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Effect of Family Structure on Mental Health Problems in Adolescents in the United States

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Effect of Family Structure on Mental Health Problems in
Adolescents in the United States

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A Thesis

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Effect of Family Structure on Mental Health Problems in Adolescents in the United States

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Chapter One: Introduction

This thesis examines the proposition that the nature of family structure consisting of two married parents produces mentally healthier adolescents than those non-traditional structures, including the absence of one or more parent. It argues that there are other critical factors that need to be taken into account when considering adolescent mental health outcomes. The thesis draws on the mental health component of the 2016 National Survey of Children's Health (NSCH), to examine the association of a wide range of factors in parental and adolescent life associated with mental health problems.

Adolescence is a challenging period, accompanied by many social, physical, emotional, psychological and developmental issues that can contribute to physical and emotional distress and more severe mental health disorders (CDC, 2017). The CDC describes childhood mental problems as chronic health conditions with significant changes in childhood learning, behavior, and coping strategies, affecting their daily lives. These problems often start in childhood and go on through teenage years or may start during teenage years and stay on into adulthood (CDC, 2019). Common mental health problems in adolescents include anxiety, depression, attention deficit hyperactivity disorder (ADHD), behavior disorders, autism, substance use and eating disorders (CDC, 2019; DHHS, 2019). Similarly, Schwarz (2009) finds that adolescents are susceptible to depression as a result of the continuing process of brain development and hormonal changes.

Approximately 13.4% of adolescents worldwide have mental health disorders (Polanczyk et al., 2015). The U.S. Department of Health & Human Services (DHHS, 2017) reports that an about one in five adolescent in the U.S. has had a serious mental health disorder. The general

prevalence of adolescent mental health disorders is 13.9%, including 6.9% for anxiety disorders, 3.3% for major depressive disorder, 6.9% for ADHD and 1.8% for conduct disorders (Perales et al., 2016).

Adolescents frequently report distress associated with normal physical and psychological growth; however, if these problems are unaddressed, they can lead to serious, often life-threatening outcomes (DHHS, 2017; Schwarz, 2009). Adolescent mental health is influenced by a variety of factors (Kieling et al., 2011), but the family as the most basic unit of social interaction often has significant influence to modulate or amplify these problems. The structure and dynamics of the family including, income, access to resources (Perales et al, 2016), parental monitoring and family home environment can have a significant impact on the emotional and psychological development of an adolescent (Cavanagh, 2008; Perales et al, 2016; Langton & Berger, 2011).

The literature, classifies family structure into “traditional families” (also referred to as ‘original’, ‘two-parent’, ‘nuclear’, ‘intact’ or ‘biological’ families) and “non-traditional families”, including step, blended, single parent or one-parent families (Areba, Eisenberg & McMorris, 2017; Cavanagh, 2008; Langton & Berger, 2011; Perales et al., 2016). Studies have shown that more than one-third (34%) of adolescents in the U.S. reside in non-traditional families (Langton & Berger, 2011; Turner et al, 2013).

The primary result in the relationship of family structure to adolescent mental health is that traditional families have children with better mental health status. Adolescents in traditional two-parent families (either biological or adoptive) have been found to have better mental health status as compared to those in non-traditional families, (Cavanagh, 2008; Langton & Berger, 2011;

Perales et al., 2016; Areba, 2017). Various explanations have been proposed to account for this correlation. Perales et al. (2016) noted that poor mental health observed in adolescents from non-traditional families was due primarily to lower household income, poorer parental mental health and the stress of family prior to the breakdown that resulted in the non-traditional family structure. Langton & Berger (2011) found that adolescents transitioning from a two-biological-parent family to a single-parent family had a decline in mental health resulting from less monitoring and supervision by parents, greater exposure to mental health risk factors such as quality of parenting and home environment, stress and parental conflict, and generally received less health-related investment of time and resources. Cavanagh (2008), on the other hand, argued that the differences in the quality of family relationships and interactions were present across a variety of family structures; the key in his view was the degree of support given to adolescents in facing their challenges. According to Cavanagh, families with positive relationships and connectedness and a high degree of parental supervision and control were associated with positive adolescent mental health, regardless of their structure. Turner et al. (2013), posited that mental health problems in children ages 2 -17 years are related to victimization experienced by these children as a result of the characteristics of their parents, family life experiences and neighborhood disorder.

Mackay (2005), in a review of the literature on parental separation and child outcomes, concluded that children from intact two-parent families fared better in mental health than those whose parents were separated, identifying factors such as a decline in the income of the custodial parent after separation, inter-parental conflict and compromised parenting. Rohde (2013) found that besides the association between family structure and children's mental health problems, other variables such as parental mental health, harsh parenting styles, quality of the marital

relationship, marital conflict and dysfunctional parental styles contribute to children's mental health disorders.

Cavanagh (2008) found that girls were likely to have poorer mental health than boys, adolescents of color were more susceptible to mental health problems than European Americans, and households with lower socioeconomic status (income and education) had a higher prevalence of mental health problems. In a school-based study of Latino, Somali, Hmong and White students, Areba et al. (2017) found ethnic variations in the association between family structure and adolescent mental health. Latino, Somali, and Hmong adolescents that belonged to non-traditional families had the highest prevalence of mental health disorders, while households with nuclear, cohabiting and grandparent-only families had fewer mental health disorders amongst Latino and White adolescents. Areba et al. speculated that this was probably due to greater access to healthcare services and increased supervision by parents.

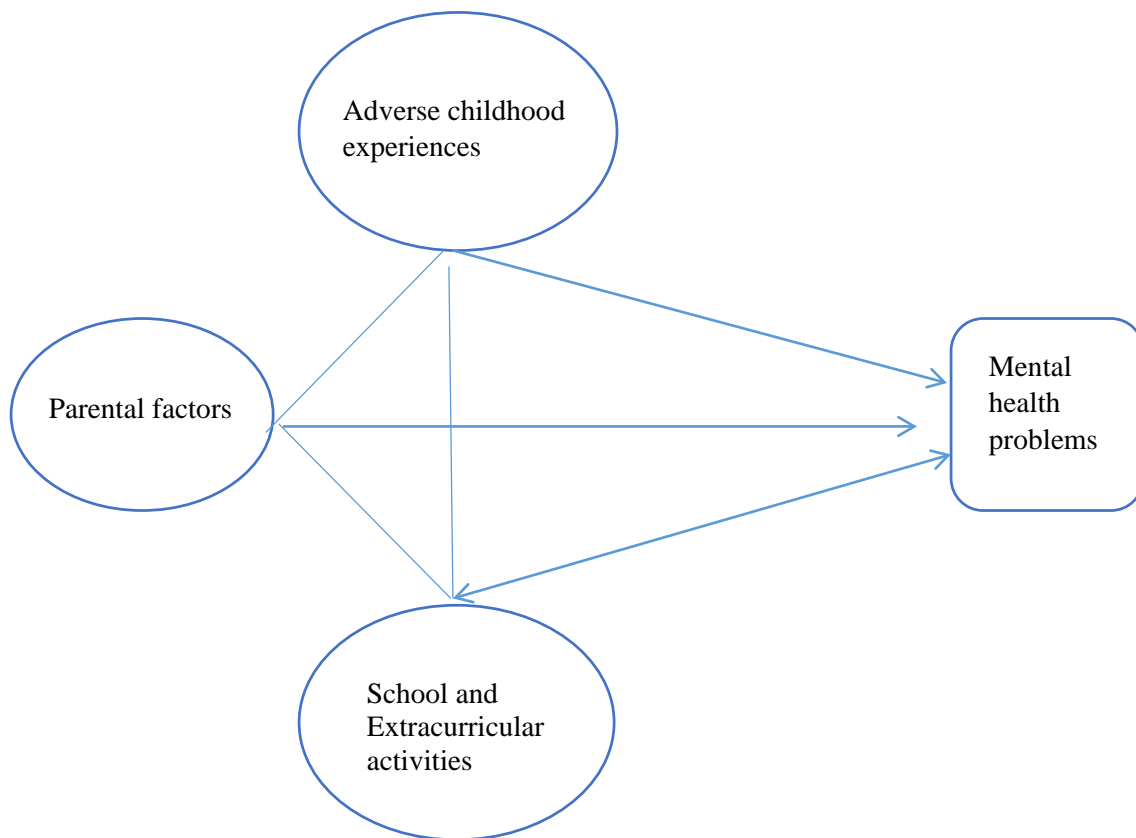
The approach of this thesis is to try to resolve the ambiguity in the literature with regard to the family characteristics that contribute to adolescent mental health problems in the United States and identify approaches to intervention. In particular the study examines whether it is just the traditional/non-traditional family structure that is important or if other factors supersede the structure of the family. The study hypothesis is that family structure is less important than other factors in contributing to the mental health of adolescents.

