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CREAN COLLEGE OF
HEALTH AND BEHAVIORAL SCIENCES

Gluten-free and Casein-free Dietary Intervention in Children with Autism

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PSY 498 Senior Seminar

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Introduction

In the United States, Autism Spectrum Disorders (ASD) had a prevalence of 1 in 150 children in 2000. In the year 2012, the prevalence of ASD in the United States jumped to 1 in 68 children. Due to the increase in diagnoses of ASD, researchers have sought out different ways to help decrease maladaptive symptoms associated with ASD's. Many parents of children diagnosed with ASD administer a gluten-free and casein-free (GFCF) diet to their children in hopes of reducing their maladaptive symptoms. Although ASD is not curable, there are many types of therapies offered to help decrease the individual's maladaptive symptoms and help them lead a more normal, independent lifestyle.

Autism Spectrum Disorder is a life-long condition that impairs the individual both mentally and physically. Common maladaptive symptoms include a reduction in verbal communication, lack of social-emotional bonds, deficits in non-verbal cues, such as eye contact, and cognitive impairments. Some children diagnosed with ASD will experience gastrointestinal issues as well. With these individuals, maladaptive symptoms would include food sensitivities, presented as pickiness when instructed to eat. For this population, administration of a GFCF diet may help reduce GI symptoms as well as their maladaptive behaviors.

It is important to keep in mind that children diagnosed with ASD have typical changes in behaviors as they mature. The autistic symptoms are expressed differently at different age levels, and they continue to change over time. No two individuals with ASD behave the same. However, almost all autistic individuals have some disturbance with social behaviors, which range from subtle abnormalities in social reciprocity, particularly with peers, to much more obvious difficulties in terms of abnormal eye contact, facial expression, and social motivation.

Hypothesis

If a child under the age of 16, who was diagnosed with Autism Spectrum Disorder (ASD) after the age of 2, is administered a gluten-free and casein-free (GFCF) diet, then the child will show a reduction in maladaptive symptoms compared to a child under the age of 16 who was diagnosed with Autism Spectrum Disorder after the age of 2 and does not consume a gluten-free and casein-free diet.

Key Definitions

Independent variables

Autism Spectrum Disorder: Autism Spectrum Disorder is defined as persistent deficits in social communication and social interaction across contexts, not accounted for by general developmental delays. Moreover, deficits in social-emotional reciprocity, nonverbal communication behaviors used for social interaction and in developing and maintaining relationships must also be present.

Gluten-free and casein-free diet: Gluten is the protein found in the grain wheat, and casein is the protein found in all mammals' milk. Gluten-free and casein-free diets limit foods that contain gluten (e.g. breads, pastas, pizza, bagels, cookies, etc., made from wheat, barely, and rye) and casein (e.g., milk, cheese, yogurt, ice cream, etc.). These alternative diets aim at preventing gluten and/or casein from entering the bloodstream and thereby reducing the maladaptive symptoms of autism.

Normal, non-gluten-free casein-free diet: Food items containing 20g of wheat/gluten flour were labeled as the containing the appropriate amount of gluten.. For individuals adhering to the GFCF diet, they consumed foods containing 20g of a different type of flour (e.g. rice or tapioca flour) were considered a adequate gluten-free and casein-free snack and were administered to children adhering to the GFCF diet.

Dependent variable

Maladaptive symptoms: Children with ASD typically show maladaptive behaviors that persist throughout the life span of the individual. These individuals may experience a reduction in verbal communication, a decrease in social functioning, and stereotypic behaviors such as repetitive movements or sounds. The maladaptive symptoms are thought to be the result of an interaction between genetics and the environment; there is no biological measure to test for ASD .

Table Note

ASD= Autism Spectrum Disorder; GFCF= Gluten-free and casein-free diet; DIPAB= Measures social isolation and strange behavior in children with ASD. CARS= rates symptoms of autism; Scores between 30-37 reflect mild autism, and scores between 38-60 represent severe autism.

