Targeting Balance and Increasing Intentionality of Motor Movements, presented in Partnership with Thieme Publishers

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- - [Announcer] All right, everyone, welcome to our webinar today, Targeting Balance and Increasing Intentionality of Motor Movements. This is part two of our four part series on incorporating movement to comprehensively treat preschoolers with autism spectrum disorders. And the series is presented in partnership between SpeechPathology.com and Thieme Publishers. Our presenter today is Kelly Vess, MA, CCC-SLP. Kelly has over 16 years of experience, specializing in preschool age intervention. She researches and develops evidence-based assessment and treatment practices that focus on optimizing therapeutic gains within realistic case load and time demands. Kelly is also a clinical instructor for Wayne State and Eastern Michigan universities, and in collaboration with Wayne State University's SLP program, she develops and directs evidence-based intervention programs for diverse populations of preschoolers. Kelly Vess is also the author of Speech Sound Disorders: Comprehensive Evaluation and Treatment from Thieme Publishers. Kelly, I'd like to welcome you and I'm gonna turn over the floor to you.

- Okay, thank you. I am Kelly Vess, I am a full time speech language pathologist in Barnes Early Childhood Center at the preschool level. I'm also author of Speech Sound Disorders: Comprehensive Evaluation and Treatment for Thieme Publishers in which I receive royalties for book sales. This book is expected to be released in the spring of 2020. I am also, I also received an honorarium for this presentation. Because autism spectrum disorder is a multifaceted impairment, there was a team of contributors from multiple disciplines that contributed to this webinar series. And those contributors include occupational therapist Joseph Evens, occupational therapist Dianne Stall, physical therapist Jordan Kondrat, early childhood researcher Julia Smith, early childhood preschool teacher Dorothy Heitjan, certified musical therapist Heather Dean, behavioral specialist Susan Lucchese, social worker Edward Trainer, and most importantly, this would not be possible without the amazing collaboration of Wayne

State University clinical director Karen O'Leary. The movement activities were developed equally by Wayne State University speech language pathology graduate students Katelyn Adams, Holly Flynn, and Torey McNally, alongside with myself. Katelyn, Holly, and Torey will be featured in the videos in this webinar series. So we completed the first webinar, Joint Attention and Executive Function. You're going to see in the remaining webinars more examples of joint attention and executive function being improved upon through movement activities and therapy as we progress in this series. This series is laid out in a left to right fashion, from more foundational skills developing first to more complex skills developing later. Notice we're going to get into the speech and language processing until the very end in the fourth webinar seminar, web seminar. Today, we're looking at targeting balance to increase proprioception, which is the child's awareness in space, and increasing intentionality of motor movements.

There are two series goals. One that participants will be able to describe evidence-based practices that comprehensively treat preschoolers with autism spectrum disorder by addressing motor skill development within therapy sessions. Secondly, the participants will be able to describe task-oriented movement activities to improve motor skills, joint attention, and executive function skills within therapy sessions. So this session I'm very excited about. This is the session where the child gains, develops awareness of where they are in space as they gain proprioception. And they also develop voluntary motor movement. The quote that comes to mind is the Descartes quote, I think, therefore I am. The child knows that the child exists. It's a very joyful moment in which the child realizes they have control over their bodies, they have control over their environment, and they have control over their body and interacting with others. I'm very excited about this presentation, and I'm very excited about all of the children who are going to benefit as they have their I think, therefore I am moments when they're working with you. So after this course, participants will be able to describe how motor, balance, postural control, and proprioception challenges

impact preschoolers with autism spectrum disorder. They'll be able to describe how to identify hypotonia, weakness, in the core and its impact on proximal and distal movements in the body, and identify evidence-based strategies to improve postural tone in therapy. Lastly, they'll be able to describe the impact of repetitive, restrictive behaviors on children with autism spectrum disorder and identify skills that replace restrictive, repetitive behaviors with intentional movements. So our meeting began with a research review of researchers that is regarding proprioception and the development of intentional motor movement. Children with autism spectrum disorder are more likely to present with delayed early motor development that often presents before 12 months of age. Recent research indicates that as early as six months of age, these children present with delays, are likely to present with delays in fine motor development. Children with autism spectrum disorder are more likely to present with hypotonia, which is low muscle tone in the trunk, the proximal muscles to the trunk, and the distal muscles, the distant muscles from the trunk. They're also more likely to present with increased perception to pain and touch. So the tag on the back of the shirt is likely to feel like sandpaper for a child on the autism spectrum disorder. And you providing light hand over hand guidance could feel like you're gripping their hands with great, great strength.

