

**MATTHEW
RAVISH:**

So we are going to talk about something I'm fairly passion about and that is the early specialization of youth sports. I've got now three children. The oldest is nine. His brother is going on five. And they both love sports.

But this is a cultural shift that we're seeing. And a lot of your patients are right there involved. And a lot of parents are having questions. Maybe some of your parents are on the track of believing that early specialization is going to get their child to the next level the quickest. And hopefully, we can discuss the benefits and risks of that and hopefully walk away understanding that early specialization is probably not the best option from the evidence we have now to produce athletes long term.

So in case you're going to get up and leave halfway through this or you're about to fall asleep, here's the summary. If you know this, we've covered everything. But over half of all children age five to 18 are involved in sports, so a lot of your patients. Sports participation can and should promote enjoyment, health, and important life skills. There is concern for the recent trends toward sports specialization at a young age. And that's why there's more and more, I would say, decent evidence coming out against it and more people speaking up against it, including AAP.

Early diversification instead of specialization is more likely to improve overall athletic performance and development and decrease the risk of overuse injuries and burnout. Even with increasing sport participation, overall daily activity continues to decrease. And so that's kind of what I call the other side of the coin, which we'll talk about and that is even though we're going to talk a lot about patients and families that want to be out in the field all the time doing a lot of things, if we look at overall fitness and activity levels among youth these days, there's things to be concerned about. Patient and family guidance and counseling should focus on delaying early sports specialization and encourage an active, healthy lifestyle along with early diversification in sports. Hopefully we'll cover all of those.

So this is a great quote. This comes from John O'Sullivan, who I referenced his book at the end of the talk. This is an-- I think-- an only electronic version. He's written a couple books. But his book on *Is It Wise to Specialize?* just came out a couple years ago.

He's a great coach. He does a lot of speaking to coaches and athletic programs around the country and around the world. "Largely gone"-- I know it's a long quote, but-- "Largely gone is the era of the sandlot and pickup play. Today, adult-led competition dominates in tryout-based, multi-season travel teams form as early as age 6. Support has shifted away from the in-town recreation leagues as well as school PE, recess, and intramurals, which are often the only sport options for the economically and physically disadvantaged, the child of a single parent, the late bloomer, the kid needs exercise as much as or more than any other-- the clinically obese."

And this is not going to be obesity talk. But the other side of that coin is-- Dr. Skelton gave a great talk yesterday on how multi-factorial obesity is. And you can't point to one thing. We can't just point to decreased fitness levels.

But activity levels in our modern day, rates of sedation, certainly are playing a role. And so this quote kind of enveloped the whole talk into one quote. And so that's why I'm starting with that.

So if we look a little bit about youth sports in the US, they are snipping a part of our culture from the fact that lots of kids are participating, all the way up to culture-dominance in regards to college and professional sports. Estimated about 45 million children between the age of five and 18 are involved in organized sports per year. There are some concerns that that number's going to go down though, as dropout rates actually increase towards adolescence. About 66% of that age group is boys, 52% girls.

If we look at North Carolina, about 1.9 million children of that age group are involved in organized sports each year. Looking at high school level back in 2014, just over 127,000 high school boys, 94,000 girls. And if we look at our county, about 5,200 high school athletes participating in sports throughout the year.

So what are the benefits of sports? Hopefully we know most of these benefits. Have fun, that's the one I like to obviously encourage everyone to educate their families about first. Develop lifelong physical activity skills, that's a huge benefit for kids as they grow, to develop some great physical activity skills that they can take into their adulthood.

There's a lot of peer socialization. There's a lot of teamwork and leadership skills that are gained. And there's a lot of self-esteem, hopefully, that's learned and gained through sports. Unfortunately, this is where a lot of coach, parent, and sometimes even the athlete competition and the goal to win becomes much more than just the fact to go out there and have fun. If you've never seen that movie, it's a funny one.

Current trends. Sports specialization at younger ages. So we're seeing travel leagues down to the age of six. Sport-specific training is increasing.

And it's really because of the thought that well that's going to get the child to an elite level faster. And so that's what we're going to do. And hopefully we'll argue against that.

Year-round single sport focus, two or more teams during a single season. That's a huge issue when it comes to overuse injuries and burnout. Increasing goal to make it to the next level.

