Improving Complex Motor Coordination and Perception of Tactile (Touch) Stimuli, presented in Partnership with Thieme Publishers

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- [Amy] All right everybody, welcome to today's speechpathology.com webinar entitled Improving Complex Motor Coordination and Perception of Tactile Stimuli. This part three in a four-part series on incorporating movement to comprehensively treat preschoolers with autism spectrum disorders, presented in partnership with Thieme Publishers. Our presenter today and for all four parts of this series 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 caseload and time demands. Kelly is also a clinical instructor for Wayne State and Eastern Michigan universities. In collaboration with Wayne State University's SLP program, she develops and directs evidence-based intervention programs for diverse populations of preschoolers. And Kelly is also the author of "Speech Sound Disorders: "Comprehensive Evaluation and Treatment" from Thiema publishers. So Kelly, I'm gonna turn over the floor to you, welcome.

- Oh, thank you so much. I am Kelly Vess, I am a full-time employee of Barnes Early Childhood Center as a speech language pathologist servicing preschoolers. I am also author of "Speech Sound Disorders: "Comprehensive Evaluation and Treatment" for Thiema publishers, in which I received royalties for book sales. I also received an honorarium for this presentation. Because autism spectrum disorder is such a multi-faceted disorder, it really took a team approach and a team of individuals across disciplines contributed to this presentation. Those individuals are occupational therapists, Joseph Evans and Dianne Stall, physical therapist, Jordan Kondrat, early childhood researcher, Julia Smith, early Childhood preschool teacher, Dorothy Heitjan, certified music therapist, Heather Dean, behavioral specialist and my mentor, Susan Lucchese, social worker, Edward Trainor, and Wayne State University's clinical director, Karen O'Leary, who makes everything wonderful possible. The movement activities were developed by Wayne State University's speech language pathology

graduate students, Katelyn Adams, Holly Flynn, and Torey McNally, alongside myself. Katelyn, Holly, and Torey are going to be featured in this web seminar videos.

So we're in the halfway point. We finished the first seminar on Joint Attention and Executive Function. It's not going to go anywhere. You're gonna continue to see examples of this as the web seminar series progresses. We also discussed targeting balance and increasing the intentionality of motor movement. Once again, you're going to continue to see more examples of this as the series progresses. But I wanna take a step back at this point and I wanna talk about how do we fit task-oriented activities into our therapy sessions or speech and language therapy sessions. So I'm gonna give a little background information. I have a caseload of 50 preschoolers of diverse severity levels of impairment, from mild to the most severe impairment you could ever imagine. I only have 30 to 60 minutes a week to service each of these children. So what I've done is I, and this is like most speech pathologists today. The research indicates that if you're in the clinical setting or if you're in the public school setting, you have about 30 to 60 minutes a week to service your clients. So what I wanted to do is I wanted to make the most change possible in a little amount of time. So when I'm working with a child with a severe autism spectrum disorder, I have 60 minutes a week. What do I do with that 60 minutes a week? I break it into four 15-minute sessions. Why do I break it into four 15-minute sessions? Because we know that the brain, if we wanna build new neuronal pathways, the brain likes frequency. So we want to have frequency of these new behaviors to strengthen the neuronal pathways of our complex treatment targets. So that's the first thing I'm gonna do with that 60 minutes so I can have optimal change when neuroplasticity is at the greatest level at the preschool level. The second thing I do is based off of the principles of high intensity interval training for the body, but instead I'm doing high intensity interval training for the brain. I picked the most, select the most complex treatment target imaginable for this child that this child can do if I pull out all the stops and I give a maximum level of support. This is the highest level the child is capable of. You remember, change equals, challenge equals change in the

brain. So I'm gonna work at that highest level of that the child's able to perform because when I do something new that the child's not able to do, the brain says, "We need to make a neuronal connection for this", and I want the brain to make the complex neuronal connection so I'm gonna pick the most complex treatment target that this child can do if I pull out all the steps and help this child. Then I'm going to recover. After the child requests with this complex treatment target, I'm gonna recover the child in the movement activity. So the movement activity is the engaging, fun, hands on experience that the child requests accessing to. So the child can regain the child's attention level, the cortisol level from the movement, have the child nice and alert, and then I can, once again, have the child produce this complex treatment target to request. So it's just like high intensity interval training for the body, but I'm doing high intensity interval training for the brain. And then the child is going to recover and engage in a hands on and educationally rich activity so the child has maximum attention again to once again perform at the highest level.

Now, what you're seeing is only movement activities. I also do hands on educationally rich literacy activities, hands on educationally rich math activities, science activities, and art activities. My idea behind the activities and developing educationally rich activities, is that we give these children a leg up. We know that the children with communication impairments are at greater risk for academic and social challenges at school age. So that's why I incorporate educationally rich activities within my speech and language therapy sessions, because we're not treating a mouth, we're treating a child. So that's what a comprehensive approach looks like. So today, we're going into session three and session three is very important because it's improving complex motor coordination and we're beginning to get into perception of touch stimuli. The reason this is so important is because in pure socialization, peers don't communicate through words with each other as much as they communicate through movement with one another. And when peers communicate with one another, the way they enter into

each other's worlds is by doing what their peers are doing. So this is a very important topic and I'm very excited to be here with you today and share what we have found.