Logic model

A graphic representation of the hypothesized relationship between the independent and dependent variables measured is shown in Figure 1. It is hypothesized that child factors including adverse childhood experiences, school problems, extracurricular activities, adolescent

health status, physical activity and parental factors, such as parents' frustration with child, parent emotional support, and parent-child relationship will predict mental health problems in adolescents.

Figure 1: Model of hypothesized relationship between mental health problems, and identified predicting factors in adolescents.



Chapter Two: Research Design and Methods

Overview of study design

The data for this study was drawn from the 2016 National Survey of Children's Health (NSCH). The NSCH provides data on multiple, intersecting aspects of children's health and well-being including physical and mental health, access to and quality of health care, and the nature of the family, neighborhood, school, and social context (Child and Adolescent Health Measurement Initiative; CAHMI, 2017a).

The author obtained the NSCH dataset from the Child and Adolescent Health Measurement Initiative (CAHMI) by filling an online data request form and subsequently signing a data utilization agreement form, after which the dataset link was released to the author. Secondary data analysis was conducted on the NSCH dataset to ascertain the socio-demographic characteristics of the survey participants, prevalence of mental health problems amongst adolescents in the US, factors associated with these problems, and how these variables relate to family structure.

Units of analysis and sampling approach

A sample of 364,150 households was selected from the Census Master Address File and allocated across the 50 states and the District of Columbia. The sample was stratified by state and a child-presence indicator that allowed the Census Bureau to oversample households that were more likely to have children (U.S. Census Bureau, 2018). Households were contacted by mail at random to identify those with one or more children under 18 years old. Households received a mailed invitation asking an adult in the household who is familiar with the child's health and health care (usually a parent) to go online to complete a short screener questionnaire. The screener asked participants to identify all children ages 0-17 living in the household. If a

child (or children) lived in the household, participants who chose to respond online are directed to a more detailed, age-specific topical questionnaire. For households with more than one child, one was randomly selected to be the subject of the main questionnaire. All non-responding households received a reminder in the mail. A mailed paper-and-pencil screener was provided if the household did not respond to the first two web survey invitations. Participants could also request a mailed copy of the screener and main questionnaire if they did not wish to complete it online (CAHMI, 2017a). A total of 138,009 screener questionnaires were completed from June 2016 to January 2017, and 67,047 of those were eligible for topical questionnaire follow-up. Of those topical-eligible households, 50,212 completed the topical questionnaire (U.S. Census Bureau, 2018). For purposes of this thesis a subset of the data, with a sample size of 20,708, consisting of adolescents, between the ages of 12-17 years constituted the sample for this study.

Data collection methods

The 2016 National Survey of Children's Health was administered via mail and the internet. Randomly selected addresses from civilian, non-institutionalized households across the United States were mailed instructions to access the survey online. After at least one reminder letter, those households who had not accessed the online survey were mailed a paper screening questionnaire (CAHMI, 2017b).

Measures

Dependent variable

The primary dependent variable is mental health problems. A composite mental health problem scale was developed by the author using a positive response to the question "*Has a doctor or other healthcare provider ever told you that this child has the condition? If yes, does this child currently have the condition?*" This question was asked for each of six mental health problems:

anxiety, depression, conduct and behavioral problems, substance use disorder (SUD), autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD). The response format for each disorder was *Do not have condition; Ever told, but do not currently have condition* and *Currently have condition*. For analytical purposes, each mental health problem was dichotomized into categories: *Did not have the problem v. Had the problem either current or past*. To facilitate analysis, a scale was computed by summing the positive responses (Cronbach's $\alpha = 0.68$). The scale was dichotomized into *No mental health problem v. One or more mental health problem either current or past*

Family structure: The composite measure of family structure was created by the Census Bureau for the 2016 NSCH public use data file from the number of parents or parent figures present in the household (one, two or other family type), the relationships of parents or other adults in the household (biological/adoptive parents, step-parents, or other family structure) and their marital status. This resulted in four family categories: Two parents, currently married; Two parents, not currently married; Single mother (currently married but living apart, formerly married or never married); Other family type, no parent reported.

Adolescent health status was based on the question asked of the parent or guardian: *In general, how would you describe this child's health?* The response format: *Excellent, Very Good, Good, Fair, Poor*. For analysis, this variable was dichotomized into *Excellent/Good v. Fair/Poor*.

Adolescent's Physical activity was based on the question: *During the past week, on how many days did this child exercise, play a sport, or participate in physical activity for at least 60 minutes?* With response format: *0 days, 1-3 days, 4-6 days, every day*. For analysis, these responses were dichotomized into *No days of physical activity v. One or more days per week*.

Body Mass Index (BMI) calculated from height and weight and grouped into categories: *underweight, healthy weight and overweight.*

Extracurricular activities: The composite extracurricular activities variable was developed using a 5-item scale including the child's participation in the previous 12 months in the following: after-school or on weekend sports team or sports lessons; clubs or organizations; organized activities or lessons such as music, dance, language, or other arts; community service or volunteer work at school, church or in the community; and paid work, including regular jobs as well as babysitting, cutting grass, or other occasional work. The original response format for each item was *Yes or No*. A scale was computed by summing the number of Yes responses (Cronbach's $\alpha = 0.55$). For analytical purposes, the scale was dichotomized into *No activities v. One or more.*

School Problems: The composite school problems scale was developed using the following 8-items:

- Number of days in the previous 12 months, child missed school due to illness or injury – the original response format was *No missed school days, 1-3 days, 4-6 days, 7-10 days and 11 or more days* (recoded into *0-10 days v. 11 or more days*);
- How many times school contacted the home about problems child was having with school- the original response format was *No time, 1 time, 2 or more times* (recoded into *0-1time v. 2 or more times*)
- Since starting kindergarten had child repeated any grades (*Yes v. No*);
- Child shows interest and curiosity in learning new things (*Yes v. No*);
- Works to finish tasks started (*Yes v. No*);

- Stays calm and in control when faced with a challenge ((*Yes v. No*);
- Cares about doing well in school (*Yes v. No*); and
- Does all required homework (*Yes v. No*);

The school problem scale was computed by summing the number of *Yes* responses (Cronbach's $\alpha = 0.68$). For analytical purposes, the scale was dichotomized into *No school problems v. One or more school problems*.

Adverse childhood experiences: The composite adverse childhood experience scale was developed using the following 9-items:

- *How often has it been hard to get by on your family's income - hard to cover basics like food or housing?*
- *Parent or guardian divorced or separated;*
- *Parent or guardian died;*
- *Parent or guardian served time in jail;*
- *Saw or heard parents or adults slap, hit, kick, punch one another in the home;*
- *Victim/witness of neighborhood violence;*
- *Lived with anyone who was mentally ill, suicidal, or severely depressed;*
- *Lived with anyone who had a problem with alcohol or drug;*
- *Treated or judged unfairly because of his/her race or ethnic group.*

The original response format for the first item was: *Somewhat often/Very often hard to get by on family income or Never/Rarely hard to get by on family income* and for each of the other items was: *Experienced the adverse childhood experience or No adverse childhood experience*.