They're also likely to present with poor motor skills, it's estimated that 80% of children with autism spectrum disorder have a movement impairment. And poor motor skills is then related to increased severity of autism spectrum disorder globally. Children with autism spectrum disorder are also more likely to present with poor balance and postural control. So poor balance and postural control would affect their proprioception, knowing where they are in space. If a child does not know where the child is in space, when a child engages in a restrictive, repetitive behavior, this is something the child can perceive, because this is something the child has done a million times. So do you understand, when you have sensory overload and you're taking all of this extra visual input in, extra auditory input in, overload. And you don't

know where you are in space. This you've done a million times, the hand flap, this you can perceive. So postural instability is also linked, they're more likely to present with postural instability, which is linked to low tone, visual processing deficit, visual fixation difficulties, and proprioception deficits. They're more likely to present with poor motor skills, which correlates to poor socialization, poor cognition, and poor language skills. They're more likely to present with poor motor skills and poor postural control, which correlates to more restrictive, repetitive behaviors. So going back to the hand flapping. If they do not know how to voluntarily move their body in space, they're going to go with what they know, something that they've done a million times. They're going to go to this behavior. This they can do and they can reliably do it. It's developed an automaticity, the neuronal pathway has, because it's been done so frequently. So in this dark, dark place of how difficult the motor, how the motor skills would present such difficulty globally for these children, the good news is that we can make a difference, and that's why we're here. And we need to focus on these motor skills, because that is the foundation that we need to develop in order to improve communication skills. So research indicates that the development of proprioception, postural control, balance, and intentionality are foundational skills for the development of social, cognitive, and linguistic skills.

Okay, we're gonna talk about restrictive, repetitive behaviors. Now, restrictive, repetitive behaviors with objects or the body, ritualistic behaviors, or irregular responses to sensory stimuli. Restrictive, repetitive behaviors impede joint attention. Now, I wanna talk about restrictive, repetitive behaviors and why I think of them as being really, really bad for the brain. If a child is engaged in a restrictive, repetitive behavior at the preschool level, such as this, we're gonna go back to the hand flapping, they're visually fixated on their hands flapping, they're missing out on perceiving all of this. Everything else in their environment, the social interaction from others, this is blocking that. And the reason that's so important, I mean, this is such a big deal and so so bad, is because preschoolers are producing the neuronal

connections at over a million times a second. And everything they're experiencing is new. And new experiences create neuronal connections. So when you're experiencing something for the first, perceiving something for the first time or the first times, your brain says, we need a neuronal connection for this and it creates a neuronal connection. When you are perceiving, visually fixated on the same movement, that neuronal connection is made. And it's simply becoming more and more automatic, meaning you don't even have to pay attention to what you're doing, you can really check out, it's automatic. So another reason restrictive, repetitive behaviors are really, really bad for the brain is because the child is engaging in the same movement. So instead of the child engaging in new movements, such as pointing, such as showing, such as waving bye bye, which creates new neuronal connections, the child's engaging in a movement that the child knows how to do, that the child can do automatically, that the child's done a million times. That means neuronal connections are not being created, it's just becoming more automatic. So that's why restrictive, repetitive behaviors I consider to be poison to the brain. Because if you do not use it, you lose it, brain, the brain is being underused. The child is not perceiving the world around them, because this is blocking it. The child is not engaging in new motor movements, in more complex motor movements, because this is preventing the child from doing so. Now, by no means am I advocating that you were to lay your hands on a child and try to prevent them from engaging in restrictive, repetitive behaviors, or punish the child or anything of that nature.

What I'm gonna say is this is the poison for the brain, but we have an antidote. And the antidote is to engage the child in purposeful, meaningful movement. If the child is engaging in purposeful, meaningful movement, the child cannot engage in restrictive, repetitive behaviors. These behaviors are incompatible. So we want to engage these children in purposeful movement. So when the children are engaged in purposeful, meaningful movement, they cannot engage in restrictive, repetitive behaviors. And when their bodies are checked in, their mind will be checked in as well. The mind and

the body are interconnected. So that is why we're here. We're here to check these children in. We're gonna check their bodies in and their minds are gonna be checked in as well by giving them meaningful task to perform purposeful movements. This is the antidote to the poison which is restrictive, repetitive behaviors. So we're now gonna talk about cortisol and how cortisol relates to restrictive, repetitive behaviors. Now, cortisol gets a really bad rep. When you think of cortisol, you probably think of, oh, that's the stress hormone that causes excess belly fat, that's the stress hormone that causes adrenal fatigue. Actually, cortisol is very good in moderate amounts. So cortisol is often called the fight or flight, fight or flight stress hormone. It is a steroid hormone made in the adrenal glands. And most bodily cells have cortisol receptors. Therefore, it serves multiple purposes, one of which is memory formulation. A moderate amount of cortisol increases the neuronal synapses and dendrite development. So how do we get a moderate amount of cortisol so we can create optimal learning conditions for the preschoolers that we work with? Let's look at the research. Children engaging in increased physical activity produce healthy cortisol levels, which positively impact cognition. Conversely, a low amount of physical activity results in decreased cortisol levels, which negatively impact cognition. Too much or too little cortisol can result in a hyperarousal or a hypoarousal state, which impedes motor, social-emotional, and cognitive engagement. So if we want to challenge these children in our speech and language therapy sessions, which we do, because challenge creates change in the brain, we are going to want to have them in an alert, ready to learn state with a medium cortisol level.

