EXPLORING THE RELATIONSHIP BETWEEN HOUSEHOLD FOOD INSECURITY AND MOOD DYSREGULATION SYMPTOMS IN A PEDIATRIC ADHD POPULATION

An Undergraduate Thesis

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ABSTRACT

Background: There are currently 12.5 million children in the United States living in food insecure households, yet the psychiatric consequences of this public health crisis are not well documented. Early childhood exposure to environmental stressors related to food insecurity could be associated with predisposing or exacerbating mood dysregulation symptoms in children.

Purpose: The purpose of this cross-sectional study is to explore the relationship of food insecurity with Attention-Deficit Hyperactivity Disorder (ADHD) symptoms and co-occurring mood dysregulation symptoms in a pediatric population.

Study Design and Methodology: Data was collected as part of baseline assessments for the "Multi-nutrients for ADHD Youth" (MADDY) Study, a multi-site randomized placebo-controlled trial investigating the efficacy of a multi-nutrient supplement in reducing ADHD symptom severity among children ages 6-12 years (N=135). Household food insecurity was ascertained using the 18-Item US Household Food Security Survey Module (USHFSSM). Children's ADHD and mood dysregulation symptoms were assessed using the Child and Adolescent Symptom Inventory-5 (CASI-5) questionnaire.

Results: Preliminary trends from baseline data (n= 45) show that the prevalence of household food insecurity is 11.1%, which is close to the national prevalence of 11.8%. Children in food insecure households scored significantly higher on measures for Oppositional Defiant Disorder (ODD) (p-value = 0.002) and Disruptive Mood

Dysregulation Disorder (DMDD) symptoms (p-value = 0.013) versus children in food secure households.

Conclusions: Childhood experience of food insecurity is associated with increased severity of mood dysregulation symptoms in a pediatric ADHD population. The direction and magnitude of this relationship will be explored in additional analysis upon study completion. If these trends are maintained in the total sample, future public health interventions addressing food insecurity may be needed to help alleviate the severity of mood dysregulation symptoms in this population. Additionally, pediatric health care providers could routinely assess hunger and food insecurity status in combination with ADHD assessments.

CHAPTER 1: INTRODUCTION AND STATEMENT OF PROBLEM

As of 2017, approximately 12.5 million children in the United States lived in food insecure households [1]. Food insecurity is characterized by an individual or household lacking access to adequate food to support a healthy lifestyle [1]. Food insufficiency, on the other hand, is characterized by an inadequate amount of food intake due to a lack of money or resources [2]. Hunger is another terminology frequently associated with a lack of food. It is defined as "short-term physical discomfort as a result of chronic food shortage, or in severe cases, a life-threatening lack of food" [3]. Although food insufficiency and hunger are often used interchangeably with food insecurity, the terms are not synonymous. Regardless, lacking consistent, safe, and sufficient food to support a healthy and active lifestyle is accompanied with stress on an individual or the household.

While there is evidence of an association between food insecurity and childhood mental health disorders, limited studies have focused on how food insecurity may affect disorders such as Attention-Deficit Hyperactivity Disorder (ADHD). ADHD is a neuropsychiatric disorder commonly diagnosed in childhood with increasing global prevalence and high heritability [4]. Symptoms of inattention, impulsivity, and hyperactivity are characteristic of ADHD, impairing an individual's ability to function in multiple settings such as at home and at school or work [5]. The current prevalence of ADHD diagnoses in the US is 10.2%, with an estimated 70% to 80% heritability [4, 6, 7]. The increasing prevalence and high heritability of ADHD diagnoses among children makes this condition one of public health concern.

Co-occurring symptoms of mood dysregulation are commonly seen in children displaying ADHD symptoms [7]. Mood dysregulation symptoms include irritability, anger, and aggression [5]. These symptoms are displayed in mood dysregulation disorders such as Oppositional Defiant Disorder (ODD) and Disruptive Mood Dysregulation Disorder (DMDD). ODD is characterized by defiant and disobedient behavior towards authority figures while DMDD is characterized by frequent and severe temper tantrums, but both disorders include mood dysregulation symptoms of irritability, anger, and aggression in their diagnostic criteria [5]. Although these mood dysregulation disorders are not well studied, there is some evidence suggesting long-lasting behavioral impacts into adulthood [5].

Despite the high prevalence of childhood food insecurity [8] and its possible effects on mental health, as well as high prevalence of pediatric ADHD diagnoses [4, 8, 9], the literature exploring the interactions between these public health crises is limited. Furthermore, the specific impacts of food insecurity on co-occurring symptoms of mood dysregulation in an ADHD population are not well understood. Evidence exists to show that early childhood exposure to environmental stressors, including food insecurity, could be associated with predisposing or exacerbating ADHD symptoms in children [9, 10]. Several studies have found behavioral challenges to be associated with periods of compromised nutrition during critical periods of early childhood development [9, 11-13]. In addition to immediate impacts on children's externalizing behavior, there is growing literature indicating long-term behavioral effects of early childhood exposure to food insecurity [9, 14-17]. For example, inattention and impulsivity may continue, and

sometimes intensify, into adolescence and adulthood [9, 14-17]. Additionally, experiencing food insecurity and specifically, hunger, may worsen or mimic symptoms of mood dysregulation [14, 18]. Mood dysregulation symptoms may also have lasting impacts into later adolescence and adulthood [13, 14, 19]. Thus, early interventions targeting childhood food insecurity may improve the occurrence and severity of future behavioral problems related to ADHD and mood dysregulation symptoms.

Experiencing food insecurity affects an individual's diet quality and intake, which may lead to nutritional deficits or differences related to presence or worsening of ADHD and mood dysregulation symptoms [4]. Other factors such as central nervous system abnormalities, metabolic differences, genetic history, and cultural likelihood to seek mental disorder diagnoses affect a child's ADHD and mood dysregulation symptoms [4]. Co-occurring mood dysregulation symptoms of irritability, anger, and aggression are commonly seen in children with ADHD [7]. It is important to note that these symptoms of mood dysregulation are mimicked in children who are hungry. The objective of this study is to determine the relationship of household food security status with severity of co-occurring ADHD and mood dysregulation symptoms in a pediatric population.