A scale was computed by summing the number of positive responses (Cronbach's $\alpha = 0.66$). For analytical purposes, the scale was dichotomized into *No adverse experiences v. One or more adverse experiences*.

Electronic media use: The composite electronic media use variable was developed using 2 items including *Time spent on average weekday watching TV, videos, or playing video* and *Time spent with computers, cell phones, handheld video games and other electronic devices doing things other than schoolwork on an average weekday*. The original response format for each item was *Do not watch TV or use electronic devices, Watch TV or use electronic devices < 1 hour/day; Watch TV or use electronic devices 1-3 hours/day; Watch TV or use electronic devices 4 or more hours/day*. A scale was computed by summing the number of responses (Cronbach's $\alpha = 0.50$). For analytical purposes, the scale was dichotomized at the median into *Moderate or no use v. Excessive use*.

Adult mentor: The adult mentor variable was assessed with the question: *Other than parent or other adult in the home, is there at least one other adult in child's school, neighborhood, or community who knows this child well and who child can rely on for advice or guidance?* The response format was *Yes or No*.

Parental frustration with the child: The composite parental frustration with the child variable was developed using 3 items including *child hard to care for, child really bothers parent, parent angry with child*. The original response format for each item was: *Never; Rarely; Sometimes; Usually* and *Always*. A scale was computed by summing the number of responses (Cronbach's $\alpha = 0.81$). For analytical purposes, the scale was dichotomized at the median into: *Little or no frustration v. Very frustrated*.

Parental emotional support: The composite parental emotional support variable was developed using 8 items including *Support from spouse, other family member or close friend, healthcare provider, place of worship or religious leader, support or advocacy group related to specific health condition, peer support group, counselor or other mental health professional, other persons*. The original response format for each item was *Yes or No*. A scale was computed by summing the number of *Yes* responses (Cronbach's alpha ($\alpha = 0.404$)). For analytical purposes, the scale was dichotomized into *No support v. Support from one or more groups*.

Parent-child relationship: The parent-child relationship variable was assessed with the question: *How well can you and this child share ideas or talk about things that really matter?* The initial response format was *'Very well, somewhat well, not very well' or 'Not well at all'*. For the purpose of this study, this was recoded into *Poor relationship v. Good relationship*.

Family's handling of problems: The composite family's handling of problems variable was developed using 4 items from responses to the question: *When your family faces problems, how often are you likely to do each of the following?: Talk together about what to do; Work together to solve our problems; Know we have strengths to draw on; Stay hopeful even in difficult times*. The original response format for each item was: *All of the time; Most of the time; Some of the time; and None of the time*. A scale was computed by summing the number of responses (Cronbach's $\alpha = 0.89$). For analytical purposes, the scale was dichotomized at the median into *Handle problems poorly v. Handle problems well*.

Mental healthcare service: The mental healthcare service variable was assessed with the question: *During the past 12 months, has this child received any treatment or counseling from a*

mental health professional? The response format was *Received mental health care* v. *Did not receive mental health care*.

Healthcare Service Satisfaction: The composite healthcare service satisfaction variable was developed using 5 items assessed with the question: *During the previous 12 months, how often did child's healthcare provider spend enough time with the child; listen carefully to the parent; show sensitivity to family's values and customs; provide the specific information needed concerning child; help parent feel like a partner in child's care*. The original response format for each item was *Always; Usually; Sometimes; and Never*. A scale was computed by summing number of responses (Cronbach's $\alpha = 0.92$). For analytical purposes, the scale was dichotomized at the median into: *Not satisfied* v. *Satisfied*.

Covariates: The socio-demographic covariates included age, gender, ethnicity, parents' educational level, household poverty level, and health insurance status

Statistical analysis

SPSS software version 25 program was used for data analysis. Frequencies and descriptive statistics assessed the distribution of variables. Correlation analysis examined the relationships between all mental health variables. Bivariate logistic regression tested the relationships between each of the mental health variables and each sociodemographic covariate and between the mental health variables and each independent variable. Multivariate logistic regression models assessed important variables associated with mental health problems, controlling for sociodemographic covariates. Variables that were statistically significant at $p < 0.25$ of the Wald statistic in the bivariate models were included in the multivariate regression models. Using purposeful variable selection, as advised by Bursac et al. (2008) and Hosmer, Lemeshow & Sturdivant (2013), multivariate models were fit containing all covariates and variables identified for inclusion. The

p-values of the Wald statistic of each variable was assessed and variables that were not significant at $p < 0.15$ were eliminated and a new model fit. The p-value computed from the chi-square distribution with 8 degrees of freedom from the Hosmer–Lemeshow goodness of fit statistic was assessed to test the fit of the model. Final models with $p > 0.05$, were considered a good fit.

Chapter Three: Results

Socio-demographic characteristics

Table 1 shows the socio-demographic characteristics and descriptive statistics of the adolescents studied. White adolescents constituted the majority in the population, while most adolescents lived in the traditional “Two parents, currently married” family structure.

Table 1. Frequency Distribution of adolescent socio-demographic characteristics (N = 20,708)

<i>Characteristic</i>		<i>N</i>	<i>Percent (%)</i>
Age	Mean	14.7	
	SD	1.7	
Gender	Male	10501	50.7
	Female	10207	49.3
Race/Ethnicity	White, non-Hispanic	14913	72.0
	Hispanic	2138	10.3
	Black, non-Hispanic	1213	5.9
	Other/Multi-racial, non-Hispanic	2444	11.8
Family Structure	Two parents, currently married	14807	72.7
	Two parents, not currently married	1082	5.3
	Single mother	2889	14.2
	Other family type, no parent reported	1580	7.8
Household Poverty level	0 - 99% FPL	1900	9.2
	100 – 199% FPL	3078	14.9
	200 – 399% FPL	6325	30.5
	400% FPL or greater	9405	45.4
Parents’ Educational level	Less than high school	496	2.5
	High school or GED	2813	13.9
	Some college or technical school	4841	24.0
	College degree or higher	12045	59.6
Health insurance Status at time of survey	Currently insured	19803	96.0
	Currently uninsured	823	4.0

The independent variables

Table 2 describes the frequencies of the independent variables of child, parental and healthcare factors.

Table 2. Frequency distribution of independent variables

<i>Characteristic</i>		N	Percent (%)
General Health Status			
Health description	Good/Excellent health	20322	98.4
	Fair/Poor health	321	1.6
Physical activity	No physical activity (0 days)	2286	11.3
	Physical activity (1-7 days/week)	17960	88.7
Body Mass Index (BMI)	Underweight	1051	5.4
	Healthy weight	13351	68.6
	Overweight	5055	26.0
Extracurricular activities	No activity	1789	8.6
	One or more activities	18919	91.4
School Problems	No School Problem	15978	77.2
	One or more School Problems	4730	22.8
Adverse childhood experience	No adverse experience	10833	52.3
	Some adverse experience	9875	47.7
Child electronic media use	None to moderate use (0-3 hours/day)	15872	77.8
	Excessive use (≥ 4 hours/day)	4539	22.2
Child has adult mentor	No	1347	6.8
	Yes	18490	93.2
Parental frustration with child	Little or no frustration	12973	64.0
	More frustration	7301	36.0
Parental emotional support	No emotional support	4982	24.1
	One or more form of support	15726	75.9
Parent-child relationship	Poor relationship	7409	36.7
	Good relationship	12788	63.3
Family's handling of problems	Handle problems poorly	9314	46.4
	Handle problems well	10738	53.6
Access to mental healthcare service	Did not receive mental healthcare	17368	84.3
	Received mental healthcare	3236	15.7
Healthcare service satisfaction	Not always or never satisfied	6951	40.7
	Always satisfied	10125	59.3

Child factors

About one in fifty of the adolescents were in fair/poor state of health, while a tenth were not physically active. Over two-thirds of the youth were of healthy weight. More than a fifth had one or more school problems while less than a tenth did not engage in any extracurricular activity. Almost half of the youth had experienced some form of adverse event in their lives. Only a fifth were reported to use electronic media excessively and the great majority had an adult mentor.