And that's what movement provides for us. We have the movement activity that provides an excellent cortisol level, so we can challenge these children with our speech and language therapy targets. And challenge equals change in the brain. So let's look at cortisol levels. Restrictive, repetitive behaviors are more likely to occur when a child is hypo-aroused with a lack of engagement, a low cortisol level. And when I see this state, this is an example of it. I'm working in a group and I'm going one child at a time,

taking turns with the child in the group. And the other child is sitting and the child is not non-verbally, is not verbally or non-verbally communicating, the child is simply passively sitting, okay. So at that time, I'm likely to see, I'll bring back the hand flapping behavior, the child is in a state of hypoarousal, a low cortisol level, he's sitting, he's sedentary, he's not participating, he's not checked in. But conversely, restrictive, repetitive behaviors are more likely to occur when a child is in a hyper-aroused state, in an overstimulated state. So a child that loves animals, when the child sees me bring out the bin of animals, the child's gonna flap, the child's very very excited, he's hyper-aroused. When I take those animals and it's time to clean up and I put those animals away, once again, the child's flapping, because the child's hyper-aroused. We want the child, the restrictive, repetitive behaviors are less likely to occur when a child is in alert, engaged state, medium cortisol level, which is what movement provides for us. So in all of the video clips that I show you, the eight video clips in this webinar series, I want you to note that children do not engage in restrictive, repetitive behaviors when they are engaged in the movement activity. You will notice they engage in it when they sit down and they're not non-verbally or verbally participating. That's when you're gonna see the restrictive, repetitive behaviors. We wanna check these children, and that's the antidote. So let's look at postural control. We're gonna focus on the foundation to develop movement and develop communication. Postural control is maintaining, achieving, or restoring a controlled state of balance during any posture or activity. Poor postural control negatively impacts proximal and distal movements. So muscular tone, muscular contraction, when a muscle is in a resting state, muscular tone helps our bodies maintain postural control.

When we see children with poor muscular contraction, you're gonna see behaviors such as a side to side, it's called a postural sway. So they are fighting, they're using their muscles to keep their posture erect, to maintain a standing position. So this is poor muscular tone. You're also gonna see these children with a wide base, when they're walking, it's almost like the Eiffel Tower. They have a wide, their feet are far

apart when they're walking. And that widening of the foundation base is to adapt for the weakness they have in keeping themselves erect, the weakness in muscular tone, the adaptation is to spread the legs apart to help support posture. So proprioception, the body's ability to sense stimuli regarding the body's position, motion, and equilibrium. Proprioception helps our bodies maintain postural control. Let me give you some common examples at the preschool level of children who are exhibiting poor proprioception. The child is walking along and holding onto the wall, as they walk by, hitting it . That's this child does not know where the child's in space, holding onto the wall helps out. The child is bumping into things and bumping into people. Another example is the child is doing things with too much strength, they're overshooting, so for instance, when they put something down, it's almost like they're slamming it down. When they're drawing with a marker, they're gripping on really really really heavy and they're pressing on the paper really really really hard to get that feedback. So when they're sitting down, they plop down onto the chairs instead of a controlled sitting, okay. The vestibular system. The vestibular system precedes the body's orientation and it orients the body to gravity, controls postural reactions, and stabilizes the body in space. Changes in head position impact balance and movement, and information is collected in the inner ear and processed in the cerebellum. So what I would like you to do is I want you to get an idea of what it feels like to have poor postural control. Okay, because so many of our children do. So we need to have an idea where are they coming from if we wanna effectively reach them and teach them and improve their social and their communication skills. So I'm gonna ask you to physically engage in an activity. And if you have any medical conditions whatsoever, if you have any issues with balance, just listen along and visualize as I talk you through it.