Specific Aims

Specific Aim 1: Describe the household food security status of a pediatric population with Attention-Deficit Hyperactivity Disorder (ADHD) symptoms.

Hypothesis 1: Based on previous research among children with other mental health disorders, food security and insecurity rates among children with ADHD will be similar to that reported for the general US population.

Specific Aim 2: Determine the relationship between household food security status and ADHD symptoms of inattention, impulsivity, and hyperactivity in a pediatric population.

Hypothesis 2: Household food security status will be significantly and directly related to severity of ADHD symptoms of inattention, impulsivity, and hyperactivity.

Specific Aim 3: Determine the relationship between household food security status and mood dysregulation symptoms in a pediatric population.

Hypothesis 3: Household food security status will be significantly and directly related to severity of mood dysregulation symptoms.

CHAPTER 2: LITERATURE REVIEW

Several large-scale epidemiological, observational, and interventional studies have examined the relationship between the presence of childhood food insecurity and symptoms of ADHD, particularly with behavioral problems such as hyperactivity and impulsivity, into adolescence and adulthood [15, 17, 20]. Among three-year-old children living in the United States (n = 2870), the severity of household food insecurity was significantly related to ADHD symptoms such as hyperactivity and inattention [21]. Similarly, a study conducted in 2012 among American youth aged 3–17 years (n = 6483) experiencing food insecurity found a 14% odds increase of all past-year mental disorder diagnoses, including behavioral disorders such as ADHD [22]. Likewise, a 2016 study among American youth ages 12–16 years (n = 8600) identified food insecurity to be independently associated with over a two-fold increase in risk for mental health problems [18]. Specifically, parents rated food insecure adolescents higher for hyperactivity scores than adolescents who were food secure [18].

Several longitudinal studies have also examined the relationship between food insecurity and symptoms of ADHD, the timing and duration of food insecurity was found to affect the display of behavior in children [20]. Among kindergarten-aged children in the U.S. (n = 6,300), with behavior problems such as self-control were more sensitive to transitions into food insecurity than chronic food insecurity [11]. A study of American children ages 4–14 years (n= 2,810) found persistent food insecurity and transitions into food insecurity predicted approximately two-times increased likelihood of exhibiting hyperactivity and/or non-compliance behaviors at follow-up [13]. A similar study in

Canada in 2012 of children ages 1.5–8 years (*n* = 2120) found food insecurity to distinctively predict a two-fold increased likelihood of persistent hyperactivity and inattention over the course of seven years [12].

Hunger is one aspect of experiencing food insecurity that is commonly identified as being related to worsened ADHD symptoms in children. In a sample of Jamaican adolescents aged 17–18 years (*n* = 129), those who experienced hunger had poorer psychological functioning in late adolescence, with parents reporting more hyperactivity [14]. Similarly, among American children ages 6–12 years (*n* = 328), hungry children displayed more inattentive, hyperactive, and impulsive behaviors than non-hungry children [23]. Another study among American youth ages 6–12 years (*n* = 205), found higher levels of hyperactivity and attention problems in hungry children by teacher report [19]. The effects of hunger on symptoms of ADHD also seems to have lasting impacts into adulthood. A recent study in 2016 interviewing young adults ages 18 years and older (*n* = 34,427) found those who had experienced childhood hunger to be two-times more likely to report a lifetime history of interpersonal violence and challenges with impulse control [24]. This study was also able to identify a direct path from frequent childhood hunger to later interpersonal violence, with impulse-control deficits mediating this relationship [24].

Co-occurring mood dysregulation symptoms of irritability, anger, and aggression are often seen in children with ADHD [7]. The literature to date suggests that food insecurity, and hunger specifically, may also affect the display of mood dysregulation symptoms in children with co-morbid ADHD symptoms. Walker et al. reported hungry adolescents with

greater tendencies for conduct disorder at age 11 and oppositional behavior at age 17 [14]. In another study by Poole-Di Salvo et al., food insecurity was independently associated with an increased risk for conduct problems and sub-optimal pro-social skills in adolescents [18]. Conduct problems in this study were characterized by externalizing behaviors including anger, aggression, and irritability while pro-social skills were characterized by behaviors that benefit others such as helping, sharing, and cooperating [18]. Thus, symptoms of mood dysregulation may be worsened or mimicked by hunger in children.

CHAPTER 3: MATERIALS AND METHODS

Study Design, Sample, and Setting

This is a cross-sectional study that utilized the baseline data from the "Multi-nutrients for ADHD Youth" (MADDY) Study. The MADDY Study is a multi-site randomized control trial investigating the safety and efficacy of a multi-nutrient supplement in reducing ADHD symptom severity among children ages 6-12 years (N=135). The three sites are located at The Ohio State University (Columbus, Ohio), Oregon Health and Science University (Portland, Oregon), and University of Lethbridge (Lethbridge, Canada). To be eligible for the clinical trial, each child must:

