

**Cross-Sectional Assessment of PTSD, Depression, and General Anxiety
Disorder Symptoms Amongst Urban First Responders: A Pilot Study**

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Abstract

Background

Firefighters, emergency medical technicians, and paramedics are regularly exposed to a variety of high stress, life threatening, and often traumatic events in the line of duty. Their services are vital to ensuring the health and safety of the communities they serve. Unfortunately, the nature of this work is thought to impose a severe mental impact on the individuals themselves, making them susceptible to a variety of psychological disorders. Literature published to date has not been able to establish a consistent estimate of the prevalence of PTSD, depression, and anxiety in this population, and there has been especially/particularly sparse research on the latter two. In response, this pilot study was created to estimate the prevalence of these symptoms in urban firefighters, emergency medical technicians, and paramedics using pre-validated screening tools, while also assessing the feasibility of a longitudinal study.

Methods

This study utilized an anonymous, self-report, cross-sectional survey hosted on Qualtrics and was electronically distributed to all members of the District of Columbia's Fire and Emergency Medical Service. Participation in the study was optional. Questions focused on pre-validated screening tools for behavioral health symptoms. Specifically, the PHQ-9, GAD-7, and a short-form of the PCL-5 were utilized to assess depression, general anxiety, and PTSD symptoms, respectively. The survey was administered in February 2021, during the COVID-19 pandemic.

Results

This study considered 1,930 eligible participants. 308 (15.6%) persons responded in some capacity and 285 of the 308 (93.4%) completed the survey in its entirety. In response to the behavioral health surveys, 294 respondents completed the PHQ-9 with a mean (SD) response score of 6.2 (4.5), 288 respondents completed the GAD-7 with a mean response score of 5.1 (4.9), and 286 respondents completed the PCL-5 short-form with a mean score of 3.2 (3.3). Using the reported cutoff scores, 24.1% of respondents, 17.7% of respondents, and 15.4% of respondents reported a symptom severity score at or surpassing the threshold for a positive screening on the PHQ-9, GAD-7, and PCL-5 short-form, respectively.

Conclusion

Depression, anxiety, and PTSD symptoms were clearly present in the respondent population at high levels, with probable prevalence rates reported based on the respondent information. A high completion rate indicates that a survey of this length was not prohibitive in obtaining results. Future studies should look at additional ways to maximize response rates to better understand the level at which behavioral health symptoms are present in this population.

Background

First responders are regularly exposed to a variety of high stress, life threatening, and often traumatic events in the line of duty.¹ While their actions during these events are vital to ensuring the health and safety of the communities they serve, these experiences are thought to impose a severe mental impact on the first responders themselves (Behnke et al., 2019; Klimley et al., 2018; SAMHSA, 2018). Complicating this work further is the potential for the rapid fluctuation between highly intense and highly sensitive events in frequently unstable environments. With often little time to decompress, there is an increased potential for a mentally strenuous environment non-conducive to a healthy psyche for these community service members (Alexander & Klein, 2001; Bentley et al., 2013; SAMHSA, 2018).

Research to date has primarily focused on frequent exposure to trauma, and thus centered on post-traumatic psychopathology including Post-Traumatic Stress Disorder (PTSD), depression, and anxiety with the latter two not as well studied (Wagner et al., 2020). In addition to traumatic events, long hours, shift work, sleep deprivation, and other organizational/occupational factors have also been thought to contribute to poor mental health in first responders (E. Donnelly, 2012; E. Donnelly & Siebert, 2009; Gist & Taylor, 2008; Lawn et al., 2020; Lewis-Schroeder et al., 2018; Patterson et al., 2012).

While attempting to identify specific triggers that would require potential interventions, many studies have focused on identifying specific events that could contribute to the onset of behavioral health symptoms (Behnke et al., 2019; Carleton, 2019; Declercq et al., 2011; E. A. Donnelly & Bennett, 2014; Monnier et al., 2002). There are two significant concerns with this approach. First, the specific prevalence of behavioral health symptoms in this population are widely unknown due to variance within the current evidence base. Additionally, with no understanding of baseline rates, the effectiveness of interventions cannot be accurately assessed. Research that focuses on identifying specific critical event exposure misses a fundamental point, that these events are at the core of emergency response work. In other words, these events cannot

¹ For the purposes of this study “first responders” will refer to all individuals acting in the capacity as a Firefighter (FF), Emergency Medical Technician (EMT), or paramedic.

be removed from the emergency response profession, and it is likely cumulative exposure, compounded by other lifestyle factors, that leads to behavioral health problems.

