Current anxiety problems and organized activity participation among U.S. adolescents

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Abstract

The study objectives were to examine the relationships between healthcare provider-confirmed current anxiety problems and organized activity participation including sports, clubs/organizations, and other activities. We used data from the 2018–2019 National Survey of Children's Health including 24,356 adolescents 12–17 years old. Poisson and logistic regression analyses were conducted. About 13% of adolescents had current anxiety problems. Poisson regression results indicated that adolescents with anxiety problems were less likely to participate in a higher total number of organized activities compared to children without anxiety problems. Similarly, logistic regression results indicated that adolescents with anxiety problems were at reduced odds of participating in at least one organized activity compared to adolescents without anxiety problems. Specific to activity type, adolescents with anxiety problems were at reduced odds of participating in sports and clubs/organizations. Study findings should be considered when creating and implementing community health promotion and education prevention programs and interventions for adolescents.

Introduction

Anxiety is the most prevalent mental health disorder diagnosed in U.S. adolescents, with about one-third (32%) meeting the diagnostic criteria for a lifetime anxiety disorder (Merikangas et al., 2010). Concerning current anxiety, the 30-day prevalence and 12-month prevalence of anxiety disorders are about 15% and 25% among U.S. adolescents, respectively (Kessler, Avenevoli et al., 2012). The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) broadly defines anxiety disorders (e.g., generalized anxiety disorder, social anxiety disorder) as having features of excessive fear or the emotional response to real or perceived threats, anxiety or anticipating the future threat, and associated behavioral disturbances (American Psychiatric Association, 2013). The median onset of anxiety is 11 years old in the U.S. (Kessler et al., 2005), with incidence increasing during the adolescence and early adulthood years, peaking during middle adulthood years, and then decreasing during older adulthood years (Bandelow & Michaelis, 2015). Thus, anxiety has been associated with many negative health problems during adolescence that can continue into adulthood, including but not limited to, decreased quality of life (Hohls et al., 2021), decreased psychosocial functioning (e.g., poor coping skills), increased substance use and alcohol use disorders (Essau et al., 2014), decreased educational attainment (Mojtabai et al., 2015), and poor cardiovascular health outcomes (Tully et al., 2016). Anxiety during adolescence has also been linked to increased healthcare costs (Pella et al., 2020).

Engagement in prosocial behaviors can have a shielding effect on adolescents' healthy behaviors and development. Specifically, involvement in prosocial behaviors can increase adolescents' positive self-image, peer relationships, family relationships, and adult mentor relationships while providing them with safe environments after school or on the weekends (Afterschool Alliance & National Recreation and Park Association, 2019). Participation in prosocial activities after school or on weekends, including organized activities (e.g., sports), has been linked to increased academic grades, educational expectations (Fredricks, 2012), educational attainment (Haghighat & Knifsend, 2019),

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self-reported health, and life satisfaction among adolescents (Badura et al., 2015). Specific to adolescent anxiety, prior research indicates that sports participation is associated with lower anxiety symptoms (Brière et al., 2018; Eime et al., 2013). However, there is a gap in the literature between current anxiety problems and participation in other organized activities (e.g., clubs or organizations).

Study purpose

This study sought to provide information for community health professionals that can be used to inform health promotion and education programming for U.S. adolescents with current anxiety problems. The objective of this study was to examine the relationships between healthcare provider-confirmed current anxiety problems and organized activity participation among U.S. adolescents. For the purpose of this study, organized activities included sports, clubs or organizations, and other activities. We hypothesized that relative to U.S. adolescents without current anxiety problems, adolescents with current anxiety problems would be less likely to participate in organized activities overall and by activity type (i.e., sports, clubs or organizations, and other activities such as dance).

Methods

Participants and procedures

The current study used combined two-year public use, cross-sectional data from the 2018–2019 National Survey of Children's Health (NSCH) (Child and Adolescent Health Measurement Initiative, 2021b), which is an annual cross-sectional survey of U.S. children and adolescents ranging from 0 to 17 years old. The NSCH is primarily funded and directed by the U.S. Health Resources and Services Administration's Maternal and Child Health Bureau and conducted by the U.S. Census Bureau. The 2018–2019 NSCH comprises questions about key indicators of the emotional and physical health of the U.S. child and adolescent populations. The guide to specific NSCH topics and questions (Child and Adolescent Health Measurement Initiative, 2019, 2020) and detailed methodologies (U.S. Census Bureau, 2019; U.S. Census Bureau, 2020) can be found elsewhere for the 2018 NSCH and 2019 NSCH, respectively.

Data for the 2018 NSCH and 2019 NSCH were collected in a cross-sectional nature from June 2018 to January 2019 for the 2018 NSCH (43.1% overall response rate) and June 2019 to January 2020 for the 2019 NSCH (42.4% overall response rate). Regarding participant recruitment and enrollment, the NSCH used a two-phased data collection

approach. First, the NSCH randomly selected U.S. home addresses. During the first phase, households were contacted with a mailed invitation for adult household members/parents to complete a brief screening questionnaire via the mailed paper version or the internet version, which screened for all children and adolescents 0–17 years old who lived in their household. If two or more eligible-aged children lived in the household, one child was randomly selected as the sampled child, with oversampling of younger children 0–5 years old and children with special healthcare needs.

There were three age-specific questionnaires (i.e., 0–5, 6–11, and 12–17 years) that included slightly different, developmentally appropriate topics and questions for the respective age groups. Of the 59,963 total participants across both survey years (N = 30,530 in 2018 and N = 29,433 in 2019), the current analytic sample was limited to the age-specific questionnaire data for adolescents 12–17 years old (N = 24,817). We removed participants with missing data on current anxiety problems ($n = 208$) and organized activity participation ($n = 253$) prior to all analyses, totaling 24,356 adolescents included in the current study. We used existing data that were publicly available, and therefore this study was exempt from review and determined not human subjects research by a university's institutional review board. All authors certify responsibility for the manuscript.