I want you to have a steady surface nearby, because you will definitely lose your balance, that's part of the activity, so please be very very careful and always just listen and visualize it if you don't feel comfortable engaging in an activity in which you will lose your balance. So to get an idea, let's, I'm going to ask you to bend forward at the

waist, bend forward at the waist, and just let your hands hang like a raggedy doll and your head hang like a raggedy doll. Just let the torso hang there, okay, you're bending forward at the waist, letting your torso hang there. What I'd like you to do now is close your eyes. And now what I'd like you to is keeping your knees together, bring one foot back, you're standing on one leg. So you're standing on one leg, eyes are closed, you're hanging forward. Now what I'd like you to do is take one of your hands, keep your eyes closed, and point to the ceiling. Okay. Now I want you, keeping your eyes closed, turn your head and point, turn your head to exactly where your finger is pointing. Bring the head in that direction with your eyes closed exactly to where your finger is pointing. Okay. Great, now you can just say, look at that. Okay. Now be very careful coming out of this position, I don't want you to fall. Now I want you to think about what did that feel like. Are you dizzy? Do you feel a little dizzy? Did you feel your leg oscillating as it moves left to right to keep your balance? Which is how many of the children are 24/7 when they're seated and when they're standing. Did you feel like this is ridiculous when I've asked you to point to the ceiling and to turn your head in that direction as well, keeping your eyes closed, and to say look at that. Was this just, this is chaos. And you were probably in a fight or flight mode in which you were mentally overstimulated, because you're thinking, I'm gonna fall and I'm gonna hurt myself. So I want you to get an idea of what it's like to have poor postural control, because postural control needs to develop before anything else, that's the foundation. So before we can work on gross motor movements, we need to have postural control. Postural control first. Gross motor movements next. Fine motor movements after that. Fingers, pointing, eye contact, lips, tongues, talking, speech, that comes last. We care about the core. It's worth our time to help develop the core.

We cannot work on speech and pointing and eye contact if you do not have a strong foundation. So the first video we're going to look at is of zoologist Davey fully engaged in the interaction. And I'm going to talk over the video, and I'm gonna tell you some things, a little background information, okay. This child Davey has poor fine motor

coordination and poor fine motor skills, okay. So this is, it's, I wanna show you how perception is related to production, okay. Davey is aversive to touch, he's aversive to textures. So by not participating in a variety of activities due to aversion sense of perception, he has weakness in production. So the two, from a lack of experience. So the two are very much interrelated, perception and production, okay. So avoiding all of these experiences means you will have delay in the fine motor coordination and the fine motor production, okay. Let's look at this video clip. This is zoologist, before I look at it, I actually want to go into task-oriented intervention a bit more, excuse me. What you're seeing in this video clip is called task-oriented intervention. And task-oriented intervention is exactly how it sounds. The child has an important task to accomplish. The child has a job to do. And this child's job is that he is a zoologist, okay. And what we're gonna do is we're gonna create an activity that challenges the child, that's the child's plus one, that's the child's challenging point, that's that just right challenge that is within the child's reach, but the child is going to have to struggle to accomplish this task. And then we're going to step back and the child is going to independently and creatively struggle and accomplish that task. And in doing so, the child is going to improve their motor skills. So what we're doing is we're providing a meaningful opportunity that's challenging and worth a struggle and stepping back. Children are very intelligent beings, they know their body better than you. Everyone has a different neuromuscular history. What we need to do is challenge the children and give them something meaningful, worth the struggle. So we also, as you're gonna see with this zoologist, he's going to have to cross the river rocks and there's gonna be crocodiles in the water. He's gonna have to climb the mountain and he's going to have to go down the waterfall and then he's gonna have to go to the safari you're gonna see and he's gonna have to save the zoo animal, put the zoo animal back in the zoo. And then he gets to go home. But think about those engagements, that's joint attention, extended joint attention. It's extended joint attention in which the therapist is enthusiastically engaging in the child's activity with the child by talking him through all of the play experiences and the imagination that the child's experiencing with

enthusiasm. And that's referred to as high states of joint engagement. That's the best kind of joint attention for a child. So let's look at the video clip, I'll point at, I'll pause it to point out some things.

- [Holly] Animals. Okay, go across the river. Up up, up.

- So, oh, I'm sorry about that, I meant to pause that. I'm gonna go back to that. So notice how the child, he, the child touches on the side of the zoo, I call it the zoo, and he touches on the side, he has poor proprioception, you're going to notice. In that he needs to hold onto something to know where he is in space. He's gonna hold the table, the box there, what else can I hold onto?

- [Holly] Up, up, up.

- There's some gravitational insecurity, he's a little bit scared of going up, he's scared of going up on those river rocks. Look how slowly he climbs.

- [Holly] Ooh, down, slide. Wow. Whoa. Let me see you.

- Now, he has a nice grasp of the giraffe. And he puts it in the zoo. Now, I want you to notice, when he comes back to his chair, you're going to see restrictive, repetitive behaviors. You're going to see him sliding his hand back and forth on the chair.

- [Holly] Here, sweetie. Sitting on the right chair.

