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**A RESEARCH NOTE ON CHANGES IN STRESS LEVELS DURING THE COVID-19 PANDEMIC:  
THE ROLE OF INVOLVEMENT IN ANTISOCIAL BEHAVIORS**

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ABSTRACT

Several recent studies have found that the COVID-19 pandemic related disruptions have led to increases in stress levels; however, they have not examined how prior stress levels and changes in stress levels during the pandemic may differ between adults who did, and did not, engage in antisocial activity, such as substance use or aggressive behavior prior to the pandemic. Using longitudinal data collected in 2019 and 2020 as part of the Toledo Adolescent Relationships Study (TARS) (n= 787), the current study examined levels of antisocial behavior reported prior to the pandemic and changes in stress during the pandemic. Results, based on OLS regression models, showed that those individuals who exhibited antisocial behaviors pre-pandemic reported higher levels of overall stress, but their stress levels decreased during the pandemic. Although individuals who did not report engaging in antisocial activity had lower levels of overall stress prior to the pandemic, they experienced an increase in stress during the pandemic that was greater than that of the individuals who engaged in antisocial activity. Future research should continue to examine how and why stress levels differ based on involvement in antisocial behavior and a range of other pre-pandemic circumstances.

## **Introduction**

In March 2020, the World Health Organization declared the spread of COVID-19 to be a pandemic that required new public health precautions to protect against the virus, such as social distancing (i.e., maintaining distances of at least 6 feet when around individuals who are not part of the household), mask mandates, and school and business closures. As of May 2021, over 30 million people have contracted COVID-19, and more than 500,000 people have died from the virus in the United States (CDC 2021). During the pandemic, many businesses permanently closed, the country faced unemployment rates of 15% (Falk et al. 2021), and many families lost loved ones to COVID-19. For some individuals, these rapid changes and losses have led to increased levels of depression and anxiety (Pfefferbaum and North 2020; Hyland et al. 2021; Douthat et al. 2021; Manning et al forthcoming). One emotional response to the pandemic has been increased levels of stress. Stress experienced by individuals can be conceptualized as an overload of demands that exceed individuals' abilities to cope, or as interruptions to individuals' daily lives or ways of thinking (Burke 1991).

In the current study, we examined stress levels before and during the pandemic, and using longitudinal data we assessed changes in stress levels among individuals who did, and did not engage in antisocial, criminal, or aggressive behavior prior to the pandemic. It is intuitive to expect that these behaviors are associated with unsettled lives and a range of problematic life circumstances, but the impact of COVID-related stress remains unclear.

Several recent studies have examined stress due to the pandemic (e.g., Taylor et al 2020a; 2020b; Qui et al 2020; Wang et al 2020; Zhang and Ma 2020). In addition to examinations of basic demographic differences, some researchers have considered the role of lifestyle and behavioral profiles, and how lifestyle may have influenced social distancing compliance levels.

For example, prior work has found that those individuals who engaged in antisocial activity may exhibit lower compliance with social distancing mandates during the pandemic (Giordano et al forthcoming; O'Connell et al 2021; Miguel et al 2021) and online antisocial behaviors have accelerated during the pandemic (Awal et al 2020). Yet, no study has compared self-reports of stress experienced by those with, and without, antisocial backgrounds. Stress is an important outcome because it determines how individuals confront the challenges associated with pandemic-related disruptions.

The current study draws on longitudinal data from the Toledo Adolescent Relationships Study (TARS) collected prior to the COVID-19 pandemic (2018-2020) and during the pandemic (June-October 2020). Assessing pre-pandemic levels and shifts in stress for individuals who have engaged in antisocial activity is important because individuals whose lives include these behaviors may experience stresses related to consequences of involvement in such behaviors, suggesting a "pile on" of stresses as a result of pandemic-specific stresses. Alternatively, it is possible that those whose lives are already "settled" may experience a significant increase in stress as a result of pandemic-related disruptions and the demands associated with social distancing.

