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## **Relationship between psychological distress and manifest behaviors of young adults in the Detroit Metro area during a COVID-19 wave**

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**Abstract.** The COVID-19 pandemic has had unprecedented effects on individuals and societies. While the adverse physical effects of the pandemic are apparent, the mental effects are arguably more prevalent and long lasting. The body of knowledge, especially for younger populations needs to be expanded. Using a survey instrument based on Depression Anxiety Stress Scale-21 and C.S Mott Children's Hospital National Poll, 412 responses were collected between January 19, 2022, and February 7, 2022, from people between ages 18 to 25 in the Detroit Metro area. Analysis of Variance (ANOVA), Kruskal-Wallis and Chi-Square tests of the collected data suggest depression, anxiety, and stress manifested as specific detrimental behaviors in young people at a 95.0% confidence level. Specifically, ANOVA suggested that depression was associated with manifest behaviors of worry, sadness, changes in appetite and withdrawing from friends and family. Anxiety was associated with sleep issues. Stress was associated with worry, sadness, and aggressive behavior. These results could offer guidance on which manifest behaviors can be addressed to possibly alleviate specific dimensions of psychological distress. In situations where response windows are short and/or where the resources are limited, policy makers and caregivers can prioritize treating and addressing these manifest behaviors.

**Keywords.** Young adults, psychological distress, COVID-19, depression, anxiety, stress, behaviors, Detroit

### **1. Introduction**

The outbreak of the novel coronavirus, officially known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), associated with COVID-19 was declared a Public Health Emergency of International Concern by the World Health Organization in January 2020 [1]. The adverse physical maladies associated with the infection are apparent. Symptoms typically include fever, cough, and tiredness, loss of taste or smell, headaches, and nausea [2]. Adverse outcomes include death, respiratory failure, sepsis, thromboembolism and multiorgan failure [3]. A lot of research and development work has been completed to address the physical effects. This is evident from rapid development of treatments [4]. Nevertheless, additional research must be continued to not only address and include the physical but also mental and emotional effects. The U.S. National Institutes of Health reported in 2023 that nearly half of Americans reported symptoms of psychological distress in a study they conducted in 2021 to

assess effects of COVID-19 on mental health of adults and children [5]. 10% of respondents in their study felt their mental health needs were not being met [5]. Further, it was found that rates of anxiety, depression, and substance use disorders have increased since the beginning of the pandemic [5]. Nevertheless, the body of research covering mental health impact of COVID-19 remains less than comprehensive. In fact, mental health changes associated with the COVID-19 pandemic in the case of young people have not been systematically reviewed [6], [7].

## 2. Hypotheses

Central tendencies, means and medians, of the manifest behaviors were tested to ascertain whether they belong to independent groups. In other words, this study assessed whether different levels of psychological factors (depression, anxiety, and stress) are associated with statistically different levels of manifest behaviors. Accordingly, two hypotheses were tested:

1.  $H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5$  and  $H_1$ : Means are not all equal
2.  $H_0: \tilde{x}_1 = \tilde{x}_2 = \tilde{x}_3 = \tilde{x}_4 = \tilde{x}_5$  and  $H_1$ : Medians are not all equal

The first set of null and alternate hypotheses were tested with ANOVA. The second set of null and alternate hypotheses were tested with the Kruskal-Wallis test. The target confidence level is 95.0% or higher ( $p \leq 0.05$ ).

## 3. Materials and Methods

A survey instrument was developed to collect data related to emotional states/psychological distress and COVID related manifest behaviors [8]. It was based on previously validated instruments that included the Depression Anxiety Stress Scale-21 (DASS-21) and C.S. Mott Children's Hospital National Poll [9], [10]. DASS-21 responses are summarized with standardized methods as extremely severe, severe, moderate, mild, and normal for depression, anxiety, and stress [9], [11]. The manifest variables adapted from the C.S. Mott survey included sleep issues, worry, sadness, changes in appetite, aggressive behavior, withdrawing from family and friends [10]. The relevant responses were limited to whether the behavior was present or not. The survey instrument was hosted and published on Centiment.Co, a commercial online survey platform that helps to target specific demographics for researchers. The platform targeted the survey to 18 to 25 years old people residing in the Detroit Metro area. All responses were anonymous and voluntary. 412 people completed the survey. All collected data were coded with numerical values. Lower numerical values indicate less severe or more benign outcomes. There are approximately 600,000 people between the ages of 18 and 25 that reside in the Detroit Metro area [12]. 384 samples would be needed to achieve 95% confidence level with a 5% margin of error. Hence, the data represent the underlying population.