So we've kind of gone from this focus on multiple sports per year, whether they're recreational, whether they're organized, a greater focus on unstructured play within youth, the athlete really being the driving force behind what he or she plays and participates in, and a focus on fun to what I would call an unhealthy shift to single sport early, year round sports-- as far as year-round single sport, I should say-- two plus teams at once, coaches and parents becoming the driving force, and someone questioned in the long term, whether it's really fun for the athlete.

So the first would be considered along the lines of early diversification versus early specialization. So how do we define early sport specialization? Well, there's really no good, great definition. These four components, at least-- and I love the name of their paper, Baker et al, "What we know about early specialization? Not much." And so we don't even have a really good definition.

But most do agree, you have to have all four of these components, the middle two being probably the most important. So early starting age in a sport, well, you can define what early is. We don't really know. But it's really the early involvement in a single sport instead of diversification that I want to harp on and an early intense focus and training, meaning intense, focus training on that sport to try to get them better. And then early involvement in competition, which there is some evidence that the fact of playing to win is not the right motivation early on.

So why specialize early then? Well, of course, there's the whole, I want to get to the next level, the college scholarship component. If my child trains in soccer from the time they're 5 and that's all they focus on, they're going to get a scholarship and we'll be good.

Professional and Olympic status, I mean, that a lot of kids want to obtain that. And a lot of kids are going to obtain it. Well, some kids are going to obtain that. But if we look at over a quarter of parents surveyed of young athletes, and this was just a survey study done by NPR this year, just late last year, hope that their child will play pro sports. So that's of significant amount of parents that actually want and hope that their child will play their sport. And so that's going to drive the parents' motivation for what they put their child in and how much sports they play.

The truth is though, right, it's not that common. So if we look at all high school athletes that are going to compete at a NCAA level, depending on the sport, your range is anywhere from just over 3% to 11% of all high school athletes. Only 1% of high school athletes are going to receive an athletic scholarship. And most of those are not even a full scholarship. And it really depends on the sport too.

And then what about becoming a professional at your sport? And your chances are really low compared to the number of kids actually playing high school athletics.

Will early sports specialization increase the chances of making it to the next level, whatever that level is? Well, if we look at current athletes at their elite level, what does that show us? And we know that about over 85% of athletes that were invited to the 2015 NFL combine reported playing multiple sports throughout high school, not even focused at high school on just one sport, which in this case would be football. And if we look at Division I athletes across the NCAA, the majority played multiple sports in high school. And the first organized sport that they reported was different from their current one, which I think is a big key in children being exposed to multiple sports and kind of differentiating on their own what they want to play as they get older.

The benefits of early specialization. So there are some benefits. And there's a couple studies that show that. Now the benefits really come into play with just a couple of sports where their peak performance in these athletes is going to occur early-- early adolescence, late childhood. And the two most common is gymnastics and figure skating.

And it's just the nature of those sports, that if they are going to become an elite gymnast because their performance is going to peak out earlier than most. But the majority of sports, you do not require early sports specialization. And again, I would argue that you need the opposite. You need diversification.

The other benefit that you'll see in early specialization is they will get better faster. So if you compare an age group, if you compare a bunch of 10-year-olds to those who have only played soccer since they were age five, well at 10, they're going to be better than their peers that have played other sports. The problem is when we look at elite athletes down the road, they may be elite at 10 in their sport, but only 10% of those athletes are going to still be elite at 18.

And there's a lot of factors that play into that. One of them is early dropout rates, burnout, fatigue, overuse injuries. And so the evidence doesn't point towards you start early, you're going to be better down the road. It actually points towards the opposite.

And so when we weigh the few benefits to the risks-- these are the risk that we're going to talk about-- high risk of overuse injuries and burnout, socially isolated from their peers who don't play their sport. Why? Because they're only playing one sport their whole life. They're not exposed to different peers. And they're often younger than the other players playing that game if they've specialized and they're really good at that age.

Altered relationship with the family, this is big from a psychological standpoint. Often the child's success is tied to-- or parental success is tied to the child's success, which is kind of sad in some families. And the lack of exposure to a sport they may enjoy or excel in or play as a teen or adult, which I think is one of the saddest things if they've ever got exposed to other sports that they actually miss out. And if we look again, most NCAA athletes Division I are playing a sport different than the one they were first exposed to.

So what about burnout? Well, 70%-- and these are more recent numbers-- drop out from youth sports by age 13. And again, that's going to be multi-factorial too.