## **Background**

### **Antisocial Behavior and the Pandemic**

Antisocial behavior has been defined as: "... a spectrum of behavior usually marked by aggression but representing transgressions against societal norms. In many cases, such behavior represents illegal acts, but not always." (Tolan, Guerra, and Kendall 1995:515). Thornberry's (2005) interactional theory offers an explanation for why some individuals might engage in antisocial behavior. Interactional theory posits that criminal offending, or breaking the law is

common, so the majority of members of society will be involved with some antisocial activity, but few individuals will be chronic offenders (Thornberry 2005). The theory also posits that the onset of antisocial behavior is “continuously distributed across the age distribution (p. 160),” meaning that the onset of antisocial behavior may occur earlier in the life course, such as childhood (early starters), or it may begin later in the life course, such as adulthood (late starters). Thornberry has theorized that negative temperamental qualities, structural adversity, weak social bonds, ineffective parenting, and abundant opportunities for deviant behavior are all reasons for the onset of antisocial behavior (Thornberry 2005). It is critical to assess individuals with these antisocial backgrounds to examine how they may or may not differ from those without antisocial backgrounds, and how antisocial background affects different outcomes.

Several recent studies have examined how individuals who have engaged in antisocial activities adhered to pandemic safety measures, such as social distancing and wearing a mask in public. O’Connell and colleagues (2020) using a sample of 131 participants from the United States who were recruited from M-turk examined whether those who engaged in antisocial behavior adhered to COVID-19 safety measures, and found lower compliance. Miguel and colleagues (2021) using a sample of 1,578 Brazilian adults who ranged in age from 18 to 73 also found that individuals who exhibited antisocial behavior were less compliant with COVID-19 safety measures relative to those individuals who did not engage in antisocial activity. Thus, only a handful of studies have considered how individuals who exhibit antisocial behaviors have responded during the pandemic. These studies are cross-sectional so they do not have measures prior to the pandemic. The current study examines stress levels measured before and during the pandemic to capture differences in pre-pandemic stress levels and change in stress levels.

### **Stress During COVID-19**

Running head: A RESEARCH NOTE ON CHANGES IN STRESS LEVELS DURING THE COVID-19 PANDEMIC: THE ROLE OF INVOLVEMENT IN ANTISOCIAL BEHAVIORS

Several studies have described stress levels during the pandemic. One study that examined stress in China, early on during the pandemic, found mildly high levels of stress due to the pandemic (e.g., Zhang and Ma 2020). Other early studies based in China found that about 25% of adults reported moderate to severe levels of anxiety due to COVID-19 (e.g., Qui et al 2020; Wang et al 2020). Although these studies have provided important insights, the data are cross-sectional. Consequently, it is unclear whether stress *has changed* during the COVID-19 pandemic.

Taylor and colleagues (2020a), developing the COVID-19 stress scales (CSS), and utilizing a sample of 6,854 adults from the United States and Canada to test the factor loadings of the new scales, found that these scales effectively measured stress during the pandemic. The results showed that worry and perceived dangerousness of the virus were common characteristics of what they referred to as the COVID-19 stress syndrome. The researchers concluded that the pandemic had a greater psychological impact than medical or physical health since the number of people affected emotionally was greater than those whose physical health was affected by the virus. Unfortunately, these scales cannot be used to measure stress before, or even after the pandemic, since the items and scales only pertain to COVID-19 specific stressors. The current study measures *overall* stress before and during the pandemic to examine the change in overall stress.

According to Thornberry (2005), those who exhibit antisocial behavior may do so because of structural adversity. Thornberry has emphasized that structural adversity increases parental stress. It is plausible to assume that structural adversity may lead not only to parental stress, but to more general types of stress as well. Although structural adversity may be one potential explanation for the differences in stress levels among those individuals who exhibit

antisocial behavior, and those who do not, no studies have investigated the differences in stress levels between the two groups before and during the pandemic.