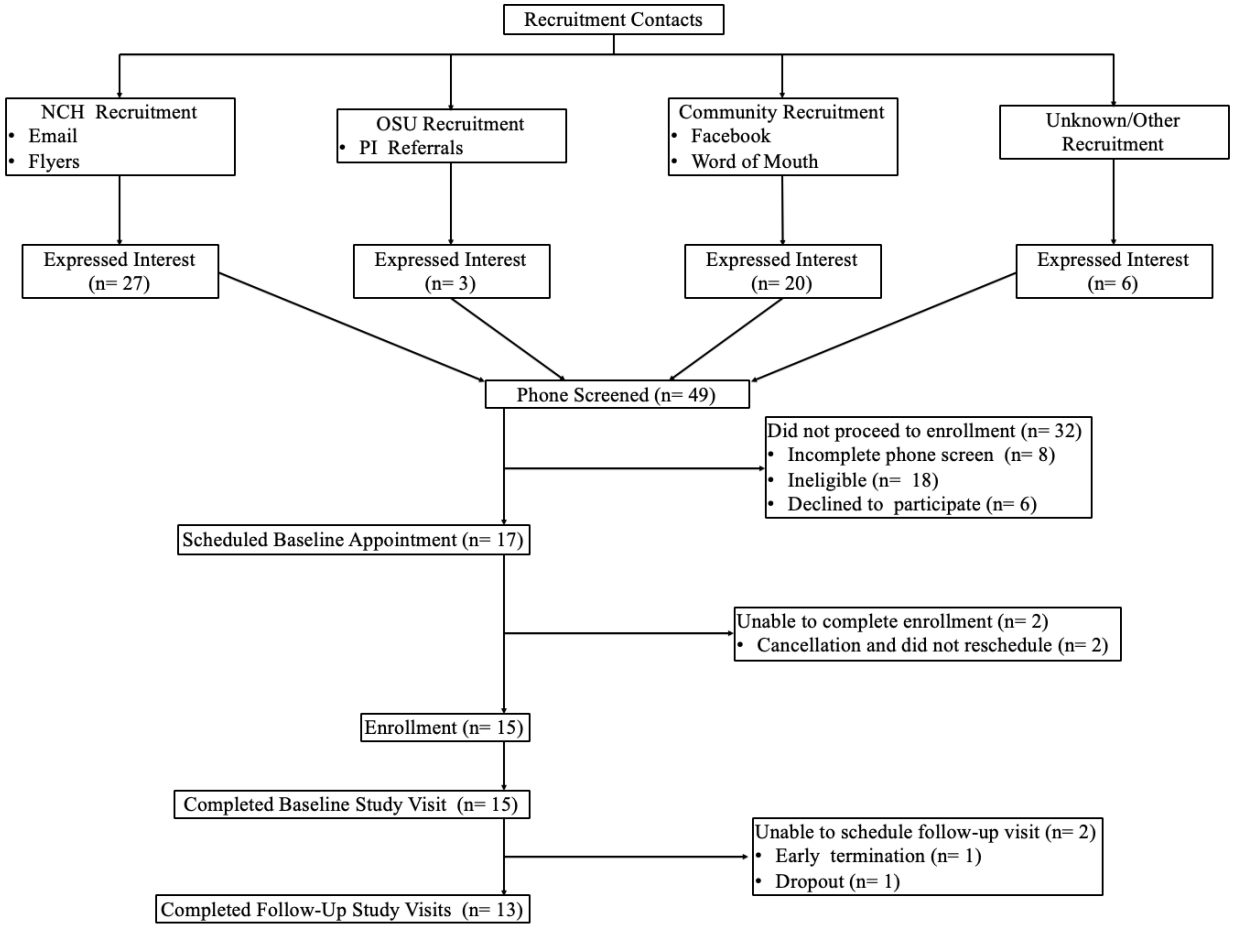
1. Be psychotropic medication-free for at least 2 weeks prior to and throughout the duration of the study
2. Be able and willing to swallow 9-12 supplements per day
3. Meet criteria for ADHD and mood dysregulation symptoms per the Child and Adolescent Symptom Inventory – 5 (CASI-5).

Recruitment and Eligibility Screening

Multi-site recruitment efforts as of October 2018 resulted in 134 families screened, of which 82 were ineligible or uninterested and 52 were enrolled. Excluding participants who dropped out or were missing data, 45 families remained from the Ohio, Oregon, and Canada sites for data analysis in this study. In Ohio, participants were recruited through Nationwide Children's Hospital (NCH), The Ohio State University (OSU), and other community outlets such as Facebook and flyers posted in public spaces. NCH is a large

pediatric hospital in Columbus, OH where employees were targeted for recruitment and to help advertise the study to their patients. Email advertisements were sent to NCH, in addition to spreading information about the study through word of mouth. At the time of data collection, site-wide recruitment efforts via email and fliers at OSU were not yet implemented. However, referrals from Principal Investigators at OSU helped recruit some potential participants. Advertisements were posted online in specific Facebook groups for parents as well as printed and posted in public spaces such as grocery stores and bus stops. Information about the study spread through word of mouth in the community also recruited potential participants. See Figure 1.

Figure 1. Consort flow of MADDY Study Site Recruitment in Ohio as of October 2018



Footnote: Recruitment efforts via email and fliers were launched at The Ohio State University, but not during the time of data collection.

Parents who were interested in having their child participate in the study were screened for eligibility via phone call and those whose children met the criteria were sent a questionnaire to determine behavioral eligibility. The Child and Adolescent Symptom Inventory – 5 (CASI-5), a psychiatric questionnaire validated to assess pediatric behavior problems, was administered to parents at phone screening to determine if children met specific study criteria.

Assessment Measures

Household Food Security Status: This was assessed using the US Household Food Security Survey Module (USHFSSM). The USHFSSM developed by the United States Department of Agriculture (USDA), to assesses household food environment and challenges in meeting food needs over the previous 12 months [25]. The questionnaire captures the main types of situations associated with food access: anxiety about inadequate household food budget or food supply, perceptions of inadequacy with food quantity and quality, and reported instances/consequences with reduced food intake among adults and children. There are three validated versions of this questionnaire including the 18-item survey, which measures overall household food insecurity [26], the 10-item survey, which measures food insecurity in households without children, and the 6-item survey, which is the shortened version that only measures adult food insecurity [27]. Currently, the 18-Item USHFSSM is the "gold standard" for measuring the prevalence and severity of household and child food insecurity in the US and Canada [25-27]. This version of the USHFSSM was used to measure food insecurity in the households of our sample of children with ADHD and mood dysregulation symptoms. Of the 18 questions, 9 had dichotomous answers of

"yes" or "no"; 3 had response options of, "three or more months" or "in only 1 or two months"; and 6 offered potential answers of, "sometimes or often" or "never." All affirmative answers were scored as 1 such that the more affirmative answers within a household, the higher their food insecurity scores for that household. Respondents are scored and categorized into High, Marginal, Low, and Very Low Food Security. Raw score zero indicated high food security, raw score 1-2 indicated marginal food security, raw score 3-5 indicated low food security, and raw score 6-10 indicated very low food security. Since all households in this study had children present in the household, the score ranges for households with children present were used to calculate raw score. See Appendix A.