Measures

Current anxiety problems

The independent variable of interest was adolescent current anxiety problems. Current anxiety was assessed in the "This Child's Health" section by initially asking parents the following yes/no question: "Has a doctor or other health care provider EVER told you that this child has anxiety problems?" (Child and Adolescent Health Measurement Initiative, 2019, 2020). If the adult respondent answered "yes", then the follow-up question asked as "Does this child CURRENTLY have the condition?" If adult respondents answered "yes" to both questions, then their adolescent was defined as having current anxiety problems.

Organized activity participation overall and by activity Ttype including sports, clubs or organizations, and other organized activities

Organized activity participation overall and by activity type in the past 12-months, the dependent variables of this study, were included in the "This Child's Schooling and Activities" section and asked parents three yes/no questions starting with, "DURING THE PAST 12 MONTHS, did this child participate in…" (1) "A sports team or did he or she

take sports lessons after school or on weekends?," (2) "Any clubs or organizations after school or on weekends?," and (3) Any other organized activities or lessons, such as music, dance, language, or other arts?" (Child and Adolescent Health Measurement Initiative, 2019, 2020). The NSCH combined these three questions to determine the total number of organized activities the adolescents participated in during the past 12-months, with scores ranging from 0 to 3 activities. Additionally, the NSCH combined the three questions and defined adolescents as participating in organized activities in the past 12-months if they had a "yes" response to at least one of the three questions.

In addition to the NSCH-provided organized activity participation variable, the current study also assessed organized activity participation in the past 12-months by the three activity types (i.e., sports, clubs or organizations, and other organized activities such as dance).

Adolescent and family characteristics

Adolescent and family characteristics were included as covariates in this study. Covariates included adolescent age (range 12–17), sex, and race/ethnicity; parent education level; family household structure and federal poverty level. Racial/ethnic group categories were non-Hispanic White, non-Hispanic Back, non-Hispanic Other/Multiracial, and Hispanic. Parent education level categories were high school graduate/equivalent or lower, some college, and college degree or higher. Family household structure categories were two currently married parents, two not currently married parents, single parent, and other family type. The 2018–2019 NSCH provided a calculated federal poverty level for public use in percents, which was calculated as the household poverty level ratio based on U.S. Census guidelines (0-199%, 200–299%, 300–399%, and $\geq 400\%$) (Child and Adolescent Health Measurement Initiative, 2021a).

Data Analysis

The 2018–2019 NSCH analytic guidelines were followed and analyses were weighted to reflect the U.S. adolescent population 12–17 years old (U.S. Census Bureau, 2019; U.S. Census Bureau, 2020). Descriptive statistics were performed to assess all variables of interest including current anxiety problems, and unweighted sample size counts and weighted percents are presented. The associations of adolescent and family characteristics with current anxiety problems were examined by conducting a series of chi-square tests for the categorical variables, and an independent samples t-test for adolescent age. Unweighted sample size counts, weighted percents, and p-values are presented for these tests. Unadjusted and adjusted Poisson

regression analyses were conducted to examine the relationship between current anxiety problems and the total number of organized activities the adolescents participated in during the past 12-months. The unadjusted relative risk ratio (RR), 95% confidence interval (CI), and p-value are presented for the unadjusted Poisson regression model, and adjusted RRs (aRRs), 95%CIs, and p-values are presented for the adjusted Poisson regression model that included the adolescent and family characteristics. Additionally, unadjusted and adjusted logistic regression analyses were conducted to examine the relationships between adolescent current anxiety problems and organized activity participation overall and by activity type of sports, clubs or organizations, and other organized activities. Unadjusted odds ratios (ORs), 95%CIs, and p-values are presented for the unadjusted logistic regression models, and adjusted ORs (aORs), 95%CIs, and p-values are presented for the adjusted logistic regression models that included the adolescent and family characteristics. The p-values for all tests was set at < 0.05 to test for statistical significance. The current study's analysis was performed using SPSS Complex Samples (version 28) and StataSE (version 16).

Results

Adolescents were a mean age of 14.48 (0.03) years (Table 1). A total of 48.8% of adolescents were female and 51.2% were male. About half (50.1%) of adolescents were non-Hispanic White followed by 26.3% Hispanic, 13.7% non-Hispanic Black, and 9.9% non-Hispanic Other/Multiracial. Nearly half (47.2%) of adolescents had parents who obtained an education of a college degree or higher, 21.4% had parents who obtained an education of some college, and 31.4% had parents who obtained an education of high school graduate/equivalent or lower. Regarding family household structure, 61.3% of adolescents were living with two currently married parents followed by 23.8% living with a single parent, 7.9% living in another household structure type, and 7.0% living with two not currently married parents. Family federal poverty levels ranged with 40.0% of adolescents in the 0-199% level, 16.4% in the 200–299% level, 12.0% in the 300–399% level, and 31.6% in the $\geq 400\%$ level (see Table 1).