### **Current Study**

Using OLS regression models, the current study uses TARS data from April 2018 through March 2020 (pre-pandemic) and data from June 15<sup>th</sup> to November 6<sup>th</sup>, 2020 (during the pandemic) to investigate how stress differs between adults who report engaging in antisocial behavior and those who did not pre-pandemic, and how stress levels changed during the COVID-19 pandemic. Our first hypothesis is that prior to the pandemic, individuals who engaged in antisocial activity would report higher levels of stress compared to those individuals who did not engage in antisocial activity. Regarding changes in stress levels during the pandemic among individuals who reported engaging in antisocial behavior, we explore two competing hypotheses. Hypothesis 2a states the following: because individuals who engaged in antisocial activity prior to the pandemic experience higher levels of stress, there is a saturation effect, such that the change in stress levels is smaller relative to individuals who did not engage in antisocial activity prior to the pandemic. Conversely, Hypothesis 2b states that individuals who engaged in antisocial activity will report greater increases in stress because the pandemic disruptions have compounding effects. We also explore two competing hypotheses regarding changes in stress among those that exhibited prosocial behavior. Hypothesis 3a states that those who engaged in prosocial behavior will experience an increase in stress because their normally “settled” lives will be disrupted by the pandemic. Hypothesis 3b states that because those with prosocial profiles presumably have more advantage, both before and during the pandemic, they will experience no change or a decrease in stress during the pandemic.

### **Methodology**

## **Data**

The Toledo Adolescent Relationships Study (TARS) is a longitudinal study that began in 2001 with an initial sample of 1,312 adolescents. The sampling frame for TARS was taken from public school enrollment records in Lucas County, Ohio, however, school attendance was not a requirement for inclusion. Additionally, the study oversampled Black and Hispanic students. Respondents initially were interviewed in 2001 and have been interviewed seven times since. Interview data for the sixth wave were collected between April 2018 and March 2020, prior to the COVID-19 pandemic in the United States ( $n = 990$ ). The seventh interview occurred between June 2020 and November 2020, during the pandemic ( $n = 815$ ). All TARS participants were invited to take the online interview for both waves. At wave seven, the ages of respondents ranged from 31 to 38 years old, with a mean age of 34 years old. Table 1 provides descriptive statistics for the sample. Both waves asked respondents about their stress levels. The final analytic sample is 787, with 254 (32.6%) respondents reporting antisocial behavior and 541 (67.3%) respondents not reporting antisocial behavior.

## **Measures**

Overall stress levels were measured prior to and during the pandemic by averaging eight items. Respondents were asked, “Over the past two years, how stressed have you been due to: (1) your own health, (2) health of family members, (3) work/employment, (4) money/finances, (5) relationship with partner, (6) relationships with other family members, (7) relationships with friends, and (8) your children (Belle and Lee 2002)?” If the respondent did not have a partner or children, they were assigned the mean value for partner or child stress. Responses ranged from (1) not stressed at all to (5) extremely stressed. Stress scores prior to the pandemic ranged from 1 to 4.13 with a mean of 1.92 ( $\alpha = .72$ ). Stress scores during the pandemic ranged from 1 to 4.5



## Running head: A RESEARCH NOTE ON CHANGES IN STRESS LEVELS DURING THE COVID-19 PANDEMIC: THE ROLE OF INVOLVEMENT IN ANTISOCIAL BEHAVIORS

with a mean of 1.93 ( $\alpha = .75$ ). The change in stress variable was measured using a difference score of respondent's stress level between wave 7 and wave 6, with higher scores indicating an increase in stress.

To assess antisocial behavior, we created a binary indicator using a measure of criminal behavior and recent arrest. Criminal or antisocial behavior was measured using a nine item self-report scale (Elliott and Ageton 1980). The scale asked respondents prior to the pandemic, "In the past two years (or 24 months), how often have you (1) stolen (or tried to steal) things worth \$5 or less, (2) carried a hidden weapon other than a plain pocket knife, (3) damaged or destroyed property on purpose, (4) stolen (or tried to steal) something worth more than \$50, (5) attacked someone with the idea of seriously hurting him/her, (6) sold drugs, (7) been drunk in a public place, (8) broken into a building or vehicle (or tried to break in) to steal something or just to look around, and (9) used drugs to get high (not because you were sick)?" Responses ranged from (1) never to (9) more than once a day. We created a summated scale for criminal behavior ranging from 0 to 42, with a mean of 3.17. For arrest, respondents were asked, "When were you last arrested? Select the date as best as you can." Recent arrest was coded as 1 if the respondent was arrested in 2015 or later, and 0 if not arrested in 2015 or later. We then created a binary measure indicating whether the respondent's behavior can be classified as antisocial. Respondents were coded as antisocial if they were above the mean on the criminal behavior scale, or if they reported a recent arrest. If respondents reported less than the mean on the criminal behavior variable and no recent arrest, they were coded as 0.

