COPE Presents: "Early Life Risk Factors for Obesity in Children with Autism Spectrum Disorder"

Dr. Tanja Kral, PhD

July 8th, 2020

Moderator: Lisa Diewald, MS, RD, LDN

Presenter: Tanja Kral, PhD

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00:00:05.279 --> 00:00:09.809

Villanova Webinar 1: Good afternoon. Welcome to COPE's July webinar for health professionals.

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00:00:10.320 --> 00:00:20.070

Villanova Webinar 1: In this period of social distancing, we're so grateful that you've chosen to attend what promises to be an informative and insightful virtual continuing education opportunity.

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00:00:20.610 --> 00:00:26.760

Villanova Webinar 1: We have about 190 health professionals registered for this webinar. And we're so excited to get started.

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00:00:27.540 --> 00:00:35.640

Villanova Webinar 1: We're particularly excited to address in our webinar today, the nutritional challenges and health-related risks of children with autism spectrum disorder

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00:00:35.970 --> 00:00:43.740

Villanova Webinar 1: or ASD and enhance our understanding of both so that as healthcare providers, we can better serve this population in need.

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Villanova Webinar 1: My name is Lisa Diewald and I am the Program Manager for the MacDonald Center for Obesity Prevention and Education at Villanova University Fitzpatrick College of Nursing.

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Villanova Webinar 1: I have the pleasure of being the moderator for today's webinar.

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00:00:58.260 --> 00:01:08.310

Villanova Webinar 1: Villanova universities M. Louise Fitzpatrick College of Nursing is home to the first College of Nursing in the country to have a center devoted to obesity prevention and education.

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Villanova Webinar 1: COPE's goals are to enhance nutrition, nursing education, and topics related to nutrition, obesity prevention, and health promotion strategies;

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00:01:19.320 --> 00:01:23.910

Villanova Webinar 1: to provide continuing education webinars, such as this program

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Villanova Webinar 1: and other programs on obesity and obesity related diseases for health professionals and educators, and finally to participate in research to expand and improve evidence-based approaches for obesity prevention and education in the community.

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00:01:42.660 --> 00:01:58.800

Villanova Webinar 1: Before we begin the presentation, I would just like to remind you that PDFs of today's PowerPoint slides are posted on the website at villanova.edu/cope. After going to COPE's website, simply click on the webinar description page for this month's webinar.

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00:01:59.910 --> 00:02:09.030

Villanova Webinar 1: Please use the question and answer box on your screen to submit any questions for the speaker. All questions will be answered at the end of the program as time permits.

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00:02:09.420 --> 00:02:18.270

Villanova Webinar 1: The expected length of the webinar is one hour. The session, along with a short transcript will be recorded and placed on the COPE website within the next week.

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00:02:22.350 --> 00:02:36.870

Villanova Webinar 1: If you use your phone to call into the webinar today and want the credit for attending the webinar, please take a moment afterwards to email us at cope@villanova.edu and please provide your name, so that we can send you your CE certificate.

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00:02:39.480 --> 00:02:48.150

Villanova Webinar 1: The objectives for today's webinar are to describe pregnancy-related risk factors for child obesity in children with ASD;

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Villanova Webinar 1: Second, to highlight possible dietary and early life risk factors that may be underlying the increased obesity rate risk and children with ASD and finally, to address feeding and weight-related concerns in children with ASD, as well as directions for future research.

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00:03:07.380 --> 00:03:16.770

Villanova Webinar 1: Villanova University College of Nursing is accredited as a provider of continuing education by the American Nurses credentialing center commission on accreditation.

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Villanova Webinar 1: Villanova University College of Nursing Continuing Education/COPE is also a Continuing Professional Education CPE Accredited Provider with the Commission on Dietetic Registration.

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00:03:31.290 --> 00:03:44.070

Villanova Webinar 1: Our webinar this month awards one contact our for nurses and one CPEU for dietitians and DTRs. If you are using learning need codes for your continuing education as a dietitian,

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00:03:44.760 --> 00:04:00.420

Villanova Webinar 1: the learning Need codes are 5070, 5180, 5370 and 9020 and the CDR level of this webinar is 2. Performance indicators are listed on the slide.

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00:04:03.660 --> 00:04:13.650

Villanova Webinar 1: Next, I have the privilege of introducing our speaker for today's webinar. Dr. Kral and I had the pleasure of working together, years ago, and I'm so thrilled she's presenting today's webinar for us.

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00:04:14.280 --> 00:04:22.620

Villanova Webinar 1: Tanja Kral, PhD is professor of Nutrition Science at the University of Pennsylvania School of Nursing and Perelman School of Medicine.

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00:04:23.130 --> 00:04:32.130

Villanova Webinar 1: A nutrition scientists with training in the study of human ingestive behavior, Dr. Kral's research focuses on cognitive sensory and nutritional controls

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00:04:32.490 --> 00:04:36.540

Villanova Webinar 1: of appetite and eating in children and adults and their relevance to obesity.

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00:04:37.500 --> 00:04:49.890

Villanova Webinar 1: She earned her MS and PhD degrees from the Pennsylvania State University and is the author of numerous peer reviewed journal articles focusing on topics such as behavioral phenotypes for childhood obesity,

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00:04:50.340 --> 00:05:00.780

Villanova Webinar 1: early life influences on child weight outcomes and the relationship between food insecurity, child weight status, and parent reported child eating and snacking behaviors.

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00:05:01.200 --> 00:05:09.810

Villanova Webinar 1: Dr. Kral is the principal investigator on several NIH grants, both active and completed and is a recipient of multiple professional awards

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00:05:10.110 --> 00:05:22.170

Villanova Webinar 1: including most recently, the Allen Epstein Research Award from the Society of Ingestive Behavior and the Ruth Pike Lecture Series Award from the Department of Nutritional Sciences of the Pennsylvania State University.

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00:05:23.700 --> 00:05:32.730

Villanova Webinar 1: While we are preparing for Dr. Kral's presentation to begin, I just wanted to mention that neither the presenter, nor the planners of this webinar, have any disclosures to report.

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Villanova Webinar 1: Accredited status does not imply endorsement by Villanova University, COPE or the American Nurses Credentialing Center of any commercial products or medical nutrition advice displayed in conjunction with an activity.

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00:05:47.160 --> 00:05:55.950

Villanova Webinar 1: And with that, I welcome Dr. Kral to our COPE webinar program and I will turn over controls to her for the presentation. Thank you, Dr. Kral.