## 4. Results

Nonparametric skywalk charts were used to compare dimensions of psychological distress and manifest behaviors. It can be visually surmised that higher levels of depression, anxiety and stress are associated with high levels of most manifest behaviors. These results are shown in Figure 1.

Subsequently, Multiple Analysis of Variance (ANOVA), Kruskal-Wallis (KW) and Chi-Square tests were performed on the collected data to assess the relationship between the psychological distress as measured by DASS-21 in terms of depression, anxiety and stress and COVID-19 related manifest variables. Further, a summation-based index was created for all the

manifest variables. The p-values for each of these tests are shown in table 1. The results of the multiple ANOVA show that at a statistically significant level:

- Depression was associated with manifest behaviors of worry, sadness, changes in appetite and withdrawing from friends and family.
- Anxiety was associated with sleep issues.
- Stress was associated with worry, sadness, and aggressive behavior.
- Depression and stress were associated with the index of all manifest behaviors.

Non-parametric tests were used to confirm the findings of the ANOVA. The KW tests were performed to see if medians of the data sets originate from the same distributions. The analyses suggested that psychological distress and manifest behaviors have statistically significant association across the board. To further develop granularity in the analyses, Chi-Square tests were performed to test whether the frequency of occurrence between dimensions of psychological distress and manifest behaviors are statistically independent. Once again, p values  $< 0.5$  were obtained, indicating that assessed data sets were, in fact, dependent. Hence both null hypotheses can be rejected at a 95.0% confidence level.

Figure 1  
Skywalk chart comparing psychological distress dimensions to manifest behaviors.