ADHD and Mood Dysregulation Symptoms: The CASI-5 is a behavior rating scale for DSM-5-defined emotional and behavioral disorders in youth ages 5 to 18 years old. The subscales of the parent version were used in this study to capture symptoms of ADHD, DMDD, and ODD using the questions from Categories A, B, and Rz, respectively. Category A captures symptoms of inattention and hyperactivity/impulsivity. ODD and DMDD are mood dysregulation disorders, where the display of mood dysregulation symptoms are included in their diagnostic criteria. The CASI-5 is validated to assess DMDD with questions from Category B and ODD with questions from Category Rz. Therefore, DMDD and ODD were used to capture symptoms of mood dysregulation in this study. The Symptom Count Score method was utilized to calculate raw score for responses. Each symptom in the CASI-5 is recorded as either present (1) or absent (0), and then modified with the following item weights: Never = 0, Sometimes = 0.5, Often = 1, Very Often = 1, No = 0, and Yes = 1. The following Symptom Count Score ranges were utilized

for each symptom: 0 to 9 for inattention, 0 to 10 for hyperactivity/impulsivity, 0 to 8 for ODD, and 0 to 2 for DMDD. A minimum of 6 symptom counts for inattention or hyperactivity/impulsivity is required to meet ADHD eligibility criteria for the study. A minimum of 1 symptom in ODD or DMDD is needed to meet eligibility criteria for irritability. See Appendix B.

Statistical Analysis

Data from the USHFSS and the CASI-5 was reviewed for completeness and scoring distributions were examined for normality to confirm that assumptions of statistical tests were met. Nonparametric tests including a Mann-Whitney U test were used for data not normally distributed. Chi squared tests compared categorical outcomes between subgroups. A p-value of <0.05 indicated statistical significance. Analyses were conducted using IBM SPSS Version 24.0. Armonk, NY: IBM Corp.

CHAPTER 4: RESULTS

Sociodemographic Characteristics and Food Security Status

Overall, majority of study participants were male (80%), Caucasian (87%) with household income above $60,000 (69%). Due to small sample size, “High” and “Marginal food Security” categories were condensed into the Food Secure group and “Low” and “Very Low Food Security” categories were condensed into the Food Insecure group. In our sample, 11.1% of study households were classified as food insecure. As shown in Table 1, among children in food secure households, 78% were male and 22% were female. The majority of these children were Caucasian (85%) with 5% mixed race or declined to answer and 3% Asian or Black. In our sample of children in food insecure households, all were Caucasian males. Both sex (p-value=0.24) and race (p-value=0.93) were not significantly related to household food insecurity status (Table 1). Likewise, median age was not significantly related to household food insecurity status (p-value=0.82). The median age of food secure children was 9.5 years old and that of food insecure children was 10 years old, with both ranging from 6-10 years old (Table 1).

As depicted in Table 1, the majority of food secure households had incomes greater than or equal to $80,000 (58%). Contrarily, the majority of food insecure households had incomes less than or equal to $30,000 (60%). Thus, food insecurity was shown to be significantly associated with low household income in our sample (p-value $\leq$ 0.001).

Table 1. Demographic characteristics of children with ADHD and mood dysregulation symptoms living in food insecure and food secure households (n=45)

	FI (n=5)	FS (n=40)	P-value
	n (%)		
Sex			
Male	5 (100%)	31 (78%)	0.24
Female	0 (0%)	9 (22%)	
Race			
Asian	0 (0%)	1 (3%)	
Black	0 (0%)	1 (3%)	
Caucasian	5 (100%)	34 (85%)	0.93
Mixed Race	0 (0%)	2 (5%)	
Decline to Answer	0 (0%)	2 (5%)	
Income			
<$30,000	3 (60%)	1 (2%)	
$30,001 - $60,000	1 (20%)	9 (21%)	
$60,001 - $80,000	0 (0%)	6 (14%)	
$80,000+	1 (20%)	23 (58%)	≤ 0.001
Don’t Know	0 (0%)	1 (2%)	
	Median (range)		
Age (years)	10 (6, 10)	9.5 (6, 10)	0.82

Associations between Food Insecurity, ADHD, and Mood Dysregulation Symptoms

Compared to food secure children, children experiencing household food insecurity scored significantly higher on measures for ODD (p-value= 0.002) and DMDD (p-value= 0.013) (Table 2). The association between food insecurity and symptoms of hyperactivity and inattention were not statistically significant in this sample (Table 2).

Table 2. ADHD and mood dysregulation symptom counts between children in food insecure and food secure households (n=45)

	FI (n=5)	FS (n=40)	P -value
	Median (range)		
Inattention	7.5 (7.0, 9.0)	9 (5.5, 9.0)	0.56
Hyperactivity/Impulsivity	9 (5.5, 9.5)	6 (1.0, 9.0)	0.12
ODD	8.00 (6.5, 8.0)	6.00 (0, 8.0)	0.002
DMDD	2.00 (1.0, 2.0)	1.00 (0, 2.0)	0.013

Footnote: Food insecurity status was determined by scoring and calculating per USHFSSM guidelines. All households in this sub-study had children present in the household thus this raw score range was utilized. Raw score zero indicated high food security, raw score 1-2 indicated marginal food security, raw score 3-5 indicated low food security, and raw score 6-10 indicated very low food security.
In order to be eligible for the study, children must meet certain behavioral criteria for ADHD and mood dysregulation. The CASI-5 scoring utilizes a symptom count score and ranges from 0 to 9 for inattention, 0 to 10 for hyperactivity/impulsivity, 0 to 8 for ODD, and 0 to 2 for DMDD.

