

## Appendix A

Table of References Found for Dynamic Lycra Orthoses Literature Review  
In Hierarchy of Evidence (Sign 50)

	Hierarchy of Evidence	Title	Area of Body	Study Type	N=	Notes	Year
Alegesan et al 2010 (1)	1+	Effect of modified suit therapy in Spastic Diplegic Cerebral Palsy- a single blinded randomized controlled trial	Body	RCT conventional therapy v Therasuit with therapy	30	Gross Motor Function Measure -88	2010
Giray et al 2018(2)	1+	Does stabilizing input pressure orthosis vest, Lycra- based compression orthosis, improve trunk posture and prevent hip lateralization in children with cerebral palsy	Trunk only and upper pelvis	Single blind RCT to measure effects of using a SPIO vest, intensive therapy and a 2 weeks or 6 weeks intervention phase post therapy	24	Sitting Assessment Score (SAS)/ Cobb Angle/ Kyphotic angle/ Hip Migration Index (HMI) Kyphotic angle reduced after treatment but little change on scoliosis or hip migration.	2018
Giray et al 2018(3)	1+	The effects of vest type dynamic elastomeric fabric orthosis on sitting balance and gross manual dexterity in children with cerebral palsy: A single blinded randomised controlled study	Trunk only and upper pelvis	Single blinded RCT to measure effects of Vest on sitting and gross manual dexterity Parent non-standard Likert test questionnaire	36	Improvements in sitting balance and manual dexterity, posture and balance whilst sitting. Parents reported child's confidence had improved	2018
Almeida et al 2017 (4)	1-	Effects of interventions with therapeutic suits (clothing) on impairments and functional limitations of children with cerebral palsy: a systematic review	Thoracic/ lumbar/Sacral	Systematic review of therapeutic suits	13	A systematic review of 13 different dynamic movement orthoses used in postural and active training in children with CP	2017
Elliott et al 2010 (5)	1-	Lycra arm splints improve movement fluency in children with cerebral palsy	Upper limb	RCT Parallel groups with waiting list control	16	3D upper limb kinematics S	2010
Karadag-Saygi,& Giray,E 2019(6)	1-	The clinical aspects and effectiveness of suit therapies for cerebral palsy : A systematic review	DMO Body suit and leggings, Adeli suit, UP suit, Therasuit second skin suit, SPIO Pediasuit	Systematic review	29 studies	Although reviewing all modalities there is no mention of the differences of construct and therefore the outcome of each	2019

						variant cannot be compared	
Martins et al 2016 (7)	1-	Efficacy of suit therapy on functioning in children and adolescents with cerebral palsy: a systematic review and meta- analysis	Body	Systematic review	4	Review of suits / combined suits	2016
Miller et al 2015 (8)	1-	Sensory dynamic orthosis mild to moderate upper limb tremor in multiple sclerosis	Upper limb	Mixed feasibility study Mixed methods Double blind randomized placebo-controlled pilot study	21	Semi – structured interviews FAHN Tremor rating Action research arm test, COPM Psychological Impact of Assistive technology and 9 peg hole test Issues in obtaining a good orthosis fit Placebo more effective than orthosis	2015
Blair et al 1995(9)	2++	A study of a dynamic proximal stability splint in the management of children with cerebral palsy	Suit	Descriptive study, Cross over trial and recipient trial	24	8 matched pairs criticism for? impartiality due to video scoring with / without the garments	1995
Cameron et al 2018(10)	2++	Management of Antenatal Pelvic Girdle Pain Study (MAPS): A Double Blinded Randomised Trial Evaluating the Effectiveness of Two Pelvic Orthoses	Pelvic Girdle	Comparative Double Blinded Randomised Trial comparing NHS standard SEROLA belt with DEFO pregnancy shorts	72	Numerical Pain Rating Scale/ Pelvic Questionnaire/ EuroQo15 dimension secondary outcome measures and VAS/ Short Form 36 questionnaires- physical and mental health  Custom DEFO shorts were more effective than stock belt at reducing day and night time pain in pregnant women with pelvic girdle pain	2018#
Edwards,K 2004 (11)	2++	Using Motion Analysis to Investigate whether Wearing Dynamic Lycra Garments Changes Posture and Movement in Children with Cerebral Palsy	Suits	Group study	5	Gait analysis Changes in posture and gait, improved proximal stability increase in cadence	2004#

