

COVID-19 Pandemic, Parental Protective Factors, and Substance Use Onset Among Early Adolescents in Appalachia



Hannah M. Layman, PhD,¹ Christa L. Lilly, PhD,² Geri A. Dino, PhD,³ Traci D. Jarrett, PhD,¹ Carrie W. Rishel, PhD,⁴ Alfgeir L. Kristjansson, PhD³

Introduction: During the pandemic, adolescents spent significantly more time at home with their families than during nonpandemic eras. This change could be beneficial because time spent with family has been linked to positive health outcomes; however, given the stress and strains accompanied by COVID-19, research has yet to assess the potential effect that increased family time may have had on youth substance use onset and development during this strenuous period.

Methods: School-based survey data from 2,322 students in the Young Mountaineer Health Study were collected during the fall of 2020 (Wave 1), spring of 2021 (Wave 2), and fall of 2021 (Wave 3) and were used to create logistic regression models to identify variables at Wave 1 that related to 3 types of substance use onset in the sample at Wave 2 and Wave 3. The study's primary independent variable was COVID-19-related emotional impact (scale range: 5–25).

Results: Average age of participants at Wave 1 was 11.50 years (males=42.9%). COVID-19-related emotional impact was positively associated with an increase in cigarette (AOR=1.06, $p=0.008$) and E-cigarette use onset (AOR=1.06, $p<0.001$). Parental monitoring (AOR=0.89, $p=0.013$) and parental social support (AOR=0.93, $p=0.026$) were associated with a decreased initiation of cigarette use, respectively.

Conclusions: The authors found that higher levels of COVID-19-related emotional impact were predictive of increased cigarette and E-cigarette onset but were only marginally related to alcohol use onset. The authors also identified that increased parental monitoring and parental social support might decrease the onset risks for cigarette and alcohol use among early adolescents.

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INTRODUCTION

The U.S. faces persistent problems with substance misuse, evident by the highest drug overdose death rate in the world.¹ The death rate due to overdose increased by 31% from 2019 to 2020.² Current efforts primarily emphasize overdose prevention (e.g., naloxone availability and distribution) and access to drug treatment.³ An alternative approach suggests addressing the root cause by delaying substance use initiation in young people. In

From the ¹Department of Social and Behavioral Sciences, West Virginia University School of Public Health, Morgantown, West Virginia; ²Department of Epidemiology and Biostatistics, West Virginia University School of Public Health, Morgantown, West Virginia; ³Prevention Research Center, Department of Social and Behavioral Sciences, West Virginia University School of Public Health, Morgantown, West Virginia; and ⁴School of Social Work, West Virginia University Eberly College of Arts and Sciences, Morgantown, West Virginia

Address correspondence to: Hannah M. Layman, PhD, Department of Social and Behavioral Sciences, West Virginia University School of Public Health, PO Box 9190, 3314 Health Sciences Center South, 64 Medical Center Drive, Morgantown, WV 26506. E-mail: hmlayman@hsc.wvu.edu. 2773-0654/\$36.00

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2019, before the pandemic, the number of U.S. youth aged 12–17 years who reported using substances for the first time was 2.3 million for alcohol and 541,000 for cigarettes.⁴ Although alcohol consumption, tobacco use, and vaping (E-cigarette use) have been found to predict later use of other substances,^{5,6} a systematic review of youth substance use conducted by the authors' team during the pandemic revealed mixed findings.⁷ Moreover, studies indicated a rise in adult substance use during the 2019 coronavirus disease 2019 (COVID-19) pandemic.^{8,9} Further exploration is needed to understand the potential impact of the pandemic on youth and substance use onset, given the concurrent increase in adult substance use.

Early adolescence is a crucial period for peer acceptance, with peer socialization gaining importance, whereas parental monitoring tends to decline.⁹ Interacting with peers that engage in risky behaviors increases substance use risk among youth, whereas low parental monitoring raises the likelihood of early substance initiation.¹⁰ Studies show that adolescents who interact with peers who engage in risky behaviors are at an increased risk of substance use.¹¹ The pandemic's effect on substance use initiation is unclear because decreased socialization with peers might act protectively. The question persists whether peer interaction, parental monitoring, or expectations have a more significant impact on youth substance use during COVID-19 than the pandemic's emotional toll.

During the pandemic, increased time spent at home with families¹¹ could have both positive and negative effects on adolescent substance use. Traditionally, more family time is associated with better communication, support, mental health, and overall well-being.¹² However, the impact of these factors on substance use during the pandemic remains unexplored. Previous research suggests a connection between nontraditional family structures and increased substance use among youth.¹³ However, increased family time during the pandemic may potentially enhance family bonds and support, thereby reducing the onset of substance use.^{14,15} It is crucial to consider family structure and social support levels when assessing youth substance use during this challenging period.