CHAPTER 5: DISCUSSION AND CONCLUSIONS

Our study is the first known study in the U.S. exploring associations of food insecurity with co-occurring symptoms of ADHD and mood dysregulation in a pediatric population. We found a household food insecurity rate of 11.1%, which is reflective of the national average of 11.8% [1]. However, we found no association between ADHD symptoms of inattention, hyperactivity, and impulsivity and household food security status. These findings are not consistent with current literature, with the exception of one study by Poole Di-Salvo et al. where food insecurity was not independently associated with hyperactivity despite parents reporting higher hyperactivity scores in food insecure adolescents [18]. Results for DMDD and ODD found significant associations with household food insecurity, which is reflective of trends seen in current literature.

The literature to date suggests that food insecurity may affect the development of mood dysregulation in children. Food insecurity increased risk for conduct problems in adolescents, which is characterized by externalizing behaviors including anger, aggression, and irritability [18]. Children transitioning into food insecurity also had poorer scores for interpersonal skills by teacher report [11]. Children experiencing mood dysregulation symptoms have difficulties with communicating and interacting with others due to their severe irritability, anger, and aggression [5]. A study by Walker et al. found hungry adolescents to have greater tendencies for conduct disorder at age 11 and oppositional behavior at age 17 [14].

Potential pathways by which food insecurity affects mental health symptoms, such as ADHD and mood dysregulation, likely channels through several mechanisms. Food insecure households are at an increased risk for micronutrient insufficiency or deficiency [10, 28]. The experience of hunger and long-term stretches of poor food quality and quantity could contribute

a critical role in this relationship [10, 28]. Childhood exposure to food insecurity was associated with elevated mood dysregulation symptoms in this sample of children displaying co-occurring symptoms of ADHD. This supports previous findings that food insecurity worsens mood dysregulation and may have lasting impacts into adolescence and adulthood [11, 14, 23]. Experiencing food insecurity affects an individual's diet quality and intake, which may lead to nutritional deficits or differences related to presence or worsening of mood dysregulation symptoms [4]. Other factors such as central nervous system abnormalities, metabolic differences, genetic history, and cultural likelihood to seek mental disorder diagnoses affect a child's ADHD and mood dysregulation symptoms [4]. It is also important to note that symptoms of mood dysregulation are worsened or mimicked in children who are hungry.

Several large-scale epidemiological, observational, and interventional studies have examined the relationship between the presence of childhood food insecurity and symptoms of ADHD, particularly with behavioral problems such as hyperactivity and impulsivity, into adolescence and adulthood [15, 17]. Specific characteristics of food insecurity, such as unreliable access to food and inadequate amounts of food intake, are most commonly identified in these studies as being related to behavior symptoms characteristic of ADHD. As shown in Table 3, several studies found the severity of household food insecurity was significantly related to behavior problems such as hyperactivity and inattention in childhood and adolescence [18, 22, 29]. Longitudinal studies have also examined the relationship between food insecurity and symptoms of ADHD. The timing and duration of food insecurity was found to affect the display of behavior in children, with self-control being more sensitive to transitions into food insecurity than chronic food insecurity and hyperactivity and/or non-compliance behaviors being sensitive to both persistent and transitions into food insecurity [11, 13]. Additionally, one study in Canada

found food insecurity to distinctively predict a two-fold increased likelihood of persistent hyperactivity and inattention over the course of seven years among the children [12]. However, the measures utilized in two of these studies were not validated to assess food insecurity and more accurately capture food insufficiency [11, 12]

Table 4 presents the results from the literature search for hunger and ADHD symptoms in children. Children experiencing hunger display more hyperactivity and psychosocial dysfunction by parent report [15, 23]. Some characteristics of psychosocial dysfunction include inattentive, hyperactive, and impulsive behaviors [23]. Similarly, teacher reports from another sample of hungry children found higher levels of hyperactivity and attention problems [19]. This relationship between hunger and symptoms of ADHD also seems to have lasting impacts into adulthood, where experience of childhood hunger increases an individual's lifetime history of interpersonal violence and challenges with impulse control [24]. This study was able to identify a direct path from frequent childhood hunger to later interpersonal violence, with impulse-control deficits as a mediating factor [24].

Our study found no association between household food insecurity and ADHD symptoms in children, which does not corroborate existing evidence which supports an association. It is possible that the low sample size in this study may contribute to this inconsistent finding. Since this study analyzed preliminary data, we hope the relationship may change to reflect the current literature once data collection is complete and a larger sample is used for analysis.

The psychological assessments utilized in previous studies show a substantial amount of variance in the methodology used to measure ADHD and mood dysregulation symptoms among children. The most commonly used methods are the Pediatric Symptom Checklist (PSC) and the Child Behavior Checklist (CBCL). As shown in Tables 3 and 4, a variety of other methods such

as the Composite International Diagnostic Interview (CIDI), the Pediatric Quality of Life Inventory (PedsQL), the Social Skills Rating Scale (SSRS), the Strength and Difficulties Questionnaire (SDQ), the Conners Teacher Rating Scale-39 (CTRS-39), the Conners Parent Rating Scale (CPRS), the Behavior and Activities Checklist (BAC), the Manifest Anxiety Questionnaire (MAQ), and the Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV (AUDADIS-IV) have been used to assess ADHD and mood dysregulation symptoms. It is imperative to note that many of these assessment materials were not designed to specifically screen for ADHD or mood dysregulation. Thus, in order to further explore this relationship, there is a need to utilize more validated and standardized measures, such as the CASI-5, in the assessment of pediatric ADHD and mood dysregulation symptoms.

While there have been inconsistencies in the measures used to assess household food insecurity, as shown in Table 3, several studies have been conducted in the U.S. and Canada and utilized the validated 6-item or 18-item USHFSSM to ascertain food security status [11, 18, 21, 22, 29]. Only a few studies used unvalidated methods such as single-question parent assessments and investigator-defined interviews to determine food security status [12, 13]. The latter measures often assess food insufficiency instead of food insecurity, as they do not capture the four main types of situations associated with the general definition of food insecurity (i.e. anxiety about inadequate food supply, perceptions of inadequacy with food quality, and reported instances/consequences with reduced food intake among adults and children). These questions only measure one aspect of food insecurity. Therefore, these measures are not validated measures of food insecurity, but more accurately describe food insufficiency.

