

Giving Teens a Voice: Sources of Stress for High School Students

Pierce Corson¹, Tyler M. Rogers¹, and Babette Shoemaker¹

¹ Ocean Lakes High School, Virginia Beach, Virginia

ABSTRACT

Teen stress is a pressing health issue in the United States. Consistent, long-lasting stress can weaken the immune system and wear down physical reserves, leaving teens susceptible to negative mental and physical health outcomes. Recent legislation in the state of Virginia (HB1604/SB953) mandates the revision of the Health and Physical Education curriculum to incorporate standards of learning (SOL) that recognize mental health and the important connections between physical and mental health. The aim of our project was to create a survey that allows teens to have a voice in the conversation about revising the health SOL in response to student-reported stress and support factors. Using convenience sampling, high schoolers ($n = 332$) were invited to participate in an anonymous online survey. To identify factors contributing to teen stress levels, participants were asked about their demographics, high school courses and activities, free time, and perception of the support they receive. Stress levels were then evaluated using Cohen's validated 4-item Perceived Stress Scale. Regression and correlation analysis findings suggest that a student's gender, homework level, amount of free and sleep time, perceived parental pressure, and family encouragement of relaxation predicted their perceived stress. Students who felt guilty taking time off or who worried about violence had higher stress levels than other teens, indicating that students' emotions play a role in their stress perceptions. Results from this study can help school communities identify sources of teen stress and inform the development of educational instruction that helps students successfully reduce and cope with stress.

INTRODUCTION

Teen stress is a pressing health issue in the United States. According to the American Psychological Association's survey *Stress in America: Are teens adopting adults' stress habits?*, teens report higher average levels of stress than adults (5.8 vs. 5.1 on a 10-point scale) during the school year (1). In fact, 27% of teens reported their stress levels as 8, 9, or 10 on a 10-point scale during the school year, which indicates a high level of stress (1). Stress is the body's response to a challenge. Humans react to stress by activating their central nervous system and setting off a chain of physiological responses that prepare a person to perform

well under pressure (2). Long-lasting stress can weaken teens immune systems and wear down physical reserves. When this happens, teens are susceptible to negative mental and physical health outcomes (2).

In March 2018, The Virginia General Assembly (392 Code of Virginia §22.1-207) passed legislation in the form of HB1604/SB953 that "requires health instruction to incorporate standards [of learning] that recognize the multiple dimensions of health by including mental health and the relationship of physical and mental health" in an effort to promote student health and well-being. The Virginia Department of Education (VDOE), which is responsible for reviewing and revising the standards of learning (SOL) to comply with the law, has proposed a working timeline for review of the SOL for Health and Physical Education in Virginia. The rationale for collecting survey data from Virginia high school students is 1) to identify the factors that correlate with stress in this population, and 2) to inform the conversation about how the Health SOL might be revised to include information on targeted coping mechanisms to reduce teen stress levels. The aim of this research is to give teens a voice in the conversation about stress factors with the hopes that their collective voice will inform targeted solutions that address teen stress. While the VDOE has indicated that they will solicit public comments for the SOL revisions in 2019, students and other stakeholders who do not closely follow state legislation and curriculum changes are unlikely to be aware of the mandated revisions or participate in the public comment period. Additionally, to our knowledge, no students are represented on the committee that is advising the VDOE on the Health SOL. By collecting and synthesizing data regarding students' experiences with stress and communicating study outcomes to the SOL review committee, we make it possible for the voices of the students ($n = 332$) who participated in our study to be considered in the curriculum revision.

Prior research indicates that there are multiple negative outcomes of teen stress, including depression, fatigue, unhealthy eating habits such as skipping meals or overeating, reduced self-perceptions of academic ability, physical pain, suicidal ideation, and social withdrawal (1, 3-5). Teens report that school is a considerable source of stress and that this stress impacts their performance at home, at work, and at school (1, 6, 7). One in ten teens reports that stress contributes to lower grades and 20% of teens say they neglect their work or school responsibilities due to stress (1).