- Restrictive, repetitive behaviors occur when the child is not participating in intentional movement.

- [Holly] Animals.

- So once again, this is his weakness, is fine motor control, fine motor coordination.

- [Holly] Look at animals.

- Davey is two years, 11 months, by the way.

- [Holly] Up to the green.

- You're gonna notice he does it more efficiently this time, and that's how task-oriented intervention works, through repeated meaningful experiences, through practice, the child becomes more efficient. Now, at the end of the tape, you're gonna see that moment where the child says I exist, I want you to look at his face when he gets to the top of the slide, right here.

- [Holly] Let's go down the slide.

- That's it. He realizes where he is in space, and he realizes that he has voluntary control over his body and that he has control over his environment. Had I been holding his hand through the river rocks, that probably wouldn't have happened. So we look at gross motor, and that refers to large motor movements of the body largely controlled by the proximal muscles. Those are movements like his walking, his walking was really good, he had strong gross motor control. When we look at fine motor, it refers to the motor movements of the body driven by the distal muscles. He did not have good fine motor control, as you saw with the sentence strip. When we look at bilateral coordination, bilateral coordination refers to the ability to coordinate both sides of the body at the same time in a controlled and organized manner. So for instance, in symmetrical coordination, both hands or our feet are performing the same motion, so

you're clapping your hands, you're jumping, they're doing the exact same thing on either side of the body.

I think it's very important for you to pay attention to these types of areas of coordination, because oftentimes, when I work with children with autism spectrum disorder, I'll have them do something like, let's raise your hands up in the air, you know, woo, you know, high five, and only one hand will come up. So I notice there's a lack of symmetrical coordination, and that's something that I'm gonna need to focus on, even though it might come naturally for most children. Reciprocal coordination. Both sides of the body are performing the motion reciprocally. So that is what we just saw in the clip with Davey when he was climbing. And what I liked about that is you saw he did it very slowly going up the slide. And I think that's wonderful, because he was checked in and he was paying attention and he was doing the motor planning and programming in his mind to figure out how to get up that slide. He was at his struggle point. And the challenge always creates change in the brain. So he was challenging himself. Asymmetrical coordination is even more complex. That's when both sides are working together, but they're performing separate tasks with one side leading and the other side supporting. So a child could be cutting a circle out of a paper, and one is stabilizing the paper and moving it along and the other is snipping. The child could be kicking, in which one is providing a structural state of balance and the other one is projecting the ball forward. This is more complex. So we went through this just now, what I saw was proprioception difficulties. So he had to hang on to something to know where he was in space. Difficulty with balance. With the river rocks, he just gave it a great tap on them, on the river rocks, which was great, 'cause that's his struggle point, he was challenging himself. Muscular tone looked good to me. He did, he had great posture, he had great gross motor movements, you saw he went on the slide, he independently squatted up off the slide. And his fine motor skills, like I said, I think that was his weakness. And the weakness I saw with the fine motor skills is I think related to the fact that he has touch aversion, which has limited his number of experiences

using the fine motor muscles. And his reciprocal coordination was very good climbing up the stairs, it was slow and he was giving 100%.

So to further prevent restrictive, repetitive behaviors, ask, how can we totally engage the child? So when it comes to the mind, we wanna challenge the child with a meaningful task that requires executive function, maintained attention, and joint attention to complete. So what we, so we also wanna model and elicit complex language that is more advanced that the child's current level. As far as the heart is concerned, we wanna encourage the child to imitate gross, fine, and verbal actions through a most to least prompting hierarchy to exponentially increase mirror neuron development. We know that children with autism spectrum disorder have substantially less mirror neurons. But we know that, when they are imitating or engaging in motor imitation, they have double the neuronal, mirror neuron activity. So very very important, and that's why we will use a most to least prompting hierarchy, which you will see later on in the video, in the next video, to increase mirror neuron development. Enthusiastically respond to the child's behaviors as communicative to increase joint attention. Notice I said enthusiasm, not excitement. Let me give you an example of the difference. When he made vocalizations, Holly said, nice talking. She gave him that feedback, she gave him that feedback that you are talking, I don't know if you can perceive it, but you're talking and that's what we wanna hear more of and that's communication. Don't do what I did. I'm gonna tell you a fail that I did, and I don't want you to do this. I was walking up with that very same child, Davey, on the stairs, and he said up, very very clearly. And what I did is I said up. And he had what I don't wanna do, a startle reflex. And a startle reflex is in the brainstem, in which you pull the head back to protect your neck from danger and you close your eyes to protect your eyeballs. And he acted like he was electrocuted, his whole body shook, luckily, he didn't fall down the stairs, that would've been really really really bad. But what I taught him was that engaging in this new behavior is scary. And that's not all I taught him, I

communicated to him that I don't expect you to say up by making such a big deal about it.