### **Sociodemographic Background**

The current analysis controlled for gender, race/ethnicity, parental status, educational level, employment status, and union status. We controlled for these sociodemographic variables

because they may be confounded with both, antisocial behavior and stress levels. Gender is a binary measure in which female = 0 and male = 1. Self-reported race/ethnicity is coded into three categories, White, Black, and Hispanic. Parental status is a binary measure that asked if the respondent has any children, which is coded 0 = no children, and 1 = has children. Educational attainment measures the highest level of education attained by the respondent coded as (1) high school or less, (2) some college, and (3) a bachelor's degree or higher. Employment status measures if the respondent is (1) unemployed, (2) working part-time, or (3) working full-time. Relationship status is classified as (1) single, (2) dating, (3) cohabiting, or (4) married prior to the pandemic.

### **Analytic Strategy**

To illustrate stress levels by antisocial behavior, we categorized respondents into antisocial behavior (yes or no) and by low, moderate, and high stress. In Figure 1, we classified respondents as experiencing low, moderate, and high stress by calculating 1.5 standard deviations below the mean (low stress), 1.5 standard deviations above the mean (high stress), and the distance between (moderate stress). The bar graph shows this distribution. We utilized OLS regression to examine the relationship between overall stress at wave 7 and antisocial behavior, with control variables. Table 1 includes the descriptive statistics for the total sample, and bivariate associations between those individuals who engaged in antisocial activity and those who did not engage in antisocial activity prior to the pandemic. Table 2 shows the association between overall stress during the pandemic and antisocial behavior while controlling for sociodemographic background characteristics. We also utilized OLS regression to examine the relationship between the change in stress, pre-pandemic and during the pandemic, and antisocial

behavior. Table 3 shows the association between change in stress and antisocial behavior while controlling for sociodemographic background.

## Results

In Figure 1, individuals who exhibited antisocial behavior experienced higher stress levels compared to those individuals who did not exhibit antisocial behavior. Although respondents with antisocial behavior had higher levels of overall stress, they experienced a decrease in stress during the pandemic while those with a more prosocial profile experienced an increase in overall stress.

Table 1 presents descriptive results. Approximately 32% of the total sample reported engaging in antisocial behavior. The mean for overall stress was the same (1.92) across wave 6 and 7 when looking at the total sample, but when classifying the sample into “antisocial” and “prosocial” groups, there are some changes across the two waves. The average stress score for those who reported antisocial behavior (2.15) was higher than it was for those who did not report antisocial behavior (1.81). Of the total sample, 64.9% are parents. About 39.3% of the sample is male. Regarding race/ethnicity 67.9% self-identify as White, 19.1% as Black, and 13% as Hispanic. About 18.2% of the sample have a high school diploma or less, 42.4% reported completing some college education, and 39.4% have a college degree. Regarding union status, 5% of the total sample are single, 26% are dating, 20.8% are cohabiting, and 48.4% are married. (Insert Table 1 here).

In Table 2, antisocial behavior is associated positively with overall stress. Women, compared to men, were more likely to report feeling stressed. Race/ethnicity, education level, employment status, relationship status, and parental status were not associated significantly with overall stress at wave 7 (i.e., during the pandemic).

(Insert Table 2 here)

Table 3 examined the change in stress before and during the pandemic regressing on predictors. Antisocial behavior is associated positively with change in stress before and during the pandemic. The model shows that those individuals who reported engaging in antisocial behavior were more likely to see a decrease in stress, while those who did not exhibit antisocial behavior prior to the pandemic were more likely to see an increase in stress levels. Gender, race, education level, employment status, relationship status, and parental status were not significantly associated with change in stress levels.

