

Breathing

Typical Development	Deficits & Compensations	How the Surestep TLSO helps
<ul style="list-style-type: none"> Babies are diaphragmatic breathers Breathing mechanics mature along with changes in the chest wall, increases in postural control and gross motor skill development Activation of intercostals and abdominals allow diaphragm to become postural control muscle in addition to a respiratory muscle 	<ul style="list-style-type: none"> Asymmetrical diaphragmatic function Asymmetrical posture Continued diaphragmatic breathing Poor pressure regulation Vision deficits Breath-holding during activities of high postural demand Co-activation of muscles 	<ul style="list-style-type: none"> Creates more symmetrical alignment & posture Breathing modifications allow tri-planar breathing Circumferential compression creates intracavitary pressure Reduce need for breath-holding (by improving postural control)

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Current Connections	Making New Connections
<p>Poor inputs affect the ability to have adequate variability and practice, which affect breathing, postural control & motor skills. As kids get older & grow, those outputs will continue to affect bony alignment, length-tension relationships & muscle balance. These will all affect their ability to participate and function in their world.</p>	<p>We can make new connections by working on breathing mechanics & helping kids have more symmetrical weight shifts and postural control. To re-write their use history and produce more efficient outputs, they will need lots of variable practice.</p>

Gait

Typical Development	Deficits & Compensations	How the Surestep TLSO helps
<ul style="list-style-type: none"> Typical gross motor development on the floor in infancy provides the necessary practice & variability in weight shifts for gait. Consistent heel strike emerges after 5-8 months of independent walking experience Reciprocal arm swing & shoulder/pelvic disassociation with 2 years of walking experience Falling, practice & variability are key to learning to walk Intra-abdominal pressure is connected to increased hip extensor torque 	<ul style="list-style-type: none"> Kids with CP have weakness, poor motor control and trunk movement Lack of reciprocal arm swing & shoulder/pelvis disassociation More global balance strategies Lack functional rotation of the trunk Tri-planar deformities of pelvis, hips, knees & ankles Co-contractions, lack of muscle balance and poor length-tension relationships 	<ul style="list-style-type: none"> Improved spinal alignment (head over pelvis) helps improve overall trunk alignment and functional movement of limbs for ambulation Circumferential compression creates intracavitary pressure, allowing for more force production in limbs Reduce need for breath-holding (by improving postural control) Improve proprioceptive input, allowing him to have more variability in weight shifts Breathing modifications allow tri-planar breathing to keep up with respiratory demands

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Current Connections	Making New Connections
<p>Poor inputs affect the ability to have adequate variability and practice, which affect postural control & motor skills, leading to asymmetrical postural strategy. Immature breathing patterns affect a child's ability to generate, maintain & regulate pressures, which affect their ability to ambulate efficiently. As kids get older & grow, those outputs will continue to affect bony alignment, proprioception, and muscle balance. With inadequate intervention, this will all affect their ability to participate and function in their world.</p>	<p>We can make new connections by working on floor mobility, transitional skills and breathing mechanics. To re-write use history and produce more efficient outputs, kids will need lots of variable practice in new positions.</p>

Gross Motor Skills

Typical Development	Deficits & Compensations	How the Surestep TLSO helps
<ul style="list-style-type: none"> • Early symmetry in movement elicits symmetrical sensory input, which increases motor control • Variability in all 3 planes of motion is required for motor skill acquisition • Gross motor skill development drives chest wall development & breathing 	<ul style="list-style-type: none"> • Asymmetrical motor strategies • Developmental delays • Co-contractions to maintain upright posture • W-sitting • Decreased proprioception • Decreased variability in movement strategies 	<ul style="list-style-type: none"> • Improve symmetry in alignment & dynamic posture, allowing for increased motor control • Reduce need for breath-holding (by improving postural control) • Improved spinal alignment (head over pelvis) helps improve overall trunk alignment for functional tasks • Circumferential compression creates intracavitary pressure, allowing for more force production in limbs • Improve proprioceptive input, allowing him to have more variability in weight shifts • Breathing modifications allow tri-planar breathing to keep up with respiratory demands

