of the five articles measured the effect of the intervention on the participants' level of attention. The study completed by Wu and colleagues[5] used

neurophysiologic measures from electro-encephalogram recordings to measure attention and reaction time during an oddball task on either a therapy ball (intervention) or standard classroom chair (control). Measures of attention included event-related potential (ERP) and P300 latency. ERP indicates overall attention to stimulus, while P300 latency measures the amount of time between stimulus onset and peak attention to the stimulus. Measures of ERP in children with ADHD were not significantly influenced by the intervention. However, participants receiving the intervention did display statistically and clinically significant improvements in P300 latency, which suggests an increase in attention during the intervention phase. In addition, this study measured the reaction time between the onset of the stimulus tone signal and the participant's trigger signal. The results of this portion demonstrated statistically significant improvement for participants receiving the intervention ($p < 0.05$). Furthermore, the change in reaction time was greater than the MDD (MDD; Text box 2).

TEXT BOX 3

***Randomized control trial*:** two randomized groups with data collected at baseline, post-intervention, and follow up

***Single case design*:** participants are compared to themselves using data that is collected at multiple intervals throughout the study

***Group continuous time series*:** two groups with data collected at equal time intervals throughout the intervention

***Non-equivalent groups design*:** two non-equivalent groups with data taken in repeated measures over time

The second study by Clark and colleagues[22] is an RCT including 53 participants with a diagnosis of ADHD. Participants were split into a treatment group (experienced vestibular stimulation using a controlled movement apparatus) and a control group. Teachers and parents were blinded to each student's group assignment. Changes in the participants' attention and ADHD symptoms were measured at baseline, treatment end, and 6-week follow up.

Attention was measured using a continuous performance task (CPT), in which participants were asked to respond to target letters and inhibit their response to a distractor letter over a span of 14 minutes. Participants in the treatment group made significantly less commission errors (responding to a distraction letter) from baseline to follow up than participants in the control group. This indicates an increase in attentiveness for the treatment group.[23] There was a large effect size ($d = 0.78$) when comparing the difference in improvement between the two groups (effect size; Text box 2).

Additionally, this study measured 18 symptoms of ADHD, including attention, via a parent and teacher rating scale. The results for the baseline to treatment end and baseline to follow-up were not statistically significant between the control and intervention group. There was a small effect size ($d = -0.26$) for the baseline to treatment end; and a medium effect size ($d = 0.41$) was calculated for the baseline to follow-up. The results from the parent-rated ADHD symptoms assessment taken between the end of the treatment and the follow-up evaluation were statistically significant between the control and intervention group ($p < 0.05$) and displayed a medium effect size ($d = 0.60$). However, this improvement may be attributed to participants resuming their medication regime following the treatment phase. There was no significant difference between the two groups tested using the teacher-rated ADHD symptoms assessment and a small effect size was found for each of the three time periods (Table 6).

In-Seat behavior

Two articles measured the effect of the intervention on the amount of time that the participant was seated. The study by Schilling and colleagues[21] contained a sample size of three and had a high quality of evidence. The second study, completed by Fedewa and Erwin[10], contained a

sample size of five participants and was of low quality of evidence. The study with high quality of evidence reported an average increase in in-seat behavior of 20%, 40%, and no difference in the three participants, respectively. The low quality of evidence study found a 45-95% increase in in-seat behavior. No statistical significance was reported from either study which is appropriate given their small sample sizes.

Occupational performance

Three studies measured the effect of the intervention on the occupational performance of the participants. The article by Taipalus and colleagues[9] was a SCD containing a sample size of four participants with a high quality of evidence. The study measured academic performance as a measure of occupational performance. The SCD displayed consistent results between intervention and baseline scores with the exception of one of the four participants exhibiting 10-30% higher scores after intervention in measures of occupational performance. It should be noted that the authors acknowledged that the increase could have been due to practice effects and that there was no significant impact on occupational performance.

The second study by Schilling and colleagues[21] measured the effects of alternative seating on occupational performance using handwriting (legible word production) as an outcome measure. This article contained a sample size of three participants with a high quality of evidence. The occupational performance of the three participants of this study improved by 20%, 60%, and 20%, respectively.

The final article that measured the effects of alternative seating on occupational performance was a group continuous time series by Fedewa and Erwin[10] containing a sample size of five participants with a low quality of evidence. This study found a 10-80% increase in measures of occupational performance among its participants.

PRACTICE RECOMMENDATIONS

Attention

Recommendation.