(Insert Table 3 here)

## **Discussion**

The current study finds that those individuals who reported engaging in antisocial behavior also reported higher levels of stress than their prosocial peers, but nevertheless experienced a significant decrease in overall stress during the pandemic. Individuals who reported that they had not engaged in antisocial activity prior to the pandemic reported lower levels of stress, but experienced significant increases in overall stress during the pandemic. These interesting findings suggest the need for additional research on the underlying mechanisms that are associated with this pattern of results. Disadvantaged respondents who may have experienced various kinds of trouble (those who exhibited antisocial or criminal behavior) may not have experienced an increase in stress because they were already experiencing significant levels of stress prior to the pandemic. This corresponds to the idea of a saturation effect. Further, it is possible that COVID-19 related payments, no interest rates on student loans/credit cards, increased unemployment benefits, and stimulus checks alleviated some financial stresses experienced by some individuals, resulting in a decrease in stress. However, supplementary

Running head: A RESEARCH NOTE ON CHANGES IN STRESS LEVELS DURING THE COVID-19 PANDEMIC: THE ROLE OF INVOLVEMENT IN ANTISOCIAL BEHAVIORS

analysis focusing on financial stress, indicated that financial stress decreased during the pandemic for both those who did and did not engage in antisocial behavior (available from authors). Additionally, engaging in antisocial activity may be the source of stress, and with social distancing and stay at home mandates these activities may have been limited (e.g., bar closings would limit altercations that often take place in these settings). Alternatively, those whose lives can be considered more settled and prosocial may have experienced the pandemic period as uniquely upsetting and stressful. As this study was based on a regional sample, additional research is needed with other sample groups. Qualitative methods should also prove useful in exploring the ways in which pre-pandemic characteristics have influenced individuals' own perspectives on and responses to this consequential period in American life.

Running head: A RESEARCH NOTE ON CHANGES IN STRESS LEVELS DURING THE COVID-19 PANDEMIC: THE ROLE OF INVOLVEMENT IN ANTISOCIAL BEHAVIORS

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Running head: A RESEARCH NOTE ON CHANGES IN STRESS LEVELS DURING THE COVID-19 PANDEMIC: THE ROLE OF INVOLVEMENT IN ANTISOCIAL BEHAVIORS

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Running head: A RESEARCH NOTE ON CHANGES IN STRESS LEVELS DURING THE COVID-19 PANDEMIC: THE ROLE OF INVOLVEMENT IN ANTISOCIAL BEHAVIORS

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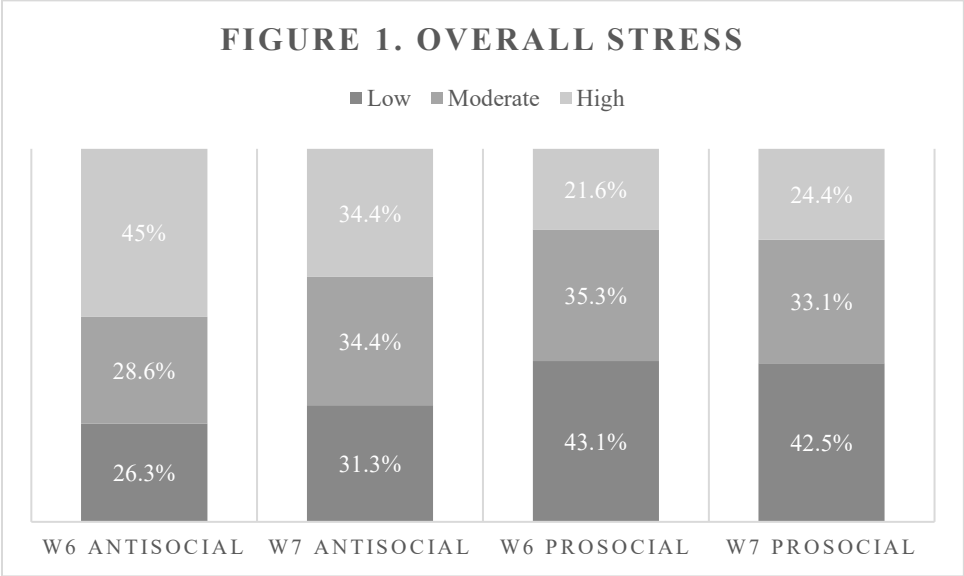
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Table 1 Descriptive Statistics Comparing Individuals Who Engaged in Antisocial Activity and Those Who Did Not Prior to the Pandemic (n = 787)