The COVID-19 pandemic significantly impacted young people's emotional well-being. Studies show that adolescent pandemic-induced stress and loneliness are linked to poor mental health (anxiety, depression) and substance use.^{16,17} Reduced access to informal and formal emotional support during the pandemic may lead young people to turn to substance use as a coping mechanism. Stay-at-home orders and virtual schooling increased time spent with family and away from peers.

Although time away from peers may potentially harm youth mental health, it could be a desirable outcome regarding substance use.¹¹ However, further investigation is needed.

This study aims to assess the potential effects of the COVID-19 pandemic on substance use onset among early adolescents in Appalachia and subgroups who may benefit from special attention for mitigating the impact of substance use and onset brought on by the pandemic.

In light of the context provided earlier, the authors put forth the following research questions:

- Is COVID-19–related emotional impact, family substance use expectations, and/or peer respect for substance use associated with substance use onset over time among early adolescents while taking account of demographic factors and personal COVID-19–related experiences?
- Is social support (from parents or adults in schools) and/or parental monitoring associated with substance use onset over time among early adolescents while considering demographic factors and personal COVID-19–related experiences?

METHODS

Study Sample

This study uses data from the Young Mountaineer Health Study (YMHS), an ongoing cohort study surveying West Virginia middle-school students semiannually for 3 years. YMHS investigates community-level factors and individual behaviors related to alcohol use onset, progression, and other risky behaviors among Appalachian middle schoolers. A specific focus is on the impact of the COVID-19 pandemic on the emotional well-being of young people. Detailed YMHS protocols and procedures are published.¹⁸

The baseline sample comprised all 6th-grade students from 20 middle schools in 5 West Virginia counties (Calhoun, Lincoln, Mercer, Wood, and parts of Kanawha counties) during the fall of 2020. Participating schools represented a range of rural, small-town, and small-city West Virginia public schools. Participation was voluntary with verbal consent (IRB of West Virginia University Number 1903499093). The cohort design involved 3 waves of data collection (October 2020, April 2021, and October 2021). At baseline assessment (Wave 1), 1,671 6th-grade students were enrolled in either face-to-face or hybrid (part in person, part virtual) school format during the fall of 2020 (i.e., not in virtual-only format) and thus available to be part of the study. Of these students, 1,348 completed the survey during Wave

1, resulting in a response rate of 80.7%. Of the participants at Wave 1, 1,029 students reported never using substances and were thus used for the subsequent longitudinal analysis using data from Waves 1–3.

Measures

During the substance use portion of the survey, students answered 4 questions from the European School Survey Project on Alcohol and Other Drugs.¹⁹ Cigarette use was assessed with the question, *In your lifetime, how many times have you smoked cigarettes? (smoked a whole cigarette, not just taken a puff)*. Response options ranged from 1=*never smoked cigarettes* to 7=*40 or more times*. E-cigarette/vape use was assessed with the question, *In your lifetime, how many times have you used e-cigarettes or vaping devices?* Response options ranged from 1=*never used e-cigarettes* to 7=*40 or more times*. Alcohol use was assessed with the question, *In your lifetime, how many times have you had a drink of alcohol of any kind, even just a few sips (e.g., beer, wine, spirits, shots)?* Response options ranged from 1=*never had a drink of alcohol* to 7=*40 or more times*. All 3 of these questions were recoded as 1=*ever used* and 0=*never use* to assess the onset of use for each substance. Those who had used substances at time point 1 were excluded, and those remaining at time points 2 and 3 who reported use were coded for onset.

The main independent variable, COVID-19–related emotional impact was assessed with 5 questions explicitly designed for this study: *How true are the following statements about you: Because of COVID-19, I am: 1) stressed, 2) lonely, 3) bored, 4) sad, 5) angry*. Response options ranged from 1=*not true at all* to 5=*very true* and were summed to form a scale ranging from 5 to 25 (skew=0.81, kurtosis=−0.40, Cronbach's α 0.85). To further substantiate this new measure, an exploratory factor analysis was assessed and indicated a 1-factor model (Kaiser–Meyer–Olkin=0.84; chi-square=2,547.2; $p<0.001$; all commonalities above 3; 1 factor explained by 63% of the variance).