So learn from my mistakes. I should've said, I should've said, nice talking, wow, you're talking. Okay, so now let's look at the body, encourage the child to struggle with increased levels of independence within more challenging and complex motor tasks. Provide objective and enthusiastic encouragement for the child's efforts throughout the therapy sessions. And that's what I talked about with the highest states of joint engagement. Talk about what the child is doing and talk about it enthusiastically and give it some creative imagination into their experiences. That will produce the best quality of joint attention. So when we looked at these videos, how did the therapist engage the mind? She engaged the mind by having him do the sentence strip. Now, he could've just exchanged the picture. He can do that, why are we having him do the sentence strip? We're having him do the sentence strip because that's challenging for him, and challenge creates change in the brain. As far as his heart is concerned, how does she engage him, once again, with enthusiasm, talking about his interests and his activities and using creative play and imagination. Now, notice she did not do hand over hand with motor imitation yet, because this is her first session with Davey and she hasn't built that therapeutic bond yet and he has touch aversion, he does not like his hands being touched. Later on when you see Davey, you will see her teaching, working on motor imitation through hand over hand covering, hand over hand prompting, excuse me. So the body, it was a task oriented, he was a zoologist, he had to save the zoo animals. And it was challenging motor skills. And he did it independently and creatively, and he was more efficient the second time around. And when did Davey demonstrate restrictive, repetitive behaviors in this digital clip? When he was seated and when he was not, when he was not verbally or non-verbally participating. That's when he was rubbing the chair. Okay. Now, incorporating balance to efficiently improve strength and proprioception. We can use against gravity movements, which is

any movement that causes a body part to move against the floor towards the ceiling, okay.

So some examples are you're walking up a ramp, you're going from the floor, you're walking up towards the ceiling. You're doing a wheel barrow on your hands, you're pushing off the floor towards the ceiling, we're using gravity to strengthen our postural control. Crab walk, in which you have your hands behind, you're walking with your torso facing the ceiling, you're pressing your torso up to the ceiling away from the floor. Climbing a slide, you're going away from the floor up to the ceiling. Throwing an object up in the air, you're going away from the floor, up to the ceiling, and jumping up, okay. So those are some examples, and you can think of, I'm sure, a lot more within our activities where we can improve strength and postural control by going against gravity. We also have gravity assisted movements, which are great, because for learning new skills, we can take away the gravity component and have the child move down from the floor, I mean, down from the ceiling, excuse me, down from the ceiling to the floor. So gravity assisted, the movement is performed in a position where gravity can assist in pulling the weight of the limb to the end of the joint's available range. So for instance, going down the ramp, jumping off a surface, throwing a ball down from a surface instead of having to throw it up in the air, descending the stairs, and pouring. So I find, with my children with muscular weakness, descending the stairs takes a fraction of the time as ascending the stairs, ascending the stairs takes about five times longer when they have muscular weakness. So when we wanna teach a new skill, we can use gravity as a prompt. And postural sway, I spoke a little about this before, that's when you're statically standing and small side to side and back and forth muscular contractions continually occur. So younger children use significantly more muscular activity to maintain a standing posture than older children do. And natural refinement occurs with experience in a posture. So once again, that postural sway, we're all doing it right now, we have oscillations in our core that you can't see to maintain your posture, your postural sway and my postural sway is refined. Younger children in the

beginning, there might be a little bit more back and forth and a little bit more of a shuffle. So incorporating balance to efficiently improve strength and proprioception. So we have something called equilibrium reactions. And this is a reaction in which the child moves the trunk and extremities to compensate for displacement in efforts to achieve balance.

An example of that is if a child is sitting like a mermaid with the feet off to the side, knees together, they're gonna have their hand down so they don't topple over, sitting like a mermaid. Another example is if a child has his knees, sitting like a mountain, knees pointing up to the ceiling. And he has his hands behind him so his torso doesn't fall back. The knees up to the ceiling, the feet flat on the floor when they're seated, making a mountain with their knees. So they'll hold, that's an equilibrium reaction to have their balance, they'll use their hands so they don't fall back. A lot of our children don't have these equilibrium reactions, they're not developed. So instead of, when they're falling, instead of holding themselves, they just plop over, okay. So instead of holding themselves behind, they just lie on their backs, okay. We wanna develop those, and we'll look at how. Protective reactions. These are reactions in response to displacement, in which the child catches the self with extremities to prevent a fall. Many of our children that we work with, when they fall, they'll just fall flat on their face, like a tree, like timber. They haven't developed protective or parachute reactions to hold out their hands and stop the fall. And so as a result, many of the children I work with, they have bruises and scratches all over their face, they just , ow, wow, that was a bad fall, that's how it is. So remember, repeated practice will develop these reactions. So this next video clip we're gonna look at is of marine biologist Ava. And Ava does not have autism spectrum disorder, Ava is a four year old girl who has Turner's syndrome. Turner's syndrome is when a girl is lacking an X chromosome or an X chromosome is partially deleted. The reason I included Ava in this series is 'cause she clearly illustrates hypotonia, which many of our children with autism spectrum disorder have. So when you're looking at Ava, first of all, just visually looking at her in

