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Adolescent Chronic Health Conditions and School Disconnectedness

Christine James, MSW^a, Hope Corman, PhD^{b,c}, Kelly Noonan, PhD^d, Nancy E. Reichman, PhD^e, Manuel E. Jimenez, MD, MS, FAAP^e

^aSchool of Social Work, Rutgers University, New Brunswick, NJ

^bDepartment of Finance and Economics, Rider University, Lawrenceville, NJ

^cHealth Economics Program, National Bureau of Economic Research, New York, NY

^dDepartment of Economics, Princeton University, Princeton, NJ

^eThe Department of Pediatrics, Rutgers University – Robert Wood Johnson Medical School, Child Health Institute of New Jersey, New Brunswick, NJ

Abstract

Objective: To examine associations between chronic health conditions and school disconnectedness, trouble getting along with others at school, and peer victimization at age 15.

Method: We conducted a secondary analysis of population-based data from the Fragile Families and Child Wellbeing birth cohort to investigate associations between chronic developmental/behavioral and physical health conditions and school disconnectedness, trouble getting along with others at school, and peer victimization of adolescents using mother-reported child health conditions and youth-reported relationships/experiences at school ascertained from standardized scales. Associations were examined using linear and logistic regression models adjusting for confounding factors.

Results: Of the 2,874 adolescents included, more than 1/3 had at least one chronic health condition. Compared to those with no chronic health conditions, adolescents with developmental/behavioral health conditions felt more disconnected from school (by .22 standard deviations [SD]), had more trouble getting along with others at school (.22 SD), and were more victimized by peers at school (.20 SD). Teens with physical health conditions also felt more disconnected from school (.10 SD), had more trouble getting along with others at school (.12 SD), and were more victimized by peers (.12 SD). One noteworthy difference was that adolescents with developmental/behavioral conditions were more likely than those with no conditions to report trouble getting along with teachers, but adolescents with physical health conditions were not.

Address correspondence to: Christine James, MSW, LSW, Rutgers School of Social Work, 120 Albany Avenue, Tower 2, New Brunswick, NJ 08901, cmjames@rutgers.edu; chrisjames1@comcast.net.

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Conclusion: Chronic health conditions were associated with disconnectedness from school and negative school social interactions in this study of U.S. urban youth, suggesting that targeted resources and interventions for this population are needed.

Keywords

disability; school connectedness; adolescents; chronic health conditions

INTRODUCTION

School disconnectedness, a feeling or sense of not belonging or fitting in at school, is associated with adverse adolescent outcomes, including delinquency^{1,2} and high school dropout,³ as well as adverse longer-term outcomes, including violence and high risk sexual behavior.⁴ School disconnectedness is exacerbated by negative relationships with peers and teachers, lack of peer-group belonging, and non-participation in school activities.^{1,5} The school closures, absence of school activities, and isolation at home as a result of the COVID-19 pandemic are expected to lead to increased feelings of disconnection from school, making it particularly important to identify groups of children that may be vulnerable.⁶

Youth with disabilities may be at risk for school disconnectedness due to an increased risk of bullying victimization,^{7,8,9,10} school discipline,^{11,12} and non-participation in school activities.¹³ A few studies have found associations between child disability (measured various ways; there is no standard measure) and school disconnectedness, but were based on small specialized samples, used few statistical controls, and rarely considered comparison groups of children with no disabilities.^{14,15,16,17,18} As such, findings from previous studies cannot be generalized to the population level. In this study, we use rich population-based data to investigate associations between chronic health conditions that are potentially disabling, categorized as developmental/behavioral or physical, and school disconnectedness at age 15. We also investigated associations between each of the two types of chronic health conditions and trouble getting along with teachers and other students and victimization by peers, which are potential pathways.

METHODS

Data

We use data from the Fragile Families and Child Wellbeing (FFCWB) study, a national birth cohort study that randomly sampled births in large U.S. cities between 1998 and 2000. By design, approximately three quarters of interviewed mothers were unmarried. Face-to-face interviews were conducted with 4,898 mothers while they were still in the hospital after giving birth.^{19,20} The baseline response rate was 86% among eligible mothers. Follow-up interviews were conducted 1, 3, 5, 9, and 15 years later. Information was collected from mothers on their children's health conditions at each time point and the teens reported on their school experiences at 15 years.

Sample

Of the 4,898 children at baseline (birth), 3,444 completed the 15-year survey. Our sample was limited to teens living with their biological mothers and not home-schooled, reducing the sample to 2,968. Of those, 94 had missing data on analysis variables. Comparisons (at baseline) between the 2,874 cases in our sample to the 2,024 cases not in our sample indicated that mothers who left the study had lower income and education, were more likely foreign-born, and were more likely to have 15-year-old children who were low birthweight and male.