The series goals, one participants will be able to identify evidence-based practices that comprehensively treat preschoolers with autism spectrum disorder by addressing motor skill development within therapy sessions. Two, participants will be able to name task-oriented movement activities to improve motor skills, joint attention, and executive function skills within therapy sessions. So here we are into session three. I'm very excited for this session and the task-oriented activities that we are going to create so that these children can engage in complex motor movements. We can make a difference by providing educationally rich activities and opportunities for these children because they learn through experience.

The learning outcomes of this course. One, identify fundamental movement skills and strategies in order to improve these skills at graduated levels of independence and complexity. Two, identify difficulties in symmetry, coordination, and postural sway across sagittal, transverse and coronal anatomical planes, and describe strategies to effectively improve upon them. Three, list tactile perception challenges often present in children with autism spectrum disorder and methods to improve tactile perception. So this is the Grim research review. It's always bad news but if there's anything I can underscore here is movement matters and it globally impacts these children's lives, and it persist through adulthood oftentimes. So motor impairment which is approximately 80% of children with autism spectrum disorder present with correlates to an increased severity level of ASD symptomatology globally, increased intellectual disability, increased social challenges, increased communication impairment.

Movement matters, we can't ignore movement. And it's important to know that these children are no more likely to receive physical therapy than their typically developing peers. Reduce fundamental movement skills and practical living skills are also

correlated to reduce social skills. Reduced fundamental movement skills are listed in the next bullet. It's poor balance, object manipulation skills which is ability to interact with toys and locomotion skills which has the ability to get from one spot to another. These deficits directly impact ability to play with peers. They present with higher levels of postural sway, asymmetry in their movements, and poor coordination across sagittal, transverse, and coronal anatomical planes. So these poor motor coordination within their body is really, really disabling, and today, I'm so excited to be here because I can show you some tasks that we can develop to do something about that and give them experiences that improve their motor functioning. Children with autism spectrum disorder are more likely to present with poor motor imitation and gestural imitation. If there's one, if you wanna put all your eggs in one basket to improve social skills, the best thing you can do is increase motor imitation. When children with autism spectrum disorder engage in motor imitation, their mirror neurons exponentially increase the mirror neuron activation. We want more mirror neuronal development because that's what's gonna develop social skills and that they're going to be able to watch peers, observe peers play and then imitate them. That's gonna improve their empathy and that they're going to be able to look at someone's face and feel what that person's feeling.

Poor motor coordination, they're often referred to as dyspraxia. It's often more present and children with autism spectrum disorder, and importantly for us remember, they take longer times to react to stimuli and execute movement. We need to stop immediately putting our hands on the children and helping them, and instead step back and let them struggle. It's when they struggle and independently and creatively use their bodies that they will change for the better. The change will occur, challenge equals change. So fundamental motor skills are those basic motor skills that children need to develop so they can play with others. These skills include stability or balance skills, such as gross motor skills involving balance and weight transfer, balancing on a beam, twisting, turning, squatting, bending, locomotion skills which is the ability to get

from one one place to another, and manipulative objects skills, in which you can handle objects with speed and control. Those objects could be Legos, they could be dolls, they could be blocks, they could be any toy, they could be a tricycle that you're pedaling, it's that you're able to use them with some degree of fluency. I provided here a lot of ball examples because improving ball skills is a real opener in opening up possibilities for them to play with other children. Now, I listed the next two slides for your reference in your future work in putting together task-oriented activities, because sometimes you find a task is too challenging for a child and you just don't know what is the step below that task or the task is too easy and you wanna take it up a level. This would be nice for you to have in the future to reference when you're trying to create a differentially create a task that's challenging to you to a child. We always want to develop that just right challenge point, that plus one, it's within the child's reach but the child's going to have to struggle to achieve this goal.

Now this is a very, very important concept. So I'm going to illustrate it. I'm gonna try to illustrate it a bit with my body. What I was noticing with the children after I was working with them for a while is that the kind of wear body cast, the way they were moving within space. So I would come back to their classroom and they would have to turn to go to their classroom. Now, this is how they would turn. They would shuffle their feet and their body would say in a body cast, almost like a chess piece, turning a chess piece. So I looked at it and I thought, "Okay, what?", and I did it, and people in the hallway, "What are you doing Kelly, what are you doing?" So if you ever wanna understand children better, do what they're doing and see what's going on. Okay, how are they supposed to do it? And I thought what they're supposed to do is they're supposed to engage across planes different behaviors. So when I turn to the side, something, if we talk about the planes, this is the coronal plane if I were to cut myself in half and the front and the back of my body would be here. The anterior plane in the posterior plane. When I turned to go into a classroom, they're doing different, they're doing performing different actions. What else is happening? If I look at the midsagittal

plane, if I was to cut myself right down the middle in the left and right sides, I was saying, they're performing different actions when I turn. And I thought, "What about the transverse plane?", which is if I cut at waistline, and I have my superior, the top, and inferior, bottom sections of my body. Those two are performing distinct different actions.