Theory would clearly support that anxiety, depression, and PTSD symptoms are present at higher levels in the first responder population compared to the general population. Increased exposure to traumatic events and occupational structure would support these predictions (E. Donnelly & Siebert, 2009; Lawn et al., 2020). Despite these predictions, there is a poor evidence base to assess these claims.

Baseline rates for anxiety, depression, and PTSD symptoms among first responders fluctuate considerably. A systematic review by Wagner and colleagues found only 24 eligible studies internationally that assess whether or not mental health symptoms were higher in this population. The studies showed that the prevalence of PTSD was between 0% to 60%, depression between 6% to 43%, and anxiety between 6% to 34% (Wagner et al., 2020). The average prevalence of these studies generally falls above rates seen in the general population, but the large variance leaves many unknowns, poor extrapolation, and no actionable conclusions. There is also a notable lack of comparison of the prevalence of mental health symptoms between genders and few longitudinal projects in the current literature.

Much of the research differs in general methodological variance, making cross-group comparisons very difficult. Specifically, the use of varying or inconsistent measurement tools prevents adequate analysis between the study populations and the general public. These inconsistencies also prevent comparison between studies to check the reliability of results. Additionally, studies suffer from poor sample sizes, poor response rates, or ignore systematically different characteristics between first responder populations (Carleton et al., 2017). The conflation of emergency worker populations is problematic as the unique needs of urban, rural, paid, and volunteer emergency medical workers are not mutually inclusive.

More research is needed to better understand the issue and to focus the limited resources available on helping these individuals. This can be done through the consistent use of

pre-validated survey tools to help narrow the scope of the work and create more focused interventions.

In an effort to address the gaps noted, a pilot study to assess urban first responders was created using the District of Columbia Fire and Emergency Medical Service (DC FEMS) as the study population. The pilot survey was centered around pre-validated screening tools used in the general population. This study supports future research that can then focus on longitudinal data collection and expansion of the study population.

Methods

Population and Study Design

This pilot study consisted of an anonymous cross-sectional survey delivered electronically to all members of the District of Columbia Fire and Emergency Medical Services (DC FEMS) agency. Participation in the study remained voluntary and anonymous at all times. Respondents were recruited from the department's operational division, consisting of all active fire and medical services personnel assigned to fire and medical apparatuses. DC FEMS is the primary agency responding to fire and medical emergencies throughout the District of Columbia and maintains 33 active stations across the city. The operational division consists of 1,930 personnel. Of these, 309 function as dual role Paramedic/Firefighters (FFs), 28 as single role Paramedics, 1,554 as dual role Emergency Medical Technicians (EMTs)/FFs, and 39 as single role EMTs. A gender breakdown of the operational division yields 327 (16.9%) female personnel and 1,603 males.

The DC FEMS leadership and medical director were both supporters and collaborators for this proposed study. DC FEMS currently has no systematic surveillance in place for mental health screening. In the past three years, members of DC Fire and EMS were dispatched at an average of 168,933 EMS incidents and 33,537 fire incidents per year. This includes responses to an average of 67,027 EMS calls of "higher priority" and 5,203 calls of "highest priority" per year, where calls were either potentially or immediately life threatening, respectively.

Survey Content

The survey was primarily composed of around three pre-validated questionnaires addressing depression, anxiety, and PTSD. Focusing on pre-validated measurement tools was necessary to allow future comparability to other first responder and non-first responder populations, as well as helping to ensure the likelihood that the intended behavioral conditions were being measured. Other questions focused on respondent background descriptors to understand respondents. Brevity was prioritized in an effort to improve response and completion rates. This study was approved by the Georgetown University Institutional Review Board (IRB).