Our results also include a finding that food insecurity was significantly associated with low income, which is consist with current literature [1]. Food insecure households often

experience inadequate food supply or reduced food intake as a result of insufficient funds. Additionally, being low income affects diet quality by reducing the ability of a household to purchase high-quality or desired food [1]. Therefore, it is unsurprising that our data corroborates current evidence that low income is significantly associated with household food insecurity.

The socioeconomic status and other demographic factors of an individual or household affect not only their food insecurity status, but also their likelihood to seek diagnosis. The majority of children diagnosed with ADHD are Caucasian males [4], thus we expect the majority of the overall sample in our present study to reflect this population. However, it is important to note that racial minorities constitute a large portion of the food insecure population [1] but these groups are culturally less likely to seek mental health diagnoses [4]. Since our study is evaluating food insecurity in an ADHD population, our demographic findings are unsurprising and consistent with present knowledge. Despite the homogeneity of our sample, the prevalence of food insecurity (11.1%) is still consistent with the national average (11.8%) [1]. Data collection is not yet complete; however, upon completion of data collection, we hope the prevalence of food insecurity in our sample will continue to reflect the national average and for the demographic characteristics to corroborate current findings.

Limitations

Our findings contribute to the growing scientific evidence of the impact of food insecurity on children's mental health. There are, however, methodological limitations that need to be acknowledged in this study. The present study aimed to assess ADHD and mood dysregulation symptom severity, yet the Symptom Count Score method was utilized for the evaluation of these symptoms. The Symptom Count Score method is unable to accurately assess symptom severity, therefore our study is limited in its ability to describe symptom severity.

Another limitation of our study is its low sample size and low statistical power, making it difficult to generalize our findings to the greater population. Low sample size may have also contributed to difficulties in generating statistically significant relationships among mean and median values for ADHD symptoms. We hope this relationship will change to reflect current evidence once data collection is complete and a larger sample size is used for analysis.

Implications for Future Research

Future and larger studies are needed to further characterize this complex relationship. Furthermore, interventions addressing food insecurity in children with ADHD and/or mood dysregulation disorders may be warranted. The symptoms of hunger often mimic symptoms of mood dysregulation, such as irritability, anger, and aggression. Currently, assessments of hunger and/or food insecurity are not included in pediatric ADHD assessment protocols. Thus, it may be valuable for pediatric health care providers to routinely assess hunger and food insecurity status in combination with ADHD and/or mood dysregulation assessments.

Table 3. Comparison of literature characterizing associations between food insecurity and symptoms of ADHD and mood dysregulation in a pediatric population

Author, Year	Population	Assessment Methods		Results	
		Food Insecurity	Psychological	ADHD	Mood Dysregulation
Whitaker 2006	US children ages 0-3 years (n = 2,870)	USHFSSM[1] Parent Report	Parent report based on CBCL[2] with categories for hyperactivity/inattention	Behavior problems among children of fully food insecure mothers remained significantly elevated, with the percentage of children with behavior problems increasing with worsening household food insecurity.	
McLaughlin 2012	US adolescents ages 13-17 years (n = 6,483)	6-item USHFSSM[1] Parent Report	Modified CIDI[3] Adolescent Interview resulting in ADHD Diagnosis	Higher food insecurity scores were associated with 14% greater odds of past-year mental disorders, including ADHD, in adolescents.	
Kirk 2015	Canadian children ages 10-11 years (n = 5,853)	6-item USHFSSM[1] Parent Report	Child questionnaire using investigator-defined questions based on PedsQL[4]	Marginally, moderately, and severely food insecure children were more likely to report problems with inattention.	Marginally, moderately, and severely food insecure children were also more likely to report problems with mood, anger, and peer relations.
Kimbro 2015	US Children grade K-1 (n = 6,300)	18-item USHFSSM[1] Parent Report	Teacher report using SSRS[5]	Teachers reported poorer scores for externalizing behaviors and self-control in children transitioning into food insecurity.	Problems with interpersonal skills, self-control, aggression, and irritability were more sensitive during transitions into food insecurity than chronic food insecurity.
Poole-Di Salvo 2016	US adolescents ages 12-16 years (n = 8,600)	18-item USHFSSM[1] Parent Report	Parent report using SDQ[6] with categories for hyperactivity and conduct problems[+]	Parent-reported scores for hyperactivity were significantly higher in adolescents in food insecure households.	Food insecurity was independently associated with greater than a two-fold increased risk of mental health problems, specifically risk of conduct problems[+] and sub-optimal pro-social* behavior.
Slopen 2010	US children ages 4-14 years (n = 2,810)	Parent Report: positive response to question "has there been a time when there was not enough money at home to buy food."	Parent Report: CBCL[2] including aggression, hyperactivity, and non-compliance.	Symptoms of hyperactivity are more prevalent in children living in food insecure households, with data suggesting that transitions into food insecurity are more likely to predict behavioral problems than chronic food insecurity.	Symptoms of aggression and non-compliance are more prevalent in children living in food insecure households, with data suggesting that transitions into food insecurity are more likely to predict behavioral problems than chronic food insecurity.
Melchior 2012	Canadian children ages 1.5-8 years (n = 2,120)	Parent Report: 4 questions regarding food insecurity asked at 1.5 years and 4.5 years	Parent Report: A combination of psychological questionnaires and investigator-defined questions on aggression, hyperactivity and aggression.	Food insecurity distinctively predicted children's two-fold increased likelihood of persistent hyperactivity and inattention, even after controlling child and family characteristics.	