Gracies, J 1997 (12)	2++	Lycra Garments Designed for Patients with Upper Limb Spasticity: mechanical effects in Normal Subjects	Glove	Double blind	10	Health subjects used to investigate the stretch to pronator muscles by garment. T-Test Donning technique important. Long lasting Angular displacement	1997
Gracies et al 2000 (13)	2++	Short – term Effects of Dynamic Lycra Splints on Upper Limb in Hemiplegic Patients	Gloves	Cross over design 18 – 85 years of age. Hemi, CVA. Sound inclusion / exclusion criteria	16	Questionnaire on comfort, circumference of arm, resting posture, spasticity at shoulder, ROM using goniometer, Elbow proprioception Good research section on CNS involvement	2000
Matthews et al 2009 (14)	2++	Effects of Dynamic Elastomeric Fabric Orthoses on Children with Cerebral Palsy	Leggings	Multiple Centre single case report methodology ABA design 3-13 years of age (Median age 5.5) 4 male/female	8	10 metre walking tests Physiological Cost Index (PCI) Visual analogue Scale (VAS) Patient specific functional scale (PSFS) Subject/Carer perceptions recorded via daily diaries	2009#
Michael et al 2014 (15)	2++	What is the effect of compression garments on a balance task in female athletes?	Lower limb and pelvis	Double blinded, RCT repeated measures study	12		2014
Morrin.J (16) *	2++	Control of hand oedema by use of Lycra pressure garments	glove	Retrospective report - review	95	Oedema control	1981
Sawle et al 2012 (17)	2++	Exploring the effect of pelvic belt configurations upon athletic lumbopelvic pain	Shorts	Randomised, repeated measures design	20	Resting pain, straight leg raise pain, 1 metre jump pain, resisted hip and adduction pain measurement	2012#
Snowdon et al 2018 (18)	2++	Compression garments and fabric orthoses for rehabilitation and function: a systematic mapping review	Compression garments All areas	Systematic mapping review	236 studies	Further studies should fully describe interventions by including measurements of pressure	2018

						beneath orthoses and clear descriptions of actual anatomical coverage.	
Bahramizadeh et al 2015 (19)	2+	Effects of dynamic elastomeric fabric orthoses in children with cerebral palsy	Leggings	Electro goniometry knee extension measurement	20	Quasi- experimental study using centre of foot pressure stability and knee extension angle measurement outcomes	201
Brownlee et al 2002 (20)	2+	Edinburgh Dynamic Lycra splinting trial – assessment of hand function	10 suits 10 gloves	Pre-experimental design with an one / post-test. 8-week duration	20	Measured hand function – cognition restricted use? Dual qual/quant, questionnaires. Difficulties in identifying measurement tool	Oral presentation 2000 Published2002
Castro et al 1997 (21) *	2+	A low-cost instrumented glove for monitoring forces during object manipulation	Glove	Group experimental design	30	Carrier for force sensing resistors. Pressure measurement  Of interest to glove research	1997
Degelaen et al 2016(22)	2+	Effect of supporting 3D garment on gait postural stability in children with bilateral spastic cerebral palsy	Lymed 3D Suit sort legs and vest top	Lower limb Kinematic data analysis & trunk control	31	Improved temporal special parameters and improved balance	2016
Finlayson et al 2018 (23)	2+	Lycra splinting garments for adults with intellectual disabilities who fall due to gait or balance issues: a feasibility study	Socks	Series of single case studies	9	3D Gait and balance assessment TUG	2018#
Flanagan et al 2009 (24)	2+	Evaluation of short – term intensive orthotic garment uses in children who have cerebral palsy	Truncal control using Theratogs	Single, pre-intervention baseline comparison design	5	Biomechanical Assessment Gait analysis Gross Motor assessment	2009
Matthews, M (25)	2+	A pilot study of multiple single case reports to investigate the effects of dynamic Lycra Orthoses on gait in children with diplegic cerebral palsy	Full length Leggings	Group of replicated measures single case studies.	8	Exoskeleton to weakened muscles Reduced energy expenditure Positive gait changes	2007#
Nicholson et al 2001 (26)	2+	Assessment of Upper Limb function and movement in children with cerebral palsy wearing Lycra garments	Suit	Journal publication	12 (5)	Questionnaire, PEDI, Motion analysis Functional skills,	2001#