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Tanja Kral, PhD.: Great. Thank you so much Lisa for this kind introduction and for the invitation to speak in this webinar. It's truly a pleasure to be here.

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Tanja Kral, PhD.: So we know from emerging research that children with autism spectrum disorder or ASD are at an increased risk for developing overweight and obesity. But what we don't know yet are the mechanisms that are underlying this increased obesity risk.

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00:06:27.540 --> 00:06:48.270

Tanja Kral, PhD.: So today I will be presenting data to you from research that we conducted at Penn Nursing and also at the Children's Hospital of Philadelphia, CHOP, which will elucidate select risk factors for obesity that emerged early in children's life and put them at risk for obesity.

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Tanja Kral, PhD.: Trying to advance. Here you go.

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Tanja Kral, PhD.: So as Lisa said, I am a nutrition scientist by training. For the last 15 years, the focus of my research has been on childhood obesity.

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Tanja Kral, PhD.: More specifically, I'm interested in identifying behavioral phenotypes, or eating behaviors that may put some children at increased risk for developing obesity.

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Tanja Kral, PhD.: Now much of my research to date has focused on typically developing children, but more recently, in collaboration with faculty from the School of Nursing and CHOP I've expanded on my research to study eating behaviors and weight development in children with autism spectrum disorder.

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Tanja Kral, PhD.: So in today's lecture, I will first provide an overview of the prevalence of obesity in children with ASD and associated cardiovascular risks.

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Tanja Kral, PhD.: I will then present data from a multisite study on pregnancy related risk factors, ASD symptoms, and co-occurring conditions related to obesity in children with ASD.

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Tanja Kral, PhD.: And lastly, I will discuss difficulties of feeding and eating routines of children with ASD and how these feeding difficulties may also impact children's obesity risk.

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Tanja Kral, PhD.: Okay, so let's start with some prevalence data on obesity in children with ASD.

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Tanja Kral, PhD.: Some studies show up to a fourfold increased risk for overweight and obesity when compared to typically developing children. But, the prevalence rates vary widely across studies.

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Tanja Kral, PhD.: So the prevalence rates for overweight and obesity-

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Tanja Kral, PhD.: This is a BMI for age greater than the 85th percentile. So for those two categories combined the obesity age rates ranges between 34 and 53% across studies. Now that's compared to only 35% in typically developing children

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Tanja Kral, PhD.: prevalence rates for obesity. So this is a BMI for age percentile that's greater than the 95th percentile, ranges between 10 and 43% with a mean around 23% across studies and this is as compared to 18.5% in typically developing children. So clearly children

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Tanja Kral, PhD.: With ASD are at higher risk, maybe not for overweight, but for obesity.

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Tanja Kral, PhD.: And this is particularly worrisome because this also puts them at greater risk for developing obesity associated comorbid conditions such as the metabolic syndrome,

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Tanja Kral, PhD.: which many of you know is a cluster of conditions such as increased blood pressure, high glucose, excess body fat around the waist and abnormal cholesterol and triglyceride levels. So the metabolic syndrome, then

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Tanja Kral, PhD.: puts these children at increased risk for heart disease, stroke, and type two diabetes.

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Tanja Kral, PhD.: Now in a study that we did, a small pilot study back

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Tanja Kral, PhD.: at Penn, we enrolled children with autism spectrum disorder and typically developing children between the ages of four and six, and we compared them in their anthropometric characteristics.

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Tanja Kral, PhD.: So you can see at such a young age four to six years of age, they already showed higher levels of BMI z-score, even though this was only a trend and non-significant.

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Tanja Kral, PhD.: Children with ASD also had already a greater waist circumference, a greater weight to height ratio and larger proportion of them had overweight or obesity.

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Tanja Kral, PhD.: Now, we were particularly interested in the weight to height ratio. This is a novel anthropometric tool that predicts cardiovascular risk in preschool and older children. And so our mean weight for height ratio already exceeded the point five cutoff point

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Tanja Kral, PhD.: to

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00:11:37.740 --> 00:11:51.960

Tanja Kral, PhD.: indicate that children as young as four to six years of age are at a greater risk for developing cardiovascular disease. And then in a study from Brazil, by Castro et al., Using bioelectrical impedance,

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Tanja Kral, PhD.: they measured body composition and total body fat in a group of children with ASD ages four to sixteen. In their study, they showed high central adiposity which again is linked to medical conditions

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Tanja Kral, PhD.: such as impaired glucose tolerance and insulin resistance, as well as overall greater total adiposity.

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Tanja Kral, PhD.: So let's talk about some early life risk factors that have been identified for childhood obesity. We know this from long standing research in typically developing

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Tanja Kral, PhD.: children that the risk for obesity starts early in life, even before children are born. So pregnancy has been identified as a critical period, which can confer this increased risk for obesity to the child.

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Tanja Kral, PhD.: Several maternal risk factors and also risk factors for life related to the infant have been identified to be linked to this increased risk.

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Tanja Kral, PhD.: One maternal risk factor is an elevated weight status or BMI prior to entering a pregnancy, also gaining more than the recommended amount of weight during pregnancy.

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Tanja Kral, PhD.: And then for the child, what we're learning is that accelerated or rapid weight gain during the first six to twelve months of life can pose a significant risk factor for later childhood obesity.

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Tanja Kral, PhD.: I want to show you

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Tanja Kral, PhD.: what we found in typically developing for each of these risk factors. This is a longitudinal study of growth and development in typically developing children.

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Tanja Kral, PhD.: And children who were born to mothers who had a pre-pregnancy BMI in the normal weight range were classified as at low risk for obesity.

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Tanja Kral, PhD.: And then children who were born to mothers with a pre-pregnancy BMI in the overweight or obese range were classified as at high risk for obesity.

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Tanja Kral, PhD.: And the graph shows you the BMI z-score trajectory for both groups over the first 14 years of children's life.

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Tanja Kral, PhD.: And what you can see as groups started to significantly different in their BMI z-score as early as age four, with high risk children showing significantly greater BMI z-scores. This discrepancy in BMI grew only bigger as time went on.

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Tanja Kral, PhD.: Also, the next risk factor for childhood obesity is gestational weight gain. You probably know that the Institute of Medicine

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Tanja Kral, PhD.: Put out pregnancy weight gain recommendations. So not all women have to gain the same amount of weight during pregnancy. It really depends on women's weight status. And as you can see from this table, the heavier a woman is entering pregnancy, the less weight she has to gain.