Depression Screening (PHQ-9)

The 9-item Patient Health Questionnaire (PHQ-9) is the self-administered depression module of the larger Patient Health Questionnaire screening tool (Kroenke et al., 2001). This self-administered survey has been identified as a valid and reliable screening method for major depression disorder (Kroenke et al., 2001). Questioning is centered around asking individuals about the potential experience of anxiety symptoms in the two weeks prior to administration. The PHQ-9 can act as both a diagnostic aid in a clinical setting and as a screening tool. Each of the 9 items is scored on a 0 to 3 scale, indicating if the respondent is bothered by that symptom not at all (0), several days (1), more than half the days (2), or nearly every day (3) in the past two weeks. The tool provides a score of symptom severity from 0-27, with severity cutoff scores of 5, 10, 15, and 20 suggesting mild, moderate, moderately-severe, and severe symptoms respectively. A cutoff of greater than or equal to 10 will be used to indicate a positive screening for major depressive disorder (Kroenke et al., 2001, 2010). This tool is currently utilized by DC FEMS in the employee health clinic during yearly physicals.

General Anxiety Disorder Screening (GAD-7)

The 7-item General Anxiety Disorder (GAD-7) questionnaire is a self-administered survey asking about anxiety disorder criteria (Spitzer et al., 2006). This self-administered survey has been identified as a valid and reliable screening method for general anxiety disorder (Spitzer et al., 2006). Questioning is centered around asking individuals about the potential experience of anxiety symptoms in the two weeks prior to administration. The GAD-7 can act as both a diagnostic aid in a clinical setting and as a screening tool capable of tracking symptom changes

over time. Each of the 7 items is scored on a 0 to 3 scale, indicating if the respondent is bothered by that symptom not at all (0), several days (1), more than half the days (2), or nearly every day (3) in the past two weeks. The tool provides a score of symptom severity from 0-21, with severity cutoff scores of 5, 10, and 15 suggesting mild, moderate, and severe symptoms respectively. A cutoff of greater than or equal to 10 will be used to indicate a positive screening (Kroenke et al., 2010; Spitzer et al., 2006).

PTSD Screening (PCL-5 Short-Form)

The PTSD Checklist for the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (PCL-5) questionnaire is a 20-item self-administered survey in its original form (Blevins et al., 2015; Morrison et al., 2021; Robertson, 2019; Weathers et al., 2013). This self-administered survey has been identified as a valid and reliable screening method for post-traumatic stress disorder (Blevins et al., 2015; Zuromski et al., 2019). Questioning is focused on presentation of potential symptoms within one month prior to administration. The length of this form can be prohibitive when attempting to screen for symptoms of multiple behavioral disorders. A four-question short-form survey that was found to produce results similar to the full length PCL-5 was utilized in this study (Zuromski et al., 2019). The PCL-5 can act as both a diagnostic aid in a clinical setting and as a screening tool capable of tracking symptom changes over time. The PCL-5 short-form produces a symptoms severity score from 0-16. Each of the 4 items is scored on a 0 to 4 scale, indicating if the respondent is bothered by that symptom not at all (0), a little bit (1), moderately (2), quite a bit (3), or extremely (4) in the past month. A cutoff of greater than or equal to 7 will be used to indicate a positive screening (Zuromski et al., 2019).

Survey Administration and Analysis

In a 7-day pre-survey announcement period, information was provided to all DC FEMS members regarding the upcoming survey. This process started with an email being sent to all DC FEMS employees containing information regarding the study and asking for voluntary participation in the anonymous survey upon the start date. A letter of support from the DC FEMS fire chief and medical director was also included. Flyers were posted in all 33 stations that contained

information about the study and a QR code that would link to the survey upon the start date. Finally, an additional email was disseminated that contained endorsement letters from the American Federation of Government Employees local 3721 union and the International Association of Fire Fighters local 36 union that represents the majority of DC FEMS employees.