Measures

Outcomes—We consider being disconnected from school, having trouble getting along with others at school, and experiencing victimization by peers as outcomes, based on three different validated scales. For being disconnected from school, the FFCWB 15-year child survey included a version of a school connectedness scale developed for the National Longitudinal Study of Adolescent Health (Add Health) that was adapted (by using four of the six original questions) for the Panel Study of Income Dynamics, Child Development Supplement III (PSID CDS III).²¹ Psychometric properties of the Add Health version were evaluated in a study that found “acceptable reliability ($\alpha = .82$ to $.87$) and concurrent validity ($r = .44$ to $.55$) across 18 sociocultural groups (p. 990)”²² and another study found that the Add Health scale had good internal consistency ($\alpha = .79$).¹ As far as we know, the PSID version has not been validated. For having trouble getting along with others at school, the FFCWB 15-year survey included a “trouble in school” scale from the Add Health study that had a Cronbach α reliability of $.69$.²³ However, we used only 2 of the 4 questions in the scale, as detailed below. For experiencing victimization by peers, the FFCWB 15-year child survey included a Peer Bullying/Victimization assessment from the PSID CDS III that Kochenderfer and Ladd (1996) found yielded “sufficiently reliable and valid data for identifying young victims (p. 1308),” with $\alpha = .74$.²⁴

Disconnected from School: Teens were asked how much they agreed with each of the following statements by providing a rating of 1 (“strongly agree”), 2 (“somewhat agree”), 3 (“somewhat disagree”), or 4 (“strongly disagree”): “I feel close to people at my school,” “I feel like I am part of my school,” “I am happy to be at my school,” and “I feel safe at my school.” We summed responses to the four questions to create a scale of school disconnection. The possible range of scores was 4 (strongly agree with all 4 statements) to 16 (strongly disagree with all), with a higher score indicating more school disconnection. Our sample mean was 6.220 with a standard deviation (SD) of 2.26 and scores ranged from 4–16. We also considered the 4 components individually, with binary outcomes assigned a value of 1 if the response was “somewhat disagree” or “strongly disagree,” and 0 otherwise.

Trouble Getting Along with Others at School: Teens were asked how often they have/had trouble getting along with teachers and how often they have/had trouble getting along with other students (never, sometimes, or often). Based on the 4-item Add Health scale that included two questions pertaining to academic performance, we created a subscale that summed responses to the two questions relevant to social interactions. Each “never” was assigned a 1, “sometimes” a 2, and “often” a 3. The possible range of scores was 2 (“never”

for both) to 6 (“often” for both), with higher scores representing more trouble getting along with the relevant party (teachers or other students) in school. Our sample mean was 3.362 with a SD of 1.25 and scores ranged from 2–6. We also considered the two components individually as outcomes, using binary variables with a value of 0 if the response was “never,” and 1 otherwise.

Victimized by Peers.: Teens were asked how often in the last month (or, if the interview took place in the summer, in the previous school year), kids at their school do the following: “Pick on you or say mean things to you,” “hit you or threaten to hurt you physically,” “take things, like your money or lunch, without asking,” and “purposely leave you out of activities.” The response choices were “never,” “once a week,” “several times a week,” or “about every day.” Based on the Peer Bullying/Victimization assessment in the PSID CDS III, we created a peer victimization scale that summed all responses. Each “never” was assigned a 0, “less than once a week” a 1, “once a week” a 2, “several times a week” a 3, and “about every day” a 4. The possible range of scores was 0 (“never” for all 4) to 16 (“about every day” for all), with higher scores representing more peer victimization. In our sample, the mean was .670 and the SD was 1.60 and scores ranged from 0–14. We also considered the four components individually as outcomes, using binary variables with a value of 0 if the response was “never,” and 1 otherwise.

Chronic Health Conditions—We considered developmental/behavioral health and physical health conditions using mothers’ reports when the children were 9 and 15 years old (Appendix Table 1). The developmental pediatrician on our research team considered all of the conditions that were reported by mothers and identified those that were likely to be chronic and potentially disabling (some of the conditions reported by mothers that were not considered chronic and potentially disabling were respiratory (primarily asthma), muscular, allergies, eczema, headaches, and scoliosis), and then classified the chronic and potentially disabling conditions as primarily developmental/behavioral or physical.

Teens were coded as having a developmental/behavioral health condition at age 15 if any of the following were reported by the mother at that time point: attention deficit disorder/attention deficit hyperactivity disorder (ADD/ADHD), autism, developmental delay, seizure, epilepsy, or depression. In addition, teens were coded as having a developmental/behavioral health condition if the mother reported at year 9 (the last time these conditions were assessed) that the child had Down syndrome or cerebral palsy.