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Current Connections	Making New Connections
<p>Poor inputs affect the ability to have adequate variability and practice, which affect postural control & motor skills development. This leads to poor alignment, which limits rib & chest excursion for more efficient breathing. Poor pressure regulation and lack of tri-planar trunk control can limit further gross motor skill development. As kids get older & grow, those outputs will continue to affect bony alignment, proprioception, and muscle balance. With inadequate intervention, this will all affect their ability to participate and function in their world.</p>	<p>We can make new connections by working on floor mobility, transitional skills and breathing mechanics. Increasing proprioception can help with motor planning & execution. To re-write use history and produce more efficient outputs, kids will need lots of variable practice in new positions.</p>

Lower Extremity Alignment

Typical Development	Deficits & Compensations	How the Surestep TLSO helps
<ul style="list-style-type: none"> • Pronation is typical in infants, toddlers & early walkers and should decrease with age & practice • Hip & knee flexion is typical in early walkers and should decrease with age & practice • As toddlers increase tri-planar dynamic control of the trunk, they gain better control of their lower extremities • Trunk pressure & alignment drives lower extremity alignment due to increased muscle control (eccentric & concentric) 	<ul style="list-style-type: none"> • Decreased sensory input • Lack of lateral weight shifts • Excessive pronation • Excessive knee flexion or hyperextension • Excessive genu valgum • Rotatory deformities of the hip • Anterior or posterior pelvic tilt • Breath-holding • Co-contractions • Inadequate variability • Range of motion deficits • Maintain feet outside knees & hips for stability in sitting, standing & walking 	<ul style="list-style-type: none"> • Improve symmetry in alignment & dynamic posture • Improved spinal alignment (head over pelvis) helps improve tri-planar lower extremity alignment (and reduces the risk of developing bony deformities & range of motion deficits) • Circumferential compression creates intracavitary pressure, better muscle control and alignment • Improves proprioceptive input, allowing him to have more variability in weight shifts • Breathing modifications allow tri-planar breathing to keep up with respiratory demands

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Current Connections	Making New Connections
<p>Poor inputs affect the ability to have adequate variability and practice, which affect postural control & motor skills development. This leads to poor lower extremity alignment and reliance on the trunk for stability and balance reactions. As kids get older & grow, those outputs will continue to affect lower extremity bony alignment, proprioception, and muscle balance. With inadequate intervention, this will all affect their ability to participate and function in their world.</p>	<p>We can make new connections by working on floor mobility, transitional skills and breathing mechanics. Increasing trunk stability, pressure regulation and proprioception can help improve movement strategies, leading to improved lower extremity alignment. To re-write use history and produce more efficient outputs, kids will need lots of variable practice in new positions.</p>

Other: Fine Motor, Speech & Swallowing

Typical Development	Deficits & Compensations	How the Surestep TLSO helps
<ul style="list-style-type: none"> • Trunk pressure is required for reaching and other fine motor skills • Coordinated movement of the eyes leads to development of vision necessary for fine motor tasks • Symmetrical trunk alignment & tri-planar control play a role in development of fine motor skills • Stabilization of the head over the pelvis helps with swallowing & speech • Trunk pressure helps with vocal cord control, speech production and endurance 	<ul style="list-style-type: none"> • W-sitting • Prop-sitting reduces ability to functionally use arms for play • Difficulty in voicing • Poor swallowing & secretion control • Decreased talking while performing more demanding postural tasks 	<ul style="list-style-type: none"> • Improved spinal alignment (head over pelvis) helps improve reaching tasks, better alignment for swallowing and improved vision development • Circumferential compression creates intracavitary pressure, allowing for better voice production and secretion control • Improves proprioceptive input, allowing him to have more variability in weight shifts • Breathing modifications allow tri-planar breathing to keep up with respiratory demands • Reduced need for breath-holding (by improving postural control), allowing for improved "other" skills