Adolescent and family characteristics and current anxiety problems

A total of 12.7% ($n = 3,711$) of adolescents had healthcare provider-confirmed current anxiety problems. Adolescent age and sex, parent education level, and family household structure differed based on current anxiety problems

Table 1 Adolescent and Family Covariates based on Current Anxiety Problems among U.S. Adolescents 12–17 Years Old, NSCH 2018–2019

| Characteristic | Overall (N=24,356) | Current Anxiety Problems | | p value[b] |
| | | No | Yes | |
	n(%)[a]	n(%)[a]	n(%)[a]	
Adolescent Age, M(SE)	14.48 (0.03)	14.44 (0.03)	14.72 (0.07)	**< 0.001**
Adolescent Sex				**< 0.001**
Male	12,730 (51.2)	11,164 (52.5)	1,566 (42.3)	
Female	11,626 (48.8)	9,481 (47.5)	2,145 (57.7)	
Adolescent Race/Ethnicity				**< 0.001**
Non-Hispanic White	17,212 (50.1)	14,327 (48.3)	2,885 (62.4)	
Non-Hispanic Black	1,585 (13.7)	1,440 (14.5)	145 (8.6)	
Hispanic	2,760 (26.3)	2,402 (26.9)	358 (21.6)	
Non-Hispanic Other/Multiracial	2,799 (9.9)	2,476 (10.3)	323 (7.4)	
Parent Education Level				**0.002**
≤High school graduate/equivalent	4,091 (31.4)	3,538 (32.3)	553 (25.3)	
Some college	5,841 (21.4)	4,889 (21.0)	952 (23.7)	
≥College degree	14,424 (47.2)	12,218 (46.7)	2,206 (51.0)	
Family Household Structure				**0.012**
Two currently married parents	16,730 (61.3)	14,407 (61.9)	2,323 (56.6)	
Two not currently married parents	1,322 (7.0)	1,111 (7.1)	211 (6.2)	
Single parent	4,965 (23.8)	4,052 (23.4)	913 (26.8)	
Other family type	1,339 (7.9)	1,075 (7.6)	264 (10.4)	
Family Federal Poverty Level				0.669
0-199%	6,403 (40.0)	5,342 (40.2)	1,061 (38.0)	
200–299%	3,870 (16.4)	3,279 (16.3)	591 (17.3)	
300–399%	3,632 (12.0)	3,084 (11.9)	548 (12.6)	
≥ 400%	10,451 (31.6)	8,940 (31.6)	1,511 (32.1)	

[a] n refers to raw counts and percentages are weighted column percent unless noted otherwise

[b] Bold font indicates statistical significance $p < 0.05$

(see Table 1). Specifically, older adolescents (M=14.72, SE=0.07) and female adolescents (57.7%) had higher current anxiety problems. Participants who were non-Hispanic White (62.4%) had a high percent of current anxiety problems compared to participants of other racial/ethnic groups. Concerning parent education level, adolescents who had parents who obtained an education of a college degree or higher (51.0%) and some college (23.7%) had higher percents of current anxiety problems compared to adolescents who had parents who obtained an education of high school graduate/equivalent or lower (25.3%). Additionally, adolescents living with a single parent (26.8%) and living in another family type (10.4%) had high percents of current anxiety problems compared to adolescents living with two currently married parents (56.6%) and two not currently married parents (6.2%) (see Table 1).

Current anxiety problems and total number of organized activities

On average, adolescents participated in a total of 1.58 (SE=0.02) organized activities after school or on weekends in the past 12-months, with 26.3% (n=6,254), 32.3% (n=8,370), and 22.2% (n=6,275) participating in one,

two, and three activities, respectively. Unadjusted Poisson regression model results indicated that adolescents with current anxiety problems were less likely to participate in a higher total number of organized activities (RR=0.81, 95%CI=0.79, 0.83) compared to children without current anxiety problems.

Adjusted logistic regression model results indicated that adolescents with current anxiety problems were less likely to participate in a higher total number of organized activities (RR=0.81, 95%CI=0.78, 0.83) compared to children without current anxiety problems, while controlling for the adolescent and family covariates. With the exception of adolescent race/ethnicity, all adolescent and family covariates were significant in the adjusted Poisson regression model. Older adolescents were at decreased likelihood of participating in a higher total number of organized activities (aRR=0.97, 95%CI=0.96, 0.98) compared to younger adolescents. Female adolescents were at increased likelihood of participating in a higher total number of organized activities (aRR=0.97, 95%CI=0.96, 0.98) compared to male adolescents. Compared to those with parents who obtained an education of at least a college degree, adolescents with parents who obtained an education of high school graduate/equivalent or lower (aRR=0.69, 95%CI=0.67, 0.72) and some

Table 2 Unadjusted and Adjusted Poisson Regression Model Results of the Association between Current Anxiety Problems and the Number of Organized Activities among U.S. Adolescents 12–17 Years Old, 2018–2019 NSCH

Independent Variable	Number of Organized Activities M(SE)	Unadjusted Poisson Regression RR	95% CI	pvalue[a]	Adjusted Poisson Regression aRR[b]	95% CI	pvalue[a]
Adolescent Current Anxiety Problems							
No	1.62 (0.02)	Ref	Ref	Ref	Ref	Ref	Ref
Yes	1.31 (0.04)	**0.81**	**0.79, 0.83**	**< 0.001**	**0.81**	**0.78, 0.83**	**< 0.001**
Adolescent Age	-	-	-	-	**0.97**	**0.96, 0.98**	**< 0.001**
Adolescent Sex							
Male	1.48 (0.02)	-	-	-	Ref	Ref	Ref
Female	1.67 (0.02)	-	-	-	**1.17**	**1.14, 1.19**	**< 0.001**
Adolescent Race/Ethnicity							
Non-Hispanic White	1.68 (0.02)				Ref	Ref	Ref
Non-Hispanic Black	1.47 (0.04)	-	-	-	0.97	0.93, 1.01	0.116
Hispanic	1.40 (0.04)	-	-	-	0.97	0.94, 1.01	0.107
Non-Hispanic Other/Multiracial	1.64 (0.04)	-	-	-	1.00	0.97, 1.03	0.756
Parent Education Level							
High school graduate/equivalent or lower	1.12 (0.03)	-	-	-	**0.69**	**0.67, 0.72**	**< 0.001**
Some college	1.47 (0.03)	-	-	-	**0.82**	**0.80, 0.84**	**< 0.001**
College degree or higher	1.93 (0.02)	-	-	-	Ref	Ref	Ref
Family Household Structure							
Two currently married parents	1.72 (0.02)	-	-	-	Ref	Ref	Ref
Two not currently married parents	1.42 (0.07)	-	-	-	**0.93**	**0.89, 0.97**	**0.001**
Single parent	1.38 (0.03)	-	-	-	**0.93**	**0.91, 0.96**	**< 0.001**
Other family type	1.17 (0.07)	-	-	-	**0.84**	**0.80, 0.88**	**< 0.001**
Family Federal Poverty Level							
0-199%	1.28 (0.03)	-	-	-	**0.85**	**0.83, 0.88**	**< 0.001**
200-299%	1.52 (0.04)	-	-	-	**0.91**	**0.88, 0.94**	**< 0.001**
300-399%	1.70 (0.03)	-	-	-	**0.95**	**0.92, 0.98**	**0.001**
≥ 400%	1.94 (0.02)	-	-	-	Ref	Ref	Ref