Given the negative repercussions of stress, it is important to understand specific sources of stress in order to develop programs that help reduce stress and alleviate negative outcomes. This project was designed to address two research questions. First, we asked whether there are specific factors that are correlated with increased stress levels in high school students from Virginia. Second, we asked whether there are certain factors that help combat stress.

Results from this research indicate that student stress is multi-faceted. More homework and less time for other activities such as relaxation and sleep contributed to increased perceived stress levels. Furthermore, findings indicate that families play a role in perceived stress. Students who felt more parental pressure regarding their school performance reported higher stress, while family encouragement of student relaxation time was associated with reduced stress levels. Finally, it was evident that inner emotions shaped the perception of stress. Worrying about violence and feeling guilty about taking time off were tied to perceived stress levels. We propose that school communities should consider our research findings to inform the development of educational instruction that helps students successfully reduce and cope with stress.

RESULTS

In order to investigate factors that contribute to teen stress, we sent an anonymous online survey to high-school aged youth in Virginia. The survey asked students to answer questions about their demographics (e.g. gender, race), high school courses and activities, free time, and their perceptions of the support they receive from friends and family. Student stress levels were measured using the validated four-item Perceived Stress Scale (8). Data collection lasted two weeks, resulting in a sample of $n = 332$ completed surveys.

Descriptive Statistics

The majority of the sample attended specialized academic magnet school programs and students overwhelmingly attended public schools (**Table 1**). Public school recruitment aligns with this project’s purpose of adding to the conversation about mandated SOL revisions for the Virginia public school system. While the sample’s racial statistics were roughly reflective of the total population of Virginia Beach City Public Schools (VBCPS), the population of Asians was higher in the study (19.6% vs. 6.5% overall) and black students were underrepresented (7.2% vs. 19.1%) (**Table 1**).

Stress and Stressor Variables

We ran summary statistics for independent and dependent variable responses (**Table 2**). Students in the sample were involved with extracurricular activities and homework. Three in ten students (29.6%) participated in extracurricular activities for between one and five hours each week, and half of the students (49.5%) reported more than

11 hours of weekly extracurricular participation. A quarter of the students (25.3%) reported doing two hours of homework per night, one in five (20.8%) reported three hours, and another quarter (24.8%) reported doing more than three and a half daily hours of homework. More homework time was significantly correlated with reduced sleep time ($r = -.225, p < .01$). One in five students (22.8%) reported sleeping five hours or less per night. Another third (33.4%) of students reported sleeping between five and six hours nightly.

	N	%
Grade in school:	332	
9	53	16.0
10	123	37.0
11	133	40.1
12	23	6.9
Gender	332	
Male	162	48.8
Female	166	50.0
Gender nonconforming	4	1.2
Race	332	
Black	24	7.2
White	215	64.8
Asian	65	19.6
Hispanic	15	4.5
Multiracial	13	3.9
School type	332	
Public	329	99.1
Private	3	3
Specialized school program	308	
Academic magnet	227	73.7
STEM program	7	2.3
International Baccalaureate	20	6.5
Arts program	10	3.2
Other	5	1.6
None	39	12.7

Table 1. Participant Characteristics

In addition to low sleep times, students reported that they had very little time to relax. Nearly three-fourths (72.0%) of surveyed students responded that they had “none” or “a little” time each week to relax with no responsibilities. Moreover, two-thirds (65.1%) reported feeling guilty “fairly often” or “very often” when they were relaxing, feeling as though they should be doing something productive instead. Another quarter (23.5%) of teens reported that they “sometimes” felt guilty while relaxing. Some of these feelings may have been related to family support. Not all families were likely to encourage teens to take time for themselves. More than four in ten teens (44.6%) said that their families “never” or “almost never” encouraged them to take time for themselves to relax and enjoy life. One in three students (33.7%) said that their families “sometimes” encouraged relaxation times, and one

in five said parents were encouraging “fairly” or “very often.”