Following the announcement period, the survey was distributed using the DC FEMS email platform for employee communications. The email contained study information and a universal anonymous link to the questionnaire hosted on the survey system Qualtrics.² Participants had 18 days to complete the survey, with reminders being sent out 7, 12, and 14 days after the original release of the survey. Upon completion of the 18-day study period (February 8th-25th, 2021), the survey was closed to all future responses. Data analysis was performed using R version 4.0.1 (R Core Team, 2020), as well as the *tidyverse* (v1.3.0; Wickham et al., 2019), and *summarytools* (v0.9.9; Comtois, 2021) packages. Graphs were created using R version 4.0.1, and the packages *cowplot* (v1.1.1; Wilke, 2020) and *gridExtra* (v2.3; Auguie & Antonov, 2017).

Results

Of the 1,930 members in the operational division, 308 (15.6%) responded to at least part of the pilot survey. Of the 308 respondents, 285 (93.8%) completed the survey in its entirety.

Table 1 describes the self reported characteristics of respondents. The majority of respondents identified as male (84.5%) and 77% of respondents (n=304) reported working as a firefighter, EMT, or paramedic for 11 or more years. In response to the average number of hours respondents work per week as a first responder, 284 provided information of which 66.5% exceeded 48 hours per week. Members who had participated in the department's O2X program made up 49.1% of the respondent population (n=285).³

² For more information see the following: <https://www.qualtrics.com/>

³ The O2X program is administered through online programs and in person workshops/lectures. This program looks to “improve the mental, physical, and emotional health” of DC FEMS members. The majority of the department's interactions with the program have been focused on the physical aspects of health, though the mental and emotional aspects are also present in the program. The O2X program was fully implemented at DC FEMS in the fall of 2020. For more information visit <https://o2x.com>.

No	Stats / Values	Freqs (% of Valid)	Graph	Valid
1	1. Female	45 (14.8%)		304 (100.0%)
	2. Male	257 (84.5%)		
	3. Non-Binary	2 (0.7%)		
2	1. EMT	6 (2.0%)		304 (100.0%)
	2. Firefighter	49 (16.1%)		
	3. Firefighter,EMT	149 (49.0%)		
	4. Firefighter,EMT,Paramedic	10 (3.3%)		
	5. Firefighter,Paramedic	78 (25.7%)		
	6. Paramedic	12 (3.9%)		
3	1. 1-2 Years	15 (4.9%)		304 (100.0%)
	2. 3-5 Years	21 (6.9%)		
	3. 6-10 years	32 (10.5%)		
	4. 11-15 years	68 (22.4%)		
	5. 16-20 years	66 (21.7%)		
	6. Over 20 years	102 (33.6%)		
4	1. 0-48 hours	95 (33.5%)		284 (93.4%)
	2. 48-60 hours	139 (48.9%)		
	3. 60-80 hours	41 (14.4%)		
	4. Over 80 hours	9 (3.2%)		
5	1. Ward 1	37 (13.3%)		279 (91.8%)
	2. Ward 2	35 (12.5%)		
	3. Ward 3	28 (10.0%)		
	4. Ward 4	22 (7.9%)		
	5. Ward 5	41 (14.7%)		
	6. Ward 6	47 (16.8%)		
	7. Ward 7	30 (10.8%)		
	8. Ward 8	39 (14.0%)		
6	1. No	145 (50.9%)		285 (93.8%)
	2. Yes	140 (49.1%)		

Table 1 – Self-reported respondent descriptive characteristics. Rows present data for reported gender (1), qualifications (2), years of first responder service (3), average work hours per week (4), station location by ward (5), and participation in the O2X program (6).

Descriptive statistics of respondents' scores on the PHQ-9, GAD-7, and PCL-5 short-form screening tools are displayed in **Table 2**.⁴ The PHQ-9 (n=294) had a mean (SD) response score of 6.2 (4.5) which is the lower threshold for the mild depression symptoms category. The GAD-7 (n=288) had a mean response score of 5.1 (4.9) which falls at the lower threshold for the mild category of anxiety symptoms. The PCL-5 short-form (n=286) had a mean score of 3.2 (3.3).

⁴ See Appendix Table 1 for complete score summary statistics.

	PHQ-9 Scores	GAD-7 Scores	PCL-5 short-form Scores
N. Valid (%)	294 (96.7)	288 (94.7)	286 (94.1)
Mean (SD)	6.2 (5.5)	5.0 (4.9)	3.2 (3.3)
Median (IQR)	5.0 (7.0)	4.0 (6.3)	2.0 (4.0)

Table 2 – Behavioral Health Surveys Descriptive Statistics.