Parental factors

More than a third of parents reported frustration with their adolescent child and less than positive relationships with their child. Only a quarter of parents reported that they had no emotional support. About half of the families reported handling family problems poorly.

Healthcare factors

Of all the adolescents studied, about 4 in 5 had no access to mental healthcare and of those who received healthcare services only about two-thirds of their parents were satisfied with services received (Table 2).

Mental health problems

Table 3 shows the distribution of each mental health condition and composite mental health problem in the adolescents studied.

Table 3. Frequency distribution of adolescent mental health problems

	Do not have condition N (%)	Ever told, but do not currently have condition N (%)	Currently have condition N (%)
Anxiety	17595 (85.7)	402 (2.0)	2535 (12.3)
Depression	18779 (91.2)	419 (2.0)	1394 (6.8)
Conduct and Behavioral Problems	18645 (90.5)	457 (2.2)	1495 (7.3)
Substance Use Disorder	20243 (99.5)	42 (0.2)	62 (0.3)
Autism Spectrum Disorder	19930 (96.9)	50 (0.2)	586 (2.8)
Attention Deficit Hyperactivity Disorder	17612 (86.0)	310 (1.5)	2556 (12.5)
Mental health problems	No mental health problem 14570 (70.4)	One or more mental health problems 6138 (29.6)	

Overall, 29.6% of adolescents had at least one of the six mental health conditions. According to the parent report, the most common mental health problem among this adolescent population was ADHD, while the least common was SUD.

Correlation analysis of mental health problems

Table 4 shows the results of the correlation analysis used to examine the relationships between all the six mental health variables.

Table 4. Correlations of Mental health variables

Variables	1	2	3	4	5	6
Anxiety	-					
Depression	0.54**	-				
CABP	0.31**	0.30**	-			
SUD	0.06**	0.09**	0.09**	-		
ASD	0.20**	0.12**	0.27**	0.01	-	
ADHD	0.29**	0.25**	0.47**	0.06**	0.20**	-

**Correlation is significant at the 0.01 level (2-tailed).

CABP: Conduct and Behavioral Problems

Results indicated that there was a significant positive association between all mental health problems ($p < 0.01$), except the association between autism spectrum disorder and substance use disorder, which was non-significant ($r = 0.01$, $p = 0.06$). There was a strong positive correlation between anxiety and depression ($r = 0.54$, $p < 0.01$) and also between attention deficit hyperactivity disorder and conduct and behavioral problems ($r = 0.47$, $p < 0.01$). Anxiety, depression, conduct and behavioral problems, and attention deficit hyperactivity disorder were all moderately inter-correlated, while autism spectrum disorder was only moderately correlated with conduct and behavioral problems. Substance use disorder had very low correlations with all other mental health problems (Table 4).

Bivariate Analysis

Table 5. Association between mental health problems and socio-demographic characteristics, and with each independent variable

Variable	Composite MHP	Anxiety	Depression	CABP	SUD	ASD	ADHD
	COR (95% CI)	COR (95% CI)	COR (95% CI)	COR (95% CI)	COR (95% CI)	COR (95% CI)	COR (95% CI)
Age	1.05 (1.03–1.06)***	1.07(1.05- 1.10)***	1.2(1.17-1.24)***	0.93(0.91-0.96)***	1.22(1.15-1.29)***	0.97(0.93-1.02)	0.98(0.96-1.01)
Gender							
Female (ref.)							
Male	1.22 (1.15–1.29)***	0.72(0.67– .78)***	0.67(0.61-0.74)***	2.12(1.93-2.33)***	0.93(0.77-1.11)	3.0(2.54-3.53)***	2.14(1.97-2.31)***
Race							
White, non-Hispanic (ref.)							
Hispanic	0.87(0.79– .97)*	0.80 (0.70 – 0.91)**	0.98(0.84-1.14)	0.98(0.84-1.14)	1.16(0.86-1.57)	0.91(0.71-1.16)	0.81(0.71-0.93)
Black, non-Hispanic	0.93(0.82 – 1.06)	0.50 (0.41 – 0.61)***	0.94(0.77-1.16)	1.49(1.26-1.77)***	1.41(0.99-2.02)	1.03(0.76-1.39)	1.01(0.86-1.18)
Other/Multiracial	0.76(0.69–0.84)***	0.67 (0.59 – 0.77)***	0.90(0.77-1.05)	0.94(0.81-1.09)	1.44(1.11-1.87)**	0.86(0.68-1.09)	0.68(0.59-0.78)***
Family Structure							
Two parents, married (ref.)							
Two parents, not married	1.46(1.28–1.66)***	1.44(1.22– 1.69)***	1.96(1.63-2.36)***	1.69(1.40-2.05)***	0.98(0.63-1.53)	1.42(1.06-1.90)*	1.53(1.31-1.80)***
Single mother	1.81(1.67–1.97)***	1.80(1.63–1.99)***	2.41(2.14-2.71)***	2.15(1.91-2.42)***	1.15(0.88-1.51)	1.32(1.09-1.61)*	1.77(1.59-1.96) ***
Other family type	1.91(1.72–2.13)***	1.44(1.25–1.65)***	2.42(2.08-2.80)***	2.66(2.31-3.06)***	1.81(1.36-2.43)***	1.09(0.83-1.43)	1.92(1.68-2.18) ***
Household Poverty level							
0 - 99% FPL (ref.)							
100 – 199% FPL	0.79(0.70–0.89)***	0.87(0.75– 0.01)	0.83(0.70-0.98)*	0.66(0.56-0.77) ***	0.50(0.35-0.73) ***	0.76(0.59-0.99)*	0.79(0.68-0.91)**
200 – 399% FPL	0.67(0.60–0.75)***	0.74(0.65– 0.85)***	0.60(0.52-0.71) ***	0.51(0.45-0.60) ***	0.65(0.48-0.87)**	0.65(0.52-0.83) ***	0.67(0.58-0.76) ***
400% FPL or greater	0.62(0.56 –0.68)***	0.73(0.64–0.83)***	0.49(0.43-0.57) ***	0.42(0.36-0.48) ***	0.65(0.49-0.87)**	0.57(0.45-0.71) ***	0.60(0.53-0.68) ***
Parents’ Education level							
Less than high school (ref.)							
High school or GED	0.96 (0.78 – 1.17)	1.07(0.81–1.40)	0.96(0.71-1.29)	0.86(0.65-1.13)	0.65(0.37-1.16)	0.73(0.46-1.14)	1.05(0.81-1.37)
Some college or technical school	1.09 (0.89 – 1.32)	1.28(0.98-1.68)	1.04(0.78-1.39)	0.79(0.61-1.04)	0.87(0.51-1.50)	0.82(0.53-1.27)	1.13(0.88-1.45)
College degree or higher	0.84 (0.69 – 1.02)	1.07(0.83–1.39)	0.68(0.51-0.91)*	0.58(0.45-0.76) ***	0.62(0.37-1.06)	0.74(0.49-1.13)	0.84(0.65-1.07)
Health insurance							
Status at time of survey							
Currently uninsured (ref.)							
Currently insured	1.18 (1.01-1.39)*	1.37 (1.10–1.70) **	1.15 (0.89-1.47)	1.40 (1.07-1.82)*	0.72 (0.48-1.08)	1.37 (0.90-2.08)	1.30 (1.05-1.60)*
General Health Status							
Health description							
Fair or Poor (ref.)							
Good to Excellent	0.18 (0.14 – 0.23)***	0.16 (0.13 – 0.20)***	0.14 (0.12–0.18)***	0.17 (0.14 – 0.22) ***	0.46 (0.27-0.78)***	0.22 (0.16 - 0.31) ***	0.30 (0.24–0.38)***
Physical activity							
No activity 0 days (ref.)							
Physical activity 1-7 days/week	0.42 (0.38 – 0.46)***	0.38 (0.35-0.43) ***	0.31 (0.28-0.35)***	0.44 (0.40 -0.50) ***	0.51 (0.35-0.73)***	0.38 (0.32 - 0.45) ***	0.57 (0.51-0.63)***