Teens were coded as having a physical health condition at age 15 if any of the following were reported: problem with limbs, heart disease, diabetes, high blood pressure, or anemia. We also coded teens as having a physical health condition if their mothers reported that their activities at home, school, or work were limited because of allergies, digestive problems, headaches, ear infections, or breathing difficulties. Mothers were asked if the child had any of these conditions (the list also included stuttering, which is a developmental condition and not a physical condition), and if so which ones, and then whether the child had activity limitations from *any* of the 6 conditions. If a mother reported that her child had activity limitations from any of the 6 conditions, but the only condition of the 6 that she reported was stuttering (this applied to only 3 children), we did not consider that child to have a physical

health condition based on question about activity limitations. Since some questions about physical health were not asked at age 15, we also coded teens as having a physical health condition if any of the following conditions were reported by the mother at age 9: sickle cell anemia, blindness (partial or full), or deafness (partial or full).

Covariates—All potentially time-varying covariates were from the 15-year survey. In adjusted models, we controlled for the teen's gender and age; maternal age, race-ethnicity, foreign-born status, education, employment, and marital status; number of children in household; and household income.

Analysis

First, we compared the maternal, child, and household characteristics of teens with no relevant (chronic and potentially disabling) health conditions, any relevant developmental/behavioral or physical health condition, any relevant developmental/behavioral health condition, and any relevant physical health condition. Statistically significant differences between teens with any developmental/behavioral or physical health condition and those with no chronic health conditions were ascertained using 2-tailed *t* tests for comparisons of means, with $p=.05$ as the threshold.

Second, we compared the school disconnectedness and relationship scales (and components) across the same groups—teens with no relevant health conditions, any relevant developmental/behavioral or physical health condition, any relevant developmental/behavioral health condition, and any relevant physical health condition. Again, statistically significant differences between teens with any developmental/behavioral or physical health condition and those with no chronic health conditions were ascertained using 2-tailed *t* tests for comparisons of means, with $p=.05$ as the threshold.

Third, we estimated unadjusted and adjusted linear regression models (for scale outcomes) and logistic regression models (for binary outcomes) of associations between presence of health conditions (any developmental/behavioral health condition and any physical health condition, compared to no conditions) and the school disconnectedness and relationship outcomes. The health condition variables were not mutually exclusive, so having one type of condition did not preclude having the other type. Estimates are presented as coefficients (for linear models) or odds ratios (OR, for logistic regression models) and 95% confidence intervals (CI).

Finally, we estimated supplementary models that considered specific types of health conditions that are of interest but not too rare for meaningful analysis in this population-based cohort. Other supplementary models alternatively involved reclassifying certain health conditions, including an indicator for having more than one health condition (of any type), and including an indicator for having both types of conditions.

All analyses were conducted using Stata Version 15.0 statistical software. The authors' Institutional Review Boards determined this study to be exempt.

RESULTS

Over one third (995/2,874) of teens had a chronic and potentially disabling developmental/behavioral or physical health condition (Table 1). As a comparison point, almost half of U.S. adolescents ages 12–17 (45%) had at least one of 27 specific chronic health conditions in 2016–17.²⁵ In our sample, 661 teens had developmental/behavioral health conditions, 518 had physical health conditions, and 184 had both (Appendix Table 1). Almost half of teens with developmental/behavioral conditions had depression (301/661) and about 2/3 had ADD/ADHD (442/661). Almost half the teens with physical health conditions had at least one of the conditions for which activity limiting conditions were assessed (240/518). Of the teens with any health condition, over one third (34%) had more than one (not shown).

Teens with chronic and potentially disabling health conditions had lower proportions of mothers who were foreign born, employed, and married, and higher proportions of mothers that who were poor and non-Hispanic white compared to teens with no such conditions (Table 1). Overall, those with conditions were more likely to be male and socioeconomically disadvantaged than their peers with no conditions, making it important to control for these factors in adjusted models.

Teens with any chronic and potentially disabling health condition were more disconnected from school, had more trouble getting along with others in school, and were more likely to be victimized by peers than those with no such conditions (Table 2). Most components used to create the scale measures also differed significantly when comparing teens with and without conditions. Teens with any condition were more likely than those with no conditions to not feel close with people at school, not feel like a part of their school, and not be happy at school, and they were more likely to have trouble getting along with teachers and peers, as well as to be picked on, hit, and left out by peers.

Unadjusted and adjusted estimates of associations between health conditions and school disconnectedness and relationship scales indicate that both types of conditions were significantly associated with having trouble getting along with others at school, and being victimized by peers. In addition, teens with developmental or behavioral health problems were significantly more disconnected from school (Table 3, with full adjusted results in Appendix Table 2).