Notes. Abbreviations: NSCH, National Survey on Children's Health; RR, relative risk; CI, confidence interval; aRR, adjusted relative risk; Ref, reference category

[a] Bold font indicates statistical significance $p < 0.05$

[b] Model adjusted for adolescent age, adolescent sex, adolescent race/ethnicity, parent education level, family household structure, and family federal poverty level

college (aRR = 0.82, 95%CI = 0.80, 0.84) were at decreased likelihood of participating in a higher total number of organized activities. Compared to adolescents living with two currently married parents, adolescents living with two not currently married parents (aRR = 0.93, 95%CI = 0.89, 0.97), a single parent (aRR = 0.93, 95%CI = 0.91, 0.96), and another family type (aRR = 0.84, 95%CI = 0.80, 0.88) were at decreased likelihood of participating in a higher total number of organized activities. Compared to those in the highest ≥ 400% level, adolescents in the 0-199% family federal poverty level (aRR = 0.85, 95%CI = 0.83, 0.88), 200–299% family federal poverty level (aRR = 0.91, 95%CI = 0.88, 0.94), and 300–399% family federal poverty level (aRR = 0.95, 95%CI = 0.92, 0.98) were at decreased likelihood of participating in a higher total number of organized activities (see Table 2).

Current anxiety problems and organized activity participation

A total of 80.8% (n = 20,899) of adolescents participated in at least one organized activity (i.e., sports, clubs, and/or other activities such as dance) after school or on weekends in the past 12-months. Unadjusted logistic regression model results indicated that adolescents with current anxiety problems were at decreased odds of participating in organized activities (OR = 0.62, 95%CI = 0.51, 0.76) compared to adolescents without current anxiety problems (Table 3).

Table 3 Unadjusted and Adjusted Logistic Regression Model Results of the Association between Current Anxiety Problems and Organized Activity Participation Overall among U.S. Adolescents 12–17 Years Old, 2018–2019 NSCH

Independent Variable	Adolescent Participates in Organized Activities n(%)[a]	Unadjusted Logistic Regression			Adjusted Logistic Regression		
		OR	95% CI	pvalue[b]	aOR[c]	95% CI	pvalue[b]
Adolescent Current Anxiety Problems							
No	18,028 (81.9)	Ref	Ref	Ref	Ref	Ref	Ref
Yes	2,871 (73.8)	**0.62**	**0.51, 0.76**	**< 0.001**	**0.54**	**0.44, 0.67**	**< 0.001**
Adolescent Age, *M*(SE)	14.44 (0.03)	-	-	-	**0.93**	**0.88, 0.98**	**0.005**
Adolescent Sex							
Male	10,675 (79.2)	-	-	-	Ref	Ref	Ref
Female	10,224 (82.6)	-	-	-	**1.31**	**1.10, 1.56**	**0.003**
Adolescent Race/Ethnicity							
Non-Hispanic White	15,016 (84.3)				Ref	Ref	Ref
Non-Hispanic Black	1,272 (78.6)	-	-	-	1.05	0.82, 1.34	0.687
Hispanic	2,216 (75.4)	-	-	-	0.99	0.79, 1.24	0.941
Non-Hispanic Other/Multiracial	2,395 (81.1)	-	-	-	0.85	0.67, 1.09	0.208
Parent Education Level							
High school graduate/equivalent or lower	2,905 (66.2)	-	-	-	**0.27**	**0.22, 0.33**	**< 0.001**
Some college	4,691 (79.0)	-	-	-	**0.47**	**0.39, 0.57**	**< 0.001**
College degree or higher	13,303 (91.4)	-	-	-	Ref	Ref	Ref
Family Household Structure							
Two currently married parents	14,894 (85.4)	-	-	-	Ref	Ref	Ref
Two not currently married parents	1,074 (75.2)	-	-	-	0.80	0.56, 1.14	0.213
Single parent	3,962 (75.4)	-	-	-	0.84	0.68, 1.04	0.103
Other family type	969 (67.0)	-	-	-	**0.61**	**0.44, 0.86**	**0.004**
Family Federal Poverty Level							
0-199%	4,827 (71.3)	-	-	-	**0.48**	**0.39, 0.59**	**< 0.001**
200-299%	3,247 (79.7)	-	-	-	**0.57**	**0.44, 0.73**	**< 0.001**
300-399%	3,173 (85.9)	-	-	-	**0.72**	**0.56, 0.93**	**0.012**
≥ 400%	9,652 (91.6)	-	-	-	Ref	Ref	Ref

Notes. Abbreviations: NSCH, National Survey on Children's Health; OR, odds ratio; CI, confidence interval; aOR, adjusted odds ratio; Ref, reference category

[a] *n* refers to raw counts and percentages are weighted row percent unless noted otherwise

[b] Bold font indicates statistical significance $p < 0.05$

[c] Model adjusted for adolescent age, adolescent sex, adolescent race/ethnicity, parent education level, family household structure, and family federal poverty level