There is Grade B evidence supporting the use of alternative seating to improve attention in children with ADHD. Based on the quality of evidence and results, it is recommended that alternative seating may be used to improve attention in children with ADHD. This intervention should be implemented with caution since further research is needed on the relationship between alternative seating and attention. In addition, further research may determine if the potential benefits of this intervention outweigh its costs.

In-seat behavior

Weak recommendation.

There is Grade D evidence supporting the use of alternative seating to improve in-seat behavior for children with ADHD. Given the low quality of evidence, alternate interventions may be more effective at improving in-seat behavior. Further research is likely to have an impact on this recommendation since only two studies of low level and quality of evidence were found at this time.

Occupational performance

Weak recommendation.

There is Grade D evidence supporting the use of alternative seating to improve occupational performance in children with ADHD. Given the moderate quality of evidence, alternative seating should be used with caution with the goal of improving occupational performance. Future research may have an impact on this recommendation.

CLINICAL IMPLICATIONS

The studies currently published indicate that there is preliminary evidence to support the effectiveness of alternative seating to improve attention and little to no evidence supporting the effectiveness of alternative seating to improve in-seat behavior and occupational performance in children diagnosed with ADHD. One high-quality RCT found a positive influence of alternative

seating with vestibular stimulation on attention and parent-rated ADHD symptoms.[22] Another SCD reported an increase in occupational performance when children used therapy balls in class; however, these results cannot be generalized to a wider population due to the limited number of participants.[21] The remaining studies reported little to no change when using alternative seating. Due to the limited available evidence, occupational therapists and teachers should only consider using alternative seating if other evidence-based interventions have been tried and found to be ineffective. When alternative seating is used for a student, OTs should use a quantitative outcome to measure change. While alternative seating is relatively low cost and low burden, practitioners should use caution when implementing this intervention. It is possible for students to become nauseous or experience headaches while using this seating strategy.[22] In addition, the unique seating could act as a distraction for other students and highlight the user's differences from their peers. Occupational therapy practitioners should always consider the current literature, their clinical experience, and the client's response to intervention when planning an intervention.

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APPENDIX 1 – A Priori Protocol

Table 1. PICO question

P - Individuals with ADHD	I - Alternative seating	C – Standard classroom chair	O – Occupational performance, in-seat behavior and attention

Table 2. List of databases searched

Databases Included in SR Search	**Planned the Search**		**Conducted the Search**	
	Person 1	**Person 2**	**Person 1**	**Person 2**
CINAHL	Zach	Natalie	Julia	Alisha
Google Scholar	Alisha	Julia	Zach	Natalie
OT Search	Alisha	Julia	Kristina	Lindsay
OT Seeker	Zach	Natalie	Kristina	Lindsay
PsychINFO	Kristina	Lindsay	Julia	Alisha
PubMed	ALL	ALL	Kristina	Lindsay

Table 3. Inclusion criteria

Population	Intervention	Outcome	Other
Inclusion Criteria			
Individuals with ADHD	Alternative seating	Occupational performance	English language
Comorbidities allowed		Attention	Peer reviewed journal article
			Quantitative study
Exclusion Criteria			
Participants over age 21			
Participants under age 3			
Must be able to extract data for individuals with ADHD only			

Justification: Brief justification for each inclusion and exclusion criteria included in the table above:

- ADHD is the diagnosis of the population (children) being investigated in the PICO question.
- Comorbidities with ADHD are included so that the search does not become too limited.
- Alternative seating is the intervention investigated in the PICO question, and includes any type of seating intervention, in order to retrieve the highest number of articles.
- Occupational performance and attention are the outcomes being investigated in the PICO question.
- The English language is included so that the article can be reviewed by English-speaking students.
- Peer-reviewed is an inclusion criterion included to limit results to articles with higher quality.
- Quantitative study is included since systematic reviews include only quantitative studies.
- Participants over the age of 21 were excluded since the focus is on school-aged children and the age limit for high school is age 21.
- Participants under the age of 3 were excluded since the focus is on school-aged children and children under 3 years of age are typically not yet in preschool.