For specific estimates, we used the coefficients in Panel B of Table 3 in conjunction with the SD of the relevant scale in our sample (2.26 for school disconnectedness, 1.25 for trouble getting along with others, 1.60 for victimization by peers), and found that having a developmental/behavioral health condition was associated with a .22 SD increase in school disconnectedness (coefficient of .505 divided by 2.26, the SD for that scale), .20 SD increase in trouble getting along with others, and .20 SD increase in victimization by peers. Having a physical health condition was associated with increases in trouble getting along with others at school, and the peer victimization scales by .12, and .12 SDs, respectively.

The analyses of the scale components generally indicate strong associations with chronic health conditions (Table 4). The odds of not feeling close to people at school, not being a part of school, and being unhappy at school were all higher for teens with developmental/

behavioral health conditions compared to those with no conditions (OR: 1.694; CI: 1.298–2.211, OR: 2.230; CI 1.696–2.933, and OR: 1.723; CI 1.312–2.263, respectively). Having a physical health condition was associated with being unhappy at school (OR: 1.414; CI: 1.062 – 1.883). Feeling unsafe at school was not associated with either type of health condition.

For the trouble getting along at school, the odds of both individual components (trouble getting along with teachers and trouble getting along with other students) were higher for those with developmental/behavioral health conditions (OR: 1.453; CI: 1.207–1.748 and OR: 1.581; CI: 1.310–1.908, respectively), but only trouble getting along with other students was associated with having a physical health condition (OR: 1.269; CI: 1.040–1.550).

For peer victimization, both types of health conditions were associated with being picked on and left out (OR: 1.504; CI: 1.198–1.890 and OR: 1.632; CI: 1.236–2.154, respectively, for developmental/behavioral and OR: 1.293; CI: 1.009–1.658 and OR: 1.447; CI: 1.076–1.954, respectively, for physical). Neither type was associated with having things taken, but teens with developmental/behavioral conditions were more likely to have been hit by peers (OR: 1.471; CI: 1.031–2.098).

Supplementary Analyses

All results from supplementary analyses are presented in Appendix Table 3. First, we estimated supplementary models that included measures of specific developmental/behavioral health conditions that are associated with social behavior and social information processing. Specifically, we estimated models that alternatively included measures of depression, ADD/ADHD, and autism, as well as indicators for physical health conditions and developmental/behavioral conditions other than the specific condition considered (e.g., in models with an indicator for ADD/ADHD, that condition was not included in the general indicator for developmental/behavioral conditions). Depression was associated with the school disconnectedness and peer victimization scales, by .28 and .31 SDs, respectively. More specifically, depression was significantly associated with not feeling close to people at school, not feeling a part of school, and not feeling happy at school, as well as being bullied, picked on, hit, and left out by peers and having trouble getting along with peers. ADD/ADHD was associated with the school disconnectedness scale (.14 SDs) and the “trouble getting along with others at school” scale (.23 SDs), as well as not feeling part of school, being left out, and having trouble getting along with teachers and other students. Models that included autism as a separate category from the other developmental/behavioral conditions suggest that teens with autism are more likely to be disconnected from school and experience victimization by peers. However, the estimates for autism were not statistically significant at conventional levels, possibly due to the low number of teens in this category.

Second, we estimated models with different classifications of the activity limitations variable. Having maternal reports of their children’s activity limitations helped in our goal of identifying children with physical conditions that were disabling. However, activity limitations were assessed only in regard to a certain set of conditions. To better assess associations (albeit limited ones) between activity limitations and the schooling outcomes, we estimated supplementary models that included a separate indicator for whether the

mother reported that the child's activities at home, school, or work were limited because of allergies, digestive problems, headaches, ear infections, or breathing difficulties, in addition to the indicators for any physical health condition (other than the activity limitations measure) and any developmental/behavioral condition. The measure of activity limitations was positively associated with (1) the school disconnection scale, primarily through being unhappy at school; (2) the peer victimization scale, largely through being bullied, picked on by peers and left out; and (3) the trouble getting along with others at school scale, because it was associated with both components. We also estimated models that excluded the measure of activity limitations from the category of physical health conditions. We found that the associations between physical health conditions and the schooling outcomes were reduced and no longer statistically significant at conventional levels, underscoring the potential importance of activity limitations for school relationships.

Third, we estimated models with different classifications of the seizures or epilepsy variable. We included seizures or epilepsy in the category of developmental/behavioral health conditions because epilepsy is a neurological condition that is strongly associated with developmental disabilities. However, the combined category of seizures or epilepsy can potentially include physical health conditions as well. We thus estimated supplementary models that excluded seizures or epilepsy as a developmental/behavioral health condition and, alternatively, considered seizures or epilepsy as a physical health condition. In both specifications, the estimated effects of developmental/behavioral and physical health conditions were very similar to those in Tables 3 and 4.