Adjusted logistic regression model results indicated that adolescents with current anxiety problems were at decreased odds of participating in organized activities (aOR = 0.54, 95%CI = 0.44, 0.67) compared to adolescents without current anxiety problems, while controlling for the adolescent and family covariates. With the exception of adolescent race/ethnicity, all adolescent and family covariates were significant in the adjusted logistic regression model. Older adolescents were at decreased odds of participating in organized activities (aOR = 0.93, 95%CI = 0.88, 0.98) compared to younger adolescents. Female adolescents were at 1.31 increased odds of participating in organized activities (95%CI = 1.10, 1.56) compared to male adolescents. Compared to those with parents who obtained an education

of at least a college degree, adolescents with parents who obtained an education of high school graduate/equivalent or lower (aOR = 0.27, 95%CI = 0.22, 0.33) and some college (aOR = 0.47, 95%CI = 0.39, 0.57) were at decreased odds of participating in organized activities. Adolescents living in another family type were at decreased odds of participating in organized activities (aOR = 0.61, 95%CI = 0.44, 0.86) compared to adolescents living with two currently married parents. Compared to those in the highest ≥ 400% level, adolescents in the 0-199% family federal poverty level (aOR = 0.48, 95%CI = 0.39, 0.59), 200–299% family federal poverty level (aOR = 0.57, 95%CI = 0.44, 0.73), and 300–399% family federal poverty level (aOR = 0.72,

Table 4 Unadjusted and Adjusted Logistic Regression Model Results of the Association between Current Anxiety Problems and Sports Participation among U.S. Adolescents 12–17 Years Old, 2018–2019 NSCH

Independent Variable	Adolescent Participates in Sports n(%)[a]	Unadjusted Logistic Regression			Adjusted Logistic Regression		
		OR	95% CI	pvalue[b]	aOR[c]	95% CI	pvalue[b]
Adolescent Current Anxiety Problems							
No	13,274 (58.4)	Ref	Ref	Ref	Ref	Ref	Ref
Yes	1,642 (40.2)	**0.48**	**0.41, 0.56**	**< 0.001**	**0.44**	**0.38, 0.51**	**< 0.001**
Adolescent Age, M(SE)	14.37 (0.03)	-	-	-	**0.92**	**0.89, 0.96**	**< 0.001**
Adolescent Sex							
Male	8,089 (58.3)	-	-	-	Ref	Ref	Ref
Female	6,827 (53.7)	-	-	-	**0.83**	**0.74, 0.94**	**0.004**
Adolescent Race/Ethnicity							
Non-Hispanic White	10,900 (60.4)				Ref	Ref	Ref
Non-Hispanic Black	887 (53.5)	-	-	-	1.02	0.82, 1.27	0.843
Hispanic	1,482 (49.9)	-	-	-	0.98	0.82, 1.16	0.790
Non-Hispanic Other/Multiracial	1,647 (54.0)	-	-	-	**0.79**	**0.67, 0.93**	**0.006**
Parent Education Level							
High school graduate/equivalent or lower	1,810 (40.7)	-	-	-	**0.44**	**0.37, 0.52**	**< 0.001**
Some college	3,129 (52.7)	-	-	-	**0.66**	**0.57, 0.76**	**< 0.001**
College degree or higher	9,977 (67.7)	-	-	-	Ref	Ref	Ref
Family Household Structure							
Two currently married parents	10,900 (60.8)	-	-	-	Ref	Ref	Ref
Two not currently married parents	750 (49.9)	-	-	-	0.89	0.67, 1.18	0.410
Single parent	2,631 (49.2)	-	-	-	0.93	0.80, 1.09	0.388
Other family type	635 (45.9)	-	-	-	0.90	0.68, 1.19	0.449
Family Federal Poverty Level							
0-199%	3,114 (44.3)	-	-	-	**0.51**	**0.44, 0.60**	**< 0.001**
200–299%	2,164 (54.7)	-	-	-	**0.67**	**0.56, 0.80**	**< 0.001**
300–399%	2,241 (60.5)	-	-	-	**0.75**	**0.63, 0.89**	**0.001**
≥ 400%	7,397 (70.1)	-	-	-	Ref	Ref	Ref

Notes. Abbreviations: NSCH, National Survey on Children's Health; OR, odds ratio; CI, confidence interval; aOR, adjusted odds ratio; Ref, reference category

[a] *n* refers to raw counts and percentages are weighted row percent unless noted otherwise

[b] Bold font indicates statistical significance $p < 0.05$

[c] Model adjusted for adolescent age, adolescent sex, adolescent race/ethnicity, parent education level, family household structure, and family federal poverty level

95%CI = 0.56, 0.93) were at decreased odds of participating in organized activities (see Table 3).

Current anxiety problems and sports participation

A total of 56.1% (*n* = 14,916) of adolescents participated in sports teams or lessons after school or on weekends in the past 12-months. Unadjusted model results indicated that adolescents with current anxiety problems were less likely to participate in sports (OR = 0.48, 95%CI = 0.41, 0.56) compared to adolescents without current anxiety problems (Table 4).