So I looked at these children and I said, "You need some experience with that. "Let's get you out of this body cast, "and let's get you moving your body, "the motor coordination in your body "and your body moving in more complex manners." And we can do that as we see, by creating, let me go back, creating some activities, and I have a list of activities for you to try in your own therapy sessions, but let's give the example of the child is gonna be a farmer. So the child's gonna be a farmer. If I want to do different behaviors on the front and the back of his body, I can have him lie on the scooter and his belly, he can go gather the vegetables, and then he can reach up from his scooter and shoot the vegetables or throw the vegetables into the crate. So the posterior action of propelling the arm up and back is different than the stabilizing action at the same time of the interior portion of the body, or how, but I have him be a farmer in which I haven't carried the crate in one hand and he puts the vegetables in the other. So then on the midsagittal plane, he's performing two distinct separate actions in the coordination with each other, or in the transverse plane, how about I have him be a farmer, and he sit crisscross on a scooter and I pull a hula hoop which would be the steering wheel, and we go ride around and we go pick up vegetables that way and throw them in the crate. So do you see how each of those actions, I'm having him do complex movements by performing set different actions and on either side of the plane.

So when examining movement across these planes, ask, "Are there asymmetries and movements across planes?" So if I ask a child to give me a high 10 and the child's only holding up one hand, that's an asymmetry across planes. He's gonna need some more

practice using both sides of the body simultaneously. Can the child perform distinct movements across the plane? I'm sure everyone's seen this. You give the child a teapot and you give the child a cup, and instead of pouring the tea pot into the cup, the child does the same movement, drinks in the cup, drinks out of the cup with both hands. The child's unable to do different movements with both hands. Are there compensations across planes for weakness or coordination difficulties? Is the child coming up the stairs and leading with the left leg and as he goes down the stairs, leading with the left leg as well? So we're going to wanna have activities that involve reciprocal movements of both limbs, if that's the case. Type of, so we covered this before, the type of coordination across planes, symmetrical, both sides doing the same things at once, reciprocal, they're both doing the same things alternately, and a symmetrical, you're doing separate things on separate sides, different sides of the body, just to review.

So the next video tape we're going to see is of Zoologist Ida. I wanna give you some background on Ida before we begin this tape. Ida, I began seeing her eight months ago, she was pre-verbal. So I really didn't care that she was pre-verbal, I cared about what can you do if I slow my speech, and I show you the cues and we echo this speech together. What are you capable of then? I wanna work at your highest level, Ida. Let's see, I don't wanna go, "Oh, you say ah, so", 'cause she was saying ah, that was her word, "Let's say ba and let's a pa", that's simple, simple, simple. So I was able to have her say, can, very slow speech, showing the speech so there's enough time for her to perceive it, enough time for her to join me in producing it and we're echoing the speech together. I started with, can you sweep it to me please? For her to repress objects and access to actions. Then, I was like, "You're good at this. "Let's take it up a level, let's say a paragraph." And I gave her the most linguistically complex paragraph and I gave her all of my support, "We're gonna say this together." Because remember, challenge creates change in the brain. And I wanna work with a child at the highest level. So I have Ida saying a paragraph the highest she can do with me. And do you

know what happens according to Judith Garrett, it's called if you have a complex treatment target, systemwide linguistic change occurs. There's a cascading effect and what happens is Ida's producing all of this language that I've never taught her. Ida's asking questions left and right. I've never worked on asking questions, but I've worked on a skill that's much more complex than that. So the way Ida develops is of typical development, she developed, when I'm working with her at the paragraph in therapy, she's saying single words, she's saying with phrases, she's saying sentences, they're just spontaneously developing, expanded sentences, compound sentences, complex senses. She's beginning to tell stories. That's because I worked at the highest level possible and there's a cascading effect and it's all spontaneously developing. So I wanted to discuss that with you before you see the video because I want you to see she's asking questions. I didn't teach her that, that's spontaneously developed. I went higher than that. So let's look at this video and I'm going to talk over it. I'll try to stop talking when you hear her answer question but don't worry about that, I'll tell you what she asked.

- [Both] Can you scrape.

- Now, I want you to see something very important. She's holding onto the chair but can't hold. I'm gonna have to pause that, I'm sorry. We'll go back to that. This is very important, let me go back, okay. She has very poor postural control, so she's holding on the chair to hold that trunk up, but there was a big price that's being paid. The mind, wherever the body goes, the mind will follow. When she's holding onto that chair, she's checked out. She is not checked in. When she is engaging in motor imitation, she demonstrates joint attention, and as quickly as her hands go down on that chair to support her torso, the joint attention stops. This is a very good video that clearly displays how postural control in motor impairments impact communication, motor imitation, social, joint attention. So, look at that and you're gonna see the mind

body connection, they're not separate. See her hands on the chair, just holding that torso up.

- Oh, throw your hands out, let me see.

- Now look at the joint attention, there's motor imitating, look at the difference. Checked out, when the body checks out, the mind's checked out.

- At me, lastly, oh where's your--

- There she is, showing attention.

- Can you, and your dog teeth, drop.

- See the difference? They're connected 'cause the mind's checked in, the body's checked in. Body's checked in, the mind's checked in. She's gonna get her to do something very difficult, stick her tongue down and put her finger under her tongue for the TH sound. Just to movement, very, very challenging, she's not making her do it, she's encouraging her to do it with enthusiasm.