						No Botox, Wilcoxon test	
Rennie et al 2000 (27)	2+	An evaluation of Lycra garments in the lower limb using 3-Dgait analysis and functional assessment (PEDI)	Whole body suits	Group study  Gait lab	8	PEDI ? not appropriate tool Issues of toileting Gait analysis No reports of breathing difficulties Reduced carer assistance	2000#
Serrao et al 2017 (28)	2+	Use of dynamic movement orthoses to improve gait stability and trunk control in ataxic patients	Suit	Longitudinal uncontrolled study	11	Linear over ground optoelectronic gait analysis Time-distance parameters, lower limb joint kinematics body sway, trunk oscillations 7 gait variability Quest Significant decrease instance phase duration, double support phase, swing phase CV, pelvic ROM, body sway and trunk ROM. Significant increase in observed swing phase duration. And knee joint ROM	2017#
Sivaraman,K & Marsden,J 2014(29)	2+	The management of spasticity in adults	Glove review	Clinical review	3 papers	? increase range of upper limb movement	2014
R and.D (30) *	3	An instrumented glove for monitoring MCP joint motion	Glove	Experimental	4	Goniometric measurement Of interest to glove research	1993
Attard et al 2004 (31)	3	Review of the use of Lycra pressure orthoses for children with cerebral palsy – including examples of two case studies	Glove Suit	Single case study	2	Review of current literature 2003  Discussion of possible causes of effect	2004#
Barbarioli, M (32)	3	A Lycra glove working splint for rheumatoid arthritis: a case study	Glove	Case study	1	Descriptive study of rheumatoid function	2001
Braithwaite.F & Pitt,F (33)	3	The use of Lycra socks in peripheral sensory deficit – a case study	Sock	Case study	1	Proprioceptive feedback	2002#

Bridges,S (34)	3	An evaluation of the immediate effects of elasticated compression on joint proprioception	Socks	Repeated measure design Pilot study as part of MSc degree	6	GMFM, PCI & 10m walking test, socks improved function and gait performance	2004#
Brownlee.et al 2002 (35)	3	Edinburgh Dynamic Lycra Splinting Trial-assessment of hand function	Glove / suit	Pre-experimental design Questionnaire	20	Article of main 3work	2002
Corn et al 2003 (36)	3	Impact of Second Skin Lycra Splinting on the Quality of Upper Limb Movement in Children	Upper Limb	Group of Single Case Studies	4	PEDI, Comparison of two patient groups of long /short term users	2003
Edmondson. J (37)	3	How effective are Lycra suits in the management of children with CP	Total Body	Group of single case	15	Untried measurement score. Good references	1999#
Edwards, K & Cramp, M (11)	3	Using motion analysis to investigate whether wearing dynamic Lycra garments changes posture and movement in children with cerebral palsy- A pilot study	Total Body	Group of single cases	4	Gait lab with markers to measure trunk flexion , extension and gait.	2004#
Gibbs et at 2002 (38)	3	Dynamic Lycra Splinting in a child with Cerebral Palsy: an objective assessment of gait.	Suit	Single case presentation	1	Smoothing of pelvic movement, reduced adduction, significant increase in temporal distance parameters	2002#
Hylton.N (39)	3	The use of compression stabilizing type bracing as an adjunct to therapy	Shorts	Single case	4	Discussion paper prior to full paper	1996
Hylton.N (40)	3	The development and use of SPIO Lycra compression bracing in children with neuro-motor deficits	Suit	Single case	1	Observational Discussion	1997
Kennedy et al 2000 (41)	3	The treatment of inter-phalangeal joint flexion contractures with reinforced Lycra finger sleeves	finger	Single case study	2	Cosmetic acceptability	2000
Knox.V (42)	3	The use of Lycra garments in children with cerebral palsy: a report of a descriptive clinical trial	Suit	Repeated measures Single case group	8	GMFM Quest Good literature review. Non biased report	2003#

