

A Systematic Review of Evidence around Dynamic Seating for Children with Dystonia

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BACKGROUND

Dystonia is often characterised by hypotonia and whole-body **spasms**, which can be **powerful**, frequent and often **painful and distressing** for both the child and those around them. As a consequence, although **children with severe dystonia need a high level of postural support** during hypotonic phases, they often **cannot sit comfortably** in a conventional seat as this can be painful which, in turn, exacerbates their spasms.

Often, children with dystonia will **push against any applied constraint** such as fixed elements of static chairs (i.e. footplates, headrest, backrests). They are **most comfortable being held**, possibly because handling allows the child’s involuntary movements to be accommodated with little constraint. This however severely **limits the child’s ability** to access to their environment, and **hinders their ability to interact with people** and function in daily life, including playing and learning. In addition, this limits their development of independence [1]. Furthermore, limiting children's ability to access learning environments and curriculum may also damage their development of mental skills.

PURPOSE OF THE REVIEW

To find out: “What is known about the use and design of dynamic seating for children with dystonia?”

This review has been carried out to assess the evidence for the impact and effectiveness or otherwise of dynamic seating for children with dystonia. Very little research was found in this field during Dr Adlam’s PhD literature review[2], and during several years monitoring the literature afterwards. Thus this systematic review was instigated to

- a) Capture all the relevant published research in the field through a systematic and thorough search of the scientific literature on dynamic seating in the context of childhood dystonia;
- b) Analyse the found literature to establish gaps in the research base and identify areas of consensus;
- c) Support the formulation of recommendations for future research in the field and guidelines for the design of seating for children with dystonia.

DYSTONIA

“Dystonia in childhood is a movement disorder in which involuntary sustained or intermittent muscle contractions cause twisting and repetitive movements, abnormal postures, or both. Dystonia is commonly triggered or exacerbated by attempted voluntary movement and may fluctuate in presence and severity over time. The severity and quality of dystonic postures may vary with body position, specific tasks, emotional state, or level of consciousness.” [3]



DYNAMIC SEATING

Seating that can move and adapt its geometry to accommodate or facilitate the movements of the user.

The R82 x:panda allows backrest movement with adjustable damping. See [4,5].



The Quantum Kids Rock seat allows movement of the backrest and foot supports, pivoting about the knees. See [6].



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METHOD

The method used for the review was adapted from that initially proposed due to the small number of papers found.
STEP 1: Systematic Search
We searched the scientific literature using EMBASE and MEDLINE. These are indexed databases of published research papers designed for structured searching.

- The search runs in sequence from top to bottom.
- Search terms in inverted commas are indexing search terms recognised by EMBASE.
- '*' is a wildcard that can represent any character or characters. This enables stemmed search queries that can capture multiple words. E.g. a search for dyskine* would capture dyskineTIC and dyskineSIA.
- Search queries can be combined using Boolean operators. For example, query #7 (#5 OR #6) aggregates the results of queries #5 and #6 using the OR operator; and query #8 (#4 AND #7) outputs results that are common to queries #4 and #7 using the AND operator.
- The suffixes 'ab' and 'ti' after a search term indicate that the abstracts and titles of papers should be searched.

Query No.	Query	Number of Results
#1	dystoni*:ab,ti OR 'dystonic disorder'	18,539
#2	'cerebral palsy'	31,054
#3	'dyskinesia' OR dyskine*:ab,ti OR atheto*:ab,ti OR 'athetosis'	33,268
#4	#1 OR #2 OR #3	78,271
#5	seat*:ab,ti OR 'seat' OR chair*:ab,ti OR 'chair'	59,606
#6	'standing frame' OR stander*:ab,ti	334
#7	#5 OR #6	59,932
#8	#4 AND #7	493
#9	dynamic*:ab,ti OR 'dynamic' OR complian*:ab,ti OR 'compliance (physical)'	605,149
#10	#8 AND #9	25

STEP 2: Hand screening
The 25 papers identified in step 10 were hand screened for relevance, resulting in only 3 papers for review [4,5,6]. Two of these [4,5] describe the same work and are closely related.

STEP 3: Assessment
At this stage in the study, with so few results, it did not make sense to statistically analyse the identified papers as originally planned.

Assessment	Cimolin [4,5]	Hahn [6]
Sample size	10 (GMFCS V)	12 (mixed GMFCS, 2 dystonic)
Randomisation	N	Y
Control	Internal	External
Intervention	R82 X-Panda	Quantum Rock Active
Degrees of Freedom	1	2
Study Type	Internally controlled trial	Randomised controlled trial (unblinded)
Functional outcome measures	N	Y (PEDI, GMFM-66)
Objective quantitative measures	Y (motion analysis)	Y (range of motion)
Economic assessment	N	N
Bias	?	? (measurement and analysis not blinded)

All three papers reported weak evidence in support of the use of dynamic seating with children with dystonia.

NEXT STEPS

SCOPING REVIEW
As so few papers were identified in the review, we are following up this review with a broader scoping review that aims to capture the scope of current research and practice in seating for children with dystonia.

This review will examine a broad range of scientific and informal literature and media including scientific journals, conference proceedings, equipment manufacturer websites, therapy service websites, best practice guidelines, and magazine articles.

We will also interview clinical professionals to establish:

- Their approach to seating children with dystonia
- Their preferred sources of information on seating and dystonia.

OUTPUTS
• Analysis of identified materials for emerging themes in seating practice and design for dystonia;
• Recommendations for future research.