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Tanja Kral, PhD.: Now women with overweight and obesity prior to pregnancy are more likely to exceed these weight gain recommendations.

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Tanja Kral, PhD.: In turn, exceeding these gestational weight gain recommendations has been shown to put children at a 46% increase in the odds of developing overweight and obesity during early childhood.

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Tanja Kral, PhD.: And then the last early life risk factor that I will be discussing is rapid weight gain during infancy,

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Tanja Kral, PhD.: which as you know, infancy is a critical period for growth and development. And a rapid growth is defined as crossing weight for age percent on lines on a standard growth chart.

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Tanja Kral, PhD.: And so what this meta-analysis showed is that rapid weight gain during the first year of life conferred a two-fold higher risk for childhood obesity and even a 23% higher risk for adult obesity.

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Tanja Kral, PhD.: Again together, these early life risk factors are important for conferring an obesity risk early on in life for children.

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Tanja Kral, PhD.: So our team at Penn Nursing and CHOP recently explored these early life risk factors for children with ASD

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Tanja Kral, PhD.: Using data from the study to explore early development or SEED, which is one of the largest studies of ASD in the US to date.

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Tanja Kral, PhD.: SEED is a multi-year multisite study that's funded by the CDC and implemented in six US sites and a data coordinating center to study the prevalence, as well as the etiology of ASD.

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Tanja Kral, PhD.: And so before I present some of the data, I want to take a moment to acknowledge our large team of investigators from around the country who participated in this analysis.

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Tanja Kral, PhD.: In particular, I want to acknowledge Dr. Jennifer Pinto-Martin at Penn Nursing and Dr. Susan Levy at CHOP who led the Pennsylvania Center for Autism and Developmental Disability research and epidemiology, which was one of the six sites for this study.

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Tanja Kral, PhD.: So this map shows you the different science, the previous as well as the current SEED science. the CDC funded SEED for three phases. The first two phases are complete and currently, they are enrolling

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Tanja Kral, PhD.: greater than 2500 children in SEED three. And so you can see, we were one of the previous SEED sites.

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Tanja Kral, PhD.: In this study, children ages two to five years and their parents were enrolled. The study has three study groups. The first group are children with autism spectrum disorder.

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Tanja Kral, PhD.: The second group of children with other developmental disabilities, other than ASD. And then the third group was sampled from the general population. Those are children with typical development.

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Tanja Kral, PhD.: So, in the current study, we had three aims. We wanted to examine the relationship between these child weight outcomes in children grouped

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Tanja Kral, PhD.: As ASD, DD or POP at ages two to five years and then relate those outcomes to maternal pre-pregnancy weight status, gestational weight gain,

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Tanja Kral, PhD.: and also rapid weight gain during the first six months of children's life. We wanted to compare the three groups in obesity rates in contributing factors that may lead to higher obesity risk.

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00:19:23.550 --> 00:19:32.250

Tanja Kral, PhD.: Then also, because we had such a wealth of data available, we were able to examine associations between child weight status and the presence

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00:19:32.520 --> 00:19:47.850

Tanja Kral, PhD.: of co-occurring medical, behavioral, developmental, and psychiatric conditions across groups as well as examine if there was a relationship between children's security of autism symptoms and the weight status.

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00:19:50.640 --> 00:20:06.630

Tanja Kral, PhD.: At the time, when we did this analysis 3899 children were enrolled in SEED. We used data from children who completed the clinic visit during which their height and weight were measured.

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Tanja Kral, PhD.: You can see the sample sizes for the three groups. We also excluded children who had biologically implausible BMI values based on the CDC cutoffs.

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Tanja Kral, PhD.: Our maternal weight related variables included maternal pre-pregnancy BMI. Also we had available from maternal interviews, but also medical records, maternal gestational weight gain.

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Tanja Kral, PhD.: And we then used the IOM recommendations to classify mothers into a group that either met or did not meet the recommended weight gain for her respective weight category. And we also further characterized, whether the mothers exceeded, equaled, or were below the weight gain recommendations.

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Tanja Kral, PhD.: Now for the children, we also had a lot of data available mostly for medical records, but also from the in person clinic visit. So we had available child heights and length as well as weights.

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Tanja Kral, PhD.: We generated weight for age and BMI z-scores and percentiles using the WHO growth standards

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Tanja Kral, PhD.: for kids for when during the infancy, period. So again, this reflects growth patterns of children who were predominantly breastfed

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Tanja Kral, PhD.: and identifies how children should grow when provided optimal conditions. Then, for children, two years and older, we used the CDC growth charts to generate BMI z-scores and percentiles.

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Tanja Kral, PhD.: For rapid weight gain, we use the cutoff point of .67 standard deviations that was used in previous research to identify infants who showed rapid weight gain during the first six months.

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00:22:20.880 --> 00:22:33.120

Tanja Kral, PhD.: We collected a whole host of demographic, maternal, and birth variables with respect to maternal conditions, medical conditions in particular.

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Tanja Kral, PhD.: These were based on clinical significance and also assessed for a potential effect on infant growth during pregnancy. And then for infants, we had birth weight, prematurity status, gestational age and also some variables on breastfeeding.

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00:22:57.090 --> 00:23:09.060

Tanja Kral, PhD.: We also collected a whole host of co-occurring medical, behavioral and psychiatric conditions for the children on the medical records that were available to us.

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00:23:09.900 --> 00:23:24.300

Tanja Kral, PhD.: You can see again, we identified medical conditions that may have a potential effect on children's weight status and also behavioral and developmental and psychiatric conditions that may be related to child weight.

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00:23:27.780 --> 00:23:49.590

Tanja Kral, PhD.: We determined autism severity for children using two separate scales. One was the Ohio State University Autism Rating Scale(OARS). This is a scale that specifies the frequency and severity of core symptoms of ASD and also quantifies overall functional impairment.

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Tanja Kral, PhD.: Whereas the Autism Calibrated Severity Score measures severity of ASD symptoms but independent of other

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Tanja Kral, PhD.: developmental factors such as language and adaptive skills and may also not take into account the overall degree of impairment. So the two scales measure slightly different aspects of autism severity.

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Tanja Kral, PhD.: Let's take a look at the descriptive characteristics of the sample.

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Tanja Kral, PhD.: There were no age differences across the three groups for the children, as expected. There was a higher proportion of boys in the ASD groups compared to the other groups.