						Discussion of Melbourne Test	
Matthews,M & Crawford,R (43)	3	The Use of Dynamic Lycra Orthoses in the Treatment of Scoliosis	Suit	Single Case Study	1	X-ray evidence New treatment protocol	2006#
Matthews, M (44)	3	The use of a Dynamic Elastomeric Fabric Orthosis to Manage Painful Shoulder Subluxation: A Case Study	Shoulder Stability Orthosis	Single Case Study	1	X-ray Evidence	2011#
Matthews et al 2016 (45)	3	The use of dynamic elastomeric fabric orthoses suits as an orthotic intervention in the management of children with neuropathic onset scoliosis: A retrospective audit of routine clinical case notes	Suits with specific scoliosis treatment additions	Clinical Audit	180	Research matrix used to interrogate clinical notes.	2016#
Oglieve,K (46)	3	An audit of satisfaction amongst people who are wearing dynamic Lycra Orthoses for the Management of Upper Limb Movement disorders caused by Neurological disorders.	Gloves	Questionnaires of users	15	Subjective improvement in posture, gait, arm awareness, confidence, arm use. Using VAS	2006#
Paleg,G (47)	3	Dynamic Trunk Splints and Hypotonia	Trunk	Single Case Benek Suit	1	GMFT/questionnaire Limited references/ No discussion	2001#
Rathinam et al 2013 (48)	3	Effects of lycra body suit Orthosis on a child with developmental coordination disorder: a case study	Shorts	Case study	1	Clinical changes in movement skill and motor performance	2013#
Shaari et al 2018	3	Interface Pressure of Lycra Orthosis at Different Postures in Children with Cerebral Palsy	Suit	Case Study to measure pressure (Tekscan) during static and dynamic postures	5	Improved Sit to stand and trunk control scores.	2018
Watson et al 2007 (49)	3	An evaluation of the effects of a dynamic Lycra orthosis on arm function in a late stage patient with acquired brain injury	Long armed glove	Case Study	1	Rehabilitation	2007#
Yasukawa et al 2011 (50)	3	Case Study: Use of the Dynamic Movement Orthosis to Provide Compressive	Shoulder Stability Orthosis	Case Study	1	Wolf Motor Function Test Grip Strength using Dynamometer	2011#

		Shoulder Support for Children with Brachial Plexus Palsy					
Yasukawa et al 2013	3	Describing the use of a glove and explored its effect upon two children with upper limb dysfunction.	Upper Limb	Case study	2	Melbourne Assessment Score	2013#
Angilley,H 2006(51)	4	Lycra Garments – A single case study	Long armed vest top	Case study on 2 <sup>nd</sup> Skin suit	1	GMFCS before and during intervention/ Video/ Bruininks OSeretsky/ questionnaire/ diary	2006
Betts.L(52)	4	Dynamic Movement Lycra orthosis in multiple Sclerosis	General introduction of use Use of combination of FES and orthosis in one of the cases studies	Case studies	3	Descriptive observational presentation	2015#
Blandford et al 2014	4	The management of Neuropathic Scoliosis in children: an audit	Spine / Scoliosis	An audit of clinical practice in 5 centres in England	180	Conference abstract.	2014#
Blandford et al 2014	4	Dynamic elastomeric fabric orthoses in neuropathic scoliosis management : an audit of frequency and characteristics of use	Spine / Scoliosis	Retrospective Audit	121/180	Conference Abstract Review of clinical practice in the UK using cross section of outcome measurements	2014#
ChengC & Chan I 2003(53)	4	Use of Lycra based garments in facilitationg postural stability in children with cerebral palsy	Short arm/ short leg suit	Case Study	2	Athetoid movements reduced, better trunk and head control	2003
Coghill, J & Simkiss, D (54)	4	Question 1 Do Lycra garments improve function and movement in children with cerebral palsy	ALL AREAS	Literature review	8	Although 66 papers found only 8 relevant to research question	2010
Davies,P 2005(55)	4	Use of a lycra compression suit to relieve painful hemiplegic shoulder three years post stroke	Shoulder	Single case report	1	Reported pain relieved (which was the aim), however outcome measures not really appropriate for condition	2005#
Drivsholm et al 2018(56)	4	Evaluation of Dynamic Movement orthosis (DMO) as a means to relieve pain and fatigue in patients with facio-scapulo- humeral muscular dystrophy	Shoulder	Group of single cases Brooke Upper limb score / manual muscle test/fatigue/ Disabilities of the arm, shoulder and hand (DASH)	8	Pain and Fatigue was not reduced Positive effects on upper limb activities Pain interfered with Activities of daily living less with orthosis on.	2018#