Using the PHQ-9 ≥ 10 cutoff score, 24.1% of all respondents (n=294) reported a symptom severity score at or surpassing the threshold for a positive screening. The GAD-7 ≥ 10 screening cut off revealed that 17.7% of all respondents (n=288) reported a symptom severity score at or surpassing the threshold for a positive screening. Meanwhile, using a PCL-5 short-form cutoff score of ≥ 7 revealed that 15.4% of all respondents (n=286) reported a symptom severity score at or surpassing the threshold for a positive screening.

The frequency distributions of all respondent scores on each screening tool are presented in **Figure 1**. **Figure 1A** and **1B** show the distribution of PHQ-9 and GAD-7 scores with severity categories displayed for reference. **Figure 1C** shows the distribution of PCL-5 short-form scores.

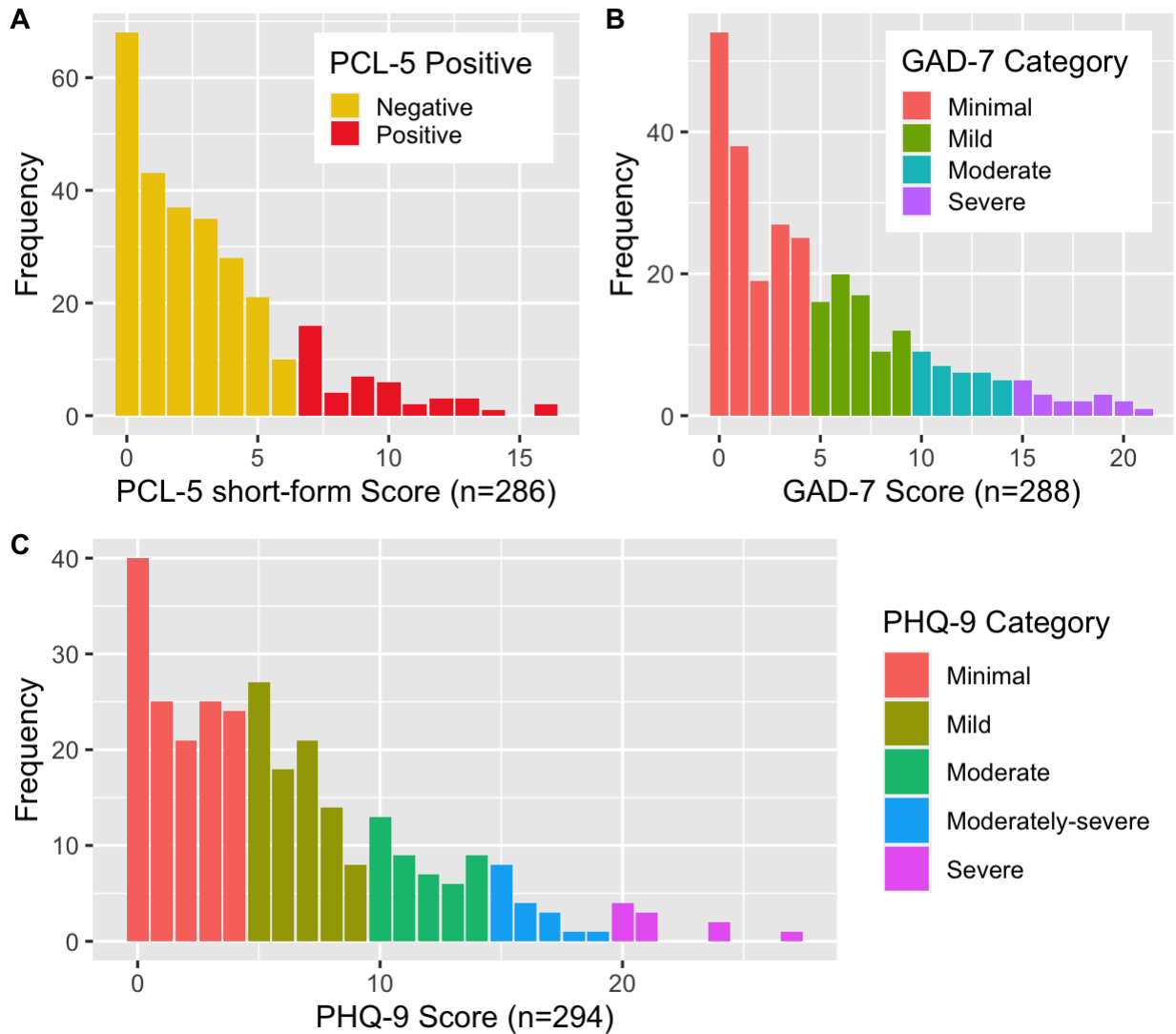


Figure 1 – Frequency distributions of the PCL-5 short-form (A), GAD-7 (B), and PHQ-9 (C) symptom severity scores.

ANOVA testing revealed three significant differences amongst subpopulations. Comparing respondents who reported working an average of 60-80 hours per week compared to those working in the 0-48 hours range, a PHQ-9 score difference of 2.59 ($p=0.05$) was noted. A difference in PHQ-9 scores was also found when comparing the 60-80 hour range to the 48-60 hour range, with a score difference of 2.52 ($p=0.04$). Finally, a difference was observed in PCL-5 short-form scores when comparing the 60-80 hour range to the 0-48 hour range with a score difference of 1.62 ($p=0.04$) between the two subgroups.

Limitations

This study utilized a cross-sectional survey to take a convenience sample from the study population. Self-selection bias may be present with the low response rate, creating uncertainty if the respondent population reflects the entire study group. No weighting was performed in the data analysis which limits generalizability. The nature of the screenings introduces the potential for recall bias as respondents try to retrospectively assess their symptoms. Also, with no ability to compare against diagnostic interviews, reported estimates must be viewed as probable prevalence rather than the absolute prevalence. There is potential for response bias due to the stigma surrounding behavioral health, though the anonymity of the survey should mitigate this potential. Finally, responses were collected during the global SARS-CoV-2 pandemic in which first responders had been on the front lines of the response. While the exact impact of these circumstances is unknown, it does create potential limitations for generalizability for non-pandemic times.

Discussion