	Antisocial (n = 258) Mean (SD)	Prosocial (n = 529) Mean (SD)	Total (n=787) Mean (SD)
<b>Stress Indicators</b>			
Stress pre-pandemic	2.15 (.617)	1.81 (.510)	1.92 (.570)
Stress during pandemic	2.04 (.598)	1.87 (.566)	1.92 (.582)
Stress change	-.118 (.675)	.059 (.544)	.001 (.596)
<b>Key Independent Variables</b>			
Antisocial	1 (0)	0 (0)	.328 (.470)
<b>Sociodemographics</b>			
<b>Parental Status</b>			
(No)			
Yes	.597 (.491)	.675 (.469)	.649 (.477)
<b>Gender</b>			
Male	.426 (.496)	.376 (.485)	.393 (.489)
(Female)			
<b>Race/Ethnicity</b>			
(White)			
Black	.194 (.396)	.189 (.392)	.191 (.393)
Hispanic	.120 (.326)	.134 (.341)	.130 (.336)
<b>Education</b>			
HS or less	.229 (.421)	.159 (.366)	.182 (.386)
Some college (College degree)	.477 (.500)	.399 (.490)	.424 (.495)
<b>Union Status</b>			
(Single)			
Dating	.283 (.451)	.250 (.433)	.260 (.439)
Cohabiting	.236 (.426)	.195 (.396)	.208 (.406)
Married	.419 (.494)	.516 (.500)	.484 (.500)



Running head: A RESEARCH NOTE ON CHANGES IN STRESS LEVELS DURING THE COVID-19 PANDEMIC: THE ROLE OF INVOLVEMENT IN ANTISOCIAL BEHAVIORS

Table 2 OLS Model Regressing Overall Stress During Pandemic (n = 787).

<i>Variable</i>	b	RSE	p
Antisocial	.169	.045	***
<i>Sociodemographic</i>			
<i>Parent</i>			
(No)			
Yes	-.064	.046	
<i>Gender</i>			
(Female)			
Male	-.112	.042	**
<i>Race/Ethnicity</i>			
(White)			
Black	-.077	.062	
Hispanic	-.004	.061	
<i>Education</i>			
HS or less	-.079	.071	
Some college (College degree)	-.083	.048	
<i>Employment</i>			
Unemployed	.034	.058	
Part-time (Full-time)	.047	.074	
<i>Union Status</i>			
(Single)			
Dating	-.063	.105	
Cohabiting	-.080	.108	
Married	-.112	.104	
Intercept			
<i>Model Statistics</i>			
F		2.91	***
R <sup>2</sup>		0.04	

\*  $p \leq .05$  \*\*  $p \leq .01$  \*\*\*  $p \leq .001$

Running head: A RESEARCH NOTE ON CHANGES IN STRESS LEVELS DURING THE COVID-19 PANDEMIC: THE ROLE OF INVOLVEMENT IN ANTISOCIAL BEHAVIORS

Table 3 OLS Model Regressing Change in Stress During Pandemic (n = 787).

<i>Variable</i>	<i>b</i>	<i>RSE</i>	<i>p</i>
Antisocial	-.180	.048	***
<i>Sociodemographic</i>			
<i>Parent</i>			
(No)			
Yes	-.066	.047	
<i>Gender</i>			
(Female)			
Male	-.029	.043	
<i>Race/Ethnicity</i>			
(White)			
Black	-.039	.062	
Hispanic	-.082	.066	
<i>Education</i>			
HS or less	.149	.073	
Some college (College degree)	-.016	.049	
<i>Employment</i>			
Unemployed	-.061	.060	
Part-time (Full-time)	-.092	.070	
<i>Union Status</i>			
(Single)			
Dating	-.066	.130	
Cohabiting	-.077	.132	
Married	-.012	.129	
Intercept	.175	.125	
<i>Model Statistics</i>			
F		2.16	**
R <sup>2</sup>		.04	

\*  $p \leq .05$  \*\*  $p \leq .01$  \*\*\*  $p \leq .001$