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Posted Date: 20 August 2024

doi: 10.20944/preprints202408.1451.v1

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Article

Behind the Sadness of Teen Girls: A Retrospective Survey Analysis Amidst the Covid-19 Crisis of 2021

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Abstract: (1) Background: Adolescent girls have increasingly faced mental health challenges. We examined prevalence trends and associated risk factors for depression among adolescent girls. (2) Methods: Data for girls aged 12 to 17 years (N=4346) from the 2021 cross-sectional National Survey on Drug Use and Health were analyzed. Factors associated with depression were examined using multiple regression analysis. (3) Results: Rates of severe depression were significantly higher ($p<.001$) in older girls (adjusted odds ratio [AOR]: 1.63, 1.61, those who did not have authoritative parents (AOR: 3.40), and those with negative school experiences (AOR: 4.03). Black and Asian/Native Hawaiian or other Pacific Islanders were less likely to report severe depression than white girls. As previously reported, non-White girls were significantly less likely to receive treatment for depression ($p<.05$). Parents' characteristics and school experiences had no effect on the likelihood of receiving mental health treatment. (4) Conclusion: Depression has become increasingly common among American adolescent girls, who are now three times as likely as adolescent boys to have had recent experiences with depression. Our results show that family structure, parenting style, and negative school experiences significantly contribute to the rate of depression and that treatment disparities exist with regard to race and ethnicity. The results of our research could be valuable for policymakers, healthcare professionals, and educators in developing specific preventative initiatives and support networks that effectively address these unique challenges.

Keywords: depression; adolescent girls; National Survey on Drug Use and Health; family structure; parenting style; negative school experience

1. Introduction

Three years after the onset of the COVID-19 pandemic, heightened concerns about mental health remain. Ninety percent of American adults believe the country is currently facing a mental health crisis [1]. Although the pandemic has impacted the mental health of the general population in various ways, adolescent girls have been disproportionately affected by negative mental health outcomes [2]. The Youth Risk Behavior Survey in 2021 showed that 57% of adolescent girls reported feeling “persistently sad or hopeless” — the highest in the last decade. Thirty percent said that they have seriously considered suicide—an increase of 60% over the last decade [3].

Adolescent girls have twice the rate of depression of adolescent boys [4]. Negative self-evaluation, earlier puberty, faster and more intense hormonal changes, estrogen's role in enhancing stress response in the prefrontal cortex, and a stronger internalization of feelings are some of the reasons behind female predominance in depression prevalence [5–7]. Although these biological differences existed from the beginning, there are several reasons why teen depression rates are rising faster for girls than boys in the last decade [8,9]. Survey studies show that, although teen boys and girls spend the same time on digital media, girls spend more time on texting and social media while boys spend more time gaming [8]. Social media creates a hierarchy: one study showed that simply

comparing oneself with others on social media could increase one's likelihood of feeling depressed. Social media also has a stronger effect on girls than boys [10,11]. Popularity and positive social interactions tend to have a more pronounced effect on the happiness of teen girls than on boys [8,9].

Race, access to mental health care, family dynamics, school experience and family income contribute the depressive symptoms in minority adolescents, with girls often facing more intense identity related stress [12]. Racial discrimination is associated with increased psychological distress with minority girls often facing intersectional challenges exacerbate depressive symptoms. Accessing mental health care is also challenging due socioeconomic factors and cultural stigma [13].

Family dynamics and cultural expectations can also contribute depressive symptoms. [14] Parenting style plays a critical role in shaping the mental health outcomes of teen girls by influencing their self-esteem, emotional regulation, stress levels, and overall psychological development during this crucial period of growth. Diana Baumrind identifies three key parenting styles: authoritative, authoritarian, and permissive [15]. Authoritative parenting is a child-rearing approach that combines warmth and sensitivity with clear limits and expectations. Authoritarian parenting is characterized by high demands and low responsiveness, often leading to children with lower self-esteem and poorer social skills. Permissive parenting, on the other hand, is high in warmth but low in demands, which can result in children with poor self-control and difficulty following rules [15].

Research findings indicate that female adolescents are disproportionately impacted by bullying and social exclusion compared with their male counterparts. The effects are particularly pronounced for girls from minority backgrounds [16]. Financial hardship can strain family relationships, leading to increased conflict and lower emotional support, which are linked to higher depression rates in adolescent girls [17].

Untreated depression can result in emotional, behavioral, and health problems that can affect every aspect of an adolescent girl's life. Depression is associated with lower academic performance, self-harm, risky behaviors, and violence and/or aggression toward others [18–20]. Untreated longer-term depression can make individuals more prone to sleep disruption, heart disease, stroke, obesity, hypertension, diabetes, Alzheimer's disease, and cancer [21–27]. Depression is a major risk factor for suicide and a loss of disability-adjusted life-years [28,29]. It can also raise the risk of substance abuse, as one-third of individuals with major depressive disorder also have a substance use disorder [30].