The collected results suggest that the online survey format is suitable for data collection on behavioral health symptoms. Given that 93.8% of respondents completed the survey in its entirety, this suggests that survey length was not a prohibitive factor impacting the overall survey response rate.

The gender demographic breakdown of respondents was nearly reflective of the greater study population, with 14.8% of respondents identifying as female compared to 16.9% in the greater study population. With the relationship between reported gender and behavioral health symptoms being of particular importance as identified by gaps in literature, this breakdown of respondents is promising for both analysis of the current data and future studies. No statistically significant difference was found between reported gender and behavioral health scores on any of the pre-validated surveys. This result held true when comparing reported gender to positive screenings on the pre-validated surveys. These results should not be taken as a definitive conclusion due to the small sample size and should continue to be a focus moving forward.

Based on the results, it appears that the question which asked respondents for their qualifications was unclear.⁵ The intention of this question was to inquire about the active qualifications being used by the respondent, while working for DC FEMS, to understand if a member's primary role impacted behavioral health symptoms. A number of respondents indicated that they serve as single role firefighters, which most likely reflects the fact that those respondents primarily serve roles acting on fire apparatuses rather than medical apparatuses. Based on DC FEMS records, these members should also hold an EMT or paramedic certification. Additionally, a small number of respondents indicated that they simultaneously hold a firefighter, EMT, and Paramedic qualification. While this is possible, it is clear that the intention of identifying the primary role was missed. In subsequent iterations of the survey the question should be reframed to ask what kind of emergency unit the respondent is primarily assigned which will allow assessment on the impact of the type of work performed.⁶

All 304 respondents provided data reporting how long they had worked as a firefighter, EMT, or paramedic. No significant differences in behavioral health survey scores were found when comparing subgroups. 77% of respondents reported working as a firefighter, EMT, or paramedic for 11 or more years. One could reasonably infer that increased years working as a first responder has caused these more experienced individuals to bear witness to more behavioral health challenges. Unfortunately, no definitive conclusions can be drawn from these results as pre-existing data on the breakdown of years of service for the population is unavailable.