Finally, we estimated supplementary models that included a measure of having more than one chronic health condition (any type) or having both types of conditions (at least one of each type) in addition to the indicators for having each type of condition. More than one condition was independently associated with disconnectedness from school as characterized by the scale, by .20 SDs. It was also independently associated with the victimization scale, by .35 SDs, and increased odds of being bullied, picked on, and left out by peers. The estimates for having both types were never statistically significant; i.e., having both types was not associated with any of the outcomes above and beyond the additive associations of having each type of condition.

DISCUSSION

In a national population-based urban birth cohort, chronic and potentially disabling health conditions were strongly associated with school disconnectedness, trouble getting along with others at school, and peer victimization at age 15. Robust links between child disability or chronic health conditions and school disconnectedness have not previously been established at the population level. Our findings of significant associations between chronic health conditions and school disconnectedness are consistent with those from a very limited number of previous studies on the topic, most of which were based on the same small convenience sample, grouped all disabling conditions together, used few statistical controls, and did not consider comparison groups of children with no disabilities.^{14,16,17,18} One recent study with a much larger sample (N=11,353) did not compare youth with disabilities to those without disabilities, relied exclusively on survey data from youth, and was not

racially or nationally representative of any population.¹⁵ The smaller prior literature on links between youth disability and student/teacher relationships also relied on small non-representative samples and no comparisons to youth without disabilities.^{17,26,27} Our findings vis-à-vis peer victimization build on a more robust previous literature by considering developmental/behavioral and physical health conditions, as well as some individual types of conditions, separately.^{7,8,9,10}

Overall, we found that youth with chronic health conditions felt less close to others at school, less like they were a part of their school, and less happy at school and that they were more likely to be picked on and feel left out by their peers compared to youth with no chronic health conditions. These findings for the various school relationship outcomes may be interrelated, as other studies have found that having strained relationships with teachers and/or other students is a risk factor for feeling disconnected from school,^{17,26,27} that youth with disabilities are at elevated risk for being disciplined by their teachers,^{11,12} which could potentially strain student-teacher relationships and make students less happy at school, and that youth with disabilities are at elevated risk for being bullied by peers, which itself has been associated with greater school disconnectedness.^{10,28}

We found larger associations with school disconnectedness and school relationship outcomes for adolescents with developmental/behavioral conditions than for those with physical conditions. Specifically, youth with developmental/behavioral conditions scored almost $\frac{1}{4}$ SD worse on all three outcome scales as compared to youth with no conditions. We were able to separately consider depression and ADD/ADHD—the two most common developmental/behavioral conditions in our sample—and found that depression was associated with school disconnectedness and peer victimization and that ADD/ADHD was associated with school disconnectedness and trouble getting along with others. Both depression and ADD/ADHD can adversely affect youth social behavior and potentially lead to struggles in relationships with teachers and other students. However, the associations could partially reflect a feedback loop, as school connectedness can be a protective factor for emotional difficulties.²⁸ That is, not feeling a sense of belonging at school and having problematic peer relationships can exacerbate emotional distress and mental health symptoms and potentially worsen school relationships.²⁹

We also found that adolescents with physical health conditions were not more likely than their peers with no conditions to report trouble getting along with teachers. It is possible that stronger relationships with teachers buffered the potential effects of physical health conditions on school disconnectedness. Students with physical health conditions may receive more attention and/or support from teachers for their physical health needs while at school and student-teacher relationships may benefit from those added opportunities for connection and interaction. Importantly, we found that our measure of activity limitations due to a specific set of conditions was a major contributor to the associations found for the physical health conditions measure. It is plausible that youth with conditions that do not interfere with their activities are not seen as any different than their typically developing peers and are therefore not subject to being left out, bullied, or other negative interactions. This inference is only suggestive, however, as we were not able to assess the extent to which most of the chronic health conditions considered were associated with activity limitations.

The findings from this study point to the importance of schools in ensuring that youth with disabilities have opportunities for social inclusion and the potential benefits of interventions that foster positive peer relationships. Peer social support is associated with decreased bullying, fighting among students, and peer victimization³⁰ and school connectedness appears to be a protective factor for bullying victimization;²⁸ as such, interventions that focus on increasing feelings of school belonging in concert with peer support may lead to reductions in peer victimization³⁰ and also make students feel more connected to school. Such interventions would benefit many children, including those with disabilities. The cohort in this study physically attended school. The finding that children with chronic health conditions were already more disconnected from school before COVID-19, when they had access to in-person resources and opportunities for interaction, suggests that this group is at risk for further disconnectedness in the current context. As children transition from remote or reconfigured schooling arrangements back to in-person classrooms, it will be critical to implement actions that reduce exposure to peer victimization and strengthen teacher and peer relationships. The findings from this study highlight the need for targeted interventions to promote positive peer and teacher interactions for youth with disabling health conditions, whether physically in school or not. Such interventions could involve technology, assistive devices, or aides to engage youth in peer-connecting activities or outreach by teachers to enhance positive relationships and foster a sense of connection.