Despite these adverse consequences, depression is often undiagnosed among adolescent girls because of stigma and shame, social expectations, misinterpretation of symptoms, and lack of awareness [31]. Depression is also untreated among adolescent girls, even with the available effective treatments [32]. The public health emergency due to the pandemic resulted in many people struggling with deteriorating mental health and well-being and encountering barriers to care [33].

Because of the limited data, especially after the COVID era, depression among adolescent girls, including trends, risk factors, and treatment, was generally underinvestigated in the US. Pre-pandemic studies looked at adolescents overall, without specifically examining differences between the sexes or among racial/ethnic minority groups [34–36]. However, adolescent girls, in a stage of rapid development, have been greatly impacted by the COVID pandemic, one of the most traumatic collective events of their lifetimes. A recent study showed that 75% of French adolescents are suffering from school burnout post COVID [37,38].

A comprehensive examination of race, income, access to mental health, and family dynamics in relation to depression in adolescent girls enhances the current state of knowledge in several significant ways. By examining multiple factors simultaneously, researchers can develop a more holistic understanding of the root causes and contributing factors of teen depression. Understanding the effect of each factor, controlling for other factors, can reveal true effects that might not be apparent when examining each factor in isolation. Race, income, and family dynamics are all correlated, and analysis should control for these factors together.

This study aims to fill a gap in the existing literature by (1) investigating prevalence of depression across varying levels of severity and examine associated treatment patterns; (2) evaluating the distribution of depression severity across different age cohorts and racial demographics; and (3) exploring the impact of family-related and school-related risk factors on both prevalence and severity

of depression among adolescent girls during the first year of the COVID-19 pandemic. Further, employing a large-scale population, which enhances the reliability and generalizability of the findings.

2. Materials and Methods

Data Collection

To provide the most recent estimates, this study used publicly available data from the 2021 National Survey on Drug Use and Health (NSDUH) administered by the Substance Abuse and Mental Health Service Administration (SAMHSA), a branch of the U.S. Department of Health Services. The NSDUH Detailed Tables are part of the annual reports produced from the National Survey on Drug Use and Health data. They provide comprehensive estimates on substance use, mental health, and other health-related behaviors in the United States (<https://www.samhsa.gov/data/report/2021-nsduh-detailed-tables>).

Participants

The survey data are nationally representative of girls aged 12 years and older in the civilian noninstitutionalized US population. In addition to demographic characteristics, income, insurance coverage, household status (e.g., whether the household included a father and/or mother, whether one lived with an authoritative parent), school experience, and responses to a series of questions related to major depression and treatment for major depression, the survey data are nationally representative of girls aged 12 years and older who are part of the civilian population in the United States who are not institutionalized. Residents of households, those living in group quarters that are not institutionalized, and civilians who are residing on military posts are all included in the study. A combination of in-person and web-based interviews were used to collect responses for the 2021 survey because of the epidemic. Individuals who were suffering homelessness, active military members, and inmates of institutional group quarters such as jails, nursing homes, mental institutions, and long-term care hospitals were not allowed to participate in the poll.

Measures

Adolescent girls' depression was characterized as follows:

1. Lifetime major depressive episode (LMDE) was identified if they have experienced either depressed mood or loss of interest or pleasure in daily activities for 2 weeks or longer at any point in their lifetime, along with 4 or more other symptoms that reflect a change in functioning, such as difficulties in sleep, eating, energy, concentrating, or feeling good about themselves.
2. Anyone who experienced depressive symptoms for at least two weeks within the previous 12 months was considered to have had a 12-month major depressive episode (TMDE).
3. Severe 12-month major depressive episode (STMDE) was identified for those in (2) if they had MDE-related functional impairment in 4 major life activities or role domains (i.e., chores at home; school or work; close relationships with family; and social life) [32,39]. Severe 12-month major depressive episode (STMDE) was identified for those in (2) if they had MDE-related functional impairment in 4 major life activities or role domains (i.e., chores at home; school or work; close relationships with family; and social life) [32,39].

Teenage girls diagnosed with TMDE were questioned whether they had sought medical attention for their depression and if they had been prescribed medication. In order to determine the probability of receiving therapy, we analyzed the responses to this question.

Three unique age groups were taken into consideration: 12-13 years, 14-15 years, and 16-17 years. The classification of adolescent girls into the following five categories was based on race or ethnicity: non-Hispanic white, Hispanic, Black, Asian, and Native Hawaiian or other Pacific Islander (NHPI). The category "Other race/ethnicity" was used to classify individuals who self-identified as not being of Hispanic descent, had more than one racial origin, and came from groups that had insufficient data for statistical analysis (e.g., American Indians and Alaska Natives). The adolescent girls who had insurance and those who did not were separately categorized. In this study, annual household

income was divided into five categories: less than \$20,000, between \$20,000 and \$49,999, between \$50,000 and \$74,999, and \$75,000 or more. Girls were also asked regarding their family structure, including whether they had a mother or father in the household and parental behavior.