Of the 284 respondents who provided information regarding the average number of hours they work as a first responder per week, it was interesting to find that 66.5% exceeded 48 hours per week. DC FEMS operates on a schedule of 24 hours on shift followed by 72 hours off shift.⁷ This setup is to provide members with adequate rest before returning to duty and means that the maximum number of hours per week that can be worked at DC FEMS is 48 hours. There is, of course, the potential for overtime which would set employees over the 48 hour per week mark, but this could also indicate that members are picking up additional part-time shifts at other agencies. This is interesting because significant differences in both PHQ-9 and PCL-5 short-form

⁵ Question read: "Please select all qualifications you currently have"

⁶ As an example, respondents could be asked if they are primarily assigned to a fire apparatus or medical apparatus.

⁷ Commonly referred to as a "24/72" shift schedule.

scores were found between certain work hour categories. For example, the group working 60-80 hours per week was found to have an average PHQ-9 score of 2.59 ($p=0.05$) points higher than the group working 0-48 hours per week. A similar disparity was also found between the group working 60-80 hours per week to those working 48-60 hours per week, with the former having an average PHQ-9 score of 2.52 ($p=0.04$) points higher than the latter. There was also a noted difference in PCL-5 short-form scores between the group working 60-80 hours per week and the group working 0-48 hours per week, with the former having an average score of 1.62 ($p=0.04$) points higher than the latter. A detailed assessment of the potential impact of increased working hours for first responders on behavioral health symptoms is beyond the scope of this paper, but should be noted and perhaps explored further in future research. It may be that working more hours is itself contributing to mental health outcomes, or it may be that the nature of the work is contributing, or a combination, or some other unknown factor.

Of the 285 individuals who indicated whether or not they had involvement in the department's O2X program, 49.1% had participated. While no significant difference in behavioral health symptom survey scores was found between the subgroups, this raises questions regarding the potential impact of the O2X program. Despite no observed relationship to symptom severity scores, it could be explored in future surveys if participation in the program raises awareness of behavioral health symptoms. If this were the case, it could be significant as part of prevention programs is creating awareness of the problem within the population. Unfortunately, data is not available to fully understand the current level of participation by all members.

Using the reported cutoff measures, 24.1% of all respondents ($n=294$), 17.7% of all respondents ($n=288$), and 15.4% of all respondents ($n=286$) met or exceeded the criteria for a positive probable screening for major depression, general anxiety, or post-traumatic stress disorder respectively. The averages of both the PHQ-9 and GAD-7 fell within the mild category for symptom severity, indicating the average respondent had symptoms beyond what might be considered normal.⁸ These results should be seen as baseline surveillance data not to be interpreted as a medical diagnosis, but rather as symptomatology that would warrant further psychiatric evaluation by medical professionals. Without comparable clinician administered

⁸ The PCL-5 is not traditionally reported with symptom severity categories.

interviews, the gold standard for a behavioral health diagnosis, the rates reported should be seen as estimated probable prevalence rates. As a point of comparison, Petrie and colleagues performed an international meta-analysis and found estimated prevalence rates of 11% for PTSD, 15% for depression, and 15% for anxiety (Petrie et al., 2018). In the general population, the prevalence of major depression, general anxiety, and post-traumatic stress disorder have been estimated at rates of 7.1%, 2.7%, and 3.6% respectively (Harvard Medical School, 2007; Center for Behavioral Health Statistics and Quality et al., 2017).⁹ While these are slightly outdated estimates, and were recorded in non-pandemic time frames, it should still be of concern that the prevalence rates found in the DC FEMS population were roughly 3-6 times greater than estimates in the general population.

The first priority moving forward should be expanding recruiting techniques to improve future studies. It was communicated through the Georgetown IRB office that there were individuals from the study population who reached out using the IRB email that was listed on the recruitment materials, wanting to make sure that the study was truly anonymous. After additional clarification regarding anonymity was provided, additional responses were received. Behavioral health is a highly stigmatized topic in both the general public and first responder communities (Stanley et al., 2016; Tatebe et al., 2020). This creates an uphill battle for understanding the magnitude of, and then addressing, potential behavior health issues. Potential changes to the recruitment process could include a longer announcement period, video communications for explanation, and in person announcements. This pilot study is expected to prove beneficial in future study recruitments by helping build trust between the study team and study population.