BMI							
Underweight (ref.)							
Healthy weight	0.82(0.72–0.94)*	1.05(0.87-1.26)	1.10(0.86-1.40)	0.82(0.66-1.01)	0.99(0.64-1.53)	0.57(0.43-0.77) ***	0.70(0.60-0.83) ***
Overweight	1.20(1.04–1.38)*	1.53(1.27-1.86) ***	2.05(1.60-2.63) ***	1.41(1.14-1.75)**	1.13(0.71-1.79)	0.97(0.72-1.31)	0.99(0.83-1.17)
Extracurricular activities							
No activity (ref.)							
One or more activities	0.30(0.27–0.33)***	0.55(0.49-0.62) ***	0.47(0.41-0.54) ***	0.35(0.31-0.39) ***	0.04(0.04-0.05) ***	0.27(0.23-0.33) ***	0.48(0.43-0.54) ***
School Problems							
No Problem (ref.)							
Had School Problems	6.19 (5.77 – 6.64)***	5.05 (4.66 –5.48) ***	6.72(6.09–7.42) ***	12.30 (11.09-13.64) ***	1.09(0.88-1.35) ***	6.08 (5.24-7.06) ***	6.02(5.55-6.53) ***
Adverse childhood experience							
No adverse experience (ref.)							
Some adverse experience	2.21(2.08–2.35)***	2.22(2.05-2.40) ***	3.43(3.08-3.81) ***	3.22(2.91-3.56) ***	1.24(1.03-1.49)*	1.56(1.34-1.80) ***	2.19(2.02-2.37) ***
Electronic media use							
Moderate to no use (ref.)							
Excessive use	1.21(1.12–1.30)***	1.09(0.99-1.19)	1.09(0.99-1.22)	1.16(1.03-1.30)*	1.27(0.10-1.61)*	0.87(0.73-1.03)	1.26(1.15-1.39)***
Child has adult mentor							
No (ref.)							
Yes	0.75(0.66–0.84)***	0.72(0.63-0.83) ***	0.69(0.58-0.81) ***	0.58(0.49-0.67) ***	0.55(0.34-0.87)**	0.53(0.42-0.66) ***	0.75(0.65-0.86) ***
Par child’s care frustration							
Little/no frustration (ref.)							
More frustration	4.12(3.87–4.39)***	3.89(3.59-4.21) ***	4.63(4.18-5.12) ***	10.05(8.94-11.30) ***	1.59(1.32-1.92) ***	4.16(3.55-4.86) ***	4.29(3.96-4.66) ***
Par. emotional support							
No emotional support (ref.)							
One or more form of support	1.0(0.93–1.07)	1.14(1.04-1.25)*	0.97(0.87-1.09)	0.89(0.80-0.98)*	0.66(0.54-0.80) ***	0.87(0.74-1.02)	1.01(0.93-1.11)
Parent-child relation							
Poor relationship (ref.)							
Good relationship	0.45(0.42–0.48)***	0.49(0.45-0.53) ***	0.37(0.33-0.40) ***	0.27(0.25-0.30) ***	0.31(0.23-0.42) ***	0.31(0.27-0.36) ***	0.47(0.44-0.51) ***
Family’s handling of problems							
Handle problems poorly (ref.)							
Handle problems well	0.64(0.60–0.68)***	0.63(0.58-0.68) ***	0.52(0.48-0.58) ***	0.54(0.49-0.59) ***	0.78(0.65-0.95)*	0.92(0.80-1.07)	0.68(0.63-0.73) ***
Mental healthcare service							
Did not receive mental healthcare (ref.)							
Received mental healthcare	20.60(18.64-22.76) ***	18.27(16.68-20.01) ***	27.87(24.87-31.23) ***	10.23(9.27-11.29) ***	2.26(1.84-2.77) ***	4.92(4.25-5.70) ***	6.68(6.13-7.27) ***
Healthcare service satisfaction							
Not always or never satisfied (ref.)							
Always satisfied	0.67(0.63–0.72) ***	0.59(0.54-0.64) ***	0.56(0.51-0.62) ***	0.58(0.53-0.64) ***	0.60(0.49-0.74) ***	0.62(0.53-0.72) ***	0.78(0.72-0.85) ***

***p < 0.001 **p < 0.01 *p < 0.05 COR: Crude Odds ratio CABP: Conduct and Behavioral Problems

Table 5 shows the bivariate regression models of the relationships between each of the mental health problems and each socio-demographic covariate and between each of the mental health problems and each independent variable.

Bivariate logistic regression analysis showed all socio-demographic variables as strong predictors of mental health problems (Table 5). Adolescents from non-traditional families were found to have significantly increased odds of having all mental health problems when compared to those from the traditional two married parent families, though not significantly for SUD and ASD. Age was a significant predictor of all mental health problems, but was not for ASD and ADHD, while gender significantly predicted all mental health problems, but not SUD (Table 5). Race significantly predicted likelihood of having any mental health problem, anxiety, conduct and behavioral problems, SUD and ADHD, but not significantly for depression and ASD (Table 5). While household poverty significantly predicted all mental health problems, parents' educational level was not a significant predictor, only significantly associated with lower odds of depression and conduct and behavioral problems in those with a College degree or higher compared with those with parents having less than high school education. While having health insurance was a significant predictor of a diagnosis of any mental health problem, anxiety, conduct and behavioral problem, and ADHD being made, it was not significant for depression, SUD or ASD.

In this adolescent sample, having good/excellent health status, and being physically active was significantly associated with lower odds of any of the mental health problems, while those who were overweight were significantly more likely to have any mental health problems, anxiety, depression, or conduct and behavioral problems, but not SUD.

Bivariate analysis also showed a statistically significant association between all mental health problems and all child, parental and healthcare variables tested (Table 5).

Multivariate analysis

Final multivariate logistic regression models for each mental health condition was adjusted for age, gender, race/ethnicity, family structure, parents' educational level, household poverty level and health insurance status (Table 6).

Table 6. Final Multivariate regression models describing association between mental health problems and socio-demographic characteristics, and with each independent variable (N=20708)