Adjusted model results indicated that adolescents with current anxiety problems were less likely to participate in sports (aOR = 0.44, 95%CI = 0.38, 0.51) compared to adolescents without current anxiety problems, while adjusting for the covariates. With the exception of family household structure, all adolescent and family covariates were significant in the adjusted logistic regression model. Older adolescents were at decreased odds of participating in sports (aOR = 0.92, 95%CI = 0.89, 0.96) compared to younger adolescents. Female adolescents were at decreased odds of participating in sports (aOR = 0.83, 95%CI = 0.74, 0.94) compared to male adolescents. Non-Hispanic Other/Multiracial adolescents were at decreased odds of participating in sports (AOR = 0.79, 95%CI = 0.67, 0.93) compared to non-Hispanic White adolescents. Compared to adolescents who had parents who obtained an education of a

Table 5 Unadjusted and Adjusted Logistic Regression Model Results of the Association between Current Anxiety Problems and Club or Organization Participation among U.S. Adolescents 12–17 Years Old, 2018–2019 NSCH

Independent Variable	Adolescent Participates in Clubs or Organizations $n(\%)^a$	Unadjusted Logistic Regression			Adjusted Logistic Regression		
		OR	95% CI	$p$value[b]	aOR[c]	95% CI	$p$value[b]
Adolescent Current Anxiety Problems							
No	13,027 (57.6)	Ref	Ref	Ref	Ref	Ref	Ref
Yes	1,964 (47.9)	**0.68**	**0.58, 0.80**	**< 0.001**	**0.57**	**0.48, 0.66**	**< 0.001**
Adolescent Age, M(SE)	14.52 (0.03)	-	-	-	**1.05**	**1.01, 1.09**	**0.020**
Adolescent Sex							
Male	7,234 (52.0)	-	-	-	Ref	Ref	Ref
Female	7,757 (61.0)	-	-	-	**1.55**	**1.37, 1.76**	**< 0.001**
Adolescent Race/Ethnicity							
Non-Hispanic White	11,024 (61.8)				Ref	Ref	Ref
Non-Hispanic Black	812 (48.9)	-	-	-	**0.80**	**0.65, 0.99**	**0.041**
Hispanic	1,444 (48.4)	-	-	-	0.90	0.76, 1.08	0.252
Non-Hispanic Other/Multiracial	1,711 (60.2)	-	-	-	0.98	0.83, 1.16	0.799
Parent Education Level							
High school graduate/equivalent or lower	1,670 (37.8)	-	-	-	**0.35**	**0.29, 0.41**	**< 0.001**
Some college	3,122 (52.5)	-	-	-	**0.57**	**0.50, 0,66**	**< 0.001**
College degree or higher	10,199 (70.3)	-	-	-	Ref	Ref	Ref
Family Household Structure							
Two currently married parents	11,086 (62.4)	-	-	-	Ref	Ref	Ref
Two not currently married parents	710 (48.9)	-	-	-	0.84	0.63, 1.12	0.226
Single parent	2,606 (48.6)	-	-	-	**0.84**	**0.72, 0.98**	**0.027**
Other family type	589 (39.2)	-	-	-	**0.64**	**0.48, 0.86**	**0.003**
Family Federal Poverty Level							
0-199%	3,058 (43.9)	-	-	-	**0.62**	**0.52, 0.73**	**< 0.001**
200–299%	2,254 (55.0)	-	-	-	**0.72**	**0.60, 0.86**	**< 0.001**
300–399%	2,318 (61.5)	-	-	-	**0.79**	**0.66, 0.94**	**0.008**
≥ 400%	7,361 (70.9)	-	-	-	Ref	Ref	Ref

Notes. Abbreviations: NSCH, National Survey on Children's Health; OR, odds ratio; CI, confidence interval; aOR, adjusted odds ratio; Ref, reference category

[a]n refers to raw counts and percentages are weighted row percent unless noted otherwise

[b] Bold font indicates statistical significance $p < 0.05$

[c] Model adjusted for adolescent age, adolescent sex, adolescent race/ethnicity, parent education level, family household structure, and family federal poverty level

college degree or higher, adolescents who had parents who obtained an education of high school graduate/equivalent or lower (aOR = 0.44, 95%CI = 0.37, 0.52) and some college (aOR = 0.66, 95%CI = 0.57, 0.76) were at decreased odds of participating in sports. Compared to adolescents in the ≥ 400% level, adolescents in the 0-199% family federal poverty level (aOR = 0.51, 95%CI = 0.44, 0.60), 200–299% family federal poverty level (aOR = 0.67, 95%CI = 0.56, 0.80), and 300–399% family federal poverty level (aOR = 0.75, 95%CI = 0.63, 0.89) were at decreased odds of participating in sports (see Table 4).

Current anxiety problems and club or organization participation

A total of 56.4% (n = 14,991) of adolescents participated in clubs or organizations after school or on weekends in the past 12-months. Unadjusted model results indicated that adolescents with current anxiety problems were less likely to participate in clubs or organizations (OR = 0.68, 95%CI = 0.58, 0.80) compared to adolescents without current anxiety problems (Table 5).

Adjusted model results indicated that adolescents with current anxiety problems were less likely to participate in clubs or organizations (aOR = 0.57, 95%CI = 0.48, 0.66)

compared to adolescents without current anxiety problems, while controlling for the covariates. All covariates were significant in the adjusted model. Older adolescents were at decreased odds of participating in clubs or organizations (aOR = 1.05, 95%CI = 0.1.01, 1.09) compared to younger adolescents. Female adolescents were at 1.55 increased odds of participating in clubs or organizations (95%CI = 1.37, 1.76) compared to male adolescents. Non-Hispanic Black adolescents were at decreased odds of participating in clubs or organizations (aOR = 0.80, 95%CI = 0.65, 0.99) compared to non-Hispanic White adolescents. Compared to adolescents who had parents who obtained an education of a college degree or higher, adolescents who had parents who obtained an education of high school graduate/equivalent or lower (aOR = 0.35, 95%CI = 0.29, 0.41) and some college (aOR = 0.57, 95%CI = 0.50, 0.66) were at decreased odds of participating in clubs or organizations. Compared to adolescents living with two currently married parents, adolescents living with a single parent (aOR = 0.84, 95%CI = 0.72, 0.98) and living in another family type (aOR = 0.64, 95%CI = 0.48, 0.86) were at decreased odds of participating in clubs or organizations. Compared to adolescents in the ≥ 400% level, adolescents in the 0-199% family federal poverty level (aOR = 0.62, 95%CI = 0.52, 0.73), 200–299% family federal poverty level (aOR = 0.72, 95%CI = 0.60, 0.86), and 300–399% family federal poverty level (aOR = 0.79, 95%CI = 0.66, 0.94) were at decreased odds of participating in clubs or organizations (see Table 5).