Strengths of this study include the focus on a population-based national birth cohort; distinguishing youth with and without chronic health conditions and with different types of conditions; controlling for detailed teen, maternal, and household characteristics; and measuring youths' reports of belonging and connectedness at school using full or modified versions of validated scales.

This study is also subject to certain limitations. First, the results may not be generalizable to all populations and settings. Second, the analysis did not include all disability types, such as learning disabilities. Third, although the outcome measures were derived from validated scales, we used a modified version of the school connectedness scale that is included in an important and widely used national survey (the PSID) but has not been independently validated, as well as our own modification of a scale used in Add Health that allowed us to focus more specifically on trouble getting along with others at school.

Fourth, the chronic health conditions included and categorized together as developmental/behavioral or physical are heterogeneous and we were able to separately consider only a few specific conditions. While we had a large sample, it was from a population-based cohort so it did not include large number of children with most potentially disabling conditions. However, studies at the population level complement existing studies using non-representative samples or no comparison groups (but focusing on specific conditions, many of which are rare in the population) by documenting associations within the population at large. The only way to include rare conditions in studies of population-based cohorts is to group them with other conditions. When interpreting the results from this study, it is important to consider that the conditions within each of the two broad categories unlikely have uniform associations with the outcomes.

Fifth, although the data we used are quite rich, this retrospective analysis leaves open the possibility that the associations between chronic and potentially disabling health conditions of teens and their school-related outcomes may have been confounded by unobserved factors. Although the disabilities may have caused school disconnectedness, trouble getting along with others at school, and peer victimization, it is important to consider possible alternative explanations for the associations. For example, it is possible that teens who are disconnected from school and victimized by their peers are more likely to get diagnosed with a developmental or behavioral disorder, or that family hardship, instability, or trauma causes children to act out at school, resulting in both diagnoses of developmental/behavioral conditions and problematic relationships with teachers and peers.

Finally, it is possible that some of the observed associations reflect reverse causality—e.g., as in the example discussed earlier, wherein adverse social behaviors associated with depression and ADD/ADHD can lead to conflict with teachers and other students, peer victimization, and disconnection from school, which then can further exacerbate emotional distress, mental health symptoms, and adverse social behaviors.

CONCLUSION

Experiences in adolescence can have long term consequences for future health and wellbeing, and schools are important institutions in adolescents' lives. We found that adolescents with chronic health conditions were more disconnected from school compared to their peers with no chronic health conditions. They also had worse social relationships with teachers and peers at school, which may have contributed to the feelings of disconnection. The findings point to a need for interventions to provide opportunities for positive interactions with teachers and peers, whether school is in-person or remote, for children with chronic health conditions.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1:

Characteristics of Sample by Presence of Adolescent Health Conditions (N=2,874)

	Full Sample	No chronic health conditions	Any developmental or behavioral or physical health condition(s)	Any developmental or behavioral health condition(s)	Any physical health condition(s)
	N=2,874	N=1,879	N=995	N=661	N=518
Teen characteristics					
Male *	.506	0.476	0.563	0.620	0.496
Age, mean in years (s.d.)	15.556 (.74)	15.557 (.75)	15.554 (.73)	15.563 (.74)	15.585 (.74)
Maternal characteristics					
Age, mean in years (s.d.)	40.729 (6.01)	40.816 (6.06)	40.565 (5.91)	40.487 (5.96)	40.579 (5.87)
Race-ethnicity					
Non-Hispanic white *	0.209	0.186	0.252	0.298	0.207
Non-Hispanic black	0.507	0.520	0.482	0.449	0.506
Hispanic	0.248	0.254	0.236	0.222	0.255
Other race-ethnicity	0.036	0.040	0.029	0.030	0.033
Foreign born *	0.141	0.159	0.108	0.094	0.127
Education					
< High school graduate	0.178	0.184	0.166	0.145	0.201
High school graduate	0.184	0.181	0.189	0.197	0.180
Some college	0.442	0.438	0.449	0.454	0.442
College graduate	0.197	0.197	0.196	0.204	0.178
Employed *	0.719	0.734	0.690	0.682	0.681
Married *	0.395	0.411	0.364	0.356	0.361
Household characteristics					
# children, mean (s.d.)	2.605 (1.51)	2.594 (1.52)	2.626 (1.50)	2.59 (1.49)	2.72 (1.59)
Household income, % of federal poverty line					
< 100% *	0.309	0.286	0.354	0.362	0.357
100–199% *	0.283	0.302	0.247	0.248	0.272
> 200%	0.408	0.412	0.399	0.390	0.371

Notes: All figures are proportions unless indicated otherwise. s.d. = standard deviation. All time-varying characteristics were assessed when the child was 15 years old.