- Teeth, there we go, okay, ready?

- Now, notice this, she's going to show diversity in the coronal movement, she's gonna be on her hands and knees, and she's gonna lift up her hand and roll the dice.

- You're gonna roll it.

- Posterior muscles are working.

- Roll it up in the air like this, your turn, roll, roll.

- There's stability skills and squatting and getting up. She was instructed to throw, she's not able to throw at this point the dice. She doesn't have the wrist extension and flexion to throw, the distal muscles have not developed yet. You're also gonna see her ankles are stiff and her feet are stiff. The ankle and foot musculature and flexion has not yet developed. She's trying to get out or encourage her to go fast like she does. She has slow motor planning. Awesome, notice her arms are bent as she walks. This is great, coronal, look at that. She's doing the locomotion is she's marching. That's diverse, that's differences across the transverse plane. That's what we wanna see, that's complex motor movement.

- [Torey] Oh yeah.

- She's waiting for you.

- She just asked, she just asked, "Where's the shark? "Is the the shark over there in the red chair?" I didn't teach her that, that naturally developed.

- Let me see all of your hands, okay?

- Now, she's sitting at the end of her chair and you're gonna see more postural sway 'cause she has less of a foundation to support her. Watch her postural sway. She's holding her hands down on her legs 'cause she needs the support to keep her torso erect. The motor impairment matters.

- Let me see your Ls, lastly.

- Look at that. If you didn't notice the way she was surfing because she was swaying so much.

- With your dog teeth.

- I love that, good reaction. And she's gonna get her to stick the tongue out again. Again, the important thing is, that's the first time she stuck her tongue out and she put her finger to her mouth. Now, when a new behavior occurs, the brain says, "We need to create a neuronal connection for that." Here she goes, she's just enthusiastically encouraging her. She doesn't have to do anything.

- Teeth, let me see your little tongue, teeth.

- Maybe we'll find a giraffe.

- We're almost there, ready?

- Maybe we'll find our giraffe.

- Teeth.

- All right.

- And she did it again. So each time she does it--

- Roll the dice.

- The nerve develop, the nerve is more like, the neuronal connection's more likely to develop over frequency.

- A giraffe.

- [Kelly] So she's not able to throw, I just want you to show you what's throwing. If you don't move your wrists and you don't have your fingers, you just cannot throw. You can only place in front of yourself. She cannot walk on her tiptoes, but that's okay, Miss Torey is providing a model and she's providing the visualization for it--

- [Torey] All right, let's leave 'em in there.

- Which is great, Ida will learn through experience.

- [Torey] Okay, let's walk back to our red chair--

- So there was a lot going on in that video. She asked about her giraffe or shark, she said, "Where's the shark? "Is the shark and the red chair over here?", and pointed over here. This is all spontaneously developed. The stability skill, as you can see, she's just learning how to squat. It's very slow and it's wonderful. We like children to do things slowly. Locomotor skill, her locomotor school is very poor. She has her arms bent when she walks, still probably for balance because of her lack of postural control, and she's unable still to walk on her tiptoes and she walks very slowly. Manipulative skill, she as far as the manipulative skill is concerned, she cannot throw yet. You cannot throw unless you have extension and flexion of the wrists and fingers. She doesn't have that developed yet. One good way to teach throwing is to use a basketball hoop and you have the child elevated so the basketball hoop is below the child, and then you can slowly elevate it over time. When we look at her coronal plane movement, she was on her hands and knees and reached up. When we look at the midsagittal plane movement, we saw that she, oh. I forgot to mention, she rolled the dice around. The left hand was rolling the dice and the right hand was rolling under it as she was looking

for her giraffe, that's great. That's what we wanna see. Transverse plane, when we saw that difference, we saw her do the locomotion, fabulous. That's what we wanna see. Those are the behaviors that are gonna get these children out of the body cast so that they can play with their peers.

Postural control, really poor and it affected joint attention, it affected attention in general, and it affected motor imitation. So we need to take the motor impairment seriously. The mind and body are interconnected. So now, we're looking at how did she engage the mind? She has challenging skills, she's saying a paragraph, a very linguistically complex paragraph to request. She has the heart, the engagement, and she has her do the TH which is really, really, really difficult. She's not making her do it, she's just encouraging it. In the heart, I love the way she responded to the angry dog teeth, she flew back, flew over, and responds to the angry dog teeth, wonderful enthusiasm, nice warmth. Ida does not have to talk, Ida gets to talk. That's how we treat talk, talk is like singing.

The body, she has a task-oriented challenging skill, she has a few, throwing the dice. It's okay, she's going to learn through experience how to throw the dice. Don't do hands over hand on her. She needs, you can't do a child's push -ups for them. When it came to moving quickly like a cheetah, it's so good that she didn't take Ida's hand. It's so great that she didn't take Ida's hand. Instead, she ran next to Ida as quickly as she could to model it for her so Ida can visualize it. Also the tiptoe walking, she didn't hold is fingers on either side and helped her tiptoe walk, you can't do a child's push ups for them. Ida, she visualized it for it Ida. Ida will develop it, Ida knows her body better than we do. She's an expert on her body and the fundamental movement skill that presented a challenge for Ida in this clip was throwing.