While this study should not be taken as a definitive descriptor of the entire group, it found a clear presence of behavioral symptoms in the respondent population. While DC FEMS does conduct screenings with the PHQ-9 during yearly employee physicals, it is likely that members underreport symptoms due to stigma and fear of job repercussions, even if those fears are unwarranted (Lewis-Schroeder et al., 2018; Tatebe et al., 2020). These screenings are an appropriate step, but stigma of a behavioral health diagnosis and fear of impact on an individual's career, even if unwarranted, are most likely prohibiting the DC FEMS wellness clinic from

⁹ These prevalence estimates are used by the National Institute of Mental Health.

obtaining accurate results (Kronenberg et al., 2008). Given the risk of missing individual level identification of behavioral health symptoms, population based monitoring and interventions would be the most effective. A viable option for this is a long term surveillance system where anonymity can encourage individuals to answer more truthfully. The results of this pilot study act as an indication that the survey used could be beneficial to such a project. Furthermore, once the prevalence of potential PTSD, depression, and general anxiety symptoms is fully understood with the use of a long term surveillance system, future intervention programs can be implemented with the ability to track the effectiveness of the deployed strategy.

Moving forward, these results support the need for a longitudinal study that can transition into an active surveillance system in the study population. It is recommended that yearly physicals conducted by DC FEMS health officials continue to use individual level screenings and potentially expand the surveys used to capture a broader range of behavioral health symptoms. Even if there is uncertainty in the accuracy of reporting, screening serves a secondary purpose of raising awareness of potential symptoms. Essentially, screening both at the primary care level and at broader surveillance level can act as a public health messaging campaign. While it is too early to make broad assertions of potentially effective population based interventions, this study has demonstrated a clear presence of behavioral symptoms which can be used to support future funding and projects.

As one additional note, it is important to realize that the data presented must be viewed in the environmental context in which the data was collected. Data collection started on February 8th, 2021, nearly one year into the global SARS-CoV-2 pandemic in which fire and emergency medical service personnel had been on the front lines of the response. This often meant that members of this population were subjected firsthand to the virus in unstable pre-hospital environments. Additionally, it is important to note that the collection came just over a month after the events that took place at the United States Capitol on January 6th, 2021. Members of DC FEMS were an essential part of the emergency response to the aftermath of that event, providing both medical triage and transportation for those that were injured. The exact impact of these events on DC FEMS members is unclear as there is no prior data on the prevalence of behavioral health symptoms in this specific population. Notably, data collected during June 2020

in the general population indicated increased rates of behavioral health symptoms related to the events of the pandemic (Czeisler, 2020).¹⁰ This included increased rates of anxiety disorder or depressive disorder symptoms as well as an increase in trauma- and stressor-related disorder symptoms reportedly connected to the pandemic. While the CDC study was conducted in the general population and 7 months before this study, there is preliminary evidence that a pandemic has the potential to exacerbate behavioral health symptoms. Historical comparisons to major crises such as 9/11 would also predict an increase of post traumatic psychopathology and outcomes (DePierro et al., 2020).

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¹⁰ This study also utilized the Qualtrics system.

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Appendix

	PHQ Scores	GAD Scores	PCL Scores
Mean	6.19	5.05	3.18
Std.Dev	5.45	4.93	3.27
Min	0.00	0.00	0.00
Q1	2.00	1.00	1.00
Median	5.00	4.00	2.00
Q3	9.00	7.50	5.00
Max	27.00	21.00	16.00
MAD	4.45	4.45	2.97
IQR	7.00	6.25	4.00
CV	0.88	0.98	1.03
Skewness	1.08	1.09	1.37
SE.Skewness	0.14	0.14	0.14
Kurtosis	0.85	0.56	1.80
N.Valid	294.00	288.00	286.00
Pct.Valid	96.71	94.74	94.08

Appendix Table 1 - Complete Behavioral Health Surveys Descriptive Statistics.