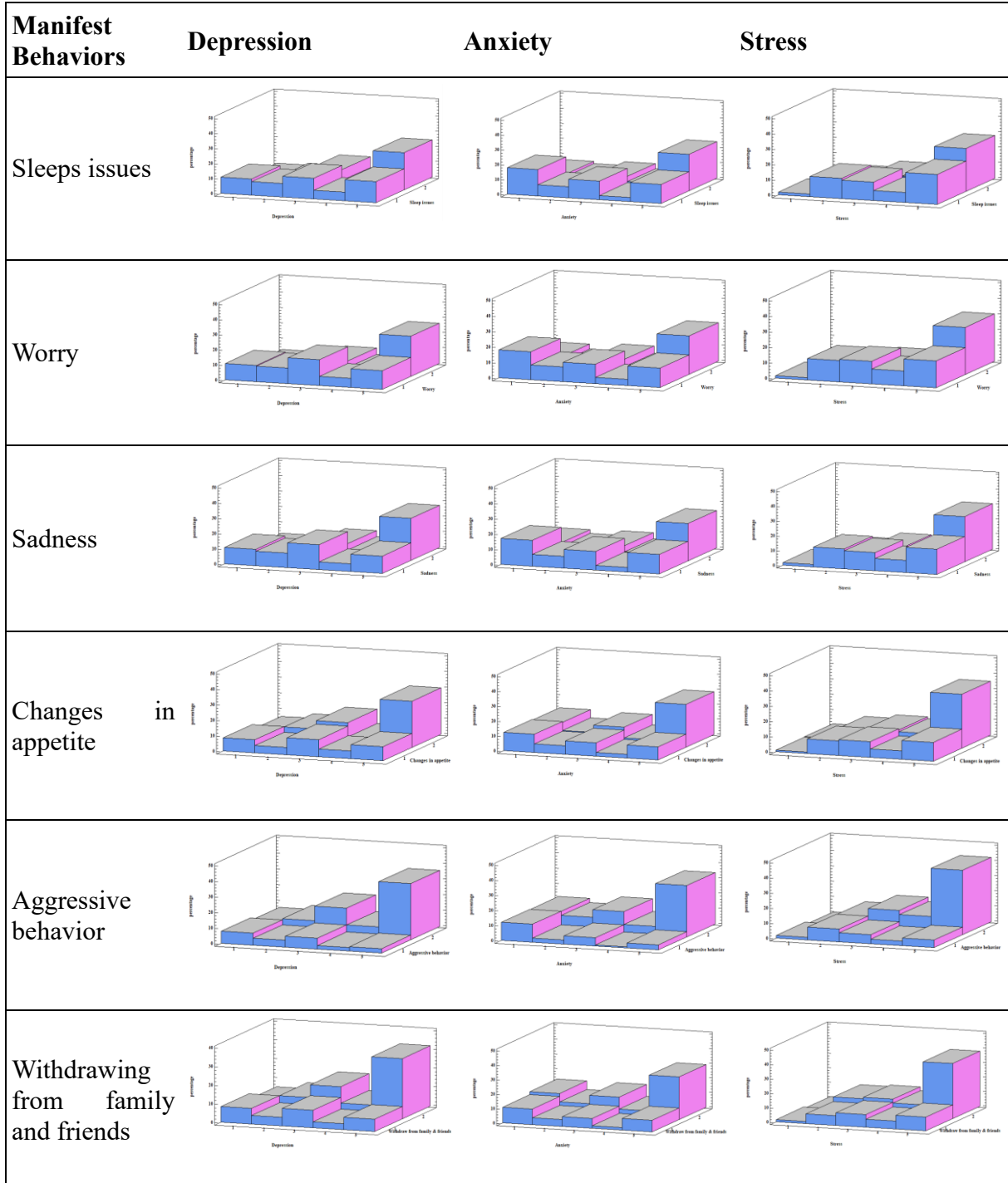


Table 1  
 p-values associated with Multiple ANOVA, Kurskal-Wallis and Chi-Square tests.

Manifest Behaviors	Depression			Anxiety			Stress		
	ANVO A	KW Test	Chi Test	ANVO A	KW Test	Chi Test	ANVO A	KW Test	Chi Test
Sleeps issues	0.2607	<0.0001	<0.0001	<b>0.0369</b>	<0.0001	<0.0001	0.1682	<0.0001	<0.0001
Worry	<b>0.0118</b>			0.2210			<b>0.0233</b>		
Sadness	<b>0.0009</b>			0.4657			<b>0.0339</b>		
Changes in appetite	<b>0.0129</b>			0.7774			0.1438		
Aggressive behavior	0.1316			0.1000			<b>0.0155</b>		
Withdraw from family and friends	<b>0.0017</b>			0.9852			0.1331		
Index of all manifest behaviors	<b>0.0001</b>			0.3394			<b>0.0133</b>		

### 5. Discussion and Conclusions

Widely accepted and acknowledged research study posits that DASS-21 reliably measures specific underlying sub-factors of psychological distress [11]. These include:

- Depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest / involvement, anhedonia, and inertia [11].
- Anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect [11].
- Stress scale is sensitive to levels of chronic non-specific arousal. It assesses difficulty relaxing, nervous arousal, and being easily upset / agitated, irritable / over-reactive and impatient [11].

The present study analyzed the relationship between psychological distress and manifest behaviors of young adults in Detroit Metro area during the January 2024 COVID-19 wave. The analyses presented in previous sections show that depression, anxiety, and stress have a strong statistical association with manifest behaviors albeit at different levels. The ANOVA suggests that depression was associated with manifest behaviors of worry, sadness, changes in appetite and withdrawing from friends and family. Anxiety was associated with sleep issues. Stress was associated with worry, sadness, and aggressive behavior.

Future studies could explore the causality between psychological distress and manifest behaviors. Nevertheless, in future COVID-19 waves or other pandemics where response windows are short and/or where the resources are limited, policy makers and caregivers can prioritize to treat and address manifest behaviors that show strong association with psychological distress as highlighted by the ANVOA tests.

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