Developmental psychologist Diane Baumrind was the first to identify the authoritative parenting style, described as a child-rearing approach that combines warmth, compassion, and the establishment of limits [31]. Research has indicated that children and adolescents brought up with an authoritative parenting style are more likely to have a healthy mental state [32]. A series of questions pertaining to warmth (e.g., letting children know they did a good job and showing pride in them), limit-setting (e.g., on the amount of time spent watching television or going out with friends), and sensitivity (e.g., helping with homework and performing household chores) are used in the NSDUH to determine parenting style.

NSDUH includes a comprehensive set of questions that assess various aspects of school experiences, particularly focusing on safety, bullying, and overall satisfaction with the school environment. A dichotomous classification was applied to the responses concerning the school experience, with the median dividing good and bad experiences.

Data Analysis

Our primary objective was to determine the percentage of teenage females who were experiencing major depressive episodes (MDE) and receiving treatment for major depression. The descriptive analysis was conducted to summarize the factors that might be associated with teen depression. Percentages was provided for dichotomous and polychotomous variables. Odds ratios and 95% confidence intervals were calculated for each variable. This was followed by an analysis of the risk variables related to MDE and therapy for MDE. Logistic Regression is applied to calculate risk adjusted odds ratios and associated 95% confidence intervals. A series of interaction terms were examined to determine whether the combination of these risk variables affected the final result.

The statistical studies were performed using RStudio software version 2023.06.0+421, taking into consideration the complex design and sampling weights of the NSDUH.

Ethical Considerations

This study acquired information from publicly available data from open data sets, acquired by RTI International via the NSDUH. The NSDUH was reviewed by an RTI International IRB prior to conducting any interviews, based on guidelines from the U.S. Department of Health and Human Services’ Office for Human Research Protections.

3. Results

A survey of a cohort of 4346 adolescent girls aged between 12 and 17 years was conducted in 2021. The sample consisted of 52.9% white individuals, 96.5% of whom had health insurance; 48.4% had a household income exceeding \$75,000. Further, 74.4% of the sample lived with a father and 92.2% lived with a mother. In addition, 19.8% of respondents said that their parents employed an authoritarian parenting style, while only 18.3% expressed satisfaction with their educational experiences (Table 1).

Table 1. Descriptive Statistics of US Female Adolescents Aged 12-17 Years in the NSDUH (2021) (N = 4346).

Sociodemographic Characteristic	Weighted %
Age (y)	
12-13	31.3
14-15	33.9
16-17	34.8
Race	
White	52.9

Hispanic	22.4
Black	13.0
Asian/NHPI	4.7
Other	7.0
Having insurance coverage	96.5
Household income, \$	
<20,000	13.6
20,000-49,999	24.8
50,000-74,999	13.2
>75,000	48.4
Father in household	74.4
Mother in household	92.2
Having authoritative parent(s)	19.8
Having positive school experiences	18.3

The prevalence of MDE was 37.5% for LMDE, 29.7%, for TMDE, and 22.9% for STMDE. Among the girls with TMDE, 44.9% of them received overall treatment and 22.4% received prescribed medication. 49.1% of with STMDE received treatment and 25.7% used prescription medication.

Tables 2 and 3 display factors linked to the probability of experiencing depression (TMDE) and severe depression (STMDE) for at least two weeks’ duration within the previous 12 months. Girls aged 14-15 and 16-17 were more likely to have TMDE (adjusted odds ratio [AOR]=1.56, $p<.001$; AOR=1.77, $p<.001$) and STMDE (AOR=1.63, $p<.001$; AOR=1.61, $p<.001$) compared with girls aged 12-13. Black and Asian/NHPI girls had a lower likelihood than white girls to possess TMDE (AOR=0.71, $p<.01$; AOR=0.70, $p<.05$) and STMDE (AOR: 0.73, $p<.05$; AOR: 0.57, $p<.01$), respectively. Girls without insurance coverage were less likely to report TMDE (AOR=0.92, $p>.05$) and more likely to report that they have STMDE (AOR=1.02, $p>.05$). Household incomes between \$20,000 and \$75,000 were not significantly associated with greater odds of having TMDE and STMDE relative to incomes less than \$20,000 ($p>.05$). With respect to family and school influences, the absence of a father or mother in the household (i.e., single-father or single-mother households) did not significantly increase TMDE (AOR=1.06, $p>.05$, AOR=1.11, $p>.05$) and STMDE (AOR=1.06, $p>.05$, AOR=1.14, $p>.05$). Girls whose parents tended to be less authoritative were more likely to have TMDE (AOR=2.84, $p<.001$) or STMDE (AOR=3.40, $p<.001$). Negative school experiences further increased adolescent girls’ likelihood of having TMDE (AOR=3.58, $p<.001$) and STMDE (AOR=4.03, $p<.001$), as expected.

Table 2. Bivariate and Multivariable Analyses of Likelihood of MDE in US Female Adolescents in the NSDUH (2021) (N = 4346).