	<i>n</i>	Mean	St. Dev.
<i>Potential Stressors</i>			
Extracurricular activity ^a	331	1.60	1.43
Homework (hrs/night)	318	2.71	1.44
Sleep (hrs/night)	324	6.19	1.16
Peer inquiries (0=never, 4=very often)	332	3.33	.793
# Confidants	321	4.46	3.48
Relax time (0=none, 3=a lot)	332	1.15	.711
Parental pressure (0=never, 4=very often)	332	2.42	1.07
Commute time (mins)	322	32.05	20.08
Encourage relaxation (0=never, 4=very often)	332	1.73	1.03
Feeling guilty (0=never, 4=very often)	332	2.84	1.09
Worry of violence (0=never, 4=very often)	332	1.09	.94
<i>Outcome</i>			
Perceived stress ^b (possible range 0-16)	332	7.90	3.40

Table 2. Description of Subjects in Terms of Study Variables
Note. Potential stressors were entered into the equation in the order listed.

a. 1 = 1-5 hrs; 2 = 6-10 hrs; 3 = 11-15 hrs; 4 = 15-20 hrs; 5 = >20hrs
b. Higher scores indicate increased perceived stress

Our data show that other people show interest in students’ academic performance. Almost all respondents (97.6%) indicated that other teens ask them personal questions about their grades and performance on tests, quizzes, and standardized tests. More than half (51.2%) were asked about performance by their peers “very often,” and another third (33.4%) “fairly often.” In addition to their peers’ inquiries, students reported that they felt pressured by their parents about their academic performance. Almost half (47.7%) of those surveyed felt parental pressure “fairly often” (28.9%) or “very often” (18.8%). Another third perceived this pressure “sometimes” (33.7%). Perceived parental pressure was negatively correlated with family encouragement of relaxation ($r = -.294, p < .01$).

Other people play an important role in students’ lives as well. Poor family relationships and family members’ high expectations are also related to increased teen stress (10). Having social support provides a buffer that can modify an individual’s response to events that are potentially stressful (11). Students were asked about the number of people they felt they could honestly and openly talk to about their lives. Student responses ranged from 0 (4.2%) to 20 (1.8%). Three in ten teens (30.8%) reported having one to two confidants. Another four in ten (44.5%) reported having between three and five confidants, and the remainder (24.7%) reported having between six and twenty people to whom they could talk openly. Notably, the reported number of confidants was positively correlated with the amount of time students had to relax each week ($r = .159, p < .01$) and with the amount of family encouragement of relaxation ($r = .125, p < .05$). Number of confidants was inversely related to teens’ reported feelings of guilt while relaxing ($r = -.148, p < .01$). Future work is needed to further explore the specific relationships among these variables.

Students were asked about how often they worried about violence in their schools or homes. While 7 in 10 students (72.3%) students reported “never” (28.6%) or “almost never”

(43.7%) worrying about violence, 2 in 10 (20.2%) reported worrying “sometimes” and a small but important number of students (7.5%) worried about violence “fairly” or “very often.” Worry about violence was negatively correlated with sleep time ($r = -.290, p < .01$) and number of confidants ($r = -.176, p < .01$).

The dependent variable in this study was perceived stress, which was measured using Cohen’s validated 4-item Perceived Stress Scale (PSS-4). Possible stress scores ranged from 0 to 16, with higher scores indicating more stress. The mean score (7.90) was at the scale’s mid-point (8), with a standard deviation (3.40) showing considerable variation in teen reports of perceived stress (Table 3). More than a third of teens (34.6%) scored 10 or higher on the scale, and a considerable number ($n = 54$; 16.3%) scored in the upper quartile (12-16) (Table 3). A similar proportion ($n = 55$; 16.6%) scored in the lower quartile (1-4) (Table 3). No student reported feeling zero stress.

Score	N	%	Cum %
1	7	2.1	2.1
2	13	3.9	6.0
3	13	3.9	9.9
4	22	6.6	16.6
5	29	8.7	25.3
6	43	13.0	38.3
7	29	8.7	47.0
8	34	10.2	57.2
9	27	8.1	65.4
10	38	11.4	76.8
11	23	6.9	83.7
12	18	5.4	89.2
13	21	6.3	95.5
14	7	2.1	97.6
15	6	1.8	99.4
16	2	.6	100.0