Now, we're getting into perception of tactile stimuli. And I'm gonna start by saying perceiving tactile stimuli is a very active process for children. So let's talk about how is

an active. I'm gonna have here a cotton ball, and here I have a ping-pong ball. So if I hold the cotton ball and the ping-pong ball up and I'm hyposensitive, I don't, I have hyposensitivity, I feel nothing, what do you feel? I feel nothing. It needs to weigh about five pounds and it needs to be rough as sandpaper for me to register it. I feel nothing. So at that level, a child that's hyposensitive is not even perceiving, doesn't even feel it exists in their universe. So, on the other hand, if the child's hypersensitive, the child might touch it for a second and say, "Ow, that hurts." The child did not even perceive it or if the child avoids perceiving it, and doesn't even touch it, the child can't learn, the child's never perceived it, the child needs to touch it. So the first step, it's a very active process in perception, the first step is proceeding it in the first place. The second step is discriminating it. This is hard, this feels different than this. The cotton ball feels soft, the ping-pong feels hard. The third step is they're differentiating it. Well, this is round and this is round and there's similar size, but this one's soft and this one's hard. This is how they're similar and it's just how they're different. And the last step is they integrate it. Well, this is soft like Teddy and my blankie, and this is hard like my cars and my blocks.

So perception is a very active process. It's not a passive process in which we can just rub a child down with some soft things. There, I fixed you. It's very active, they have to create their own neuronal connections and make sense of their environment through active exploration. They need to experience it first and foremost. So, looking at the research review, children with autism spectrum disorder are more likely to present with tactile perception difficulties, which is estimated to be prevalent in 70% of the children with autism spectrum disorder. They're more likely to present with hypersensitivity, and an increased sensitivity or aversion in perceiving tactile input, which is a problem, because if you don't touch it, you don't perceive it when it comes to tactile input. They're more likely to present with atypical sensory processing differences, which are linked to challenges and joint attention, increased restrictive repetitive behaviors, social competence, social participation, anxiety disorders, behavioral challenges, cognitive

impairment, sleep disturbances, gastrointestinal issues, and food overselectivity. And so these sensory processing differences, they impact these children globally and the sad thing is they can persist through adulthood. So a brief overview on the somatosensory system. The somatosensory system includes processing multiple types of sensations such as light touch, pain, pressure, temperature, and proprioception. The somatosensory system is lumped into three different pathways or modalities in the spinal cord and have different targets in the brain. So let's give an example of discriminative touch. It includes the touch pressure and vibration perception.

Okay, if I, I'm gonna tell you about Davey. You saw Davey, he was a zoologist in the last video clip, he went up the slide, he saved a zoo animal. He is tactile aversive. At the end of each of our weekly literacy groups, I write with the marker the letter on the back of the child's hand. The children have an option. Davey is brave. Davey holds out his hand and he looks in the other direction as if I'm giving him a shot. And if it's the letter W, I'm only gonna get the V done, and then he pulls it back, and he hides it. That's Davey's struggle point. Davey knows his body better than I do. The worst thing I could do is to grab his hand and finish that W, respect these children, okay. Never force them to experience only when they're comfortable. They'll tell you when they're comfortable, they know their bodies. So that's an example of hypersensitivity. And discriminative touch, an example of hyposensitivity is I worked with a child before who put his hand on a space heater. His mom came into the room and she said, "Take your hand off of that", and it was covered in blisters and he didn't feel it. So that's an example of hyposensitivity in discriminative touch, I'm sorry. I'm going to use that in pain and temperature, but it goes over both. In temperature, I wanted to use that example, I'm sorry, take that in pain and temperature and use the space heater, one, I'm sorry, space heater under pain and temperature, my apologies. Under pain and temperature, we have the child, who had his hands on the space heater, doesn't even know it's hot, doesn't even register it. Mom came in, told him to take his hand off the space heater, it's covered in blisters.

Now going to proprioception, these are the children with poor proprioception that we see that are running into other children, causing accidents here and there, knocking down children's castles by accident, going into the sandbox and digging in the sand and getting sand all over the place, because they do everything hard and fast. It's not light and slow because when they go hard, they get feedback, when they go fast, their muscles contracts, they get feedback. They do not go slow and light. So we can see benefit and working with them at task-oriented interventions of having them do things in slow and light manner. So the continuum of tactile perception, we just gave some examples of that, hyporesponsivity was the child that had his hand on a space heater and it was covered in blisters. We really want an optimal arousal and orientation, and the research indicates that when children are moving, they have a better registration of sensory input. And there's hyperresponsivity which was the example of Davey who gets a V instead of a W because he whips his hand away, but I'm so proud of him because he's 100%, his challenge point is a 50% of a letter. So I'm very proud of him for struggling and the struggle is making him stronger. Tactile defensiveness, that's what we're talking about with Davey where the lightest touch feels like a cut that you're cutting into my hand.