Results						
Study/ Relation to Hypothesis	Country	Sample Size and Age Range		Type of dietary Intervention	Maladaptive Symptoms	Results
		Size	Age Range	Independent Variable	Dependent Variable	
Genius & Bouchard (2010) Support	Canada	One child; Case study	5 year old male	Gluten-free diet	Lack of verbal communication and eye contact	Within 3 months after implemental of the GF diet, the boy's functioning had improved so much that he no longer required an individualized learning program and was able to enter a normal classroom without an aide
Herbert & Buckley (2013) Support	USA	One child; Case study	5 year old female	Ketogenic, GFCF diet (high fat, low carbohydrates)	CARS measured overall symptoms of autism	One year post implementation of the kGFCF diet, the child improved 50 points in cognitive testing on the intelligence quotient of the CARS test. Her score on the CARS reduced to a rating to 17, placing her in the non-autistic range
Knivsberg et. al (2003) Support	Norway	20	M= 7.6 years (SD= 1.8 years)	GFCF diet and a Normal, non-GFCF diet	DIPAB score, measuring non verbal cognition, social isolation and resistance to communication	Resistance to communication and interaction had disappeared completely for 80% of the children on the GFCF diet after one year. (M= 0.2, SD = 0.4) and for the control group, (M=1.9, SD = 1.4)
Nazni et. al (2008) Support	Iran	30	3-11 years old	Casein-free diet, gluten-free diet, and GFCF diet	Researcher observed attention span, repetitive body movements, eye contact, etc. using an interview process	The GFCF diet group, improved as a whole from a mean of 1.34 (SD= 0.43) on all symptoms, to 1.46 (SD= 0.50) after dietary implementation
Pedersen et al. (2014) Support	United Kingdom	27	4-12 years old	GFCF diet, and Normal, non-GFCF diet	Using ADOS, measured autistic symptoms and hyperactivity	The children's mean ADOS score was 5.56 at baseline, and after 8-10 months on GFCF diet was M= -0.0093 (p=0.7830)
Whiteley et al. (2010) Support	Denmark	72	4-10 years old	GFCF diet and Normal, non-GFCF diet	Using ADOS, measured social interaction, communication, and developmental disturbances.	Significant improvement in ADOS scores when comparing GFCF diet group at 8 months (ADOS-communication = 0.87) with normal, non-GFCF diet group at 8 months (ADOS-communication 1.07)
Elder et al. (2006) Refute	USA	12	2-16 years old	GFCF diet and Normal, non-GFCF diet	CARS measured symptoms associated with autism	Group analysis at day 84 indicated no significant differences between the experimental and control groups when measuring behaviors with CARS (p=.85)
Hyman (2016) Refute	USA	14	3-16 years old	Diet with gluten, casein, gluten and casein, or a placebo diet (Normal, non-GFCF)	ADOS measured the child's social relationships and sensory motor abilities	Findings show a GFCF diet does not improve maladaptive symptoms. The mean of ASD-related behaviors was 0.33 at week 1, and 0.23 at week 30. Social relationships showed a mean of -0.27 at week 1, and -0.29 at week 30

Discussion and Conclusions

The results of the supporting articles indicate that implementation of a gluten-free and casein-free diet in children with Autism Spectrum Disorder significantly reduce the frequency of maladaptive symptoms. The studied completed by Herbert et. al (2013), Knivsberg et. al (2003), Pedersen et. al (2014) and Whiteley et. al (2010) demonstrate significant reductions in maladaptive symptoms using various behavior scoring mechanisms.

Results from the limited refuting articles demonstrated no difference in maladaptive behaviors when adhering to a gluten-free and casein-free diet and when consuming a normal, non-GFCF diet.

Based on the literature reviewed up to date, the results predominately support this paper's hypothesis. Children diagnosed with ASD after age 2, but before age 16, who follow a GFCF diet show a significant reduction in maladaptive symptoms compared to a child diagnosed with ASD after age 2, but before age 16, not following a GFCF diet.

Strengths of the literature in review prove consistent use of well-established diagnostic criteria for Autism Spectrum Disorder. Moreover, a consistent definition of what constitutes a gluten-free and casein-free diet was widely accepted. Lastly, the reduction of maladaptive symptoms in children diagnosed with ASD is shown more significantly the longer the diet was implemented.

Future Study

To further study the effects of dietary implementation on children diagnosed with Autism Spectrum Disorder it would be effective to use longitudinal studies. By testing children diagnosed with ASD in longitudinal studies would allow the long-term effects of GFCF diets to be known. It would also be interesting to test the differences in children not diagnosed with ASD on a GFCF diet and children not diagnosed with ASD on a normal, non-GFCF diet. This would allow researchers to study the effects of diet on normal, everyday behaviors for children not diagnosed with ASD.

Furthermore, future research should aim to study quantitative data. This can be done by using maladaptive behavior scales, such as the DIPAB or ADOS scales to measure the child's behaviors. By using quantitative data instead of qualitative data, parental biases about their children's behaviors would decrease leaving only quantitative, empirical data.

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