Table 4

List of search items

	Construct 1: ADHD		Construct 2: Seating		Limits (if any)
Database	**Subject Headings**	**Keywords**	**Subject Headings**	**Keywords**	
CINAHL	Attention Deficit Hyperactivity Disorder	ADHD	Sitting, Seating	*Alternat* Seating, Therapy Ball*, Stability Ball*, Dynamic Seating, Disc 'O' Sit Cushion*	
Google Scholar		Attention Deficit Hyperactivity Disorder		*therapy ball, stability ball, wiggle stool, wobble chair, Disc 'O' Sit cushion, bouncy bands, dynamic seating, dynamic sitting, alternate seating, sitting wedge, rocker chair, bean bag seat, wedge cushion*	
OT Search	Attention Deficit Disorder with Hyperactivity			*dynamic seating, therapy ball, stability ball, alternat$ seat$*	
OT Seeker		ADHD, Attention Deficit Hyperactivity Disorder, Attention Deficit Disorder with Hyperactivity		Seating, Sitting, Dynamic Seating, Disc "O" Sit Cushion	
PsychINFO	Attention Deficit Disorder with Hyperactivity, Attention Deficit Disorder	Attention Deficit Disorder with Hyperactivity, Attention Deficit Disorder, ADHD, Attention-Deficit/Hyperactivity Disorder		therapy ball*, stability ball*, wiggle cushion*, dynamic seat*, disc 'o' sit cushion*, alternat* seating, beanbag chair*	
PubMed	Attention Deficit Disorder with Hyperactivity	Attention deficit, ADHD, Attention Deficit Hyperactivity Disorder, Attention Deficit Disorder with Hyperactivity		stability ball, dynamic seating, dynamic sitting	
Disclaimer: Different keywords were used between databases due to the lack of relevant results when using a uniform set of keywords. In some cases, certain keywords yielded no results at all.					