And I'm gonna go back to Davey with gravitational insecurity. Three months before the videos you're seeing here, I started working with him. It was on an elevated surface that was two inches high and one foot wide and I was helping him up onto that surface and he dug his nails into me and he stiffened his body as if we were 100 feet in the air. Now, we're getting into the intervention portion and I'm so excited about this because first, I want you to visualize how, I want you to go through a visualization exercise with me. I know we've all been here before. You're at a conference and it's cold. It's one of those all day conferences and you're gonna stay to the end 'cause you're gonna get the certificate at the end no matter what it takes. So you're freezing cold, you're wearing your coat, the speaker's talking, and then suddenly, because the senses

protect us, our sensory system protects us, and when something insults our sensory system, we go into the amygdala, fight-or-flight sympathetic autonomic nervous system. So what happens, your shoulders raise up, you clench your jaw, and then, and you clench your jaw, and then you you can't even understand the speaker anymore. All you're thinking, you're ruminating 'cause you're sitting, you're just sitting still, right? And your sensory system has been assaulted and you're in fight-or-flight mode, and all you can think in your head, is that, "I can't understand a word, "I can't do any higher level thinking right now "'cause I'm in fight-or-flight mode", is all you're thinking is, "Get me out of here. "Get me out of here, I'm cold, I'm cold, "I'm cold, I'm cold, I'm cold." And maybe you're going to online shop or some something else to check out 'cause you realize that you don't understand anything this person saying right now so learning is not happening right now and then you're gonna say, "It's okay I'll read the PowerPoints in the weekend", sure, you will, sure, you're gonna read the PowerPoints over the weekend. So then the next day, instead of reading the PowerPoints, you're going to do run a 5K race and you're running a 5K race and it's 30 degrees out and it's windy and it's raining, and you're not even noticing the wind and the rain because you're running and you have a task. You have a task at hand, you're finishing a 5K, and you might even have frostbite forming on your fingers and you're not even noticing it because you're engaged in a task and you're moving. So, that's my segue of why are we going to expose these children to new textures in the context of movement where there's a task. That's create context instead of sitting 'em down at a table and exposing them to making them do one thing after the next, that makes them ruminate about the experience.

So here are some strategies to improve tactile perception. The research base is not very strong. It works on some, doesn't work on others at this point, but we could do some self-care activities and idea that comes to mind is we could have the child cut up fruit, different textures of fruit with a plastic knife, and be a chef and the chef is making the friendship fruit salad. We could have the child for tactile discrimination and being

exposed to a variety of materials, we could have a child that loves cars, be a car wash attendant. And maybe we just put a little bit of the shaving cream on the car. Everyone has a different struggle point. Work with a child and work that just right challenge for that child where that child can struggle, and that child can change through the new experience. Fundamental movements skill activities. I love doing this. I create mazes for the children to go through, obstacle courses, and what we can do is I can have a wide balance beam that goes narrow, I can change the height, I can change the stability in which they can be going across a balance for one moment and then it's a stable surface the next, and I can change the texture, I can have it be a cushion, and I can change the transitions, I can have the child move to the left, move diagonally move to the right, do a U-turn. And when the child does those things, what happens is the child increases his awareness in space, because the child has the proprioception 'cause he has to pay attention to where he's going or she's going. Complex movements of cross sagittal transfers and coronal planes of increased complexity. I spoke with you about this before, and that's where we're going to have different movements occur before for the left side of the body and the right side of the body simultaneously. Think of activities where they're doing something different on the left and the right sides of their body. Transverse, think of activities where the bottom and the top of the body or top of the body are engaged in different activities simultaneously. Coronal planes think of activities where the front of the body and the back of the body are engaged in different activities simultaneously.

Linguistically rich activities, I'm gonna give you a little example here of a recent experience. So my wall is yellow and I had an interior designer help me pick out a paint color. And first, she showed me all of the paint swatches and I said I can't see a difference. They all look the same, just pick one you like. I don't care, just pick one. And she's like, "No, this one is lemony, "and this one's more of a banana "and this one's more of a flax, "and this color here is more of a sunlight." And she said that, I said, "Oh my goodness, "I totally see what you're talking about." And she's like, "Do

you like this color?" And I'm like, "No, no, that's too lemon." And I started, I took that terminology, integrated it into my brain, and I suddenly was perceiving all of these colors that I thought were all the same a moment ago, because language is a container of thought. Now, when mapping out these linguistically rich activities, we wanna use those words. Is it heavy? Is it sticky? Is it soft? Is it smooth? An all of those, is it rough? And then, let's also think about the four stages of perception. Can we first say, "Oh look at this, attend to this. "Look at this, pay attention to it." Secondly, "Can you see the differences "between this cotton ball and this ping-pong ball? "This one soft and this one's hard." Wow, and then we can talk once more and we can say, "How is it different and how is it same differentiation?" And then we can integrate that into their prior knowledge.

So those four steps I told you about before, when we're linguistically mapping out their experiences, we can take them up that continuum with our words 'cause language is a container of thought and it really does help make sense of the world. Within the context of educationally rich task-oriented activities, we can have children with autism spectrum disorder engage in strengthening activities. This increases their proprioception, the knowledge of where they are in space. What I found in the research has also indicated that children with autism spectrum disorder tend to have problems with lateral movements. So a lot of times, I do the wheelbarrow sideways with them walking sideways or the crab cross sideways to challenge them and improve their lateral movements.