		12-Month MDE		
		%	OR (95% CI)	AOR (95% CI)
Age (y)	12-13 (Ref.)	6.5		
	14-15	10.8	1.78 (1.51, 2.12) ***	1.56 (1.30, 1.86) ***
	16-17	12.5	2.14 (1.81, 2.54) ***	1.77 (1.49, 2.11) ***
Race	White (Ref.)	16.0		
	Hispanic	7.2	1.08 (0.92, 1.27)	1.09 (0.91, 1.30)
	Black	3.0	0.69 (0.56, 0.86) ***	0.71 (0.56, 0.89) **
	Asian/NHPI	1.1	0.68 (0.48, 0.95) *	0.70 (0.49, 0.99) *
	Other	2.4	1.24 (0.96, 1.59)	1.20 (0.92, 1.57)
Insurance coverage	Yes (Ref.)	28.6		
	No	1.1	1.07 (0.75, 1.51)	0.92 (0.63, 1.32)
Household income, \$	<20,000 (Ref.)	3.7		
	20,000-49,999	7.3	1.13 (0.90, 1.41)	1.04 (0.82, 1.32)
	50,000-74,999	4.4	1.33 (1.04, 1.71) *	1.23 (0.94, 1.62)

	>75,000	14.4	1.14 (0.93, 1.41)	1.10 (0.87, 1.39)
Father in household	Yes (Ref.)	21.9		
	No	7.8	1.05 (0.91, 1.22)	1.06 (0.89, 1.26)
Mother in household	Yes (Ref.)	27.2		
	No	2.5	1.12 (0.88, 1.41)	1.11 (0.86, 1.44)
Authoritative parenting	High (Ref.)	2.3		
	Low	27.4	4.01 (3.23, 5.02) ***	2.84 (2.26, 3.57) ***
School experiences	Positive (Ref.)	1.8		
	Negative	27.9	4.79 (3.78, 6.15) ***	3.58 (2.78, 4.59) ***

p*<.05. *p*<.01. ****p*<.001. All listed variables were included in the multivariable model to predict 12-month MDE. Abbreviations: AOR, multivariable adjusted odds ratio; MDE, major depressive episode; OR, crude odds ratio; Ref., reference group.

Table 3. Bivariate and Multivariable Analyses of Likelihood of MDE-related Severe Impairment in US Female Adolescents in the NSDUH (2021) (N = 4346).

		12-Month MDE with Severe Impairment		
		%	OR (95% CI)	AOR (95% CI)
Age (y)	12-13 (Ref.)	4.9		
	14-15	8.7	1.88 (1.56, 2.27) ***	1.63 (1.34, 1.98) ***
	16-17	9.3	1.99 (1.65, 2.40) ***	1.61 (1.33, 1.95) ***
Race	White (Ref.)	12.4		
	Hispanic	5.6	1.09 (0.91, 1.29)	1.07 (0.88, 1.29)
	Black	2.4	0.72 (0.57, 0.91) **	0.73 (0.56, 0.95) *
	Asian/NHPI	0.7	0.56 (0.37, 0.82) **	0.57 (0.38, 0.86) **
	Other	1.9	1.26 (0.96, 1.64)	1.21 (0.91, 1.60)
Insurance coverage	Yes (Ref.)	22.0		
	No	0.9	1.18 (0.80, 1.69)	1.02 (0.69, 1.51)
Household income, \$	<20,000 (Ref.)	2.8		
	20,000-49,999	5.9	1.21 (0.95, 1.55)	1.13 (0.87, 1.46)
	50,000-74,999	3.4	1.33 (1.01, 1.76) *	1.25 (0.93, 1.67)
	>75,000	10.9	1.13 (0.91, 1.42)	1.11 (0.86, 1.44)
Father in household	Yes (Ref.)	16.8		
	No	6.1	1.07 (0.91, 1.26)	1.06 (0.88, 1.28)
Mother in household	Yes (Ref.)	20.9		
	No	2.0	1.16 (0.89, 1.49)	1.14 (0.87, 1.50)
Authoritative parenting	High (Ref.)	1.4		
	Low	21.5	4.81 (3.70, 6.37) ***	3.40 (2.57, 4.49) ***
School experiences	Positive (Ref.)	1.1		
	Negative	21.8	5.55 (4.16, 7.57) ***	4.03 (2.97, 5.47) ***

p*<.05. *p*<.01. ****p*<.001. All variables listed were included in the multivariable model to predict 12-month MDE with severe impairment. Abbreviations: AOR, multivariable adjusted odds ratio OR, crude odds ratio; MDE, major depressive episode; Ref., reference group.

Table 4 presents the factors associated with the likelihood of visiting a doctor for treatment of TMDE symptoms. Factors associated with the likelihood of having prescription medication are presented in Table 5. Girls in the 16 to 17-year-old age group were more likely than 12- to 13-year-old girls to visit a doctor and receive medication (AOR=1.28, *p*>.05, AOR=1.33, *p*>.05). White girls were significantly more likely than those of other race/ethnicity groups to get treated (AOR=0.63, 0.59, 0.28, 0.61, *p*<.05). Girls lacking health insurance were less likely to seek and receive treatment for TMDE symptoms (AOR=0.65, *p*>.05, AOR=0.61, *p*>.05). Having an authoritative parent or negative school

experiences had no influence on the likelihood of TMDE treatment or TMDE medication use, but girls living without fathers were less likely to seek and receive medication treatment (AOR=0.80, $p>.05$). Adding several interaction terms among explanatory variables did not change the results.