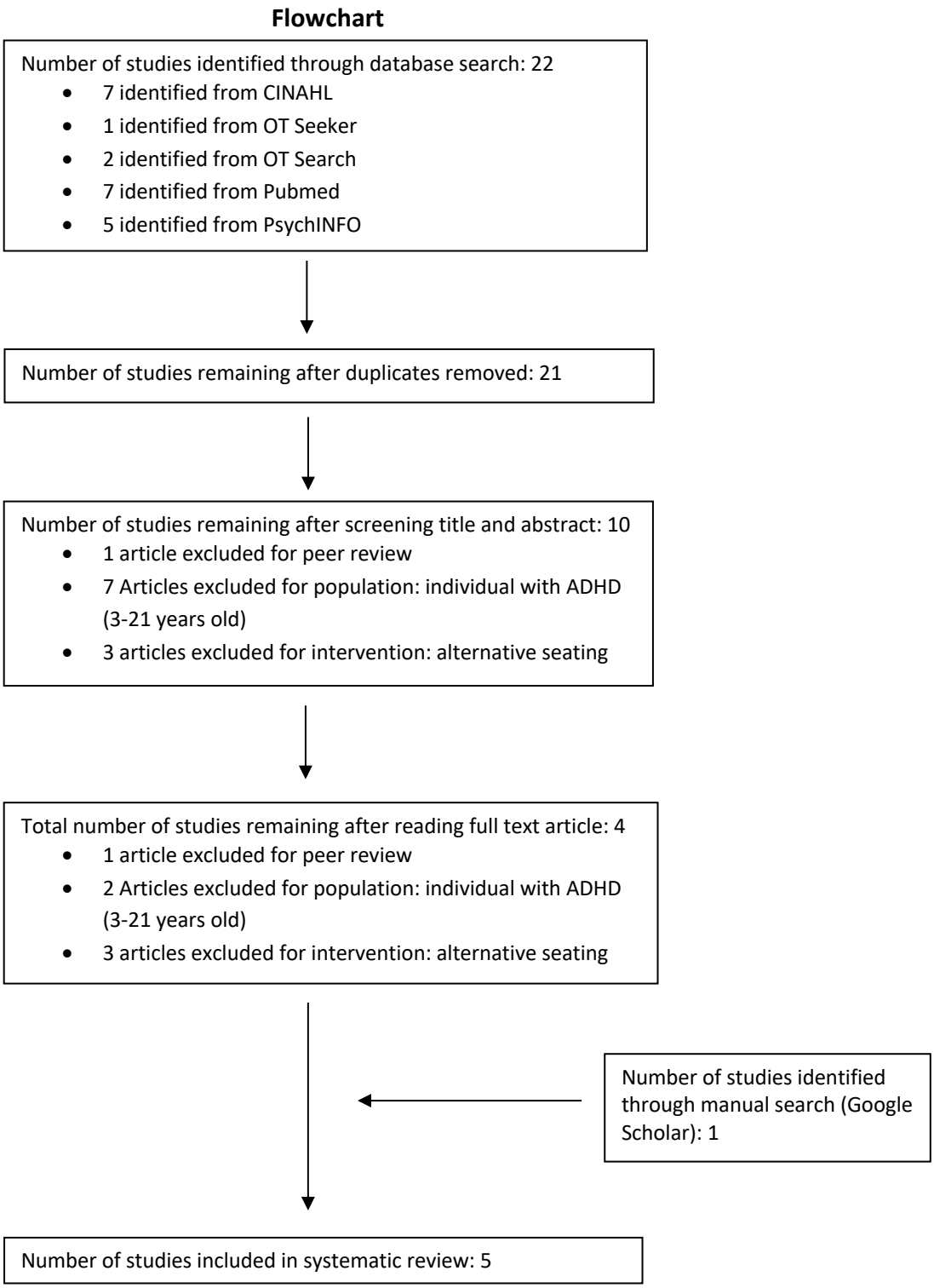

Figure 1. Summary of the search results and application of the inclusion criteria

Table 5. Quality of Evidence Table

		Quality Criteria											
Citation	Type of design	1	2	3	4	5	6	7	8	9	10	Quality Level	Evidence Level
Clark et al., 2008	RCT (3)	0	0	1	1	1	1	1	1	1	0	High	I (1)
Fedewa & Erwin, 2011	Time Series Design (6)	0	0	0	0	1	0	0	1	X	X	Low	IV (4)
Schilling et al., 2003	Single Case Design (7)	1	1	1	1	0	1	0	1	X	X	High	IV (4)
Taipulus et al., 2017	Single Case Design (7)	1	1	1	0	1	1	0	1	X	X	High	IIIb (3b)
Wu et al., 2012	Repeated measures non-equivalent group design (5)	0	1	1	0	0	X	0	0	0	1	Low	II (2)

Table 6
Descriptive Table of Individual Studies

Single-Case Design (SCD)						
Study	**Design Type/ Level & Quality of Evidence**	**Participants**	**Intervention/ Comparison**	**Outcome(s)**	**Measurement Tools (unit; dir. of change)**	**Results**
Schilling. et al, 2003	Single Case Design 6/8 High	*n* = 3 M/F: 2/1 Age = 9yr 8mos - 9yr 11mo (4th grade)	C: Standard classroom chair I: Alternative Seating: therapy ball (Sit 'n' Gym by Gymnic)	1. In-seat behavior (awake & asleep) 2. Legible word productivity 3. Social validity of intervention	1. Momentary real-time sampling of remaining in seat at 10s intervals (0-100%; > = better) 2. Legible word production compared to class mean (0-100%; > = better) 3. Questionnaire units were preference of chair, ball, or neither	1. Generally*: Subject 1 had an average 20% increase of in seat behavior with therapy balls. Subject 2 had an average 40% increase of in seat behavior with therapy balls. Subject 3 displayed no difference of in seat behavior. 2. Generally*: Subject 1 had a 20% increase in handwriting production. Subject 2 had a 60% increase in handwriting production Subject 3 had a 20% increase in handwriting production. 3. All 3 students preferred ball
Taipulus et al., 2017	Single Case Design 6/8 High	*n* = 4 students with ADHD 3rd & 4th grade	C: Standard classroom chair I: Therapy ball	1. Academic engagement	1. Momentary real-time sampling of attention towards class activity/teacher at 10s intervals (0-100%; > = better)	1. Scores remained relatively consistent from baseline to intervention with the exception of Student 1 who showed 10-30% higher academic engagement on the ball versus the chair during the intervention phase.

				2. Reading comprehension 3. Math fluency	2. Daze reading comprehension (> = better) 3. Grade level math worksheet (> = better)	2. Scores remained consistent (no change) 3. Scores increased, but practice effect may have influenced results		
Group Study								
Study Citation	**Design Type/ Level & Quality of Evidence**	**Participants n per group**	**Intervention & Comparison/ Control Group**	**Outcomes Measured**	**Outcome Measures**	**Means (SD)**	**Inferential Statistics**	**Effect Size**
Clark et al., 2008	RCT 7/10 High	*n* = 53 children with ADHD dx I/C: n = 26/27 M/F: *n* = 48/5 Age: 6-12 yrs	C: Reclining in CMA I: Vestibular stimulation with CMA I & C: ambient sounds, darkened room and vision guarding 30 min session 3x/wk 13 wks	ADHD symptoms Attention	1. Parent-rated ADHD symptoms (0-3 scale ↓=+) 2. Teacher-rated ADHD symptoms (0-3 scale ↓=+) Continuous Performance Task	1. Baseline: C: 2.13(0.45) I: 2.04(0.5) Intervention: C: 1.29(0.52) I: 1.33(0.58) FU 6-wks: C: 1.63(0.75) I: 1.35(0.7) 2. Baseline C: 1.82(0.65) I: 1.91(0.50) Intervention: C: 1.60(0.59) I: 1.58(0.70) FU: C: 1.61 (0.66) I: 1.64(0.85) Commission Errors Baseline:	1. N.S. for baseline-I or baseline-FU $p < 0.05$ I-end to FU 2. N.S. between groups Baseline-FU: $p < 0.05$★	1. Baseline-Intervention: $d = -0.26$ Intervention-FU: $d = 0.60$✦ Baseline-FU $d = 0.41$ 2. Baseline-Intervention $d = 0.13$ Intervention-FU: $d = -0.10$ Baseline-FU: $d = 0.28$ Baseline-FU: $d = 0.78$✦