Deep pressure, deep pressure acts as a calming or focusing agent to increase activity in the parasympathetic division and lower activity in the sympathetic division of the autonomic nervous system. We talked about that we want children to be in a calm state when we are exposing them to new materials and new textures. So deep pressure has mixed research as far as weighted vests are concerned. It's effective with some children and not with others in improving attention, attention and self-regulation.

I find I like using the animals, the stuffed animal, so I'll take the stuffed frog and I'll say, "Will you be the herpetologist "and make sure the frog doesn't jump off your lap? "I want you I want the frog to stay on your lap." Give them a job to do. Tactile perception strategies, deep breathing. I stole this one from Joseph Evans, my occupational therapist partner in crime. And what that is is you touch your nose and you say, "Okay, let's breathe in", and you say, "Touch your chin, breathe out." So Joe does that three times before he begins his fine motor table activities. I do it one time before I have the child say a paragraph to requests access into one of our educationally rich activities. Vestibular activities, another way you can improve proprioception is by altering the speed of what you perform an action. So I use the song. ♪ Motorboat motorboat goes so slow ♪ ♪ Motorboat motorboat goes fast ♪ And you can do that with any occupation. You can say ♪ Farmer farmer go so slow ♪ ♪ Farmer farmer go so fast ♪ ♪ Farmer farmer step on the brake ♪ And so messing with the speed would improve their proprioception in space as well.

So we're looking at our last video clip for today of Chef Davey. Remember he has tactile aversion and he's going to check out each of the ingredients for the Sunday and the activity he's gonna engage in is painting in bingo markers, which is something he's highly aversive to, but he understands he has a job to do, and he's gonna do it. So it's a really funny clip, we do have to put our hands on the child unfortunately because he sees his grandmother as she's right outside the door when he goes up to climb the platform. So we just had to block him and say, "Whoops, speech isn't over yet. "Stick with us for a little bit longer, buddy." I'm going to be talking over this video.

- [Holly] Yummy, yummy.

- So this is session five, you saw him in session one before. Now, he's independently exchanging the sense strip. Notice he applies this when he uses fine motor movement. Cerebellum, the tongue is next to the fingers when it comes to motor production. But

first, he tolerates it. Then he begins to explore it. There still is frown on his face. He's not sure how to take this. But he's accommodating, he's coming along, he's going along with this.

- All right, it's so shiny.

- Now, what you're seeing is he's beginning to engage in prolonged play with that. ♪ Mixing mixing feel how soft they are ♪

- What is this? See the marshmallows? What's this?

- Do you see how she just gives him time to react to the stimuli? ♪ Put it in, in, in, in ♪ ♪ In, in, in, in ♪

- Feel the soft.

- Then, normally we wouldn't spend this much time.

- This feels so soft.

- On the tactile aspect, on the claiming aspect, but because Davey has tactile aversion, and he has gravitational insecurity, it's worth giving a little bit more time to struggle. ♪ Go go, let's go up, up, up ♪

- [Holly] You can do it. I need to get the marshmallow.

- So now, he needs to find a way to independently and creatively struggle with his own body and figure out how to climb that platform. That's his goal for bingo marker, which he's aversive to, he's a hard worker, and with his grandmother right outside the hall,

so, watch him go. ♪ Up, up, up, up ♪ ♪ Let's go up, up, up ♪ Remember, listen to her singing, she's singing. She's just tonally encouraging him. She's not overexciting him. It's the perfect level of eyes on the prize, eyes on the price.

- [Holly] Big step, you can do it.

- Okay, now watch this.

- It's time for marshmallow.

- Is he gonna figure it out? ♪ Up, up, up, up ♪

- Let's see, yes, he uses different movements across the transfers plane, the top of his body are doing different movements to come up and climb together. Look how slowly he's moving. This is the first time he's doing this. He's doing some major motor planning programming here. And now he gets a bingo marker. So he just holds her hand. That's one struggle point, that's fine. ♪ Down, down, down, down ♪ ♪ Red chair, red chair ♪ Notice again, when he engages in fine motor, vocalizations emerge. We want vocalizations, pleasurable vocalizations.

- [Holly] The marshmallows, all right, nice taking.

- So first, children develop a frequency of vocalizations and then they increase in complexity.

- One more, nice.

- Right now, we want frequency, that's great.

- Candy, yum, yum, okay. I'm so excited for our Sunday. Now, we need some candy.

- Awesome talking, nice talking.

- When you're sitting is when you're going to see Davey's repetitive behaviors, not when he's moving.

- Food, nice talking. Here's our secret candy.

- So at first, he accommodates you. He's like, "Oh, I'm gonna". Now, notice her singing, it's very calming. ♪ Mixing mixing ♪ She's just saying ♪ Mixing mixing ♪ It's like ♪ This is something we do every day ♪

- Beautiful candies.

- He's not sure about this, he's tolerating it right now.

- They feel hard. ♪ Mixing mixing, mixing mixing ♪

- So think about her music. Think about how different it will be if she's singing like ♪ Mixing mixing mixing ♪ in a quicker rate or in a slower rate. It's just perfect. Now, look at this. He's engaging in it in continuous play. ♪ Mixing mixing ♪

- Here are the candies.

- It's wonderful. So he's stepping out of his comfort zone and he's growing as a result from tolerating to engaging in play.

- Yeah, nice talking. Go, go, go.