Table 4. Bivariate and Multivariable Analyses of MDE Likelihood of MDE Treatments in the Sample of US Female Adolescents with 12-Month MDE in the NSDUH 2021 (N = 1285).

		12-Month Treatments Overall		
		%	OR (95% CI)	AOR (95% CI)
Age	12-13 (Ref.)	8.5		
	14-15	16.6	1.33 (0.98, 1.80)	1.28 (0.94, 1.74)
	16-17	19.8	1.40 (1.05, 1.89) *	1.33 (0.98, 1.80)
Race	White (Ref.)	27.6		
	Hispanic	9.5	0.62 (0.47, 0.81) ***	0.63 (0.48, 0.84) **
	Black	3.8	0.58 (0.40, 0.86) **	0.59 (0.39, 0.88) *
	Asian/NHPIs	0.8	0.27 (0.13, 0.54) ***	0.28 (0.13, 0.57) ***
	Other	3.2	0.60 (0.39, 0.91) *	0.61 (0.40, 0.94) *
Insurance coverage	Yes (Ref.)	43.7		
	No	1.3	0.62 (0.33, 1.13)	0.65 (0.35, 1.22)
Household income, \$	<20,000 (Ref.)	5.3		
	20,000-49,999	11.1	1.12 (0.76, 1.64)	1.06 (0.71, 1.59)
	50,000-74,999	5.9	0.92 (0.60, 1.41)	0.88 (0.56, 1.37)
	>75,000	22.7	1.19 (0.84, 1.69)	1.05 (0.71, 1.55)
Father in household	Yes (Ref.)	33.5		
	No	11.4	0.95 (0.74, 1.21)	1.03 (0.78, 1.36)
Mother in household	Yes (Ref.)	40.9		
	No	4.1	1.18 (0.79, 1.75)	1.16 (0.77, 1.74)
Authoritative parenting	High (Ref.)	3.4		
	Low	41.2	1.07 (0.71, 1.62)	1.11 (0.73, 1.70)
School experiences	Positive (Ref.)	3.2		
	Negative	41.7	0.72 (0.45, 1.14)	0.68 (0.42, 1.09)

* $p<.05$. ** $p<.01$. *** $p<.001$. All listed variables were included in the multivariable model to predict overall 12-month treatment. Abbreviations: AOR, multivariable adjusted odds ratio MDE, major depressive episode; OR, crude odds ratio; Ref., reference group.

Table 5. Bivariate and Multivariable Analyses of Likelihood of MDE Medication Use in US Female Adolescents with 12-Month MDE in the NSDUH (2021) (N = 1285).

		12-Month Prescription Medication		
		%	OR (95% CI)	AOR (95% CI)
Age	12-13 (Ref.)	3.1		
	14-15	7.7	1.62 (1.09, 2.45) *	1.57 (1.05, 2.36) *
	16-17	11.6	2.29 (1.57, 3.39) ***	2.27 (1.54, 3.37) ***
Race	White (Ref.)	14.7		
	Hispanic	4.4	0.60 (0.43, 0.83) **	0.66 (0.47, 0.94) *
	Black	1.3	0.41 (0.23, 0.68) ***	0.45 (0.25, 0.78) **
	Asian/NHPIs	0.2	0.12 (0.02, 0.41) **	0.12 (0.03, 0.52) **
	Other	1.8	0.74 (0.44, 1.19)	0.76 (0.46, 1.25)

Insurance coverage	Yes (Ref.)	21.9		
	No	0.5	0.60 (0.24, 1.26)	0.61 (0.27, 1.41)
Household income, \$	<20,000 (Ref.)	2.8		
	20,000-49,999	4.9	0.86 (0.55, 1.38)	0.69 (0.42, 1.13)
	50,000-74,999	2.8	0.82 (0.48, 1.37)	0.68 (0.40, 1.18)
	>75,000	11.9	1.12 (0.75, 1.71)	0.81 (0.51, 1.29)
Father in household	Yes (Ref.)	17.3		
	No	5.1	0.80 (0.59, 1.09)	0.80 (0.57, 1.14)
Mother in household	Yes (Ref.)	20.0		
	No	2.4	1.46 (0.93, 2.25)	1.50 (0.95, 2.38)
Authoritative parenting	High (Ref.)	1.8		
	Low	20.6	0.95 (0.59, 1.58)	0.91 (0.55, 1.51)
School experiences	Positive (Ref.)	1.3		
	Negative	21.1	1.04 (0.61, 1.86)	1.03 (0.58, 1.83)

p*<.05. *p*<.01. ****p*<.001. All listed variables were included in the multivariable model to predict 12-month prescription medication use. Abbreviations: AOR, multivariable adjusted odds ratio; MDE, major depressive episode; OR, crude odds ratio; Ref., reference group.

