Characterizing Mental Health Treatment Utilization among Individuals Exposed to the 2001 World Trade Center Terrorist Attacks 14–15 Years Post-Disaster

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Abstract: Following the World Trade Center (WTC) attacks in New York City (NYC) on 11 September 2001 (9/11), thousands in NYC experienced significant stress reactions and disorders, presenting an immediate need for counseling and treatment. While other studies documented post-9/11 mental health treatment utilization, none have data more than two years post-disaster. We used data from 35,629 enrollees of the WTC Health Registry, a longitudinal cohort study of those exposed to the WTC attacks, to examine predictors of counseling after 9/11, the types of practitioners seen, and the perceived helpfulness of therapy up to 15 years post-disaster. Among enrollees, 37.7% reported receiving counseling at some time after 9/11. Predictors of seeking counseling included race/ethnicity, age at 9/11, education level, exposure to the WTC attacks, other traumatic experiences, mental health symptomology, and pre-9/11 counseling. Whites and Hispanics, those who were children on 9/11, and those with high levels of exposure to the WTC attacks sought counseling soonest after 9/11. Among those who sought counseling, Blacks, Asians, and those with lower education and income were less likely to see mental health specialists and more likely to see general practitioners or religious advisors. Finally, among those who sought recent counseling, women, Blacks, those aged ≥65 years, and those with very high WTC exposures were more likely to rate their recent counseling as very helpful. This study used data up to 15 years post-disaster to document mental health treatment utilization patterns, trends, and disparities that have implications for future preparedness plans and needs assessments.

Keywords: counseling; post-disaster; psychotherapy; mental health treatment; treatment utilization

1. Introduction

The World Trade Center (WTC) terrorist attacks in New York City (NYC) on 11 September 2001 (9/11) resulted in thousands of casualties and, among the survivor population in NYC, a substantial mental health burden [1], primarily consisting of stress disorders [2,3]. Specifically, similar to the aftermath of other natural or human-made disasters, posttraumatic stress disorder (PTSD) was the most common mental health condition that resulted from the attacks [4]. This mental health burden translated into a need for crisis counseling and treatment [1]. In response, several mental health programs in New York City were established after 9/11, such as Project Liberty [5]. Project Liberty was a mental health screening and treatment program with a bilateral approach. The first tier was a general outreach program to communities affected by the attacks, providing free short-term counseling...
and education on coping methods for typical stress reactions. In addition, it included delivery of counseling to children in schools [6]. Secondly, individuals were screened for more severe and/or prolonged symptoms and then referred to specialized mental health treatment. Separately, mental health treatment was also offered through a program initially designed to monitor and treat those who participated in the rescue and recovery efforts [7]. Subsequently, treatment for mental health conditions was also made available to community members (i.e., those who were not involved in the rescue and recovery work) [8]. Together, these programs are collectively referred to as the WTC Health Program. Despite these established programs, it was consistently documented that receipt of these mental healthcare services was less than expected given the number of affected individuals and magnitude of the situation [9,10], which is common among populations who experience different types of mass trauma, such as natural disasters [11,12].

Several studies examined mental health treatment use after 9/11 and documented predictors of treatment receipt [9,13–17]. These studies reported that those with the greatest levels of exposure to the WTC attacks and those who had experienced peri-event panic attacks were the most likely to use mental health services after 9/11. Individuals who were Black and those without a regular doctor were less likely to use mental health services, including therapy and medication. However, these studies were conducted between six months and up to two years after the attacks, and data on longer-term or delayed utilization are sparse. Furthermore, studies generally lack specific details on the type of practitioner sought and the perceived degree of benefit of counseling.

The main objective of this study was to describe post-9/11 mental health treatment utilization, specifically counseling and therapy among individuals exposed to the WTC attacks up to 15 years post-disaster. Firstly, we examined predictors (e.g., demographics and exposure to the WTC attacks) of seeking counseling after 9/11, and then compared the characteristics of individuals who sought different types of practitioners for such counseling. Secondly, we assessed determinants of perceived benefit of recent counseling. Lastly, we evaluated the distributions of time to first counseling after 9/11 by several factors.

2. Materials and Methods

Study Population. The World Trade Center Health Registry (Registry) is a longitudinal cohort study of persons exposed to the WTC terrorist attacks on 9/11 [18]. Those who lived, worked, went to school, or were otherwise present in lower Manhattan on 9/11 and/or those who participated in the rescue and recovery efforts were eligible to enroll. The Registry was established in order to track the short and long-term potential health effects of 9/11.