this freeze frame, you're gonna see she has a rounded back. You see her head is forward, which is bad, and the bad postural alignment. I don't know if you can see it right there, but her mouth is open at rest. And I don't know if you're going to be able to see it in the video, you might not, if you look really closely, you're gonna see scapular winging in which her scapulas protrude out of her back. Look at her shoulders, look at the lack of muscle tone in her shoulders. We're also going to see in her wrists hyperextension, they're very floppy. She doesn't have that muscular tone at rest. It's like this, okay. So we're gonna look at that, and I also want you to see this, a lack of proprioception in her mouth, and what we wanted to do is teach her to retract and protract her mouth. This is a girl who says uh, that is, that is what she can spontaneously produce, I know a lot of you work with children like this, they say uh. Our goal for her was to say, with maximum level of prompting so we can go to our highest level, because challenge equals change in the brain, is to say, can you sweep it to me please? Now, when I say that, if you notice, there is a lot of retraction of the lips and protraction of the lips. So this is something we really wanted to focus on, because she has a lot of difficulty in this area. So we're taking a child that can say uh, and we're saying, what can you do with a maximum level of support, how high can you go? And that's her highest level, that's her struggle point, that's her challenge point right there, is to say, can you sweep it to me please to receive the animals. So her task as a marine biologist is to save the animals stuck in the sandbar and put them in the aquarium. Okay. Let's look at it, hypotonia.

- [Holly] I have... Front teeth.

- [Female Speaker] Okay, are you ready? You're gonna catch a fishy, floop floop floop floop--

- So you notice how she's going slowly and exaggerated, making...

- Wee.

- There is nice motor imitation.

- [Female Speaker] Biologist. All right, what color is our fish, ready?

- [Holly] Mmm. Me.

- Notice the postural sway, she's moving back and forth 'cause she's seating, 'cause she's seated. She's struggling to keep her posture erect.

- [Holly] Okay, let's give you the animal.

- Okay. So what we're gonna see first is we're gonna see a parachute reaction, she's going to think that she's falling and she's gonna grab onto the aquarium for her life. This is the protective reaction right here. Oh, no, sorry, it's gonna be, it's going to be in the next one, I'm sorry about that. That one, this was the first step, she handed her the animal this time, it's going to get more difficult.

- [Holly] Nice talking.

- Notice she's going slowly, which allows the child time to perceive it and join in in producing it. I taught many many children who are preverbal with autism spectrum disorder to speak using this technique right here.

- It. To. Mmm.

- Normally, we do not put our hands on the child's face, we have the child put their hands on their own face. This was such an instance of a lack of proprioception in her

awareness of her lips that was so extreme that Holly makes an exception here, decides to make an exception.

- Plea. E. Ease. Let's save the animal.

- Awesome. Now, this time, we're gonna see the protective reaction, she's going to grab onto that aquarium so she doesn't fall, the parachute reaction which we want to see.

- [Holly] Can you reach it?

- Yup, there it is, don't fall. Now, this is equilibrium reaction, she's gonna reach down with one hand to save the animal from the sandbar and put the animal in the aquarium.

- [Holly] Save the animal.

- [Female Speaker] Yes, yes, yay.

- [Holly] Put him in his home. Back over the waterfall.

- So you're going to notice she's going to be more efficient the next time in saving the next animal from the sandbar. This motor imitation is so beneficial for her because of her motor weakness, so we're not only working on speech here.

- Ooo. Weep. It.

- What she's using is called dynamic tactile temporal cueing, the technique is. And it's a most to least prompting strategy in which you provide the highest level of prompting

in the initial stages and then you fade out the cues. And then the child takes on the role as teacher.

- Mmm. Me. Plea. E. Ease. Okay, let's save an animal.