* $P < .05$ for difference between teens who had no health conditions and those who had any developmental or physical health condition(s). See Appendix Table 1 for information about coding of specific health conditions.

Table 2:

School Disconnectedness and Relationships by Presence of Adolescent Health Conditions (N=2,874)

	Full Sample	No chronic health conditions	Any developmental or behavioral or physical health condition(s)	Any developmental or behavioral health condition(s)	Any physical health condition(s)
	N=2,874	N=1,879	N=995	N=661	N=518
Disconnected from school					
Scaled score, mean (s.d.) *	6.220 (2.26)	6.093 (2.16)	6.458 (2.42)	6.546 (2.53)	6.494 (2.37)
Components:					
Not close to people at school *	0.121	0.111	0.141	0.157	0.131
Not part of school *	0.101	0.081	0.138	0.157	0.133
Unhappy at school *	0.110	0.093	0.142	0.151	0.149
Unsafe at school	0.062	0.056	0.074	0.074	0.085
Trouble getting along with others at school					
Scaled score, mean (s.d.) *	3.362 (1.25)	3.265 (1.24)	3.548 (1.25)	3.582 (1.24)	3.535 (1.26)
Components:					
Trouble getting along with teachers *	0.508	0.478	0.563	0.579	0.556
Trouble getting along with other students *	0.525	0.489	0.594	0.607	0.589
Victimized by peers					
Scaled score, mean (s.d.) *	.670 (1.60)	0.551 (1.41)	.896 (1.87)	0.944 (1.87)	0.875 (1.89)
Components:					
Gets picked on by other kids *	0.166	0.142	0.211	0.219	0.205
Is hit by other kids *	0.059	0.050	0.076	0.082	0.079
Has things taken by other kids	0.035	0.030	0.043	0.044	0.041
Is left out by other kids *	0.100	0.081	0.136	0.144	0.137

Notes: All figures are proportions unless indicated otherwise. s.d. = standard deviation.

* $P < .05$ for difference between teens who had no health conditions and those who had any developmental or physical health condition(s). See Appendix Table 1 for information about coding of specific health conditions.

Disconnected from school: Teens were asked how much they agreed with each of the following statements by providing a rating of 1 ("strongly agree"), 2 ("agree"), 3 ("disagree"), or 4 ("strongly disagree"): "I feel close to people at my school," "I feel like I am part of my school," "I am happy to be at my school," and "I feel safe at my school." We summed responses to the four questions. The possible range of scores was 4 (strongly agree with all 4 statements) to 16 (strongly disagree with all), with a higher score indicating more school disconnection. For the components, we created binary outcomes with a value of 1 if the response was "somewhat disagree" or "strongly disagree," and 0 otherwise.

Trouble getting along with others at school: Teens were asked how often they have trouble getting along with teachers and how often they have trouble getting along with other students (never, sometimes, or often). Each "never" was assigned a 1, "sometimes" a 2, and "often" a 3. The possible range of scores was 2 ("never" for both) to 6 ("often" for both), with higher scores representing more trouble getting along with others. For each component, we created a binary variable with a value of 0 if the response was "never," and 1 otherwise.

Victimized by peers: Teens were asked how often in the last month kids at their school do the following: "Pick on you or say mean things to you," "hit you or threaten to hurt you physically," "take things, like your money or lunch, without asking," and "purposely leave you out of activities." The response choices were "never," "once a week," "several times a week," or "about every day." We created a peer victimization scale that

summed the responses. Each “never” was assigned a 0, “less than once a week” a 1, “once a week” a 2, “several times a week” a 3, and “about every day” a 4. The possible range of scores was 0 (“never” for all 4) to 16 (“about every day” for all), with higher scores representing more peer victimization. For each component, we created a binary variable with a value of 0 if the response was “never,” and 1 otherwise.

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Table 3:

Adjusted and Unadjusted Ordinary Least Squares Regression Estimates of Associations Between Adolescent Health Conditions and School Disconnectedness and School Relationship Scales (N = 2,874)

	Disconnected from school	Trouble getting along with others at school	Victimized by peers
	Coefficient [95% CI]	Coefficient [95% CI]	Coefficient [95% CI]
PANEL A Unadjusted			
Any developmental or behavioral health condition(s)	0.389 [0.175 – 0.603]	0.264 [0.155 – 0.373]	0.330 [0.172 – 0.488]
Any physical health condition(s)	0.276 [0.053 – 0.498]	0.170 [0.049 – 0.290]	0.198 [0.022 – 0.375]
PANEL B Adjusted			
Any developmental or behavioral health condition(s)	0.505 [0.290 – 0.719]	0.274 [0.164 – 0.385]	0.316 [0.154 – 0.478]
Any physical health condition(s)	0.215 [–0.007 – 0.437]	0.151 [0.031 – 0.270]	0.191 [0.014 – 0.368]

Notes: In each panel, the columns present estimates from a single regression model containing both health condition measures. CI = confidence interval. Adjusted models control for all teen, maternal, and household characteristics in Table 1. The health condition variables are not mutually exclusive. See Appendix 2 for full adjusted regression results.