In terms of other independent variables, parental social support was assessed with 5 questions from the CRPBI-30²⁰: *My primary caregiver: 1) is able to make me feel better when I am upset, 2) enjoys doing things with me, 3) cheers me up when I am sad, 4) gives me a lot of care and attention 5) is easy to talk to*. Response options ranged from 1=*not like my primary caregiver*, 2=*like my primary caregiver*, and 3=*a lot like my primary caregiver* and were summed to form a scale ranging from 5 to 15 (skew=−1.45, kurtosis=1.49, Cronbach's α 0.87). School social support was assessed with 5 questions²¹ (Mann et al. manuscript in preparation): *The following questions ask you to think about your school. Please select the*

response that best captures your experience.: The adults at my school: 1) care about me, 2) are fair and kind to me, 3) are safe to be around, 4) notice when I am having a hard time and offer to help me, 5) believe I can make the world a better place. Response options ranged from 1=*strongly disagree* to 5=*strongly agree* and were summed to form a scale ranging from 5 to 25 (skew=−1.33, kurtosis=2.06, Cronbach's α 0.86). To further substantiate this new measure, an exploratory factor analysis was assessed and indicated a 1-factor model (Kaiser–Meyer–Olkin=0.86; chi-square=3,034.88; $p<0.001$; all commonalities above 3; 1 factor explains 66% of the variance). Parental monitoring was assessed with 4 questions from youth in Iceland,²² headed by the statement: *My parents/caregivers know: 1) whom I am with when I am away from home, 2) where I am when I am away from home, 3) my friends, 4) the parents of my friends*. Response options that ranged from 1=*never* to 4=*always* were summed to form a scale ranging from 4 to 16 (skew=−1.41, kurtosis=1.74, Cronbach's α 0.82). Family substance use expectations were assessed with the question, *My family has clear rules about alcohol and drug use*. Response options ranged from 1=*never* to 4=*always*. Perceived peer respect was assessed using 2 questions stating: *To gain respect from my friends, it is important for me to 1) drink alcohol, 2) smoke cigarettes*. Response options that ranged from 1=*strongly disagree* to 4=*strongly agree*.

In terms of covariates, gender was assessed with a 4-category question 1=boy, 2=girl, 3=gender nonconforming, and 4=other, which was recoded to a dichotomized variable (male and female) owing to inadequate responses in other categories, which were coded as missing ($n=310$). Age was assessed by asking participants what year they were born—1=2,007, 2=2,008, 3=2,009, 4=2,010, 5=2,011, and 6=2,012—and family structure was coded as living with both biological parents versus other forms. In addition, youth-perceived family income status was assessed with the question, *How well off financially do you think your family is in comparison to other families in West Virginia?* Response options ranged from 1=*much worse off* to 7=*much better off*. This variable was recoded as a dichotomized control variable for better interpretation with answers between 1 and 4=*worse off or similar* and 5–7=*better off*. Furthermore, 2 other covariate variables of interest were identified for the purposes of the study. Individual experiences of COVID-19 were assessed: (1) *Do you personally: (1) know anyone who has been sick with COVID-19 and (2) know someone who died of COVID-19?* (multiresponse options for these questions included *me* [Question 2 only], *a parent/caregiver*, *another family member*, *a friend*, *someone else*) and were employed as 2 separate

dichotomized variables (I know someone who has: [1] been sick with or [2] died of COVID-19. With responses of *yes* [regardless of a selected multiresponse option] or *no*).

Statistical Analysis

All analyses were conducted in SAS 9.4 (SAS Institute Inc., 2000–2012). Demographic information was identified using summary tables. Logistic regression models were fitted to identify variables at time point 1 that related to three types of substance use onset in the sample at any time during time points 2 and 3. The initial inclusion of variables was based on theoretical relevance and prior literature. Independent variables and covariates were tested for interactions with each kind of substance (cigarettes, E-cigarettes, and alcohol). Each significant variable in the bivariate analyses ($p < 0.05$) was included in the final model through a step-by-step process while using the lowest Akaike Information Criterion values to determine the best-fitting model for each outcome.

Many of the variables of interest identified did not have a statistically significant bivariate association with substance use onset in this study and thus were excluded from the analysis. These variables included age, youth-perceived family income, substance use expectations, peer respect for substance use, and individual experiences with COVID-19.

For cigarette use onset, after adding each significant variable into the model, the best fitting model included the following variables: (1) COVID-19–related emotional impact, (2) parental monitoring, (3) school social support, (4) family structure, and (5) race. For E-cigarette use onset, the best fitting model included the following variables: (1) COVID-19–related emotional impact, (2) parental social support, (3) school social support, (4) parental monitoring, (5) gender, and (6) family structure. Finally, for alcohol use onset, the best fitting model included the following variables: (1) COVID-19–related emotional impact and (2) parental social support.