The study design, eligibility, and enrollment methods of the Registry were previously described [18]. Briefly, in 2003–2004, 71,426 individuals who were exposed to the WTC attacks on 9/11 either as rescue and recovery workers or community members, were enrolled into the Registry and completed a baseline questionnaire (Wave 1). This was followed in subsequent years by Wave 2 (2006–2007), Wave 3 (2011–2012), and Wave 4 (2015–2016). The Institutional Review Boards of the Centers for Disease Control Prevention and the New York City Department of Health and Mental Hygiene approved the Registry protocol.

For this study, enrollees had to complete the Wave 4 questionnaire (N = 36,862), which included questions on their mental health treatment history, and were required to not be missing data on date of birth (N = 18) or missing a response to the question about whether the enrollee had at least one session of counseling or therapy after 9/11 (N = 1215). This yielded a final sample of 35,629.

Mental health treatment. On the Wave 4 survey, enrollees were asked about their mental healthcare-seeking behavior ever, after 9/11, and in the last 12 months. Firstly, enrollees were asked whether they had ever had a session of counseling or therapy lasting 30 minutes or longer and, if so, at what age the first session of counseling occurred, and whether any counseling was sought after 9/11. Among those who reported seeking care after 9/11, questions were asked about the conditions for which counseling was sought (e.g., depression, PTSD, anxiety, among others) and what types of
practitioners were sought (e.g., psychologist, psychiatrist, social worker, clergy member, among others). Lastly, among those who reported seeking counseling in the last 12 months, questions were asked about medical indications for counseling, frequency of counseling, and perceived benefit. Whether any counseling was sought in relation to the events of 9/11 was not explicitly asked in the questionnaire.

**Explanatory variables.** Questionnaire data consisted of details on demographics and social factors, WTC-related exposures and experiences, health-related and care-seeking behaviors, and mental and physical health symptoms and conditions over time. Demographic information included sex, age, race and ethnicity, household income, and education. For this study focusing on mental health, exposure to the WTC attacks was operationalized using data on several traumatic experiences on and directly after 9/11 that were asked about on Waves 1 and 2. Based on work by Adams and Boscacino [19], Brackbill et al. derived a composite score consisting of 11 questions about traumatic experiences such as being in the North or South World Trade Center (WTC) towers at the time of the attack, witnessing three or more events (seeing planes hit the buildings, people fall or jump from buildings, people injured, or people running), being injured on 9/11; having a relative killed on 9/11, and being displaced from home due to 9/11 [20]. These items were summed (range = 0–11) and the score was then categorized as none/low (0–1 exposures), medium (2–3), high (4–5), and very high (≥6). In addition, another measure of “exposure” to the WTC attacks was the Registry eligibility group. Enrollees were categorized with regard to how they originally became eligible for the Registry: rescue and recovery workers, lower Manhattan residents or lower Manhattan area workers, passersby, or students. Because these groups were not mutually exclusive, those who met the criteria for more than one category were placed in the category considered to be more highly exposed to 9/11, such that rescue and recovery workers had greater levels of WTC exposure than residents, who had greater exposures than area workers, passersby, and students.

**Mental health measures.** PTSD symptoms were assessed at each wave (Waves 1–4) using the 9/11-specific PTSD Checklist (PCL)-17 [21–23]. The PCL is a self-administered questionnaire based on Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV criteria [24] and its validity was established [25]. Total scores ≥44 were considered to be indicative of probable PTSD [21]. PTSD status was summarized across time as ever (scores ≥44 on at least one wave) or never (scores <44 on all waves). Persistent PTSD was defined as those who had scores ≥44 at all four waves.

Depressive symptoms were assessed using the Patient Health Questionnaire (PHQ)-8 [26] at Waves 3 and 4 only. This self-administered and validated instrument contains eight of the nine criteria that constitute the DSM-IV diagnosis of depressive disorders [24,27]. Scores ≥10 were considered to be indicative of moderate to severe depression [28].

Enrollees were also asked whether they had ever been diagnosed by a doctor or other medical professional with various mental health conditions, such as depression, PTSD, or anxiety.