- Once again, fine. Now, once again, no grandma yet, no grandma. Okay good, so she had to redirect him 'cause he's gonna look at grandma, okay. ♪ Let's go up, up, up ♪ Okay, and he starting, he gets paint, which is probably his least favorite activity in the universe. And now, he's gonna independently and creatively struggle, that's not working. ♪ Let's go up, up, up ♪ And that's not working, either.

- Beautiful candy.

- See how we have to give these children time? We can't just go and put our hands and get 'em up and take them. Give them time to struggle. ♪ Let's go up, up, up ♪ ♪ Let's go up, up, up ♪

- He cut her hand there, I don't think she wanted him to hold his hand.

- Now, here what we're going to see is you're going to see differences on the sagittal plane and he's crawling, so differently. When he comes up at a time, now, we're going to see differences across coronal plane. He's gonna hold on to the ledge. And he's gonna come up, so the anterior and the posterior areas of his body are doing something different. Now the paint, does he dare? Would he dare touch a paintbrush? She's not gonna force it, she'll offer it.

- [Holly] Yum, yum, yum, I need your help. ♪ Candy candy ♪

- And that's his struggle point.

- Beautiful.

- He did it.

- [Holly] Let's go to the red chair.

- So he's going to come down. Okay, when we look at the locomotor skill of Davey, there's a relative weakness, it's not that bad. He's a little bit slow but it looks pretty fluid to me. The climbing is the part we wanna look at. The climbing he challenged himself on which was really, really wonderful. In one way, he climbed to climb two different ways up the platform. Now, we have to remember this is a child that has gravitational insecurity that three months ago would not go up a two inch platform, so this is huge. How has he made this progress? He's made this progress through experience, through experiences, through experiences, he's come to this level where he can stand now and climb a high platform through struggle. Manipulative skills, I thought he had a really nice toss as he tossed the candy into the high box. That actually looked really well. His fine motor skills have substantially improved as you could see with the sense strip from five sessions ago. Stability skill, that is when you saw him getting up from the squat nice and slowly. It's actually harder to go slowly than quickly because you need to use more balance, and you need to use more muscles instead of momentum. He was obviously motor planning and motor programming and very actively involved in his learning. Sagittal plane motion, we saw him crawl his knees up one at a time when he came to the top of the platform. Transverse plane motion, we saw him push up with his arms and kick his feet up to the side, engaging in different movements in the top and the bottom of his body. Coronal plane motion, we saw he was in the front of the body holding himself in a crawling position, and he lifted his arm up with the posterior muscles of the body to hold on to the chalkboard to stand up. So that's what we want to see. We wanna see complex movements across planes.

Now, how did Holly engage Davey? Challenging skill, she had him do the sense strip and he now has developed independence with it by challenge with practice. The

engaging of the, or engagement and motor and rotation of the heart. The singing was wonderful. When she was mixing the beads and mixing the cotton balls, she was saying ♪ Mixing mixing ♪ Think about how she, what was really saying is ♪ Mixing's no big deal ♪ And when the child was coming up, using music to get them to go up to the platform, it kept his eyes on the prize and it wasn't hyperarousal and it wasn't hypoarousal. She said ♪ Up, up, up, up ♪ ♪ You're gonna climb up ♪ ♪ You're going to climb up ♪ ♪ I know you can do it. ♪ If she would have been like, "Up, up, up, up, up." That's a little bit of hyperarousal if she would have been like, "Up, up." It's a little underarousal. So she made excellent use of music for him to engage in activities that he wasn't comfortable in. Body, the task-oriented challenging motor skill. That was the first time I've ever seen Davey engage in such a challenging task and perform such a challenging task. And remember, when the child does something new and challenging, the brain says, "We need to create a neuronal connection for that." So that was the first time he's ever climbed like that. And it's the first time, and he did it two times in a row, so this is good. Challenge creates change in the brain. When did Davey make the most vocalizations in this digital clip? When he used fine motor movement. It was paired with vocalizations, and the cerebellum, the finger movement is adjacent to the tongue movement.

So a takeaway tip to improve their motor coordination therapy for tomorrow. Create a movement activity that challenges children to use distinct movements across the transfers, the top and the bottom, the sagittal, the left and the right, and the coronal, the front and the back planes. So when a child is crawling, it is the child is engaging in distinct movements across all of those planes simultaneously, which is why crawling is such an important developmental milestone. And I give an example on the right there as well as the child's engaging in all of those planes simultaneously using different movements across the planes. So have fun coming up with task-oriented activities that incorporate these complex motor movements. It's really gonna get these children out of the body cast. If you have any questions, please feel free to contact me through

kellyvessslp.com if you have any comments or questions, small or big, I would love to hear from you. This is a topic I'm quite passionate about. Thank you so much, Amy, back to you.

- [Amy] Thank you so much Kelly, we can tell, we can sense your passion. You do a great job telling us about all this interesting information and I loved the videos, they're sensational. They really demonstrate everything that you're talking about. So I wanted to thank you for being here today. We look forward to part four of this four-part series which should be available in video form by around the end of February, and then the four-part series will be complete. So Kelly, we're looking forward to having you back next week. Thanks so much and we'll see you next time.

- Thank you.