And no one really has a good idea of where that's going as far as culturally. But many studies attribute it to a rise in early sports specialization. And they attribute it directly to early burnout.

I thought this was an interesting little survey out of Utah State. So they looked at parental spending on sports. And you guys know, because you're probably there yourselves, some of these sports cost an exuberant amount of money, especially if there are multiple teams and travel teams and playing year round. The greater the parental spending, they found the more pressure the child felt because of what the parent was spending and the less enjoyment and motivation the child derived from the sport.

This study from 2008 focused on physical and psychological factors related to dropout versus prolonged engagement in the sports. So again, looking at dropout. And they looked at 50 swimmers. And these swimmers, between the age of 13 and 18, and they had to have at least three years of competitive swimming of greater than 10 hours a week. So some of these kids were younger than 10 when they started their swimming at a competitive level of greater than 10 hours a week.

So not just enjoy being in the pool and swimming and being on a summer swim league. This was actually eight, nine, and 10-year-olds competing at a high level. They found their rate was about 50%. So less than kind of the average of all dropout rates across the board. But still a 50% dropout rate.

And what they found with the drop the 50%, the 25 that dropped out early when they look back at their kind of a life, fewer had articular activities outside of what they're doing in the pool, less unstructured swim and play time, which I think is huge for kids early on as they're developing, started training camps, dry land training earlier than the engaged athletes. OK, so they started earlier because they had specialized earlier. More likely to have parents who were a high-level athlete in their youth, which was interesting.

More likely to be the youngest in the training group. Again, they got better faster so they were younger. But it caused them to drop out. So prolonged activity has decreased.

Less likely to have a best friend at swimming. Again, I think that this study didn't say it, but I think that's because they were younger. They couldn't relate as being a prodigy child, let's say, to some of their peers that were swimming as well.

Another big risk of early specialization is overuse injuries. And in general, we say that about a third to 50% of all sports injuries are overuse. And if we look at all sports injuries and say that well 50% of them are preventable, the vast majority of those are going to be overuse injuries. And if we look at overuse injury rates among children specialized in one sport versus those that play multiple sports, the number is pretty high-- 70% to 93% depending what study you look at where those numbers come from.

So if we just look at overuse injuries in general, this kind of taking a side bar, but just to kind of refresh what we're talking about with overuse injuries. You have a repetitive activity. You have fatigue to the musculoskeletal system. You have sufficient recovery, typically. The tissue adapts.

There is further loading. And repetitive stress can take place. When you have an overuse injury, the tissue fatigues as we expect. But there's insufficient recovery. Often that's because there typically is just not enough time for the child to recover when they're playing a sport because the amount of hours that they're playing and the trauma that ensues leads to clinical injury.

When we look at who's at risk for overuse injuries, this is just at risk of overuse injuries, we know that athletes who train more than 16 hours per week, especially in the pre-adolescent. When their ratio of organized sports to free time is greater than 2 to 1. And what is it about free time play? If you just think about a bunch of 10-year-olds going out to the basketball court to play pick up and they may be playing for five hours, who knows, I got next kind of game, that is going to have a less rate of an overuse injury than a coach that's pushing them to run x amount of laps, x amount of drills. And they're not able to facilitate their amount of activity in that moment.

More hours of organized sports per week than in age. And so what does this sound like? Again, we're just talking about overuse injuries. But this sounds like this patient that's specializing early. They're probably going to fit into all three of those components.

Prevention of overuse injuries-- I just threw this in there because the American Academy of Pediatrics and the Council of Sports Medicine and Fitness has their statements in prevention of overuse injuries. And what is was the number one? Focus on fun, skill acquisition, safety, and sportsmanship, right? Recreate the focus of what sports is really about.

Encourage one to two days off per week to allow for recovery. Encourage two or three months away from a specific sport. That is extremely hard for parents and patients to understand sometimes when they're a year round volleyball player, year round soccer player, that they actually have to take two or three years off from competitive play and just do something else-- cross-train, have fun, go swim, I don't know. But do something.

Encourage only one team during a season. Again, high rate of overuse injuries if you're playing on more than one team of the same sport during the same season. Participate in sports at a level consistent with their abilities, coached by persons knowledgeable about proper training and early recognition of overuse injuries and burnout.

So when is it safe to specialize? We'll just throw this out there. So all the evidence that we kind of have-- again, it's not great evidence, it's good evidence, some is better than others-- most people would agree and feel that late adolescence to two after puberty.