Variable	Composite MHP	Anxiety	Depression	CABP	SUD	ASD	ADHD
Hosmer & Lemeshow Test	$\chi^2 = 14.98$ $\rho = 0.06$	$\chi^2 = 6.34$ $\rho = 0.61$	$\chi^2 = 12.57$ $\rho = 0.13$	$\chi^2 = 7.70$ $\rho = 0.46$	$\chi^2 = 14.79$ $\rho = 0.06$	$\chi^2 = 15.42$ $\rho = 0.05$	$\chi^2 = 4.28$ $\rho = 0.83$
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Age	1.04 (1.02–1.06)**	1.07 (1.04– 1.10)***	1.21 (1.17 - 1.25)***	0.91 (0.88 - 0.94)***	1.37 (1.23 - 1.52)***	0.98 (0.93 - 1.02)	0.98 (0.96-1.01)
Gender							
Female (ref.)							
Male	1.10 (1.02 – 1.18)*	0.58 (0.54 – 0.64)***	0.53 (0.48 - 0.60)***	1.94 (1.72 - 2.18)***	1.10 (0.81-1.50)	2.73 (2.29 -3.25)***	2.01 (1.84 - 2.21)***
Race							
White, non-Hispanic (ref.)							
Hispanic	0.68 (0.60 – 0.77)***	0.65 (0.55 – 0.76)***	0.70 (0.58 - 0.85)***	0.70 (0.57 - 0.85)***	0.95 (0.55 - 1.66)	0.71 (0.54 - 0.94)*	0.69 (0.59 - 0.81)***
Black, non-Hispanic	0.61 (0.52 – 0.72)***	0.34 (0.27 – 0.43)***	0.62 (0.48 - 0.78)***	0.99 (0.79 - 1.24)	1.53 (0.87 - 2.69)	0.76 (0.54 - 1.06)	0.72 (0.60 - 0.87)**
Other/Multiracial	0.64 (0.57 – 0.72)***	0.60 (0.52 – 0.70)***	0.77 (0.65 – 0.92)**	0.80 (0.67 - 0.96)*	1.57 (1.03 – 2.40)*	0.87 (0.67 - 1.12)	0.61 (0.52 - 0.71)***
Family Structure							
Two parents, married (ref.)							
Two parents, not married	1.04 (0.88 – 1.22)	1.08 (0.90 – 1.31)	1.29 (1.03 - 1.60)*	0.91 (0.71 - 1.15)	0.71 (0.32 - 1.56)	1.09 (0.80 - 1.49)	1.06 (0.88 - 1.29)
Single mother	1.29 (1.15 – 1.44)***	1.33 (1.17 – 1.51)***	1.45 (1.25 - 1.69)***	1.11 (0.95 - 1.31)	1.12 (0.72 - 1.74)	0.91 (0.73 -1.14)	1.22 (1.07 - 1.40) **
Other family type	1.15 (1.00 – 1.32)***	0.91 (0.77 – 1.08)	1.20 (0.99 - 1.45)	1.20 (0.99 – 1.45)	1.54 (0.96 - 2.48)	0.72 (0.53 – 0.97)*	1.18 (1.00 - 1.39) *
Household Poverty level							
0 - 99% FPL (ref.)							
100 – 199% FPL	0.91 (0.78 – 1.06)	0.91 (0.76 – 1.08)	1.02 (0.83 – 1.24)	0.82 (0.67 - 1.01)	0.42 (0.23 - 0.76) **	0.93 (0.69 – 1.25)	0.91 (0.76 - 1.08)
200 – 399% FPL	0.87 (0.76 – 1.01)	0.86 (0.73 – 1.02)	0.86 (0.71 - 1.04)	0.81 (0.66 - 0.98)*	0.60 (0.36 – 1.00)*	0.87 (0.66 – 1.16)	0.91 (0.77 - 1.07)
400% FPL or greater	0.91 (0.79 – 1.05)	0.94 (0.79 – 1.12)	0.88 (0.72 - 1.08)	0.79 (0.65 – 0.98)*	0.66 (0.39 – 1.10)	0.76 (0.57 - 1.02)	0.96 (0.81 – 1.14)
Parents' Education level							
Less than high school (ref.)							
High school or GED	0.91 (0.70 – 1.17)	0.97 (0.70 – 1.34)	1.02 (0.71 - 1.46)	0.83 (0.58 - 1.18)	0.71 (0.29 - 1.72)	0.78 (0.47 - 1.31)	1.01 (0.74 - 1.37)
Some college or technical school	1.15 (0.89 – 1.47)	1.28 (0.94 – 1.76)	1.30 (0.91 – 1.85)	0.85 (0.60 - 1.20)	0.97 (0.42 – 2.28)	1.04 (0.64 -1.71)	1.15 (0.85 - 1.55)
College degree or higher	1.14 (0.88 – 1.47)	1.36 (0.99 – 1.87)	1.24 (0.86 – 1.77)	0.87 (0.61 - 1.24)	0.85 (0.36 – 2.02)	1.29 (0.78 - 2.12)	1.04 (0.77 - 1.42)
Health insurance Status at time of survey							
Currently uninsured (ref.)							
Currently insured	1.42 (1.17 - 1.73)***	1.47 (1.14 – 1.88) **	1.46 (1.09 – 1.96)*	1.90 (1.38 - 2.63)***	0.68 (0.36 - 1.29)	1.69 (1.06 - 2.70)*	1.45 (1.13 - 1.86)**

General Health Status							
Health description							
Fair or Poor (ref.)							
Good to Excellent	0.56 (0.42 – 0.74)***	0.43 (0.33 – 0.56)***	0.47 (0.36 – 0.62)***	0.65 (0.49 – 0.86) **		0.60 (0.42 – 0.87) **	
Physical activity							
No physical activity - 0 days (ref.)							
Physical activity (1- 7 days)	0.64 (0.58 – 0.72)***	0.61 (0.54 - 0.69) ***	0.59 (0.51 - 0.68) ***	0.86 (0.74 – 1.00)*		0.55 (0.45 - 0.67) ***	0.86 5(0.76 - 0.98) *
School Problems							
No Problem (ref.)							
Had School Problems	4. 24 (3.91 – 4.59)***	3.53 (3.21 – 3.89) ***	4.05 (3.60 - 4.56) ***	6.13 (5.43 – 6.92) ***	3.19 (2.25 - 4.51) ***	4.95 (4.19 – 5.83) ***	3.75 (3.41 – 4.12) ***
Extracurricular activities							
No activity (ref.)							
One or more activities	0.73 (0.63 – 0.84)***	0.83 (0.71 - 0.97) *	0.87 (0.73 – 1.04)	0.65 (0.55 - 0.77) ***		0.41 (0.33 - 0.50) ***	0.78 (0.67 - 0.90) **
Adverse childhood experience							
No adverse experience (ref.)							
Some adverse experience	1.56 (1.43 – 1.69)***	1.54 (1.39 – 1.71) ***	1.95 (1.71 – 2.24) ***	1.81 (1.58 - 2.08) ***			1.44 (1.29 – 1.60) ***
Par frustration with child							
Little/no frustration (ref.)							
More frustration	2.68 (2.48 – 2.89)***	2.40 (2.18 - 2.64) ***	2.34 (2.06 – 2.65) ***	4.92 (4.29 – 5.65) ***	2.17 (1.49 – 3.17) ***		2.68 (2.43 – 2.96)***
Par. emotional support							
No emotional support (ref.)							
One or more form of support	1.19 (1.09 – 1.30)***	1.27 (1.14 - 1.41)***					1.13 (1.01 – 1.25)*
Parent-child relation							
Poor relationship (ref.)							
Good relationship	0.84 (0.78 – 0.90)***	0.90 (0.82 – 0.98)*	0.72 (0.64 - 0.81) ***	0.61 (0.54 - 0.69) ***	0.57 (0.41 - 0.81) **		0.88 (0.80 - 0.97) **
Family's handling of problems							
Handle problems poorly (ref.)							
Handle problems well			0.91 (0.81 – 1.02)	1.15 (1.02 – 1.29)*			1.10 (1.00 - 1.21) *

***p < 0.001 **p < 0.01 *p < 0.05 AOR: Adjusted Odds ratio CABP: Conduct and Behavioral Problem

In the final models, body mass index (BMI), adolescent electronic media use, having an adult mentor, how families handled problems, access to mental health services, and healthcare service satisfaction were not predictors of adolescent mental health problems.

Composite Mental health problems scale

The results showed that adolescents living with single mothers and with other family types (with no parents reported), were significantly more likely to have any mental health problem than those living with two married parents. With every year increase in adolescent age, there was an increased odds of mental health problems. Males were significantly more likely to have any mental health problem than females, and having health insurance was a significant predictor of adolescents' higher odds of being diagnosed with mental health problems. There was a significantly reduced odds of mental health problems in adolescent minority race/ethnic groups when compared with White adolescents. Household poverty level and parental education level were not significant predictors of having any mental health problems (Table 6).