Table 3. Scale score totals for perceived stress, the dependent variable

Hierarchical Regression Analysis

The aim of this study was to determine which predictors contributed to students’ perceptions of stress. Since the literature supports a difference between genders related to stress (10, 12), gender was entered into the model first, followed by the remaining predicted stressors. Adding gender to the model yields $R^2 = .143, F(1, 301) = 50.269, p < .01$ (Table 4), confirming prior research showing a difference in perceived stress between genders (10,12). Gender was coded male (0), female (1), and nonconforming (2). The positive regression coefficient for gender ($\beta = .221$; Table 4) indicates that being female or gender non-conforming is associated with increased stress (vs. being male). With the remaining stress predictors added to the model, $R^2 = .355, F(11, 290) = 10.09, p < .01$, an indicator that the entered predictors improved the predictive capacity of the model by 23.7% (ΔR^2

= .237) (Table 4). Beta weights for the individual predictors supported our hypotheses that increases in homework time ($\beta = .106$), parental pressure ($\beta = .163$), guilt ($\beta = .121$), and worry ($\beta = .203$) would predict higher stress levels (Table 4). Our hypotheses that commute time ($\beta = -.008$), extracurricular activity time ($\beta = -.085$), and number of confidants ($\beta = -.069$) would predict stress were not supported by the model (Table 4). While the hypothesis relating increases in peer inquiries into a student's performance to increased stress was not supported ($\beta = .091$, $p = .059$), the low p-value indicated it approached significance as a predictor of stress (Table 4). As hypothesized, reductions in sleep ($\beta = -.136$), relaxation time ($\beta = -.146$), and family encouragement to relax ($\beta = -.103$) were predictive of increased stress (Table 4).

DV: Perceived Stress		
Predictor	ΔR^2	B
Step 1	.143	
Gender ^a		.221**
Step 2	.237	
Extracurricular		-.085
Homework time		.106*
Sleep time		-.136**
Peer inquiries		.091
# Confidants		-.069
Relax time		-.146**
Parental Pressure		.163**
Family Encourag.		-.103*
Guilt		.121*
Worry		.203**
Commute		-.008
Total R^2	.380**	
F	50.269**	

Table 4. Regression of Perceived Stress on Hypothesized Stressors

Note. Beta weights listed are from the full model (through step 2)

^aGender was coded male (0), female (1), nonconforming (2)

* $p < .05$ ** $p < .01$

DISCUSSION

Teenage years are filled with potential sources of stress, and teens' physical and mental health may be negatively impacted when they are exposed to high stress levels. This study, inspired by the first author's personal experiences with and observations of high school stress, provides insight into teens' perceived stress levels. On a perceived stress scale of 0 to 16, the mean score of students in this study was near the midpoint (7.90, $s = 3.40$). Because the PSS is not a diagnostic tool, there are no score ranges to indicate specific stress levels (e.g. low/medium/high). However, normative data allows us to compare our study results to other populations' perceived stress levels. In a sample of U.S. adults ($n = 2,387$), the mean score for the PSS-4 was 4.49 ($s = 2.96$) (13). While the norming study did not include children, the findings indicate that perceived stress decreases with age, with 18-29 year-olds reporting

the highest stress levels (13). A recent study of English adults (ages 16-85) found a mean PSS-4 score of 6.11 ($s = 3.14$), with younger adults again experiencing higher stress levels (14). A small subset ($n = 22$) of the English sample aged 16-17 had a mean PSS-4 score of 6.91 ($s = 2.89$). The U.S. high school students in our sample experienced higher stress levels than average adults at the time of our survey. On average, students in our study scored 39.2% higher than the adults in the U.S. normative sample and 29.3% higher than English adults. While comparison to the younger U.K. subset is limited without additional descriptive statistics (e.g. student status), students in our study scored 13% higher than that population. This information, alongside increasing rates of teen depression and anxiety (15) and the fact that suicide is the third leading cause of death in 15-19 year-olds (16), is concerning. More work is needed to establish normative data regarding teens' perceived stress levels, yet the stress levels reported in this study warrant attention and remediation.