4. Discussion

Using NSDUH data, we comprehensively analyzed the prevalence and factors associated with depression among adolescent girls in the US, particularly during the COVID-19 pandemic. A 2021 survey of 4346 adolescent girls found that a majority of them had health insurance, lived with a father or mother, and had an authoritative parenting style. The prevalence of mental health issues (MDE) was 37.5% for LMDE, 29.7% for TMDE, and 22.9% for STMDE. Girls with TMDE received treatment, while 49.1% received treatment and 25.7% used prescription medication. Factors linked to the probability of experiencing depression (TMDE) and severe depression (STMDE) were found to be higher in girls aged 14-15 and 16-17. Black and Asian/NHPI girls had lower likelihoods of TMDE and STMDE. Girls without insurance coverage were less likely to report TMDE and more likely to report STMDE. Girls aged 16-17 were more likely to visit a doctor for TMDE treatment and receive medication. White girls were more likely to get treated than other race/ethnicity groups.

Our research highlights the intricate nature of depression in adolescent girls, with an alarming increase in depression rates from 27.9% to 37.5% for LMDE, 21.2% to 29.7% for TMDE, and 15.1% to 22.9% for STMDE. The rates increased close to 50% during the pandemic. The prevalence of affective disorders in females is particularly high during mid-adolescence [40–44]. Adolescent girls are more prone to depression due to their inclination toward negative self-assessment and rumination [40–48].

We demonstrated that girls aged 16-17 were more likely to have depression than girls aged 12-13 and 14-15 years. As girls reach the ages of 16-17, they often face heightened academic pressures related to college admissions and future career planning. Additionally, social dynamics become more complex, with increased emphasis on peer relationships and social status. These pressures can contribute to higher levels of stress and depression. [49] The CDC report highlights that older teen girls are more likely to experience violence, including sexual violence, which significantly impacts mental health. The report states that 18% of high school girls experienced sexual violence in the past year, and more than 1 in 10 had been forced to have sex, contributing to higher rates of depression. [50] The onset of puberty and the associated hormonal changes can affect mood and emotional regulation. As girls progress through adolescence, hormonal fluctuations can become more pronounced, potentially contributing to increased vulnerability to depression. [51] Older adolescents have more advanced cognitive abilities, which can lead to more complex and potentially negative thought patterns. This increased cognitive sophistication can result in greater rumination and a heightened awareness of personal and societal issues, contributing to depressive symptoms. [52]

Our research has revealed complex racial differences in the rates of depression among adolescent girls. Black and NHPI girls were found to be less likely to have TMDE and STMDE than their white peers. In contrast to previous research that has emphasized the increased vulnerability of marginalized racial and ethnic communities, such as Black and Hispanic Americans, to mental health challenges, our results showed no discrepancies in race [53–56]. This could be due to reporting differences related to cultural factors and not actual feelings of depression; that is, Black or Asian American/NHPI girls were not less depressed than white girls but were less likely to report their feelings in a survey due to their cultural norms. Further, Asian Americans were 50% less likely than other racial groups to seek mental health services [57]. Asian culture carries a stigma on depression and anxiety; since it is often viewed as a weakness, these feelings are often dismissed and not freely discussed [57]. Further, a 2013 study found that Black and African American individuals were not as open to acknowledging their psychological problems as white individuals and were less likely to seek treatment [58]. Some participants in the study attributed this to a large stigma on anxiety and depression within their community, and many feared being deemed “crazy” and/or “irrational” for talking about their depression and anxiety within their social circle [58]. Our research has revealed complex racial differences in the rates of depression among adolescent girls. Black and NHPI girls were found to be less likely to have TMDE and STMDE compared with their white counterparts.

In terms of treatment, our results are consistent with previous studies that have shown that even when controlling for income and insurance status, disparities still exist [59,60]. In terms of treatment, our results are consistent with previous studies that have shown that even when controlling for income and insurance status, disparities still exist [59,60].

The insurance variable was found to be statistically insignificant in relation to both the likelihood of experiencing a MDE and receiving treatment for an MDE among female adolescents in the United States. Several factors may explain this lack of significant impact. First, Medicaid and the Children's Health Insurance Program (CHIP) provide extensive coverage for mental health services for eligible adolescents. [61] The Early and Periodic Screening, Diagnostic, and Treatment mandate under Medicaid ensures comprehensive coverage for preventive, mental health, and substance abuse treatment services for adolescents up to age 21. [62] This means that many low-income adolescents already have access to mental health services regardless of private insurance status. Second, recent data shows that nearly one-third of adolescents in the U.S. (about 8.3 million youth ages 12-17) received some form of mental health treatment in 2023. [63] This suggests that access to mental health services for adolescents has generally improved across the board, potentially reducing the impact of insurance status on treatment likelihood. Third, any adolescents receive mental health treatment through school-based services, which may be available regardless of insurance status. [63] Fourth, the most common type of mental health treatment for adolescents was meeting with a provider in an outpatient setting, such as a school counseling center. [63] There have been ongoing efforts to normalize and destigmatize seeking mental health treatment, particularly for adolescents. This cultural shift may be encouraging more adolescents and their families to seek treatment regardless of insurance status. [63]