Current anxiety problems and other organized activity participation

A total of 47.3% (n = 11,912) of adolescents participated in other organized activities or lessons (e.g., music, dance, language, arts) in the past 12-months. Unadjusted and adjusted logistic regression model results indicated that there were no significant associations between current anxiety problems and other organized activity participation (Table 6).

All adolescent and family covariates were significant in the adjusted logistic regression model. Older adolescents were at decreased odds of participating in other organized activities (aOR = 0.89, 95%CI = 0.86, 0.92) compared to younger adolescents. Female adolescents were at 1.95 increased odds of participating in other organized activities (95%CI = 1.72, 2.20) compared to male adolescents. Non-Hispanic Other/Multiracial adolescents were at increased odds of participating in other organized activities (aOR = 1.18, 95%CI = 1.01, 1.38) compared to non-Hispanic White adolescents. Compared to those with parents who obtained an education of at least a college degree, adolescents with parents who obtained an education of high school graduate/equivalent or lower (aOR = 0.48, 95%CI = 0.40,

0.58) and some college (aOR = 0.67, 95%CI = 0.58, 0.78) were at decreased odds of participating in other organized activities. Adolescents living in another household structure type were at decreased odds of participating in other organized activities (aOR = 0.68, 95%CI = 0.50, 0.91) compared to adolescents living with two currently married parents. Compared to adolescents in the ≥ 400% level, adolescents in the 0-199% family federal poverty level (aOR = 0.81, 95%CI = 0.69, 0.95) and 200–299% family federal poverty level (aOR = 0.80, 95%CI = 0.68, 0.95) were at decreased odds of participating in other organized activities (see Table 6).

Discussion

This study found that nearly 13% of U.S. adolescents had current anxiety problems. This prevalence is slightly higher than other research that used older 2016 NSCH data and reported nearly 11% of adolescents in the same 12-17-year age group had current anxiety problems (Ghandour et al., 2019). However, both of these studies are higher than the global prevalence of about 7% for any anxiety disorder (Polanczyk et al., 2015). This study also found that older adolescents and female adolescents had higher reports of current anxiety problems, which has been previously reported in other studies that assessed anxiety symptomatology and disorders (Carter et al., 2011; Kessler, Petukhova et al., 2012; Ohannessian et al., 2017). Additionally, findings indicated that parent education level and family household structure also varied by current anxiety problems, but family federal poverty did not. Despite these mixed findings on socioeconomic status indicators, prior research shows that adolescents with lower socioeconomic status including lower parent education level and/or income level are at increased risk for anxiety (McLaughlin et al., 2011; Najman et al., 2010; Reiss, 2013).

The main objective of this study was to assess the associations between current anxiety problems and participation in organized activities among a national sample of U.S. adolescents. As hypothesized, our study results indicated that when assessing the relationship between current anxiety problems and overall organized activity participation (i.e., sports, clubs or organizations, and/or other organized activities such as dance), adolescents with current anxiety problems were at reduced likelihood to participate in a higher total number of organized activities after school or on weekends in the past 12-months than adolescents without current anxiety problems, even after controlling for adolescent and family characteristics. We also report that adolescents with current anxiety problems were less likely to participate in at least one organized activity than adolescents without

Table 6 Unadjusted and Adjusted Logistic Regression Model Results of the Association between Current Anxiety Problems and Other Organized Activity Participation among U.S. Adolescents 12–17 Years Old, 2018–2019 NSCH

Independent Variable	Adolescent Participates in Other Organized Activities n(%)[a]	Unadjusted Logistic Regression			Adjusted Logistic Regression		
		OR	95% CI	pvalue[b]	aOR[c]	95% CI	pvalue[b]
Adolescent Current Anxiety Problems							
No	10,213 (47.6)	Ref	Ref	Ref	Ref	Ref	Ref
Yes	1,699 (44.9)	0.90	0.76, 1.06	0.189	0.85	0.71, 1.02	0.073
Adolescent Age, *M*(SE)	14.30 (0.04)	-	-	-	**0.89**	**0.86, 0.92**	**< 0.001**
Adolescent Sex							
Male	5,035 (39.7)	-	-	-	Ref	Ref	Ref
Female	6,877 (55.2)	-	-	-	**1.95**	**1.72, 2.20**	**< 0.001**
Adolescent Race/Ethnicity							
Non-Hispanic White	8,399 (48.2)				Ref	Ref	Ref
Non-Hispanic Black	691 (46.5)	-	-	-	1.17	0.96, 1.43	0.116
Hispanic	1,312 (44.6)	-	-	-	1.16	0.97, 1.40	0.111
Non-Hispanic Other/Multiracial	1,510 (51.3)	-	-	-	**1.18**	**1.01, 1.38**	**0.046**
Parent Education Level							
High school graduate/equivalent or lower	1,472 (36.1)	-	-	-	**0.48**	**0.40, 0.58**	**< 0.001**
Some college	2,458 (44.0)	-	-	-	**0.67**	**0.58, 0.78**	**< 0.001**
College degree or higher	7,982 (56.2)	-	-	-	Ref	Ref	Ref
Family Household Structure							
Two currently married parents	8,682 (50.9)	-	-	-	Ref	Ref	Ref
Two not currently married parents	579 (44.6)	-	-	-	0.95	0.70, 1.28	0.729
Single parent	2,171 (42.6)	-	-	-	0.88	0.75, 1.03	0.106
Other family type	480 (35.6)	-	-	-	**0.68**	**0.50, 0.91**	**0.010**
Family Federal Poverty Level							
0-199%	2,636 (41.1)	-	-	-	**0.81**	**0.69, 0.95**	**0.010**
200–299%	1,792 (45.0)	-	-	-	**0.80**	**0.68, 0.95**	**0.012**
300–399%	1,827 (49.9)	-	-	-	0.89	0.76, 1.05	0.159
≥ 400%	5,657 (55.4)	-	-	-	Ref	Ref	Ref