This project builds on prior work in teen stress research by exploring peer and parental pressures as predictors of stress. The aim of this study is to give teens a voice in the conversation surrounding state SOL revisions, and to explore specific factors that might predict stress. Project results indicate that physiological (sleep and relaxation), social (parental pressures and family encouragement), and emotional (worry and guilt) factors contribute to high school students' perceptions of stress. Targeted programs to educate students and families about stress, including contributing factors and skills to cope with stress, might lead to reduced stress levels and more positive health outcomes.

Adolescence is a time in life when individuals are vulnerable to peer pressure and want to fit in with a group (17, 18). The variable concerning peer inquiries approached significance as a predictor in this study. Peers' questions about academic performance may make students feel pressure to perform at a high academic level or to hide or misrepresent grades and scores that they feel are below expected levels. Either of these behaviors might contribute to student stress. Providing students with appropriate responses to peer inquiries about academic performance and promoting a culture of confidentiality and privacy among both teachers and students in academic settings might reduce student stress levels.

Only 1 in 10 students (11.4%) in this study reported getting the 8-10 hours of nightly sleep recommended to promote optimal health for teenagers aged 13-18 (19). Teens who follow these sleep recommendations are likely to have improved attention, learning, and memory. They also experience better quality of life and overall well-being than their peers with less sleep (19). To promote these outcomes, schools might consider revising the levels of homework and extracurricular activity time of their students. For example, teachers could coordinate test schedules for blocks of students in order to avoid giving students multiple exams at the same time. Coaches might consider students' time

commitments (e.g. academic obligations, commute or activity bus times) when scheduling practices. Standards of learning might be revised so that students are taught the importance of making time for sleep and relaxation in their schedules, as well as the importance of not over-committing themselves at the expense of much-needed rest and relaxation.

More than a quarter of students in this study (27.7%) expressed concern about school or home violence. Research shows that student experiences of persistent fear and anxiety can impact their learning and problem-solving capabilities (20). As such, the survey respondents who reported feeling worried about violence may be at risk for negative health and social outcomes. School officials should follow best practices in assuaging fears of school violence and implement programs that encourage and allow students to report their concerns about violence to trusted adults both inside and outside of the school system.

Interventions to counteract stressors are not limited to student approaches. Like other school systems, VBCPS offers parent workshops on topics relevant to their children. Potential topics for future workshops should include information about student stress, contributing factors, and ways to reduce stress and promote teens' coping mechanisms. Parents should understand the role that they play in creating stress for their teens when they pressure them about their academic performance. Likewise, they should know the importance of encouraging their teens to have a healthy school-life balance, and should encourage their high school students to take time for self-care, rest, and relaxation. When parents and students are informed about stress, its impacts, and ways to reduce it, they will be better equipped to manage teen stress levels.

Limitations

This research was designed to maximize validity, yet no study is without limitations. Survey respondents were not selected at random but recruited through social media. Convenience sampling resulted in a sample that was overly skewed toward academic magnet programs and not representative of the entire population of Virginia students. This is likely a result of the fact that the study's first author attends a public-school academic magnet program and was responsible for recruitment. As such, study results are not generalizable to the entire population of Virginia high school students but to students who attend specialized academic programs in Virginia public schools.

The dependent variable in this study was perceived stress, measured using the 4-item PSS scale. A limitation of the scale is that its predictive ability is limited to one or two months, so it may not accurately predict longer-term stress exposure (8). Future studies should focus on longitudinal measures to capture the outcomes of long-term high school stressors.

Since study participants were self-selected, only teens with certain characteristics or qualities may have chosen to participate, which creates sampling bias. Using

an online-only survey may have created sampling bias as well, since teens active on social media may differ in some ways from their peers who rarely or never use social media. Another study limitation is self-report bias, since students may purposefully or inadvertently have mischaracterized their habits and perceptions. Lastly, the study's correlational design does not establish causal relationships. The direction of the variable relationships discussed in this paper is a topic for future research.

METHODS

Survey Development

The 23-item survey was developed based on a literature review, the first author's personal experiences, and anecdotal information collected via informal peer interviews and conversations. Prior research with teen populations indicates that sleep and homework are correlated with stress (1, 6, 7). Questions about extracurricular activities and commute time were added to gauge how these variables might correlate with sleep and relaxation time. The question about school violence was added in response to national news coverage of student reactions to recent school shootings (e.g. Stonewood Douglas High School), as well as to recent violent incidents involving students in or around local Virginia schools.