The findings emphasize the interconnected roles of insurance coverage, household income, and access to medical care in the prevalence and treatment of depression among adolescent girls. The availability of insurance coverage has been identified as a significant factor affecting the utilization of mental health services, especially among adolescents [64]. Specifically, 96.4% of the girls surveyed had health insurance, and those without insurance were less likely to report TMDE and STMDE [64]. Specifically, 96.4% of the girls surveyed had health insurance, and those without insurance were less likely to report TMDE and STMDE. Additionally, the 16-17 age group was more likely to see their doctors and receive medication for TMDE symptoms if they had insurance. This agrees with existing literature highlighting variations in treatment outcomes based on insurance status [65].

The relationship between household income and depression prevalence in our study also offers valuable insights. Although past research suggests that lower SES is associated with being depressed, a generous portion of individuals with a low SES (income <\$20,000 vs. \$20,000-\$75,000) does not, in fact, report being depressed for a persistent period. For example, in their research evaluating

depression in a low-income area in Zimbabwe, Patel and Abas found that although many members of the community have faced extreme tragedies (e.g., losing a home, losing a child to starvation or disease) many members do not report being depressed daily [66]. These authors claim that this community does not let feelings of depression persist because at that point, they do not view it as experiencing an emotion but rather as self-destructive [58,66]. Research on educational outcomes in the United States has revealed that a significant number of high-achieving students from lower-income backgrounds demonstrate remarkable academic resilience, defying socioeconomic expectations. [67] One key factor highlighted in the report is the presence of supportive family environments. Despite economic challenges, some lower-income families appear to provide strong emotional support and emphasize the importance of education, which may foster academic resilience in their children. Additionally, the report suggests that effective educational programs and resources play a crucial role in nurturing resilience among these students. This implies that targeted interventions and support systems within educational institutions can significantly impact the academic trajectories of high-achieving students from lower-income backgrounds.

Although the present study is different demographically, this could be a reason that adolescent girls of a lower socioeconomic status (SES) are less depressed than those of a higher SES. Lower-SES girls are more likely to have extra stressors in their lives and, therefore, may have learned to adopt stronger coping mechanisms against feelings of depression whereas those of a higher SES are more likely to let these feelings persist [66].

The vital role of family structure in shaping the mental well-being of adolescents, particularly girls, was highlighted in our research. Instances where either a father or mother is missing from the household, as in single-parent families, have been linked to an increased likelihood of TMDE and STMDE in girls. In addition, our study revealed that the absence of a mother in the household correlated with the highest depression rates, accentuating the significance of maternal involvement and presence in maintaining mental health. Mothers' emotional withdrawal, lack of empathy, and detachment during child interactions may contribute to diminished social skills and internalizing behaviors in children [68].

Regarding parenting style, the results highlighted that girls whose parents tended to be less authoritative were more likely to have major depressive disorders [68]. The authoritative parenting style promotes parents to be supportive, responsive, and comforting but also to set limits and boundaries for their children [69]. Although this style may increase general anxiety level among tweens, it has the opposite effect for teens [70]. The opposite of the authoritative parenting style, the permissive parenting style, is characterized by parents who are responsive and comforting but set no limits or boundaries for their children; rules and expectations are rarely enforced with this parenting style. Another form of parenting style, the permissive parenting style, is characterized by parents who are responsive and comforting but set no limits or boundaries for their children; rules and expectations are rarely enforced with this parenting style [69]. Although adolescents may feel as if more freedom equates to being a happier person, the lack of boundaries or limits allows for more self-destructive behavior [71]. During adolescence, the prefrontal cortex of the brain, which controls rationality, judgment, and self-control, is not fully developed [72]. This is inevitably why teens engage in self-destructive activities such as unsafe sex, substance abuse, drunk driving, and fighting [73,74].

Without boundaries or limits set by a parent, a teen is more likely to engage in these acts, which can lead to persistent feelings of depression [69,75]. Having emotional availability and meaningful parent-child connections is crucial. Any disruption in these areas can cause family instability and individual distress, particularly in families facing economic disadvantages or with a parent experiencing depression. Conducting longitudinal studies to track the effects of different parenting styles on adolescent girls' mental health over time could provide more insights into the causal relationship between parenting and depression.

Insights gained from this analysis can lead to the development of tailored interventions that address specific needs of subgroups (e.g., minority girls with authoritative parents or in low-income households). These interventions can be more effective than one-size-fits-all approaches. Policy makers can use these comprehensive data to create policies that address the root causes of depression,

for example, improving access to mental health care in underserved communities, implementing antidiscrimination laws, and providing economic support to low-income families. By understating the combined effects of race, income and family dynamics, healthcare providers can develop better screening tools to identify at-risk teen girls earlier. Community organizations can use this information to create more effective prevention programs that are culturally and economically relevant to the populations they serve. More funding can be directed toward mental health services in low-income, racially diverse areas. Insights into how family dynamics influence teen girls' depression can help in designing family-centered interventions.