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Tanja Kral, PhD.: With respect to prematurity, we found higher rates of prematurity among ASD and DD groups,

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Tanja Kral, PhD.: with the DD group showing the highest rates of prematurity. Interestingly, when you look at the Children's BMI z-score, you can see here very clearly

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Tanja Kral, PhD.: that children with ASD had the highest BMI z-scores, followed by children with DD and then POP children had the lowest on the MIC scores. This is also reflected in the rates of overweight and obesity across these three groups.

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00:25:19.140 --> 00:25:35.850

Tanja Kral, PhD.: With respect to some maternal variables, we found that there were racial and ethnic differences with a higher rate of African Americans and a lower rate of whites among ASD and DD mothers.

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Tanja Kral, PhD.: In terms of educational level, we found a higher level of high school education and a lower level of college education among ASD and DD mothers.

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00:25:47.220 --> 00:25:52.830

Tanja Kral, PhD.: Also higher levels of poverty among ASD mothers when compared to DD and POP mothers.

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Tanja Kral, PhD.: What's also interesting is to look at their pre-pregnancy weight status. We did find higher levels of overweight and obesity among ASD and DD mothers.

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Tanja Kral, PhD.: With respect to being above, meeting, or being below the gestational weight gain recommendations, we found a greater percentage of ASD mothers exceeded the gestational weight gain recommendations.

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Tanja Kral, PhD.: And a lower percentage of ASD and DD mothers actually met the recommendations for gestational weight gain when compared to POP mothers.

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Tanja Kral, PhD.: These are the medical characteristics of the mothers in our sample. We found a higher percentage of gestational diabetes. This is diabetes, which develops for the first time during pregnancy,

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Tanja Kral, PhD.: But a lower pre-pregnancy diabetes percentage among ASD and DD mothers. We also found higher rates of hypertension and other pregnancy-induced hypertension among ASD and DD mothers.

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00:27:05.340 --> 00:27:16.860

Tanja Kral, PhD.: When you look at breastfeeding rates, we found that among ASD and DD mothers, a higher percentage never breastfed or breastfed for less than three months.

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00:27:22.050 --> 00:27:39.690

Tanja Kral, PhD.: This table shows the frequency of the various medical conditions and I've highlighted the ones that were significant. As expected children with ASD, but also with developmental disabilities showed a higher frequency in a whole host of

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00:27:40.800 --> 00:27:43.140

Tanja Kral, PhD.: medical co-occurring conditions.

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Tanja Kral, PhD.: And then finally, when we look at a child's behavioral, developmental, or psychiatric conditions, we also found significant differences.

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00:28:00.480 --> 00:28:09.480

Tanja Kral, PhD.: Now I want to draw your attention to differences related to feeding difficulties here. These are significantly higher in the ASD group.

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00:28:10.050 --> 00:28:25.290

Tanja Kral, PhD.: But also sensory disorders and we will come back to the sensory difficulties later in the presentation and also sleep problems. All of these three characteristics have been implicated in a higher risk for obesity.

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00:28:28.620 --> 00:28:36.330

Tanja Kral, PhD.: Okay, so let's take a look at the weight related results that we found in the study. I will walk you through some of these tables

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Tanja Kral, PhD.: first. This graph shows you, or the table shows you the association between maternal pregnancy weight status, whether the women had overweight or obesity or underweight or normal weight

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Tanja Kral, PhD.: before entering pregnancy and then child weight status during early childhood. You can see that we started out with a regular regression analysis with no covariance in the model

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Tanja Kral, PhD.: and then consequently adjusted for case status. This is children's group status, whether they were ASD, DD or POP and then progressively adjusted for demographic variables, for maternal variables, and then for

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00:29:19.620 --> 00:29:30.990

Tanja Kral, PhD.: medical maternal as well as child variables. And what you can see here is even after we control for all covariance, mothers who had a pre-pregnancy

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Tanja Kral, PhD.: BMI that indicated obesity were two times more likely to have a child with obesity during early childhood. What was interesting, but also expected is that this finding applied to all three groups. It wasn't

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00:29:46.380 --> 00:29:54.360

Tanja Kral, PhD.: just applying to children with autism. It applied to children with autism developmental disabilities as well as typically developing children.

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00:29:58.320 --> 00:30:07.950

Tanja Kral, PhD.: Next, we looked at the association between maternal gestational weight gain, whether it was above, equal to, or less than the IOM recommendation.

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00:30:08.880 --> 00:30:20.070

Tanja Kral, PhD.: In conjunction with our child weight status. Here you can see the most consistent relationship was found when comparing mothers who had

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00:30:20.580 --> 00:30:32.100

Tanja Kral, PhD.: exceeded the IOM recommendations to those who met the IOM recommendations. So when controlling for case status, mothers who exceeded the gestational weight gain recommendations

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00:30:32.790 --> 00:30:41.700

Tanja Kral, PhD.: were one and a half times more likely to have a child with obesity. This association held true when we added all covariance to the model.

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00:30:44.460 --> 00:30:52.440

Tanja Kral, PhD.: Where it got really interesting was when we looked at the frequency of rapid weight gain in infants across the three groups.

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00:30:53.610 --> 00:31:04.740

Tanja Kral, PhD.: Here you can see the children with ASD had the highest prevalence, nearly 44% of them showed rapid weight gain when compared to DD and POP children.

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00:31:05.190 --> 00:31:13.740

Tanja Kral, PhD.: This association is really striking because it's almost half of the sample who showed rapid weight gain during the first six months of life.

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00:31:22.200 --> 00:31:35.970

Tanja Kral, PhD.: When we look at the association between rapid weight gain and weight status, we again found the most consistent relationship in children ASD, those with versus without rapid weight gain.

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00:31:37.980 --> 00:31:49.200

Tanja Kral, PhD.: Children with ASD and rapid weight gain had three and a half times greater chance of developing obesity during early childhood after controlling for all covariance.

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00:31:55.260 --> 00:32:00.390

Tanja Kral, PhD.: I'm moving on to associations between child weight status and co-occurring conditions.

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00:32:01.170 --> 00:32:10.080

Tanja Kral, PhD.: So this time we are controlled for all of these medical, behavioral, and developmental as well as psychiatric covariance in children.

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00:32:10.890 --> 00:32:20.340

Tanja Kral, PhD.: We saw a very pronounced association when we looked at, when we compare children with ASD to typically developing children.

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00:32:20.880 --> 00:32:34.050

Tanja Kral, PhD.: Children with ASD had a one and a half times greater odds of developing obesity, even after we control for all demographic variables and all co-occurring medical conditions.