						C: 27.88(4.82) I: 27.88(5.46) Intervention: C: 26.96(6.82) I: 25.47(6.42) Follow up: C: 25.96(6.73) I: 21.94(7.78)	Tx end-FU: $p = 0.05$★	Tx end-FU: $d = 0.56$⅄
Fedewa & Erwin, 2011	Group Continuous Time Series 2/8 Low	n = 8 with ≥ 120 on the ADHDT (high-very high probability of ADHD); 5 with ADHD dx M/F: 6/2 Age: 9yrs 11mos (4th & 5th grade)	C: Standard classroom chair I: Therapy ball	1. In Seat and On- task Behavior Frequency 2. Teachers perception of intervention	1a. In-seat/out-seat (0-100%; > = better) 1b.Off-task/on-task behaviors (0-100%; > = better) 2. Teachers Social Validity Scale (1-5; ↑=+)	1a. Average time spent in seat: Increased from pre-intervention 45% to 94% 12wks 1b. Average time spent on task: Increased from pre-intervention 10% to 80% post-intervention 2. Enhanced levels of: Attention 4.0(0.71) In-seat behavior 4.5(0.55) Work completion 3.6(0.56)	No statistically significant tests were computed by the authors	1. N.P. 2. N.P.

Wu, Wang, Chen, Lai, Yang, & Guo, 2013	Repeated measures non-equivalent groups design 3/9 Low	*n* = 15 children with ADHD Mean age = 8.6 *n* = 14 children without diagnosis Mean age = 8.7	C: Standard classroom chair I: Therapy ball	1. Attention	1a. ERP amplitude (Higher ERP shows greater attention to stimulus) (5-20 µV; ↑=+)	1a. Amplitude ADHD C: 10.56(4.84) I: 13.62(4.53) Without ADHD C: 12.42(5.11) I: 12.48(7.23)	1a. Amplitude: N.S.	1a. Amplitude MDC = 2.555 ADHD: 10.56-13.62 = -3.06 Without ADHD: 12.42-12.48 = -0.06
					1b. Latency of P300 (amount of time between stimulus onset and peak attention to stimulus) (250-900 ms; ↓=+)	1b. Latency ADHD C: 563.00 (31.27) I: 490.80 (47.70) Without ADHD C: 462.86 (48.74) I: 480.14 (72.01)	1b. Latency ADHD I/C: p = 0.046★ Between-group C/chair: p < 0.05★	1b. Latency MDC = 24.37 ADHD: 490.8-563 = -72.2✦ Without ADHD: 462.86-480.14 = -17.28
				2. Reaction time	2. Difference in time between the stimulus trigger signal (0 - ∞; ↓=+)	2. ADHD: C: 536.73 (83.94) I: 457.92 (73.83) Without ADHD C: 445.90 (36.36) I: 463.62 (30.12)	2. ADHD I/C: p = 0.01 Between-group C/Chair: p = 0.003★	2. Amplitude MDC = 18.18 ADHD: 457.92-536.73 = -78.81✦ Without ADHD: 463.62-445.90 = 17.72✦

KEY. ADHDT: Attention-Deficit/Hyperactivity Disorder Test; C: Control; CMA: Comprehensive Motion Apparatus; ERP: Event-related potential; EEG: Electroencephalogram; FU: Follow-up; I: Intervention; M/F: Male/Female; MDD: Minimal Detectable Difference; N.S.: not significant; N.P.: Not Provided; SD: Standard deviation; X: Mean; *Values were displayed in graph format, reviewers extracted from graph with estimates; **No data given; ✦Medium effect size; ★Statistical significance; ✦Clinical significance