Edwards et al 2016 (57)	4	Evaluation of the use of a dynamic elastomeric fabric orthosis (DEFO) to improve truncal stability in a young child with Osteogenesis Imperfecta	Trunk	Single case report	1	Improved hands free sitting play Activity and confidence increased whilst wearing the suit.	2016#
Edwards et al 2016 (58)	4	Is participation in children with type 1 OI influenced by wearing a DEFO?	Trunk	3 Singles case studies	3	Improved gross and or fine motor function. Improve posture in sitting and standing Improved pencil grip Reduced balance loss and more stable	2016#
Fisher et al 2010 (59, 60)	4	Effects of a "SNUG" Sensory Dynamic Orthosis on Gross Motor Function in Children with Cerebral Palsy	Trunk	Multi-centre Study 1-23 years of age (Median 7 years) 21 males/10 females GMFCS GMFM 88	31	Conference Abstract Statistically Significant change in GMFM 88	2010#
Lewis,J & Pin,T	4	Dynamic elastomeric fabric orthosis in managing shoulder subluxation in children with severe cerebral palsy: a case series	Shoulder	Repeated measures design	3	Conference Abstract Shoulder relocation and decreased pain and discomfort reported at rest or on activity when worn noted	2016#
Little et al 2015	4	Impact of de-rotational Lycra® shorts on in-toeing gait profile: a single case study	Pelvis	Single case study Foot progression angle and plantar flexion angle	1	Conference Poster Presentation. 3D Gait analysis	2015#
Kumar et al 2016(61)	4	Investigating the effects of Lycra sleeves on shoulder girdle: A study to inform management of glenohumeral subluxation in post stroke hemiplegia.	Upper limb sleeve	Surface EMG, surface ultrasound with scapular position measured in realisation to the spine	30	Lycra sleeve laterers scapular position, activated the muscles around the scapula and increases external rotation	2016
Matthews, M (62)	4	A pilot study of the effects of Dynamic Elastomeric Fabric Foot Orthoses on Gait in Subjects with Chronic Hemiplegia	Lower Limb	Single case report Video analysis	1	Conference Abstract Comparison Video Analysis	2010#
Matthews et al 2010 (63)	4	Dynamic Lycra Orthoses for Shoulder Instability	Upper trunk and arm	Single case report X- ray pre and post intervention	1	Conference abstract Visual X- ray change	2010#