- Okay, is she going to, do you see the balances? I don't know if you saw that, she's shuffling, she had a wide stance. Now watch how she independently figures this out inefficiently. Holly set the conditions, so it's the perfect struggle point, perfect challenge point. Challenge equals change in the brain, when there's challenge, the brain needs to create new neuronal connections. And we are challenging, okay, so here it is, we are using challenging activities that the cerebellum is responsible for to target the cerebellum and ignite neuronal growth in the cerebellum. So when we look at what we saw, the motor imitation, you saw that she could do motor, she was doing motor imitation and it was wonderful. But you could see, because of her hypotonia, she was approximating what Holly was doing. She didn't have the strength to imitate exactly Holly's models. Postural control, very poor postural control, you saw poor postural alignment, you saw her swaying from side to side the entire time and front and back. Muscular tone, extremely weak muscular tone, which was pervasive throughout the entire body. Protective reaction, yes. She showed two protective reactions, which is great. She did the parachute reflex, in which she grabbed onto the aquarium so she wouldn't fall. She did the equilibrium reflex, in which she put one hand on the aquarium to balance herself and reach down and bravely saved the sea animal from the sandbar. Against gravity movement, she lifted her core up to the ceiling to put the animal in the aquarium, which is strengthening. So further reflection of marine biologist Ava in video 2.2. What actions or activities supported Ava's engagement? In the mind, they were challenging skills with scaffolding. This is a girl that can say uh spontaneously. We wanted to say, what can you do if we give you a maximal level of cueing so we can ignite as much neuronal change in your brain as possible? So we chose can you sweep it to me please? And we gave her all of the cues, we slowed down the cues,

and we made the cues really big so that she could perceive them with our bodies. What about her heart? The engagement, did you see how the enthusiasm, the warm enthusiasm that was provided by Holly was incredible, facially, in her voice, in her smiles, and she was right in her face, really nice and close, and they were smiling with one another, it was absolutely wonderful and great, oh, look, we've gotta save the animal, there he is. Great enthusiasm for joint attention.

Motor imitation, super important. Motor imitation is when the child learns that, if I watch someone else do something, I can do it, it develops the mirror neurons, which is the basis of how we learn. We see someone do something, then we can do it. We're developing the mirror neurons, extremely important for all of the children with autism spectrum disorder that we work with. You haven't seen it yet with Davey, because this is his first session and he's tactile defensive. But this is crucially important, the mirror neurons. If children have well developed mirror neurons, then they can develop empathy. So when the child sees someone crying, their mirror neurons are activated, so they know, they feel like they are crying. If they see someone laughing, their mirror neurons are activated, so it's as if they experience laughter and joy. Very important, if you wanna improve these children's socialization skills, the best thing you can do is develop their motor imitation. 'Cause when they're imitating motor movements, their mirror neuron activity is double. So what visual and behavioral, we talked about that, observations indicate hypotonia in Ava? We discussed that. We also noticed behaviorally there was that shuffle, wide, you didn't see it, the wide stance when she was standing, constantly shuffle back and forth. So the takeaway tip to improve balance and intentionality tomorrow is differentially create obstacles based on the child that are challenging yet within the child's capacity. So this is very important, these two children I could see right after each other, so I'm back to back in therapy. It's okay to have the child sit down and wait, it's good, builds executive function skills. So this child, I'll put the blue stepping stones, let's call them stepping stones, right next to each other at a lower height, because that's this child's struggle point. The next child I

see in therapy, I'll pull them apart, over a feet apart, because that's this child's struggle point. So just differentially create obstacles, it only takes about two minutes, make the adjustments, okay, we need to make this lower, we need to make this higher for each child so each child can work at their struggle point. I'm gonna tell you also another, I'm gonna end on another what I've done in the past, don't do this. In the past, when a child's two years old, when they're going across an obstacle course or a balance beam, I've held out my finger. So I've held out a finger for them to hold on to. What I find is, three years later, when the child's five years old, guess who's holding my hand to cross that balance beam? And that's because this finger, what I've been doing is I've been doing the motor planning, programming, reprogramming, I've been doing that for the finger, execution and cessation of action, I've been providing that with my finger, that's one reason. And we've developed this sort of learned helplessness where it's, you need this finger and I'm doing the work, I'm the chauffer. Another thing that I've done is I'm teaching the child, when I offer my finger, I'm telling the child, you can't do this alone. So once again, it's very important to step back and let the child independently struggle. Okay. So as far as questions are concerned, you're welcome to email me, I have a link there, kellyvessslp.com, with any questions or concerns, little or big, I'm very passionate about this topic. This is, it brings me so much joy to talk to others about this, to read research and share research on this topic. It's very very important and it's really really gonna change a lot of children's lives. Thank you so much for your time, I look forward to seeing you next week.

- [Announcer] Kelly, thank you so much for another wonderful presentation. We will be looking forward to parts three and four that will be coming up over the next couple of weeks. And I just wanted to let our audience know that, if you did miss part one, that is available in our library in video format now, I believe it's course 9096, so you can look that up. But anyway, I will wrap this up here. And thanks again, Kelly, and thank you to our audience out there. I hove everybody has a great day.