In the final composite model, adolescents with good/excellent health status, those who engaged in weekly physical activities, were involved in extracurricular activities, and had positive relationships with their parents, were significantly at reduced odds of having any mental health problems. However, adolescents with school problems, adverse childhood experiences and whose parents were frustrated with child's care and with parental emotional support had significantly increased odds of having any mental health problem.

Anxiety

As shown in Table 6, living with a single mother was significantly associated with a higher odds of adolescents having anxiety, compared with living with two married parents. Age, and health insurance status were significant predictors of higher odds of adolescent anxiety. Household

poverty level and parental education level were not significantly associated with anxiety. Gender, race/ethnicity were significantly associated with lower odds of anxiety in adolescents (Table 6). Adolescents with good/excellent health status, those who engaged in weekly physical activities, were involved in extracurricular activities, and had positive relationships with their parents, were significantly at reduced odds of having anxiety. However, adolescents with school problems, adverse childhood experiences and whose parents were frustrated with the child and those whose parents had emotional support had significantly increased odds of having anxiety (Table 6).

Depression

In the final depression model (Table 6), living with two unmarried parents or a single mother was significantly associated with higher odds of adolescent depression compared with living with two married parents. Age and having health insurance were significantly associated with an increased probability of adolescent depression, while gender and race/ethnicity were associated with a significantly reduced likelihood of adolescent depression. Adolescents with good/excellent health status, those who engaged in weekly physical activities, and had positive relationships with their parents, were significantly at reduced odds of having depression. Adolescents' involvement in extracurricular activities and how their family handled problems were not significant predictors of depression. However, adolescents with school problems, adverse childhood experiences and whose parents were frustrated with child, had a significantly increased odds of having depression.

Conduct and behavioral problems

In the final conduct and behavioral problems model (Table 6), family structure and parents' education level were not significantly associated with adolescent conduct and behavioral problems. However, each year increase in adolescent age and being in the higher income levels

were significantly associated with having lower odds of conduct and behavioral problems, while males were more likely to have conduct and behavioral problems than females. Hispanics and multiracial adolescents were significantly less likely to have conduct and behavioral problems than Whites. Having health insurance significantly increased the odds of having conduct and behavioral problems diagnosed.

Adolescents with good/excellent health status, those who engaged in weekly physical activities, involved in extracurricular activities and had positive relationships with their parents, were significantly at reduced odds of having conduct and behavioral problems. However, adolescents with school problems, adverse childhood experiences and whose parents were frustrated with child's care had significantly increased odds of having conduct and behavioral problems.

Substance Use Disorder

In the final substance use disorder model (Table 6), gender, family structure, parents' education level, and health insurance status were not significantly associated with adolescent substance use disorder. However, each year increase in adolescent age and being Multiracial (compared with being White) were associated with a significantly increased chance of having SUD, while being in the lower income level was significantly associated with having lower odds of SUD.

Adolescent health status, being involved in physical or extracurricular activities, having adverse childhood experiences, parent's emotional support, how family handled problems were not predictors of SUD. However, adolescents with school problems, and whose parents were frustrated with child had significantly increased odds of having SUD, while having positive relationships with parents reduced adolescents' odds of SUD.

Autism Spectrum Disorder

In the final autism spectrum disorder model (Table 6), adolescents living with other family types were found to be significantly less likely to have ASD than those living with two married parents (Table 5). Age, household poverty level, and parents' education level were not significantly associated with adolescents' chances of having ASD. Males were significantly more likely to have ASD than females, while Hispanic youth were less likely to have ASD compared to Whites. Having health insurance was a significant predictor of getting an adolescent's ASD diagnosed. Adolescents with good/excellent health status, those who engaged in weekly physical activities, and were involved in extracurricular activities were significantly at reduced odds of having ASD. However, having school problems was significantly associated with increased odds of having ASD. Adverse childhood experiences, parents' frustration with child's care, parents' emotional support and parent-child relationship, were not predictors of adolescent ASD.

Attention Deficit Hyperactivity Disorder

In the final ADHD model (Table 6), living with a single mother or with other family types was associated with significantly higher odds of adolescent ADHD, than living with two married parents. Adolescent age, household poverty level, and parents' education level were not significantly associated with ADHD. However, males were more likely than females to have ADHD, and having health insurance significantly increased the odds of getting ADHD diagnosed in adolescents. Adolescents from minority racial groups (Hispanics, Blacks, and Multiracial) were significantly less likely to have ADHD. While adolescents' health status did not predict ADHD, engaging in physical and extracurricular activities and having positive relationships with parents were significantly associated with decreased odds of having ADHD. However, having school problems, adverse childhood experiences and having parents who were

frustrated with the child, parents' with emotional support and handling family problems well were significantly associated with higher odds of ADHD.

Relationships between variables

Table 7 gives an overview of the relationships and strength of association between the composite mental health variable and all independent variables and each mental health condition and all independent variables.

Table 7. Summary table of strength of association of mental health problems with independent variables

Independent variable	MHP	Anxiety	Depression	CABP	SUD	ASD	ADHD
Age	**	***	***	***	***		
Gender	*	***	***	***		***	***
Race/Ethnicity	***	***	***	***		*	***
Hispanic							
Black, non-Hispanic	***	***	***				**
Other/Multiracial	***	***	**	*	*		***
Family structure, Non-traditional	***	***	***				**
Household poverty level				*	**		
Parents' Educational level							
Health insurance status	***	**	*	***		*	**
Health status	***	***	***	**		**	
Physical activity	***	***	***	*		***	*
School Problems	***	***	***	***	***	***	***
Extracurricular activities	***	*		***		***	**
Adverse childhood experience	***	***	***	***			***
Parental frustration with child	***	***	***	***	***		***
Parent emotional support	***	***					*
Parent-child relation	***	*	***	***	**		**
Family's handling of problems				*			*

p-value		Color code
	Not a predictor	
> 0.05	Not significant	
< 0.05	*	
< 0.01	**	
< 0.001	***	

Associations of individual mental health conditions

Non-traditional family structure was associated with anxiety and depression, particularly for single mothers. However, family structure showed a weak, or non-significant relationship with the other mental health problems. Household poverty level was not significant for all mental health conditions except for SUD in which it was moderately associated and conduct and behavioral problems where it was weakly associated. Parents' educational level was not significantly associated with any of the mental health problems (Table 7).

Both anxiety and depression had similar associations, but differed in the association with extracurricular activities, parent emotional support and parent-child relationship. Similarly, conduct and behavioral problems and ADHD had almost similar associations, but differed in the associations with health status, and parent emotional support (Table 7). Both SUD and ASD had no similarities in their associations with most of the other mental health conditions. (Table 7).

Conduct and behavioral problems and ASD show similarities in associations with school problems and extracurricular activities, but also reveal differences in the associations with adverse childhood experiences, parental frustration with child and parent-child relationship (Table 7).

Chapter Five: Discussion

Analysis of the national data set identified the prevalence of six common mental health disorders (anxiety, depression, conduct and behavioral problems, substance use disorders (SUD), autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), and their composite), a US adolescent population (Table 3). Of the adolescents sampled, 29.6% were found to have one or more of the six mental health conditions, with ADHD (12.5%) being the most common followed closely by anxiety (12.3%), conduct and behavioral problems (7.3%), depression (6.8%), ASD (2.8%) and SUD (0.3%).