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00:32:34.470 --> 00:32:42.570

Tanja Kral, PhD.: This suggests to us that a higher risk for obesity among children with autism is independent of other conditions.

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00:32:45.750 --> 00:32:57.180

Tanja Kral, PhD.: Also, a very interesting finding was that children with more severe impairment, who had more severe autism, using the OARS scale,

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00:32:58.230 --> 00:33:02.820

Tanja Kral, PhD.: they were 70% more likely to have overweight or obesity.

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00:33:04.170 --> 00:33:15.540

Tanja Kral, PhD.: We saw this association with the OARS scale, but we did not find it with the as ACSS scale. Again the two measure slightly different aspects of autism security.

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00:33:17.520 --> 00:33:19.050

Tanja Kral, PhD.: But summarizing

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00:33:20.880 --> 00:33:36.390

Tanja Kral, PhD.: What these data suggest are that our children with ASD showed the highest frequency of rapid weight gain. Those with rapid weekend were at a significantly greater risk for developing obesity during childhood.

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00:33:38.850 --> 00:33:54.780

Tanja Kral, PhD.: Helping mothers to achieve a healthy pre-pregnancy weight, an adequate gestational weight gain is important for all three groups, not just for mothers who later on, have children with autism. So these are clearly important targets for early prevention.

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00:33:56.310 --> 00:34:04.980

Tanja Kral, PhD.: Then finally, healthy growth patterns during infancy may carry special importance for children who may be at increased risk for developing ASD.

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00:34:05.430 --> 00:34:17.250

Tanja Kral, PhD.: So, these may be formally premature infants, younger siblings of children with ASD, or children with a genetic disorder that may predispose them on to ASD.

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00:34:21.510 --> 00:34:29.910

Tanja Kral, PhD.: Furthermore, developmental disabilities such as ASD confer an independent risk of overweight and obesity in children.

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00:34:33.210 --> 00:34:56.760

Tanja Kral, PhD.: Also, it's important that we pay special attention to children with a higher impairment and more severe symptoms of ASD as they may be at greatest risk for developing obesity. So it's really important for health care providers to monitor these children's growth early on.

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00:35:00.480 --> 00:35:09.810

Tanja Kral, PhD.: With that, I would now like to switch gears and talk a little bit about feeding difficulties that present themselves in children with ASD.

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00:35:10.530 --> 00:35:20.280

Tanja Kral, PhD.: There are many feeding difficulties and we believe that as many as 89% of children may be affected by feeding difficulties.

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00:35:21.060 --> 00:35:31.530

Tanja Kral, PhD.: In a recent meta-analysis of 17 studies, the data suggested that the odds of having a feeding problem in children with ASD were five times the odds

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00:35:31.890 --> 00:35:36.810

Tanja Kral, PhD.: of children with typical development. And what's interesting is that these feeding difficulties

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00:35:37.230 --> 00:35:51.090

Tanja Kral, PhD.: arise early during infancy, when children haven't been diagnosed yet with ASD. So these are feeding problems such as late acceptance of solid foods and they're described to be slow eaters.

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00:35:52.740 --> 00:35:59.730

Tanja Kral, PhD.: Because of these feeding difficulties, there of course is concern for potential short and long-term health care service health risks.

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00:36:01.410 --> 00:36:13.530

Tanja Kral, PhD.: But also these nutritional difficulties post significant everyday challenges for parents and caregivers when it comes to child feeding and daily eating routines.

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00:36:14.370 --> 00:36:28.260

Tanja Kral, PhD.: And many clinicians and care providers feel ill equipped at this point in also like the knowledge of how to best address these feeding difficulties in families. And this is an active area of research right now.

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00:36:31.410 --> 00:36:45.390

Tanja Kral, PhD.: So the first feeding difficulty is picky eating. We know that a significantly greater proportion of children with ASD are at risk for picky eating as compared to typically developing children.

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00:36:46.980 --> 00:37:11.550

Tanja Kral, PhD.: Now picky eating is not uncommon among young children. However, children with ASD are disproportionately affected, so much so that some studies reported that children with ASD may limit their willingness to eat a range of foods and consume less than 20 foods in their diet.

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00:37:14.940 --> 00:37:16.110

Tanja Kral, PhD.: One parent said,

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00:37:17.310 --> 00:37:26.550

Tanja Kral, PhD.: My child is very picky. He has a good appetite, but his choices are very limited, pancakes with chocolate chips, pizza, McDonald's chicken nuggets, some fruits,

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00:37:26.970 --> 00:37:47.040

Tanja Kral, PhD.: yogurt, applesauce, and juices. What's interesting here is that even though our children with ASD show increased levels of picky eating, they do not necessarily show a poor appetite and they do eat the foods that they like and oftentimes, those foods are energy dense nutrient

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00:37:48.090 --> 00:37:50.460

Tanja Kral, PhD.: poor foods that are highly processed.

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00:37:52.050 --> 00:38:00.390

Tanja Kral, PhD.: Another feeding difficulty of children with autism is a food neophobia which is the fear or unwillingness to try new foods.

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00:38:01.740 --> 00:38:20.760

Tanja Kral, PhD.: Again, a high percentage of children with ASD show food neophobia. So again, food neophobia is common among young children, but it typically decreases with age. However, in children with ASD, it's more chronic and a more sustained food neophobia.

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00:38:22.110 --> 00:38:35.010

Tanja Kral, PhD.: Also, a high percentage of children with ASD exhibit rituals surrounding their eating habits. So they want, for example, to use the same utensils, the same dishes, place settings. They demand

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00:38:35.790 --> 00:38:52.290

Tanja Kral, PhD.: for food to be made the same way every time, which perhaps suggests that some of the core symptoms of ASD, such as restrictive or repetitive behaviors, may be implicated in these feeding difficulties.

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00:38:56.040 --> 00:39:09.840

Tanja Kral, PhD.: This study aimed to determine parent report of food refusal based on the characteristics of foods and compare children with ASD to typically developing children. So this was a cohort.

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00:39:10.440 --> 00:39:16.170

Tanja Kral, PhD.: of 53 children between the ages of three and eleven years who were enrolled in the study.

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00:39:16.800 --> 00:39:34.590

Tanja Kral, PhD.: And what the investigators found was that children with ASD were significantly more likely to refuse food based on the texture and consistency. Also, the taste and smell of foods. Foods being mixed together, even the brand name of the foods, as well as the shape.