If you have a patient that really is asking when should I-- I love soccer. I want to play soccer. I want to specialize. I want to try to go to college. When should I really focus on that and no other sports?

And the best evidence and guidance we have right now is to wait until after puberty. Before then, let them play soccer. But participate in other sports throughout the year and really gain a lot of benefits that you have from other skills that you gain in other sports. And the few benefits that are gained early in sport specialization, do not seem to outweigh the risks long term.

So what's a better model? What can we look at than just engaging in a sport specialization for right away? And early diversification or sampling of sports is really the terms that are used.

And again, these are for the patients that love sports. They want to participate in sports. They want to be active.

They want to go on and play maybe at college. They love it. So what can you guide them and give them some evidence for as what may actually help them long term in early diversification? So a variety of sports while growing physically, cognitively, and socially.

I stole this slide from Dr. Brenner, Joel Brenner, former chair of the Council of Sports Medicine and Fitness within the AAP. And he broke this down pretty nicely. When you compare early diversification to early specialization, how does that compare? And I think it helps us think about the diversification model a little bit easier.

So early diversification, you'd be playing multiple sports throughout the year versus one sport. We've already kind of harped on that. You participate in deliberate play throughout the year versus early specialization, which is deliberate practice and very little play based on the time that it takes for these kids to participate in the sport that they are. Early diversification, you acquire foundational skills and those skills, we think that they gain, come from multiple sports, different movements, different activities, things you have to do in different sports, the way you think about it, the way you run, the way you jump, the way you kick, the way you throw, that allows you to gain some skills that you would not gain otherwise in one sport.

There's different social interactions with peers and adults if you're playing multiple sports versus maybe that one team that you're with the same people all the time, all year, spending you know tons of hours throughout the week. Reinforce emotional and self-regulating skills that are needed versus just a training regimen that may actually not be guided by the child's motivation or psychosocial development, which can be a big concern. Less likely to drop out of organized sports the evidence points and more likely to drop out of organized sport if you're specializing. The goal, really, what's our goal? Long term needs of a child through enjoyment, variety in play versus producing elite athletes.

One of those models that we can look at, and again this is a model. There's multiple out there. This is probably one of the more popular ones as far as long term athlete development model. It's been around for 15 or 20 years at least.

It's basically a framework. And that's the way I want you think. It's not something that do a check off list and everyone follows the same protocol. But it's a framework for athlete education, development, and training.

And it focuses on development more than just age. I'll show you there is an example where it breaks down ages that kind of fit into each developmental stage. But it focuses on development more than just age. And it's really based on the foundation of what we call ABC's within this model, which is agility, balance, coordination, and speed.

And so again, it's a tool. It's kind of a resource. It's a way to think about the development of an athlete, not in all your patients, but in the patients that are really highly sports-focused and want to go on. This is a resource or a model that you can mimic and hopefully coaches are mimicking in regards to education.

So active start, really from whenever you want to get him on the field, whether it just starts with play at home up until about age six. The FUNdamentals is really where you're teaching fundamentals of sports. But yet, it's focused on fun. That's why we highlight fun. It's focused on getting out there and kicking a ball and chasing around your friends and taking lots of breaks and not focused on who's winning. And somewhere between the ages of six and 10, those kids normally need to be at the fundamental age.

Learning to train, once you get kids that are kind of over the age of eight, between eight and 12, learning to train. Again, this is just learning. This is learning kind of what it takes to maybe do some specific training of a sport, do some drills, that kind of focus.

But it's not on training to compete, which is actually two down from where I'm at right now. It's just learning to train. It's learning the concepts.

Training to train is a little bit harder to understand. But it's basically you are training to get better at something. But the end goal is still not to compete and win all the time. And that doesn't come, you see, until later adolescence and even young adulthood. And then training to win is really for the elite athletes that are getting to the college age.

I just want to highlight, the first three are focused on sampling a wide variety of sports, having fun, and engaging in deliberate play. That's really where the first three are. The problem is what I said before, down at the age where they should just be learning fundamentals and having fun in it, lots of kids are starting join travel leagues where their focus is only about winning and gaining a title.

So what is the benefits of early diversification? These studies, again, are decent to good evidence that early diversification is going to be better than early sport specialization. It increases physical capacity and motor skill base, less sport specific training as an adolescent to reach elite athlete. I think it's a very interesting thing that the paper found. It took less specific training because they gained so many skills by the time they get to an adolescent level by playing multiple sports.