RESULTS

Table 1 includes descriptive statistics for all study variables at Wave 1. Participants included 42.9% males and 57.1% females. Consistent with West Virginia's racial demographics, most participants identified as White (87.4%); 52.1% reported living with both biological parents, and the remaining 47.9% reported living in different arrangements. Participants reported an average COVID-19–related emotional impact score of 11.21 (SD=5.78, range=5–25). For social support, participants

reported an average parental social support score of 13.44 (SD=2.30, range=5–15) and an average school social support score of 21.36 (SD=3.78, range=5–25). The average parental monitoring score reported by participants was 14.04 (SD=2.49, range=4–16).

Tables 2, 3, and 4 include the logistic regression models for the outcomes of cigarette, E-cigarette, and alcohol use onset. As seen in Table 2, for every 1-point increase in COVID-19–related emotional impact, the odds of initiating cigarette use at time point 2 or 3 would increase by 6.0% ($p=0.008$) while holding other variables in the model constant. In addition, for every 1-point increase in parental monitoring, the odds of initiating cigarette use at time point 2 or 3 would decrease by 11.0% ($p=0.013$) while holding other variables in the model constant. Compared with those who live with both biological parents, those who reported their family structure as other had a 2.20 increase in the odds of initiating cigarette use at time point 2 or 3 ($p=0.006$). As seen in Table 3, for every 1-point increase in COVID-19–related emotional impact, the odds of initiating E-cigarette use at time point 2 or 3 would increase by 6.0% ($p < 0.001$) while holding other variables in the model constant. Compared with males, females had a 1.68 increase in the odds of initiating E-cigarette use at time point 2 or 3 ($p=0.012$). Finally, as seen in Table 4, for every 1-point increase in parental social support, the odds of initiating alcohol use at time point 2 or 3 decreased by 7.0% ($p=0.026$) while holding other variables in the model constant. Notably, COVID-19–related emotional impact was only marginally related to alcohol use onset ($p=0.055$).

DISCUSSION

Study results shed light on indicators of substance use onset in Appalachian early adolescents during the COVID-19 pandemic. Although the pandemic disrupted daily routines and access to peers, young people were still able to initiate cigarette, E-cigarette, and alcohol use during the time of data collection for this study (October 2020 – October 2021). The most common indicator for substance use onset during this study was COVID-19–related emotional impact. As this score increased, so did the likelihood that young people would initiate cigarette and E-cigarette use at later time points. The study identified 2 protective factors for substance use onset: parental monitoring and parental social support. These variables were found to decrease the odds of initiating cigarette and alcohol use, respectively. Finally, when assessing E-cigarette use initiation, females were more likely than males to begin E-cigarette use at time point 2 or 3. This finding contradicts most other literature,

Table 1. Descriptive Statistics for Participants and Study Variables (n=1,029)

Characteristic	n	%	n	%	n	%
Gender						
Male	442	42.9				
Female	587	57.1				
Age, years						
11	554	53.8				
12	442	43.0				
13	33	3.2				
Race						
White	899	87.4				
Other	130	12.6				
Family structure						
Lives with both biological parents	536	52.1				
Other	493	47.9				
Youth-perceived family income						
Similar to others or better off	957	93.0				
Worse off	72	7.0				
Cigarette use						
Never			827	97.8	781	95.0
Ever			19	2.2	41	5.0
E-cigarette use						
Never			797	94.4	721	87.4
Ever			47	5.6	104	12.6
Alcohol use						
Never			734	86.9	623	74.9
Ever			111	13.1	209	25.1
	Mean	SD				
COVID-19—related emotional impact (range=5–25)	11.21	5.78				
Parental social support (range=5–15)	13.44	2.30				
School social support (range=5–25)	21.36	3.78				
Parental monitoring (range=4–16)	14.04	2.49				

Table 2. Logistic Regression Model for the Outcome of Cigarette Use Onset

Effect	Estimate	SE	AOR	95% CI		p-value
				LL	UL	
Intercept	−1.49	0.96	—	—	—	0.122
COVID-19—related emotional impact	0.05	0.02	1.06	1.01	1.10	0.008
Parental monitoring	−0.12	0.05	0.89	0.81	0.98	0.013
School social support	−0.04	0.03	0.96	0.90	1.02	0.187
Family structure						
Other versus both biological parents	0.79	0.29	2.20	1.26	3.86	0.006
Race						
Other versus White	0.53	0.31	1.70	0.93	3.09	0.084

Note: Boldfaces indicate statistical significance ($p < 0.05$).

AIC, 464.76.

AIC, Akaike Information Criterion; LL, lower limit; UL, upper limit.