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00:39:40.200 --> 00:39:56.850

Tanja Kral, PhD.: Also, we know that a high percentage of children with ASD have difficulties with sensory processing. They have difficulty processing, but also integrating sensory information such as the sight, sound, smell, taste, or movement.

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00:39:57.990 --> 00:40:13.470

Tanja Kral, PhD.: And in our study with the four to six year olds, we found that in relation to oral sensory sensitivity, we had 44% of these young children who already showed a typical oral sensory sensitivities.

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00:40:16.200 --> 00:40:24.840

Tanja Kral, PhD.: This is interesting because we know that sensory processing and eating and food acceptance are all interrelated.

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00:40:25.350 --> 00:40:37.920

Tanja Kral, PhD.: So it's possible that for children who have these sensory sensitivities, they may limit their food intake to foods that are tolerable to them in terms of their sensory properties.

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00:40:39.300 --> 00:40:52.230

Tanja Kral, PhD.: Parents are very aware of the sensory sensitivities. In one of our studies, one parent said since 15 months of age, my child has had a very limited diet.

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00:40:52.740 --> 00:41:02.580

Tanja Kral, PhD.: He has sensory issues as far as texture and smell. My child can become very repetitive with certain foods and he will eat that food for months at a time.

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00:41:02.970 --> 00:41:18.540

Tanja Kral, PhD.: For example, he used to only eat yogurt for lunch. Nothing else. Now he only wants peanut butter sandwiches. Again, I'm showing these are rigid and repetitive behaviors when it comes to the range of food the children accept to eat.

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00:41:20.190 --> 00:41:28.620

Tanja Kral, PhD.: And we also looked at feeding difficulties in relation to children's sensory sensitivity status.

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00:41:29.220 --> 00:41:39.960

Tanja Kral, PhD.: Those are kids with autism who either show a typical oral sensory sensitivity or atypical oral sensory sensitivity. And sure enough, it's children

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00:41:40.770 --> 00:41:50.790

Tanja Kral, PhD.: with an atypical role in sensory sensitivity that show high levels of food neophobia, high levels of food fuzziness, which is similar to picky eating.

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00:41:51.240 --> 00:42:12.150

Tanja Kral, PhD.: But interestingly, they also show eating dysregulation, either under eating or overeating. This then becomes significant in response to negative emotions. So this suggests also that food may play an important role for children with autism in regulating negative emotions.

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00:42:17.520 --> 00:42:22.800

Tanja Kral, PhD.: Now picky eating has often been conceptualized as food selectivity.

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00:42:24.090 --> 00:42:37.020

Tanja Kral, PhD.: It includes three domains. One is food refusal, which is quantified as both the number or percentage foods a child will not eat of those offered.

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00:42:37.590 --> 00:42:55.680

Tanja Kral, PhD.: A limited food repertoire, which is quantified as the number of unique foods a child consumed over a three day period. And then third, a high frequency of a single food intake. So this refers to a single food eaten more than four to five times daily.

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00:42:57.630 --> 00:43:12.600

Tanja Kral, PhD.: And in a study that was conducted by Bandini and colleagues, they found that children with ASD when compared to typically developing children exhibited more food refusal

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00:43:13.680 --> 00:43:21.840

Tanja Kral, PhD.: and also a more limited food repertoire. Single food intake did not differ in that study. But again, it was a fairly small sample size.

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00:43:24.150 --> 00:43:35.280

Tanja Kral, PhD.: Then, of course, the concern is if children show such a limited food repertoire, what happens to their dietary variety which is so important for young children?

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00:43:36.960 --> 00:43:47.100

Tanja Kral, PhD.: In this study, a large sample of children were enrolled, including children with classic autism, as well as other types of autism.

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00:43:47.760 --> 00:43:55.770

Tanja Kral, PhD.: And sure enough, when compared to typically developing children, the odds of having a more limited dietary variety

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00:43:56.460 --> 00:44:11.130

Tanja Kral, PhD.: progressively increased as children got older and it was most pronounced in children with classic autism. What was interesting in this study was they also looked at the dietary intake and

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00:44:11.970 --> 00:44:26.940

Tanja Kral, PhD.: their nutrient intakes and apparently there were no differences in energy or macro nutrient intake, even though kids showed a more limited dietary variety. We have seen, sort of

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00:44:28.230 --> 00:44:35.880

Tanja Kral, PhD.: that diet quality is not necessarily affected by food selectivity in part because children do not lack an

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00:44:36.480 --> 00:44:44.370

Tanja Kral, PhD.: appetite for foods. They just limit the type of foods that they're eating. Often they're eating highly processed foods that are fortified.

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00:44:44.910 --> 00:45:00.780

Tanja Kral, PhD.: And many children with ASD are often given dietary supplements. So therefore, in many cases, even though children are restricting their dietary intake or limit the range of foods that they're eating, they're not necessarily reducing their diet quality.

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00:45:04.800 --> 00:45:11.460

Tanja Kral, PhD.: All of these feeding difficulties, of course, present great challenges to parents and caregivers.

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00:45:12.180 --> 00:45:30.090

Tanja Kral, PhD.: And we, at this point, know still very little about the feeding practices that parents and caregivers used to address these feeding difficulties. We do know that food and food reinforcers are often used for behavior management by parents, but also by therapists.

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00:45:31.800 --> 00:45:37.410

Tanja Kral, PhD.: And again, some of these feeding behaviors we have studied in typically developing children

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00:45:38.280 --> 00:45:56.100

Tanja Kral, PhD.: that showed that being overly restrictive, restricting access to highly palatable calorie dense foods, as well as engaging and instrumental feeding, which means using food as a reward can actually have an adverse impact on children's eating behavior.

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00:45:57.450 --> 00:46:04.380

Tanja Kral, PhD.: But there are very limited data on sort of these feeding practices to date in children with ASD.

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00:46:07.890 --> 00:46:23.700

Tanja Kral, PhD.: In our study with the four to six year old children, caregivers of children with autism reported to engage in higher levels of prompting and encouragement to eat, but we don't know the types of foods they're encouraging their children to eat.

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00:46:24.780 --> 00:46:38.130

Tanja Kral, PhD.: What was also interesting is that caregivers often engage in emotional feeding, meaning they're using food to regulate children's negative emotional states.

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00:46:43.560 --> 00:46:58.350

Tanja Kral, PhD.: In summary, what I've shown you today in my talk was that children with ASD are at a higher risk for developing obesity and perhaps cardiovascular disease and that higher obesity risk starts at a very young age.