Our research also reveals that negative school experience significantly contributes to the mental health of adolescent girls. Future research on school experience and depression could delve into various aspects such as school climate factors such as safety, social support, academic pressure, and bullying; the teacher-student relationship including teacher support, encouragement, and mentorship; school-based interventions including mindfulness programs, peer support groups, counseling services, and mental health education initiatives; or technology and media including the role of cyberbullying, online social comparison and excessive screen time.

Many schools have implemented peer support programs where older students are trained to provide mentorship and emotional support to younger students. [76] For instance, a high school might have a "Peer Helpers" program where juniors and seniors volunteer to be paired with freshmen and sophomores. These older students receive training in active listening, empathy, and basic mental health awareness. They meet regularly with their younger peers, often during lunch periods or after school, to discuss any challenges the younger students are facing - whether academic, social, or personal. The peer helpers provide a supportive ear and can help connect students to additional resources if needed, such as the school counselor. This type of program leverages the natural tendency of adolescents to turn to their peers for support. It helps create a more supportive school environment, gives older students leadership opportunities and provides younger students with relatable mentors who can offer guidance and encouragement. Such peer support initiatives have been shown to improve school climate and student well-being when implemented effectively.

Limitations

The data used in this study are derived from a survey that may be subject to recall bias, which occurs when participants in a study do not accurately remember a past event or experience when reporting the event [77]. It is more likely to occur when the event happened long in the past or when participants have poor memory [77]. In addition to the significance of the event being recalled, factors such as age, sickness status, education, socioeconomic level, and pre-existing opinions can contribute recall bias [62]. Because the participants' responses about the usage of medication are susceptible to recall bias, our findings would significantly underestimate the amount of medication used by adolescent females with TMDE. However, the NSDUH was examined for its validity and reliability, and shown to have percentage agreements that were higher than 80 percent on the majority of the variables [1]. Second, because the NSDUH was administered only in English and Spanish, it is possible that some racial and ethnic groups were not well represented in the sample. Third, using a cross-sectional design for the research makes it impossible to determine whether there is a causal relationship between the variables. Fourth, 2021 was indeed a peculiar period for data collection and analysis, particularly for the NSDUH, due to the ongoing COVID-19 pandemic. The 2021 NSDUH incorporated multimode data collection, utilizing both in-person and web interviews. This was a direct response to the varying COVID-19 infection rates across the country. For instance, in the first quarter of 2021, 76.6% of interviews were conducted online, while by the fourth quarter, this number had decreased to 41.5% as in-person interviews became more feasible in areas with lower infection rates. Overall, 54.6% of the interviews for 2021 were completed via the web. These methodological changes were necessary to adapt to pandemic conditions but introduced variability that complicates direct comparisons with previous years.

5. Conclusions

Depression's impact during adolescence is widely recognized, but there remains a lack of understanding about its prevalence among teenage girls. Traditional research on depression often overlooks the differences in risk factors that may affect males and females differently. This is especially significant when considering the biological changes that are unique to females, such as hormonal shifts. The urgent need for the development of practical, cost-efficient methods for detecting, assessing, and treating depression in girls, especially in low- to middle-income and ethnic minority households. Our findings may be of use to policy makers, healthcare providers, and educators in tailoring prevention programs and support systems that account for their special challenges.

Author Contributions: O.B. provided the supervision, conceptualization, methodology, validation, and visualization of the research and participated in the writing process from the original draft preparation to the reviewing and editing of the manuscript. S.A. participated in the literature research and writing process from the draft preparation to the reviewing and editing of the manuscript. Y.Z. participated in the investigation of the data, methodology, software, validation, analysis, data curation, and writing process from the draft preparation to the reviewing and editing of the manuscript. I.E.B. participated in project management, investigation of the literature review, and the writing process from the original draft preparation to the reviewing and editing of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: This study acquired information from publicly available data from open data sets acquired by RTI International via the NSDUH. The NSDUH was reviewed by one of RTI International's Institutional Review Boards (IRBs) prior to conducting any interviews, based on guidelines from the U.S. Department of Health and Human Services Office for Human Research Protections.

Informed Consent Statement: Informed consent is not applicable to this study, which used deidentified patient surveys.

Data Availability Statement: The original data from the National Survey on Drug Use and Health presented in this study are openly available via the Substance Abuse Mental Health Services Administration's Research Data Center at <https://www.samhsa.gov/data/data-we-collect/nsduh-national-survey-drug-use-and-health>. <https://www.samhsa.gov/data/report/2021-nsduh-detailed-tables>.

Acknowledgments: The authors thank Amy Endrizal for assistance in editing the manuscript.

Conflicts of Interest: The authors declare no conflicts of interest.

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