[1]USHFSSM = United States Household Food Security Survey Module; [2]CBCL = Child Behavior Checklist; [3]CIDI = Composite International Diagnostic Interview; [4]PedsQL = Pediatric Quality of Life Inventory™; [5]SSRS = Social Skills Rating System; [6]SDQ = Strengths and Difficulties Questionnaire

Table 4. Comparison of literature characterizing associations between hunger and symptoms of ADHD and mood dysregulation in a pediatric population

Author, Year	Population	Assessment Methods		Results	
		Food Insecurity	Psychological	ADHD	Mood Dysregulation
Kleinman 1998	US children ages 6-12 years (n = 328)	Parent Report: 8-item adult CCHIP[7] hunger scale	Parent Report: PSC[8]	Hungry children scored higher in inattention and hyperactive/impulsive symptoms and were 3-times more likely to be classified as dysfunctional (scoring 28 or higher on PSC) by parent report.	Hungry children also scored higher in oppositional/aggressive and irritable/anxious symptoms.
Murphy 1998	US children ages 6-12 years (n = 205)	Parent Report: 8-item adult CCHIP[7] hunger scale Child Report: 5-item child CCHIP[7] hunger scale	Parent Report: PSC[8], CBCL[2] Teacher Report: CTRS-39[9]	Teachers reported hungry and at-risk of being hungry children more likely of having higher levels of hyperactivity and attention problems.	
Walker 2007	Jamaican adolescents ages17-18 years (n = 129)	Adolescent Report: interviewed on frequency of hunger experienced in the home during the previous year due to lack of food	Parent Report: short form CPRS[10] Adolescent Report: Antisocial Behavior: BAC[11] Anxiety Symptoms: MAQ[12]	Hungry adolescents had poorer psychological functioning in late adolescence, with parents reporting more hyperactivity.	Hungry adolescents had greater tendencies for conduct disorder at age 11 and oppositional behavior at age 17.
Vaughn 2016	US young adults 18+ years (n = 34,427)	Participant Report: fairly often or often response to "how often did a parent or other adult living in your home make you go hungry or not prepare you regular meals"	Participant Report: Psychiatric Disorders: interviewed with AUDADIS-IV[13]	Participants who experienced childhood hunger were more likely to report challenges related to impulse control, with impulse control deficits mediating the relationship between frequent childhood hunger and later interpersonal violence.	

[2]CBCL = Child Behavior Checklist; [7]CCHIP = Community Childhood Hunger Identification Project; [8]PSC = Pediatric Symptom Checklist; [9]CTRS-39 = Conners Teacher Rating Scale-39; [10]CPRS = Conners Parent Rating Scale; [11]BAC = Behavior and Activities Checklist; [12]MAQ = Manifest Anxiety Questionnaire; [13]AUDADIS-IV = Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV.

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APPENDIX A

18-Item US Household Food Security Survey Module

Confidential

Food Insecurity

Please answer the following questions to the best of your ability.

Section 1- Household Questions	
Which of these statements best describes the food eaten in your household in the last 12 months:	◯ Enough of the kinds of food we want to eat ◯ Enough but not always the kind of food we want ◯ Sometimes not enough to eat ◯ Often not enough to eat
"I/We worried whether my/our food would run out before I/we got money to buy more." Was that often, sometimes, or never true for you/your household in the last 12 months?	◯ Often true ◯ Sometimes true ◯ Never true
"The food that I/we bought just didn't last, and I/we didn't have money to get more." Was that often, sometimes, or never true for you/your household in the last 12 months?	◯ Often true ◯ Sometimes true ◯ Never true
"I/we couldn't afford to eat balanced meals." Was that often, sometimes, or never true for you/your household in the last 12 months?	◯ Often true ◯ Sometimes true ◯ Never true
Section 2- Adult Referenced Questions	
In the last 12 months, since last (current month), did you/your or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?	◯ Yes ◯ No
How often did this happen?	◯ Almost every month ◯ Some months but not every month ◯ Only 1 or 2 months
In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?	◯ Yes ◯ No
In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?	◯ Yes ◯ No
In the last 12 months, did you lose weight because there wasn't enough money for food?	◯ Yes ◯ No

Section 3- Adult Referenced Questions

In the last 12 months, did you/you or other adults in your household ever not eat for a whole day because there wasn't enough money for food?	◯ Yes ◯ No
How often did this happen?	◯ Almost every month ◯ Some months but not every month ◯ Only 1 or 2 months

Child Stage 1- Transition to Child Referenced Questions

"I/we relied on only a few kinds of low-cost food to feed my/our child/the children because I was/we were running out of money to buy food." Was that often, sometimes, or never true for you/your household in the last 12 months?	◯ Never true ◯ Sometimes true ◯ Often true
"I/we couldn't feed my/our child/the children a balanced meal because I/we couldn't afford that." Was that often, sometimes, or never true for you/your household in the last 12 months?	◯ Never true ◯ Sometimes true ◯ Often true
"My/our child was/the children were not eating enough because I/we just couldn't afford enough food." Was that often, sometimes, or never true for you/your household in the last 12 months?	◯ Never true ◯ Sometimes true ◯ Often true

Stage 2- Child Referenced Questions

In the last 12 months, since (current month) of last year, did you ever cut the size of you child's/any of the children's meals because there wasn't enough money for food?	◯ Yes ◯ No
In the last 12 months, did your child/any of the children ever skip meals because there wasn't enough money for food?	◯ Yes ◯ No
How often did this happen?	◯ Almost every month ◯ Some months but not every month ◯ Only 1 or 2 months
In the last 12 months, was your child/were the children ever hungry but you just couldn't afford more food?	◯ Yes ◯ No
In the last 12 months, did your child/any of the children ever not eat for a whole day because there wasn't enough money for food?	◯ Yes ◯ No

APPENDIX B

CASI-5 Questionnaire

Confidential

CASI-5 Questionnaire

Select the rating which best describes your child's current behavior.
Please answer each question to the best of your ability.

Category A

Question 1

A1. Does not pay close attention to details or makes careless mistakes.

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very often

A1.a How many times per day, per week, or per month?

_____
(E.g.: 3x per day, or 4x per week, or 2x per month)

A1.b Please give an example

_____

A1.c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A1.d At what age was this behavior first noted?

_____

Question 2

A2. Has difficulty paying attention to tasks or activities

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A2.a How many times per day, per week, or per month?

_____
(E.g.: 3x per day, or 4x per week, or 2x per month)

A2.b Please give an example

_____

A2.c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A2.d At what age was this behavior first noted?