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00:46:59.430 --> 00:47:04.440

Tanja Kral, PhD.: The risk for that, we now know starts before children are born.

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00:47:05.790 --> 00:47:18.750

Tanja Kral, PhD.: Children with ASD often show limited dietary variety. But many children and perhaps due to on dietary supplements, are eating processed foods that are fortified

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00:47:20.520 --> 00:47:39.390

Tanja Kral, PhD.: tend to meet the recommended intake from any nutrients. Now this does not apply to children who are on very restricted diets, either by your caregiver or from a physician. Those children clearly need to be closely monitored for potential nutrient deficiencies.

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00:47:43.020 --> 00:47:53.550

Tanja Kral, PhD.: I will close with some thoughts for research opportunities. We clearly have learned a lot about eating behaviors and weight development in children with autism.

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00:47:54.420 --> 00:48:06.390

Tanja Kral, PhD.: Yet, we're still at the beginning and we're still interested in identifying more of the mechanisms that are underlying these feeding difficulties. Of course the ultimate

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00:48:08.250 --> 00:48:20.550

Tanja Kral, PhD.: goal of this research is to develop meaningful interventions to help children eat healthier. We know that the pronounced impairments of social and communication skills

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00:48:21.750 --> 00:48:29.850

Tanja Kral, PhD.: in children with ASD complicate the traditional treatment options for healthy eating that are available to typically developing children.

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00:48:30.600 --> 00:48:44.100

Tanja Kral, PhD.: But perhaps we can use what we have learned for decades long nutrition and obesity research in typically developing children and tailor these interventions to the specific needs of children with ASD.

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00:48:46.080 --> 00:49:03.840

Tanja Kral, PhD.: Clearly, the feeding problems are very complex in children with autism and they're multi-factorial. And therefore, those can be best addressed by an interdisciplinary approach. So we need interdisciplinary teams, both in science and practice

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00:49:04.860 --> 00:49:11.040

Tanja Kral, PhD.: To help develop on best strategies for improving children's food choices.

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00:49:12.810 --> 00:49:26.700

Tanja Kral, PhD.: I also want to mention I'm part of a really wonderful Healthy Weight Research Network, which was founded in 2013 by investigators from The University of Massachusetts and Tufts University.

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00:49:27.750 --> 00:49:38.910

Tanja Kral, PhD.: This network is funded by the Maternal and Child Health Bureau and comprises researchers, clinicians, policymakers, self-advocates, as well as family members.

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00:49:39.510 --> 00:49:49.950

Tanja Kral, PhD.: And really the research priorities are exactly what we sort of have been talking about today; to look at family practices around food and mealtimes,

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00:49:50.430 --> 00:50:06.510

Tanja Kral, PhD.: food patterns, behaviors, and weight gain, physical activity, and sedentary behaviors in children with autism as well as developing programs and adapting them for delivery to these vulnerable children.

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00:50:07.770 --> 00:50:20.520

Tanja Kral, PhD.: And then lastly, I want to mention a study that we were recently funded by the NIH to develop a mobile health, nutrition intervention for kids with autism.

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Tanja Kral, PhD.: This is a collaboration with researchers from CHOP, from Penn, as well as Brown University. And we know that children with ASD are engaging daily with mobile devices.

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00:50:35.220 --> 00:50:44.400

Tanja Kral, PhD.: Technology has also shown to help with their learning and communication. So we thought perhaps we can harness sort of the lure of the technology

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00:50:44.910 --> 00:50:56.700

Tanja Kral, PhD.: to help promote healthy eating behaviors in these children. As a first step, we developed and tested the feasibility, of this interactive nutrition

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00:50:57.270 --> 00:51:15.900

Tanja Kral, PhD.: intervention for children, specifically, who are picky eaters. And then we just finished data collection for a three month randomized control trial to test the efficacy of this intervention unchanging consumption of targeted foods and beverages.

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00:51:17.760 --> 00:51:23.520

Tanja Kral, PhD.: With that I close, and I thank you so much for listening and I'm happy to take questions.

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00:51:30.960 --> 00:51:36.900

Villanova Webinar 1: Thank you, Dr. Kral for a wonderful presentation. It's so nice to know that

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00:51:37.740 --> 00:51:50.280

Villanova Webinar 1: children who have such special needs are receiving such, that there's so much research going on to help them because I know that that will ultimately translate into as you said,

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00:51:51.030 --> 00:52:02.190

Villanova Webinar 1: practical implementation of strategies that can be helpful. We do have a few questions for you. But before we get to that, I wanted to remind

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00:52:02.700 --> 00:52:08.460

Villanova Webinar 1: everyone who has completed the webinar that you will be emailed a link to an evaluation within a week.

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00:52:08.790 --> 00:52:18.120

Villanova Webinar 1: The email will be sent to the email address you used to register for the webinar. The evaluation will expire in three weeks. So please complete it as soon as you can

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00:52:18.540 --> 00:52:22.320

Villanova Webinar 1: to ensure that you receive your CE certificate.

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00:52:23.130 --> 00:52:40.500

Villanova Webinar 1: Once the evaluation is completed, we will email you out a separate certificate within five business days. And remember, if you phoned into the webinar today, please email us at cope@villanova.edu and provide your name, so that we can provide you with your CE certificate.

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00:52:42.060 --> 00:52:48.900

Villanova Webinar 1: While we won't be presenting a webinar in August, we're happy to provide a sneak peek at the beginning of our

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00:52:50.850 --> 00:53:01.260

Villanova Webinar 1: webinar series, beginning in September. You will be receiving information via email on how to register for these webinars and more information will be available soon on our website.

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00:53:02.940 --> 00:53:13.140

Villanova Webinar 1: Fitzpatrick College of Nursing is thrilled to be studying the impact of COVID 19 on the healthcare workforce and, to this end, invite you, if you have been caring for patients with COVID

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00:53:13.710 --> 00:53:23.910

Villanova Webinar 1: to be part of the nationwide CHAMPS study. If you are someone who knows a health professional, a first responder, an essential worker or support staff in a hospital or nursing home

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00:53:24.510 --> 00:53:37.680

Villanova Webinar 1: and are currently providing or have provided support for patients or treatment sites for the community during the COVID 19 pandemic, you are encouraged to participate by completing a survey. It takes about 15 minutes.

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00:53:38.100 --> 00:53:48.150

Villanova Webinar 1: By hearing from these workers, where we can better determine how we can improve services in the future. To find out more, you can visit the website where you'll find a link to participate.