Among the adolescents studied, there was a clustering of interrelated mental health problems. Of note was the strong correlation between anxiety and depression, probably because they are both internalizing disorders, and generating low self-esteem in adolescents, as identified by DeJong et al. (2012). Another strong correlation was between conduct and behavioral problems and attention deficit hyperactivity disorder. Tuvblad et al. (2009) found that genetic influences explained the correlation between the externalizing factors of conduct and behavioral problems and attention deficit hyperactivity disorder. A moderate association was found between autism spectrum disorder and conduct and behavioral problems. There was also a moderate correlation found between four of the conditions, including anxiety, depression, conduct and behavioral problems and attention deficit hyperactivity disorder (Table 4). This is similar to previous studies where mental disorders co-occurred in adolescents (Merikangas et al., 2010). Cosgrove et al. (2011) proposed that internalizing and externalizing mental disorders were moderately hereditary and were influenced by common genetic and environmental factors. Surprisingly, in this study, substance use disorder had very low interrelatedness with all the other mental health problems. This is contrary to what was reported by Skogen et al. (2014) in which early initiation of

substance use was associated with depression, attention deficit hyperactivity disorder, and anxiety. This may be due to the fact that data from this study was parent reported, and parents might not be aware of substance use by their adolescent children.

This clustering of interrelated mental health problems indicates that mental health problems co-occur in adolescents. The fact that these mental health problems tend to occur in clusters among adolescents is an important factor to consider in implementing interventions.

Family structure did not remain significantly associated with all mental health problems in the final models (Table 6). This study found that while family structure was a predictor of some mental health problems in adolescents, it was not significantly associated with conduct and behavioral problems, and substance use disorders. Within the mental health problems in which it was significant, it was not significantly associated with all family structures (Table 6). This is in contrast with findings by Perales et al. (2017) that there is a strong association between family structure and adolescent mental health. However, this study found that adolescents living in non-traditional family structures (with single mothers and with other family types (with no parents reported), were significantly more likely to have any mental health problem or ADHD, than those living with the traditional two married parents. Similarly, adolescents living with single mothers were significantly at higher odds of having anxiety or depression, compared with those living with two married parents. On the other hand, adolescents living with non-traditional (other family types) were found to be significantly less likely to have ASD than those living with two married parents (Table 6). These findings show an inconsistency with previous studies that adolescents living in traditional families were less likely to have mental health problems than those living in non-traditional families (Mackay, 2005; Perales et al. 2017).

For other socio-demographic variables beyond family structure, this study found that with each year increase in adolescent age, there were higher odds of having any mental health problem, anxiety, depression or substance use disorder. Schwarz (2009) similarly reported that mental health problems became more pronounced with transition into adolescence. However, adolescents were less likely to have conduct and behavioral problems with increasing age. This shows that behavioral and developmental problems (externalizing disorders) are more common in younger adolescents while internalizing disorders (anxiety and depression) and SUD are commoner in older adolescents.

Among these adolescent population, males were more likely to have any mental health problems, conduct and behavioral problems, autism spectrum disorder and attention deficit hyperactivity disorder than females. While males were less likely to have anxiety or depression compared to females (Table 6). Previous studies showed that females were more likely to have poorer mental health than males (Cavanagh, 2008).

In terms of racial differences among adolescents, minority racial/ethnic groups (Hispanics, Black, non-Hispanics and Other/Multiracial) were less likely to have any mental health problems, anxiety, depression, and attention deficit hyperactivity disorder, compared to Whites. While Hispanic and Multiracial youth were less likely to have conduct and behavioral problems when compared to their White counterparts. Hispanic youths were also less likely to have autism spectrum disorders compared to Whites. This seemingly shift in favor of minority youths might be due to lack of access to mental healthcare services, or poor utilization of available services to diagnose these mental health problems. However, multiracial youths were more likely to have substance use disorders than Whites.

Despite majority of the youth having health insurance coverage at the time of the survey (Table 1) only about one in five had received mental healthcare services (Table 2). This could be due to the stigma still attached to mental health, or to healthcare service dissatisfaction by the adolescents' parents. As demonstrated in this study, 40.7% of parents were not always or never satisfied with healthcare service (Table 2), this could hinder their seeking needed mental healthcare for their adolescents.

Stronger predictors of mental health problems in adolescents found in this study are child factors of health status, physical activity, school problems, engaging in extracurricular activities, adverse childhood experiences; parental factors including parents' frustration with child's care, parent-child relationship and parent emotional support. While adolescents' mental health was predicted in part by the family structure, it had more to do with the quality of parenting. As shown in the logic model (Figure 1), parental factors such as parents' frustration with child, may lead to poor parent-child relationships, which may result in adverse experiences for the adolescent. This unfavorable household environment may contribute to and have an impact on an adolescent's mental health.

Similarly, child factors such as school problems may have a bi-directional effect on an adolescent's mental health. School problems could either be as a result of the mental health problems the adolescent is struggling with, an indicator of a developing mental health problem or it could be the school problems that are weighing the adolescent down, resulting in a mental health breakdown.

On the other hand, a positive relationship between the adolescent and the parent, in addition to the stability of the school and community structure, in which adolescents engage in extracurricular activities were significantly associated with less likelihood of having any mental

health problem, anxiety, conduct and behavioral problems, ASD and ADHD than those who don't. However, engaging in extracurricular activities was not significantly associated with depression, though it showed lesser odds when compared to those who did not engage in extracurricular activities.

Furthermore, this study showed that being physically active 1-7 days a week was protective of adolescents' mental health. Similarly, being in good to excellent state of health was also protective of adolescents' mental health.

In this study, adolescents' electronic media use, having an adult mentor, how families handled problems, access to mental health services and healthcare service satisfaction were not predictors of adolescent mental health.

These findings support the author's hypothesis that family structure is less important than other factors in contributing to the mental health of adolescents. This is also in keeping with findings by Cavanagh (2008), arguing that quality of family relationships and interactions, irrespective of the family structure produced better mental health outcomes in adolescents.

Conclusion

This study found that while family structure was associated with mental health problems in adolescents, it was not the strongest predictor. Adolescents having school problems, having experienced adverse childhood experiences and parental frustration with the child were stronger predictors and these are important factors to address in adolescents to prevent mental health problems. Furthermore, being engaged in extracurricular activities and having good relationships between a parent and the adolescent seemed to reduce the likelihood of adolescents having mental health problems.

Strengths of the study: the large sample size ensures that associations made were not just due to chance/random error. It also ensured a nationally representative sample of US adolescents, so the results can be generalizable nationally, hence the study's high external validity.

Study limitations: Since analysis was on secondary data, there was no control over the questions asked or the manner in which they were asked. Hence, data was solely dependent on how CAHMI decided to ask questions with respect to all variables that was utilized. Potentially relevant, but sensitive variables that could answer a number of research questions such as risky behaviors e.g. suicidal and sexual behaviors amongst adolescents were not included in the data set. In addition, this survey was solely parent-based. Hence, there is a parent-report bias and no responses from adolescents who were actually the subject of this study.

While there were associations between family structure and some measures of adolescent mental health, it is difficult to show a cause and effect relationship from this study, as it was cross-sectional. A longitudinal study would be more appropriate to demonstrate this.

Implications for inter-professional public health practice.

Understanding the effect of family structure on adolescent mental health problems and other predictors of mental health problems in adolescents will be of assistance to physicians, public health professionals, and those who work in close contact with adolescents at school and in the community. This will enable them identify at risk youth and families, thereby promoting a conducive environment that will prevent mental health disorders from occurring or to involve those who already have the disorders in early intervention programs and mental healthcare resources.

Approach to intervention

This study identified at risk adolescents as older adolescents, males, and minority youths, and this is important in targeting them for mental health interventions. It is also important to screen adolescents who present for care for co-occurring mental health problems, as this study as demonstrated that these conditions are interrelated.

Having school problems was the strongest predictor for mental health problems in this population of adolescents studied and is a basis for intervention. School problems are factors that can be potentially modulated by providing school-based programs to educate adolescents and school providers about identification of red flags that point towards mental health problems. This will be useful in detecting mental health problems early and linking the adolescent to needed care. It can also help to de-stigmatize mental illness so that those needing mental health services can access it. Furthermore, these programs can be used to motivate adolescents to be involved in extracurricular activities and weekly physical activities, which improve mental health.

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