Disconnected from school scale: Teens were asked how much they agreed with each of the following statements by providing a rating of 1 (“strongly agree”), 2 (“agree”), 3 (“disagree”), or 4 (“strongly disagree”): “I feel close to people at my school,” “I feel like I am part of my school,” “I am happy to be at my school,” and “I feel safe at my school.” We summed responses to the four questions. The possible range of scores was 4 (strongly agree with all 4 statements) to 16 (strongly disagree with all), with a higher score indicating more school disconnection.

Trouble getting along with others at school scale: Teens were asked how often they have trouble getting along with teachers and how often they have trouble getting along with other students (never, sometimes, or often). Each “never” was assigned a 1, “sometimes” a 2, and “often” a 3. The possible range of scores was 2 (“never” for both) to 6 (“often” for both), with higher scores representing more trouble getting along with others.

Victimized by peers scale: Teens were asked how often in the last month kids at their school do the following: “Pick on you or say mean things to you,” “hit you or threaten to hurt you physically,” “take things, like your money or lunch, without asking,” and “purposely leave you out of activities.” The response choices were “never,” “once a week,” “several times a week,” or “about every day.” We created a peer victimization scale that summed the responses. Each “never” was assigned a 0, “less than once a week” a 1, “once a week” a 2, “several times a week” a 3, and “about every day” a 4. The possible range of scores was 0 (“never” for all 4) to 16 (“about every day” for all), with higher scores representing more peer victimization.

Table 4:

Adjusted Logistic Regression Estimates of Associations Between Adolescent Health Conditions and Components of School Disconnectedness and School Relationship Scales (N = 2,874)

	Any developmental or behavioral health condition(s)	Any physical health condition(s)
	OR [95% CI]	OR [95% CI]
Disconnected from school		
Not close to people at school	1.694 [1.298 – 2.211]	0.969 [0.720 – 1.304]
Not part of school	2.230 [1.696 – 2.933]	1.257 [0.929 – 1.700]
Unhappy at school	1.723 [1.312 – 2.263]	1.414 [1.062 – 1.883]
Unsafe at school	1.265 [0.889 – 1.799]	1.413 [0.985 – 2.026]
Trouble getting along with others at school		
Trouble getting along with teachers	1.453 [1.207 – 1.748]	1.173 [0.962 – 1.432]
Trouble getting along with other students	1.581 [1.310 – 1.908]	1.269 [1.040 – 1.550]
Victimized by peers		
Gets picked on by other kids	1.504 [1.198 – 1.890]	1.293 [1.009 – 1.658]
Is hit by other kids	1.471 [1.031 – 2.098]	1.398 [0.963 – 2.031]
Has things taken by other kids	1.348 [0.854 – 2.127]	1.187 [0.717 – 1.967]
Is left out by other kids	1.632 [1.236 – 2.154]	1.447 [1.076 – 1.945]

Notes: Each row presents estimates from a separate logistic regression model. CI = confidence interval. All models control for all teen, maternal, and household characteristics in Table 1. The health condition variables are not mutually exclusive.

Disconnected from school: Teens were asked how much they agreed with each of the following statements by providing a rating of 1 (“strongly agree”), 2 (“agree”), 3 (“disagree”), or 4 (“strongly disagree”): “I feel close to people at my school,” “I feel like I am part of my school,” “I am happy to be at my school,” and “I feel safe at my school.” For each question, we created a binary outcome with a value of 1 if the response was “somewhat disagree” or “strongly disagree,” and 0 otherwise.

Trouble getting along with others at school: Teens were asked how often they have trouble getting along with teachers and how often they have trouble getting along with other students (never, sometimes, or often). For each question, we created a binary variable with a value of 0 if the response was “never,” and 1 otherwise.

Victimized by peers: Teens were asked how often in the last month kids at their school do the following: “Pick on you or say mean things to you,” “hit you or threaten to hurt you physically,” “take things, like your money or lunch, without asking,” and “purposely leave you out of activities.” The response choices were “never,” “once a week,” “several times a week,” or “about every day.” For each question, we created a binary variable with a value of 0 if the response was “never,” and 1 otherwise.