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00:53:49.530 --> 00:54:07.080

Villanova Webinar 1: COPE offers an online catalog of webinars and presentations, which can provide you with one contact hour or one CPEU for each webinar. You can search for topics that interest you. So simply go to the COPE website or to this link to find out.

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00:54:08.250 --> 00:54:13.920

Villanova Webinar 1: And with that, we do have, Dr. Kral, some questions to ask.

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00:54:16.050 --> 00:54:20.010

Villanova Webinar 1: One question that I think may

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00:54:21.090 --> 00:54:33.330

Villanova Webinar 1: be one that lots of people who don't have experience with children with autism spectrum disorder may wonder is, when is ASD typically diagnosed?

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00:54:34.050 --> 00:54:46.650

Villanova Webinar 1: The reason why perhaps this comes up is that if a parent and a physician are noticing that rapid weight gain in infancy, is that ever a

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00:54:48.270 --> 00:54:52.110

Villanova Webinar 1: a clue or symptom that is looked at as a possible

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00:54:53.940 --> 00:54:58.110

Villanova Webinar 1: link early on so that early intervention can begin?

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00:54:59.100 --> 00:55:07.170

Tanja Kral, PhD.: That's a really good question. So autism is generally diagnosed around the age of two or three.

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00:55:08.280 --> 00:55:17.580

Tanja Kral, PhD.: Rapid weight gain is seen not only in children, who later on, go on to be diagnosed with autism, but also with typically developing children.

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00:55:18.990 --> 00:55:32.070

Tanja Kral, PhD.: I wouldn't necessarily draw connection between the two. But you bring up a good question. We don't know yet what the mechanisms are that are underlying this rapid weight gain.

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00:55:33.330 --> 00:55:49.410

Tanja Kral, PhD.: But it's certainly something that should be monitored. We know that one of the potential hypotheses for rapid weight gain could be the feeding method, whether a child is being breastfed of formula fed.

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00:55:50.460 --> 00:55:58.800

Tanja Kral, PhD.: In our study, we had a variable on breastfeeding. But we really had very little information on formula feeding.

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00:56:00.180 --> 00:56:08.070

Tanja Kral, PhD.: And so we know that formula food has a higher protein content, is also more calorically dense,

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00:56:09.210 --> 00:56:19.380

Tanja Kral, PhD.: and it can increase growth more rapidly than regular breast milk. It can also change some appetite regulating hormones.

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00:56:20.070 --> 00:56:27.750

Tanja Kral, PhD.: And a new area for research is changes, potentially, to the gut microbiome. So the bacteria that are in our gut.

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00:56:28.680 --> 00:56:42.960

Tanja Kral, PhD.: Together, I think we just need more information. I wouldn't necessarily draw the link between rapid weight gain and later diagnosis for autism. And children with rapid weight gain should be should be closely monitored.

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00:56:44.670 --> 00:56:59.580

Villanova Webinar 1: Thank you. Let's see, in terms of parental feeding practices, are there any tips that you can offer based on what you see

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00:57:00.960 --> 00:57:11.910

Villanova Webinar 1: that a parent might be able to implement in, especially in those first couple years of life from your work, your research and from your work with

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00:57:13.440 --> 00:57:15.330

Villanova Webinar 1: other professional disciplines?

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00:57:16.080 --> 00:57:27.930

Tanja Kral, PhD.: Right. So what we generally learn in nutrition research is that an early varied diet that introduces healthy foods and presents children with a variety of healthy options

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00:57:28.950 --> 00:57:42.330

Tanja Kral, PhD.: is sort of the best way to put children on a good path for nutrition. Now, what we have seen in children who later on become diagnosed with autism,

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00:57:42.930 --> 00:57:54.330

Tanja Kral, PhD.: they early on, show feeding difficulties. They are more food neophobic. So it creates more of a challenge for parents and caregivers

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00:57:55.170 --> 00:58:08.310

Tanja Kral, PhD.: to figure out how to nourish their children with the best food possible, while at the same time managing food neophobia in picky eating.

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00:58:08.880 --> 00:58:19.950

Tanja Kral, PhD.: I would suggest trying different foods and not just once. We know from research in typically developing children that introducing foods multiple time and having children

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00:58:20.670 --> 00:58:33.450

Tanja Kral, PhD.: Try foods multiple times can actually lead to our liking for those foods, but again, parents with children who are very food neophobic Oh very picky eaters. It's very challenging.

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00:58:34.530 --> 00:58:46.590

Tanja Kral, PhD.: And as I've shown you, even the preparation method can make a difference. So it's probably trial and error that parents have to test out to get their kids to eat the healthy foods.

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00:58:49.080 --> 00:58:53.910

Villanova Webinar 1: I think we have time for one more quick question. Are medications ever

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00:58:55.680 --> 00:59:03.210

Villanova Webinar 1: prescribed for children in early ages for autism and, if so, do they have any weight-related?

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00:59:04.350 --> 00:59:13.350

Tanja Kral, PhD.: Yes, certainly. This is a great question. Unfortunately in our SEED study, we were not able to look at medication use because this is, I think,

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00:59:13.740 --> 00:59:24.450

Tanja Kral, PhD.: where the association between autism severity and obesity comes into play. We don't know if children. Well, we know that children who have more severe autism

276

00:59:24.930 --> 00:59:35.610

Tanja Kral, PhD.: are likely to be prescribed more medications that can impact eating and weight development. But, at least in our study, we didn't have this detailed data available, unfortunately.

277

00:59:38.130 --> 00:59:46.590

Villanova Webinar 1: Well, thank you. I think that we have all learned quite a bit and have a greater appreciation, Dr. Kral, of the tremendous

278

00:59:48.420 --> 01:00:02.520

Villanova Webinar 1: impact that ASD can have on a child's development and some of the early risk factors of obesity that are being identified can certainly help lead to

279

01:00:03.810 --> 01:00:11.220

Villanova Webinar 1: some healthy interventions. I really appreciate your time today and your willingness to share your research.

280

01:00:11.820 --> 01:00:19.950

Villanova Webinar 1: We wish you the very best as you continue your research. And I do want to thank everyone who has tuned in today.

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01:00:20.670 --> 01:00:33.150

Villanova Webinar 1: We will be resuming our webinar series in the fall, and we hope you enjoy the rest of the summer and stay safe. Thank you again. Dr. Kral. Great to see you. We wish you the very best.

282

01:00:33.240 --> 01:00:33.990

Thanks so much.