Table 3. Logistic Regression Model for the Outcome of E-Cigarette Use Onset

Effect	Estimate	SE	AOR	95% CI		p-value
				LL	UL	
Intercept	−0.51	0.80	—	—	—	0.522
COVID-19–related emotional impact	0.05	0.02	1.06	1.02	1.10	<0.001
Parental social support	−0.08	0.04	0.92	0.85	1.00	0.053
School social support	−0.03	0.03	0.97	0.92	1.02	0.250
Parental monitoring	−0.06	0.04	0.94	0.87	1.02	0.124
Gender						
Female versus male	0.52	0.20	1.68	1.13	2.50	0.012
Family structure						
Other versus both biological parents	0.83	0.28	2.29	1.31	4.01	0.064

Note: Boldfaces indicate statistical significance ($p < 0.05$).

AIC, 763.98.

AIC, Akaike Information Criterion; LL, lower limit; UL, upper limit.

Table 4. Logistic Regression Model for the Outcome of Alcohol Use Onset

Effect	Estimate	SE	AOR	95% CI		p-value
				LL	UL	
Intercept	−0.49	0.50	—	—	—	0.322
COVID-19–related emotional impact	0.03	0.01	1.03	1.00	1.05	0.055
Parental social support	−0.07	0.03	0.93	0.87	0.99	0.026

Note: Boldfaces indicate statistical significance ($p < 0.05$).

AIC, 979.23.

AIC, Akaike Information Criterion; LL, lower limit; UL, upper limit.

which typically points to adolescent males being more likely to initiate E-cigarette use than adolescent females.^{23–25}

Youth-perceived family income was unrelated to substance use onset in this study. This suggests that pandemic impact may have been greater than family income, a well-known predictor for substance use initiation in adolescents. School social support and peer respect for substance use were also not shown to be related to substance use onset in this study. These results likely are due to the decreased interaction with peers and school personnel during this time due to COVID-19 quarantine and isolation procedures. These findings underline the importance of social relationships and other risk and protective factors of substance use initiation in youth and may help to better prepare for similar situations and/or the long-term effects of the pandemic on youth substance use moving forward.

Limitations

Study limitations include nonresponse bias despite precautionary measures, challenges in survey administration during the pandemic, increased attrition in longitudinal cohort studies, potential recall bias in middle-school students' reporting of substance use habits,

and generalizability to other West Virginia counties and more diverse populations.

This study has strengths, including a longitudinal design with a sparsely studied rural population, high response rates, and a large sample size that minimized sampling error.²⁶ The authors conducted pilot testing of the school-based data collection system.¹⁸ Previous studies informed reliable estimates for recruitment, retention, and study timeline. Self-reported constructs with demonstrated reliability in past samples were used to minimize observer bias. Audio-computer–assisted self-interviews reduced social desirability bias, enhanced accuracy, and accommodated literacy levels.

CONCLUSIONS

This study assessed the COVID-19 pandemic's potential impact on substance use onset among early adolescents in a rural Appalachian sample. COVID-19–related emotional impact was linked to higher odds of cigarette and E-cigarette initiation. Family structure and gender were related to substance use, with other family forms and females showing increased odds of cigarette and E-cigarette use onset, respectively. In addition, higher levels of parental monitoring and social support were

negatively associated with cigarette and alcohol use onset, respectively. These findings underscore the importance of targeted interventions for specific subgroups and emphasize the protective role of parental involvement.

These results have important implications for intervention design. Interventions should pay special attention to those more heavily affected by the pandemic's emotional strains and those from nontraditional families. Findings also underscore parenting/caregiver programs interventions as potentially important to mitigate the risks associated with substance use onset among youth during the COVID-19 pandemic. Future research should explore the mechanisms underlying the gender differences in E-cigarette initiation and how emotional impacts during population-level crises such as the COVID-19 pandemic disproportionately affect substance use behaviors among diverse populations. In addition, studies could investigate the interplay of family structure, parental/caregiver monitoring, and social support in mitigating the risks of substance use onset in diverse populations and contexts.

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CREDIT AUTHOR STATEMENT

Hannah M. Layman: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing - original draft, Writing - review & editing, Visualization. Christa L. Lilly: Methodology, Software, Validation, Formal analysis, Resources, Data curation, Writing - review & editing, Visualization. Geri A. Dino: Validation, Resources, Writing - review & editing. Traci D. Jarrett: Validation, Resources, Writing - review & editing. Carrie W. Rishel: Validation, Resources, Writing - review & editing. Alfgeir L. Kristjansson: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Writing - review & editing, Supervision, Project administration, Funding acquisition.

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