Notes. Abbreviations: NSCH, National Survey on Children's Health; OR, odds ratio; CI, confidence interval; aOR, adjusted odds ratio; Ref, reference category

[a] *n* refers to raw counts and percentages are weighted row percent unless noted otherwise

[b] Bold font indicates statistical significance $p < 0.05$

[c] Model adjusted for adolescent age, adolescent sex, adolescent race/ethnicity, parent education level, family household structure, and family federal poverty level

current anxiety problems. Study findings also confirmed our hypothesis that adolescents with current anxiety problems were less likely to participate in sports and clubs or organizations, but no difference was found based on other organized activities (e.g., dance). It is noteworthy to mention that adolescents with lower socioeconomic status indicators of lower parent education levels and lower family federal poverty levels were less likely to have reports of participation in organized activities overall and by activity type compared to adolescents with the highest socioeconomic indicators of a parent education level of college degree or higher and a ≥ 400% family federal poverty level. This is not surprising since the most recent Afterschool Alliance (2020) research report indicated that program costs and

access (e.g., available transportation) are major roadblocks to afterschool activity participation among adolescents nationwide. The report also indicated that organized activity participation after school or on weekends provides adolescents with critical social and emotional learning experiences for positive youth development. Therefore, it is important to promote organized activity participation and reduce existing barriers to encourage engagement in afterschool prosocial activities among adolescents.

Specific to sports participation and adolescent and family characteristics, female adolescents and older adolescents were less likely to have reports of sports participation compared to male adolescents and younger adolescents, respectively. Comparatively, a recent systematic review and

meta-analysis provides evidence that sports involvement has an inverse relationship with anxiety symptoms, and that this relationship can be moderated by sex with a stronger negative correlation found in studies with more male participants (Panza et al., 2020). Thus, while sports participation is a protective factor against anxiety symptoms for female adolescents, participation may have a stronger effect against anxiety symptoms for male adolescents. We also found that older adolescents were less likely to participate in sports. Our findings highlight the importance of encouraging sports participation as adolescents continue to age, as well as encourage both sexes to be involved in sports. Further, a recent systematic review and meta-analysis found that sports team participation decreased adolescents' odds for anxiety symptoms and improved their social health outcomes (e.g., academic performance) (Zuckerman et al., 2021). Thus, it is essential to promote participation in prosocial behaviors including sports and club or organization participation during adolescence for both the prevention and reduction of anxiety symptoms.

The current study used the most recently available and combined 2018–2019 NSCH dataset at the time of analysis, and results are generalizable to U.S. adolescents ages 12–17 years. However, there are limitations associated with this secondary analysis study that should be noted. The 2018–2019 NSCH relied on parent-reported questionnaire responses, which may have led to under- or over-reporting of adolescents' emotional and physical health and related behaviors due to issues with parents recalling information within a timeframe (e.g., past 12-months) and/or responding in a socially desirable manner. For example, current anxiety problems were measured using parent-reported questionnaire items, and future research should consider using health records to confirm these responses and consider asking adolescents questions about anxiety symptoms to assess potential undiagnosed anxiety problems. Additionally, future work should consider using a mixed-methods or qualitative study design and offer parents and adolescents the opportunity to provide more in-depth information. Further, the NSCH employed a cross-sectional study design and this study included two independent samples of adolescents who participated in the 2018 NSCH and 2019 NSCH. Therefore, longitudinal associations across the two years could not be assessed and causal inferences cannot not be ascertained. Thus, there may be a bidirectional relationship between current anxiety problems and organized activity participation and we could not distinguish whether anxiety problems occurred prior to, during, or after organized activity participation. For example, it is possible that adolescents with current anxiety problems were encouraged to participate in organized activities to mitigate their symptoms. It is also possible that adolescents with specific anxiety problems avoided organized activity participation, such as having social anxiety and perceiving risk of negative evaluation or having a panic disorder and avoiding potential related physical symptoms that may occur during sports participation such as shortness of breath. Future research should consider assessment of anxiety diagnosis type with organized activity participation among adolescents.

Conclusion

This study found that adolescents with current anxiety problems were less likely to participate in organized activities including sports and clubs or organizations compared to their peers without current anxiety problems, while adjusting for important adolescent and family characteristics. Study findings should be considered when creating and implementing community health promotion and education prevention programs and interventions for adolescents. In the school and community locations, promoting organized activity participation, especially sports and clubs or organizations, may assist in lower current anxiety problems among adolescents. At the policy level, it is important to find ways to create access to these activities, especially among adolescents of lower socioeconomic status. While our study focused on the most recent 2018–2019 NSCH data, it is also important to note that recent global data suggest that from pre- to mid-coronavirus 2019 (COVID-19) pandemic, an increased association has been reported between current anxiety disorders and increased infections and human mobility reductions (Santomauro et al., 2021). Therefore, increasing adolescents' participation in activities is especially critical during the current COVID-19 pandemic. Finally, in the healthcare setting, it is vital for clinicians to use valid assessment tools for early detection of anxiety symptoms and disorders to allow for early intervention and associated treatment plans. It is important to provide adolescents with efforts that focus on anxiety prevention and management as well as participation in organized activities that may promote their overall health and wellness during this critical developmental period.

Declarations

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