Matthews, M & Bridges, S (64)	4	Does the use of dynamic elastomeric fabric scoliosis suits provide an improved and more user-friendly option for early intervention in childhood	Spine	AB	1	X-ray observation	2011#
Matthews,M; Lane,R; Chappell,P(65)	4	The novel use of combining a dynamic elastomeric fabric orthotic sock with an integrated membrane and functional electrical stimulation for an adolescent with hemiplegia	Lower Limb	Single case report	1	Conference Abstract 10 metre walking test and Physiological cost index	2015#
Mayston, M & Barron, L Discussion(66)	4	The Use of a Dynamic Elastomeric Fabric Orthosis to Optimise upper limb recovery following stroke	Upper Limb	RCT	23	NK dexterity Board 3-D Motion Analysis EMG	2011#
Morris et al 2017 (67)	4	The effect of a Lycra compression garment on upper limb muscle activity during a functional task: a student project	Upper Limb	Same subject cross over design	19	Surface electromyography (EMG) applied to biceps, triceps and common wrist/finger extensors Lycra garment may improve proximal muscle activation and that static positional changes may not be maintained during task performance.	2017
National Horizon (68)	4	Lycra garments for cerebral palsy and movement disorders	Upper limb and Trunk	Review of known knowledge		Government Review	2002
Preisler, B & Eve, K	4	The treatment of Young Children with Low Truncal Tone as a Result of a Result of Various Diagnoses, with Dynamic GPS Soft Orthoses- Case studies	Trunk	Review 18 months – 3 years of age	3	Conference Abstract Improved trunk stability Functional changes	2010#
Sawle et al 2010	4	Developing a dynamic Elastomeric Fabric Orthosis to Manage Pregnancy- Induced Pelvic Pain	Low Trunk	Single Case Review	1	Conference Abstract Subjective improved pain management and function	2010#
Sawle,L	4	Evaluation of a customised dynamic elastomeric fabric orthosis (DEFO) for aiding return to sport afer lumbopelvic injury	Lumbopelvic	AB design	5	Pain (Numerical Rating Scale (NRS) Maximal resisted hip adduction/squeeze test Training diary	2011#

Sawle et al 2013 (17)	4	The development and evaluation of a dynamic orthosis (shorts) to aid in the management of athletic pelvic /groin pain	Shorts	Single case Discussion Article	8	Pain scores VAS	2013#
Shaari et al 2015(69)	4	The Immediate Effects of Lycra Fabric Soft Orthosis (LFSO) Garment on Trunk and Pelvis Kinematic during Sit to Stand (STS) on a Healthy Child	Suit	Single case using 3D Gait Analysis to measure Kinematic	1	Changes in STS movement pattern spine and pelvis in Range of movement.	2015
Hassan,A & Snowdon,N	4	Clinicians' perceptions and experiences of using dynamic elastomeric fibre orthoses with patients with neurological disorders	All variants	Qualitative Semi-structured interview	7	Interviews	2015
Takeuchi,C	4	Effect of Dynamic Elastomeric Fabric Ankle Foot Orthoses for Paralytic Foot drop in Paediatric Siblings with Charcot- Marie- Tooth Disease	Foot	ABC design	2	Gait Analysis	2011#
Wynne et al 2010 (37)	4	Acceptance and Outcomes of the Dynamic Elastomeric Fabric Wrist Hand Orthosis in the Paediatric Population.	Upper Limb	Quality Audit and review of trends in wearer profile, treatment plan, follow up schedules and outcomes	Not stated	Conference Abstract General Review	2010#

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#### Type and quality of evidence

1++ High quality meta-analyses, systematic reviews of RCTs, or RCTs (including cluster RCTs) with a very low risk of bias

1+ Well conducted meta-analyses, systematic reviews of RCTs, or RCTs (including cluster RCTs) with a low risk of bias

1– Meta-analyses, systematic reviews of RCTs, or RCTs (including cluster RCTs) with a high risk of bias

2++ High quality systematic reviews of these types of studies, or individual, non-RCTs, case-control studies, cohort studies, CBA studies, ITS, and correlation studies with a very low risk of confounding, bias or chance and a high probability that the relationship is causal

2+ Well conducted non-RCTs, case-control studies, cohort studies, CBA studies, ITS and correlation studies with a low risk of confounding, bias or chance and a moderate probability that the relationship is causal

2– Non-RCTs, case-control studies, cohort studies, CBA studies, ITS and correlation studies with a high risk – or chance – of confounding bias, and a significant risk that the relationship is not causal

3 Non-analytic studies (for example, case reports, case series)

4 Expert opinion, formal consensus

NB: for policy interventions, then CBA can be awarded level 1 evidence.

*Nice et al March 2006*