_____

Question 3

A3 Does not seem to listen when spoken to directly

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A3.a How many times per day, per week, or per month?

_____

(E.g.: 3x per day, or 4x per week, or 2x per month)

A3.b Please give an example

_____

A3.c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A3.d At what age was this behavior first noted?

_____

Question 4

A4 Has difficulty following through on instructions and fails to finish things

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A4.a How many times per day, per week, or per month?

_____

(E.g.: 3x per day, or 4x per week, or 2x per month)

A4.b Please give an example

_____

A4.c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A4.d At what age was this behavior first noted?

_____

Question 5

A5 Has difficulty organizing work and activities

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A5.a How many times per day, per week, or per month?

_____

(E.g.: 3x per day, or 4x per week, or 2x per month)

A5.b Please give an example

_____

A5.c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A5.d At what age was this behavior first noted?

_____

Question 6

A6 Avoids doing tasks that require a lot of mental effort

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A6.a How many times per day, per week, or per month?

_____

(E.g.: 3x per day, or 4x per week, or 2x per month)

A6.b Please give an example

_____

A6.c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A6.d At what age was this behavior first noted?

_____

Question 7

A7 Loses things necessary for activities

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A7.a How many times per day, per week, or per month?

_____

(E.g.: 3x per day, or 4x per week, or 2x per month)

A7.b Please give an example

_____

A7.c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A7.d At what age was this behavior first noted?

_____

Question 8

A8 Is easily distracted by other things going on

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A8.a How many times per day, per week, or per month?

_____

(E.g.: 3x per day, or 4x per week, or 2x per month)

A8.b Please give an example

_____

A8.c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A8.d At what age was this behavior first noted?

_____

Question 9

A9 Is forgetful in daily activities

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A9.a How many times per day, per week, or per month?

_____
(E.g.: 3x per day, or 4x per week, or 2x per month)

A9.b Please give an example

_____

A9.c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A9.d At what age was this behavior first noted?

_____

Question 10

A10 Fidgets with hands or feet or squirms in seat

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A10.a How many times per day, per week, or per month?

_____
(E.g.: 3x per day, or 4x per week, or 2x per month)

A10.b Please give an example

_____

A10.c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A10.d At what age was this behavior first noted?

_____

Question 11

A11 Has difficulty remaining seated when asked to do so

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A11.a How many times per day, per week, or per month?

_____

(E.g.: 3x per day, or 4x per week, or 2x per month)

A11.b Please give an example

_____

A11.c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A11.d At what age was this behavior first noted?

_____

Question 12.1

A12.1 Runs about or climbs on things when asked not to do so

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A12.1a How many times per day, per week, or per month?

_____

(E.g.: 3x per day, or 4x per week, or 2x per month)

A12.1b Please give an example

_____

A12.1c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A12.1d At what age was this behavior first noted?

_____

Question 12.2

A12.2 Seems restless or jittery

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A12.2a How many times per day, per week, or per month?

_____
(E.g.: 3x per day, or 4x per week, or 2x per month)

A12.2b Please give an example

_____

A12.2c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A12.2d At what age was this behavior first noted?

_____

Question 13

A13 Has difficulty playing or doing things quietly

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A13a How many times per day, per week, or per month?

_____
(E.g.: 3x per day, or 4x per week, or 2x per month)

A13b Please give an example

_____

A13c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A13d At what age was this behavior first noted?

_____

Question 14

A14 Is "on the go" or acts as if "driven by a motor"

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A14a How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

A14b Please give an example

_____

A14c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A14d At what age was this behavior first noted?

_____

Question 15

A15 Talks excessively

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A15a How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

A15b Please give an example

_____

A15c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A15d At what age was this behavior first noted?

_____

Question 16

A16 Blurts out answers to questions before they have been completed

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A16a How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

A16b Please give an example

_____

A16c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A15d At what age was this behavior first noted?

_____

Question 17

A17 Has difficulty awaiting turn in group activities

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A17a How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

A17b Please give an example

_____

A17c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A17d At what age was this behavior first noted?

_____

Question 18

A18 Interrupts or intrudes on other people's activities

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

A18a How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

A18b Please give an example

_____

A18c Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Please give examples

_____

A18d At what age was this behavior first noted?

_____

Question about Category A

Ax How often do the behaviors in category A interfere with youth's ability to do schoolwork or get along with others?

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

Category B

Question 19

B19 Loses temper

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

B19 How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

B19 Please give an example

_____

B19 Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Question 20

B20 Argues with adults

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

B20 How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

B20 Please give an example

_____

B20 Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Question 21

B21 Defies or refuses to do what you tell him/her

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

B21 How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

B21 Please give an example

_____

B21 Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Question 22

B22 Does things to deliberately annoy others

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

B22 How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

B22 Please give an example

_____

B22 Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Question 23

B23 Blames others for own misbehavior or mistakes

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

B23 How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

B23 Please give an example

_____

B23 Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Question 24

B24 Is touchy or easily annoyed by others

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

B24 How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

B24 Please give an example

_____

B24 Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Question 25

B25 Is angry and resentful

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

B25 How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

B25 Please give an example

_____

B25 Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Question 26

B26 Takes anger out on others or tries to get even

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

B26 How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

B26 Please give an example

_____

B26 Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Question about answers in section B

Bx How often do the behaviors in Category B interfere with youth's ability to do schoolwork or get along with others?

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

Category Rz

Question Rz 1

Rz1, Has temper outbursts that are way out of proportion to the situation

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

Rz1 How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

Rz1 Please give an example

_____

Rz1 Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Question Rz 2

Rz2. Is irritable or angry most of the day

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often

Rz2 How many times per day, per week, or per month?

_____

(E.g.: 3x per day or 4x per week or 2x per month)

Rz2 Please give an example

Rz2 Does this behavior occur in one setting or several?

- ◯ One setting
- ◯ Several settings

Question about answers in section Rz

Rzx How often do the behaviors in Category Rz interfere with youth's ability to do schoolwork or get along with others?

- ◯ Never
- ◯ Sometimes (once in a while, not often)
- ◯ Often
- ◯ Very Often