Increased motivation, confidence, and self-direction, longer playing careers. Again, what's our long term goal for patients as they're growing is really get them ready for adulthood, right? Not just to get to be a college or a pro athlete. Enhanced peer relationships as college athletes is what they found among patients they studied in college.

So kind of to shift a little bit, what is that other side of the coin? Because we're talking a lot about patients that love to be active, love to play. And I personally want this to be a part of it because the biggest issue we see in the daily clinic when it comes to peds orthopedics and sports medicine is just the general decline in fitness. So this is not going to go on to be an obesity talk at all. I'm just going to touch on a couple things.

But other than the patient that's highly specialized and wants to specialize and is coming in with multiple overuse injuries, the other patients that I see that are having just what I would call overuse injuries from just getting up and being active is because they're just not active enough. And yet they're going to want to play a sport. So how can we coach and guide them on that? Unfortunately, there's not a high number of kids that are even getting the recommended daily moderate activity level.

And you know, I added this slide after Joe talked yesterday. I mean, I'll be quoting him exactly, but he said, "Culture has changed and we have not adapted." And he was talking to Gayle [INAUDIBLE] from the obesity clinic. It hit me when he said that because just simply, where is culture gone? We talk about video games, but we have so much technology that you can't argue, puts us down in a sitting position or a standing position.

I don't care how many Wii Fit games you play-- and I do like the Wii-- most of these kids are not on their iPads on a treadmill, right? They're sitting down. And so the amount of screen time that kids are getting and then you can go and talk about the decrease in physical education, which seems to be trying to make a trend in some states back. But just the amount of school hours, the amount of homework, the amount of-- so we are living in a sedentary lifestyle, which is playing a role, in my mind, to what we see with the need to educate, not just on playing sports, but being active.

And so playing a sport is not [INAUDIBLE] activity. I changed the verbiage on this. I forget when Dr. Skelton used it for. But I think just being active. But just walking your dog while you driving down is not what we want when we say get up and be active and go do something outside.

So just because you play a sport, doesn't mean you actually getting-- you know, for some sports, there's a ton of sit around time. There's a lot of focus training on certain movements, drills, that doesn't necessarily even equate to the level of activity that kids need to be doing during the day.

So this is kind of geared right now just towards your average patient being in the clinic. We know the numbers aren't good when it comes to childhood obesity. So again, when we focus on education, we not only want to focus on diversification, but also encouraging kids to be physically active and fit early on in their life, which is going to lead to a lot of benefits down the road.

So how can you put this into your practice? Encourage having fun when playing sports. I love the YMCA, at least in [INAUDIBLE] county. I think they do an incredible job. Most of their coaches are focused on a lot of what we're talking about early on. And so I put a plug-in for them. They're not paying me anything.

Advise patients to participate in multiple sports at least until puberty. I think as of right now, the evidence we have, that's a good guidance if your patients. It may change. But that's good guidance for now.

Discuss that specializing later may lead to better overall athletic abilities and accomplishment of athletic goals. So you're not telling the patient that wants to be a pro baseball player that they aren't going to do that. You're basically saying, I have a better model, we believe, to keep you healthier and active and actually get to where you want to go as an 18-year-old. Encourage athletic goals that are realistic and self-motivated. So we saw the numbers on who's actually going to be a pro athlete. So just remind parents of that when they are upset that you think Johnny should slow down.

Summary-- another great quote from a book called *Childhood to Champion Athlete*. "Athletes who participate in a variety of sports and specialized after puberty, tend to be more consistent performers across the board, have fewer injuries, and continue sports longer compared to those who specialized early." Again, the evidence that we at least have now points to that statement being true.

Suggested readings. Most of what I talked about comes out of this. It's John O'Sullivan's book is down there again. It's a \$5 Kindle download. You could read it in probably less than five hours.

It is a great resource, I think, to encourage parents to read. If you've read it, I'd love to hear feedback in a second. The American Academy of Pediatrics Sports Medicine Council has put out some statements. They actually are coming out with a revised statement on early sports specialization, I believe, this year. I believe this year.

And if you're not a part of the Council of Sports Medicine, along with all the other AAP dues, I think you can join for \$10 or \$20. But I would say it's a wealth of resources on their website. The Aspen Project Play is another great resource that has a lot of this evidence that I've talked about. And there one of these groups that preaches a lot of what I'm talking about here today.