As a gap exists in the literature concerning the effect of peer pressure in academic settings as it relates to perceived stress, a question was added to gather data that would help fill that gap. We measured stress using Cohen's validated four-item version of the Perceived Stress Scale (PSS), which asks students about their thoughts and feelings over the last month. The PSS, which was used with permission, is sensitive to chronic stress and to stress that students perceive concerning upcoming circumstances (8), which is important when measuring high school stressors like homework (chronic stress) or exams and school violence (upcoming circumstances). The PSS is a self-report scale that measures the survey respondent's feelings about their own psychological stress. For example, questions ask about how often in the last month students felt confident handling their problems, or whether they perceived things to be "going their way." Responses ranged from never (0) to very often (4), with resulting range of scores from 0-16. The survey was hosted on the Research Electronic Data Capture (REDCap) system.

Sampling and Recruitment

This study used a cross-sectional, descriptive, correlational research design. We collected data from a purposive convenience sample of individuals in 9th-12th grades in Virginia using an online survey. The project was approved by the Ocean Lakes High School Math and Science Academy's Scientific Review Committee. No computer IP addresses were collected, and researchers were not able to identify study participants. We posted the survey link on social media (e.g. Facebook, Snapchat) and emailed friends of the first author (P.C.) to request participation. As expected,

1 snowball sampling occurred as individuals shared the link
2 through personal emails and social media accounts. Because
3 it is impossible to know how many people saw the link, we
4 could not calculate a response rate. Data collection lasted
5 two weeks and a total of 397 responses were recorded in
6 REDCap. There were 65 incomplete surveys, resulting in a
7 final sample of $n = 332$ high school students. Power analysis
8 reduces the risk of Type II errors (false negative outcomes)
9 and increases the statistical conclusion validity of a study
10 (21). Using G*Power 3.1, an a priori power analysis using
11 power level ($1 - \beta = 0.95$), significance level ($\alpha = .05$), and a
12 medium estimated population effect size (Cohen's $f^2 = 0.15$),
13 calculated a required sample size with 12 predictors of $n = 178$
14 (22).
15
16

17 Data Analysis

18 Data entries were cleaned prior to analysis. We
19 recoded string entries that were entered in numeric variable
20 fields, e.g. "six" was recoded to 6. Items in the Perceived
21 Stress Scale were reverse coded as necessary, and a total
22 stress score was calculated by summing responses to
23 individual scale item values. Missing values were determined
24 by Little's MCAR to be missing at random ($\chi^2 = 208.342$, $df =$
25 255 , $p = .985$). No variable had more than 5% of cases missing
26 values. Univariate outliers are cases with extreme values for
27 one variable that may distort statistical analysis (23). Two
28 respondents reported that they had 30 people with whom they
29 could talk honestly about their lives. These two outlying cases
30 had standardized scores more than 3 standard deviations
31 above the mean (i.e. Z score > 3.29) and were recoded into
32 the next highest value (20) plus one. Multivariate outliers
33 indicate cases with an unusual combination of scores on two
34 or more variables, and these cases have inflated Mahalanobis
35 distances (19). Mahalanobis distances were generated
36 using linear regression analysis and no value exceeded the
37 χ^2 critical value, indicating no multivariate outliers. SPSS
38 bivariate correlation analysis indicated no problems with
39 multicollinearity ($r > .70$) between continuous variables.
40
41

42 We entered the cleaned data into SPSS v24 for
43 correlation and linear regression analyses. Because prior
44 research shows significant variances in perceptions and
45 levels of stress between boys and girls (10,12), gender was
46 entered into the linear regression model in step one to control
47 for its effect before investigating other stress-related variables.
48 Eleven variables (extracurricular hours, homework hours,
49 sleep hours, peer inquiries, number of confidants, relaxation
50 time, perceived parental pressure, family encouragement,
51 guilt, worry about violence, and commute time) were entered
52 in step two of the regression analysis (in the listed order) to
53 test their ability to predict stress levels.
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