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Current Connections	Making New Connections
<p>Poor inputs affect the ability to have adequate variability and practice, which affect postural control & fine motor skills development. This leads to decreased speech development, feeding difficulties and poor secretion control. As kids get older & grow, those outputs will continue to affect these other areas of development. With inadequate intervention, this will all affect their ability to participate and function in their world.</p>	<p>We can make new connections by working on head and trunk alignment and stability. Increasing trunk stability, pressure regulation and proprioception can help improve speech production, secretion control & fine motor skills. To re-write use history and produce more efficient outputs, kids will need lots of variable practice in new positions.</p>

Postural Control

Typical Development	Deficits & Compensations	How the Surestep TLSO helps
<ul style="list-style-type: none"> • The muscles that help with postural control are also respiratory muscles. Breathing will always win. • Infants develop sagittal plane stability of the head, then lateral flexion of trunk, shoulders and hips, then transverse plane stability of the trunk • Adequate tri-planar control of head over the pelvis leads to tri-planar control of arms & legs • Proprioception and variability in all 3 planes of motion are required for postural control development • Postural control development is a limiting factor for advanced motor skills 	<ul style="list-style-type: none"> • Poor trunk alignment • Asymmetrical posture • Decreased weight shifts • Co-contractions • Breath-holding • W-sitting • Lack of variable movements • Immature breathing patterns • Poor balance • Poor proprioception 	<ul style="list-style-type: none"> • Improved spinal alignment (head over pelvis) helps improve dynamic postural control • Circumferential compression creates intracavitary pressure, allowing more efficient movement patterns • Improves proprioceptive input, allowing improved motor control • Breathing modifications allow tri-planar breathing, allowing diaphragm to assist in postural control • Reduced need for breath-holding (by improving postural control)

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Current Connections	Making New Connections
<p>Poor inputs affect the ability to have adequate tri-planar variability and practice, which affect development of more advanced postural strategies. This leads to delayed motor skill development, inefficient breathing, and poor muscle balance. As kids get older & grow, those outputs will continue to affect postural control development, as breathing will always win. With inadequate intervention, this will all affect their ability to participate and function in their world.</p>	<p>We can make new connections by working on floor mobility, transitional skills and breathing mechanics. Increasing trunk stability, pressure regulation and proprioception can help improve postural control development. To re-write use history and produce more efficient outputs, kids will need lots of variable practice in new positions.</p>

Spinal Alignment

Typical Development	Deficits & Compensations	How the Surestep TLSO helps
<ul style="list-style-type: none"> • Symmetrical alignment & weight shifts are needed for symmetrical growth • Tri-planar mobility & stability drives typical spinal alignment • Spinal alignment helps with the ability to produce, maintain, and regulate pressures • Spinal alignment affects breathing mechanics • Spinal alignment has a direct effect on upper & lower extremity alignment 	<ul style="list-style-type: none"> • Thoracic hyper-kyphosis unlocks spine, allowing for neuromuscular scoliosis to develop (typical c-shaped curve) • Increased asymmetrical loading increases risk of structural curve formation • Poor breathing mechanics & pressure regulation • Poor lower extremity alignment • Decreased variability • Decreased vision & social participation 	<ul style="list-style-type: none"> • Improved spinal alignment (head over pelvis) helps reduce effects of gravity on the spine and slows progression of neuromuscular scoliosis • Circumferential compression creates intracavitary pressure, allowing better spinal alignment • Improves proprioceptive input, allowing him to have more variability in weight shifts and more functional movement of the trunk and extremities • Breathing modifications allow tri-planar breathing to help facilitate chest wall development

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Current Connections	Making New Connections
<p>Poor inputs affect the ability to have adequate variability and practice, which affect postural control & motor skill development. This leads to poor spinal alignment, length-tension relationships & muscle balance. As kids get older & grow, those outputs will continue to affect spinal alignment & breathing. With inadequate intervention, this will all affect their ability to participate and function in their world.</p>	<p>We can make new connections by working on head and trunk alignment and stability. Increasing trunk stability, pressure regulation and proprioception can help improve spinal alignment & breathing. To re-write use history and produce more efficient outputs, kids will need lots of variable practice in new positions.</p>