**Statistical Analysis.** Firstly, we evaluated the distribution of personal characteristics, WTC exposures, and mental health symptomology by whether enrollees sought counseling at some time after 9/11. In order to identify predictors of seeking counseling, we then fit multivariable log binomial models to estimate associations between these factors and seeking counseling after 9/11. In these models, we did not include factors that required a doctor diagnosis (e.g., doctor-diagnosed depression), since these diagnoses could have been received through such counseling visits. Instead, we included PTSD and depression symptoms as measured by the PCL-17 and PHQ-8, respectively. We fit these models among everyone in the sample, and then conducted a sensitivity analysis restricting the sample to those who had a history of PTSD (Waves 1–4) or depression (Waves 3–4) via threshold PCL-17 and PHQ-8 scores, respectively, in order to examine those with the most theoretical clinical need for counseling. Next, among those who sought counseling, we then examined the types of practitioners sought, and the distributions of personal characteristics, WTC exposures, and mental health symptomology across practitioner type. Again, we did this in the total sample, and subsequently just among those with a history of PTSD or depression. Next, among those who had sought counseling in the last 12 months prior to completing the Wave 4 questionnaire, we explored the determinants of
perceived helpfulness of therapy. We fit log binomial models estimating adjusted risk ratios (aRR) and 95% confidence intervals (CI) to identify predictors of perceiving recent counseling as “very helpful” compared with all other ratings (i.e., collapsing all other categories; somewhat, slightly, and not at all). Demographic characteristics, WTC-related exposures, mental health symptomology, and variables related to care-seeking were examined simultaneously in models. Finally, among those who did not seek counseling before 9/11, we assessed the distributions of time elapsed between 9/11 and first seeking counseling (i.e., time to first counseling after 9/11) by several covariates, such as demographics and WTC exposures using unadjusted Kaplan–Meier curves.

3. Results

The study population was majority male (60.6%), White (70.0%), and had at least a college education (53.2%) (Table 1). There was approximately equal representation of rescue and recovery workers (46.3%) and community members (residents, area workers, passersby, and students; 53.7%) in the sample. Mental health conditions were common: 27.1% screened positive for PTSD on at least one Wave according to PCL-17 scores over time and 16.3% reported ever being diagnosed with PTSD by a medical professional. Likewise, although only 18.5% of individuals reported seeking counseling before 9/11, 37.7% reported counseling at some time after 9/11. Among those who sought treatment for the first time after 9/11, counseling was sought consistently throughout the 15 years after 9/11, with the largest increase observed in the first year after 9/11 (Figure 1).

Table 1. Distributions of personal characteristics, World Trade Center (WTC) exposures, and mental health symptomology by seeking counseling post 11 September 2001 (9/11) and adjusted risk ratios (aRR) and 95% Confidence Intervals (CI). GED—General Education Development; PTSD—posttraumatic stress disorder.

|                          | Total (N = 35,629) | Sought Counseling (N = 13,435, 37.7%) | No Counseling (N = 22,194, 62.3%) | aRR \(^a\) | 95% CI |
|--------------------------|--------------------|---------------------------------------|----------------------------------|---------|-------|
| **Sex**                  |                    |                                       |                                  |         |       |
| Men                      | 21,586             | 60.6%                                 | 7,240                            | 33.5%   | 14,346 | 66.5%  | 1.00   | Reference |
| Women                    | 14,043             | 39.4%                                 | 6,195                            | 44.1%   | 7,848  | 55.9%  | 1.01   | 0.99 | 1.03 |
| **Race/Ethnicity**       |                    |                                       |                                  |         |       |
| White                    | 24,939             | 70.0%                                 | 9,857                            | 39.5%   | 15,082 | 60.5%  | 1.00   | Reference |
| Black                    | 3,416              | 9.6%                                  | 1,045                            | 30.6%   | 2,371  | 69.4%  | 0.83   | 0.76 | 0.90 |
| Hispanic                 | 4,046              | 11.4%                                 | 1,550                            | 38.3%   | 2,496  | 61.7%  | 0.98   | 0.94 | 1.02 |
| Asian                    | 2,002              | 5.6%                                  | 470                              | 23.5%   | 1,532  | 76.5%  | 0.72   | 0.63 | 0.82 |
| Other race               | 1,226              | 3.4%                                  | 513                              | 41.8%   | 713    | 58.2%  | 1.00   | 0.99 | 1.02 |
| **Education at Wave 1**  |                    |                                       |                                  |         |       |
| ≤High school/GED         | 7,857              | 22.2%                                 | 2,619                            | 33.3%   | 5,238  | 66.7%  | 0.94   | 0.90 | 0.99 |
| Some college             | 8,704              | 24.6%                                 | 3,138                            | 36.1%   | 5,566  | 63.9%  | 0.99   | 0.96 | 1.02 |
| College                  | 11,423             | 32.3%                                 | 4,470                            | 39.1%   | 6,953  | 60.9%  | 0.99   | 0.98 | 1.00 |
| College                  | 11,423             | 32.3%                                 | 4,470                            | 39.1%   | 6,953  | 60.9%  | 0.99   | 0.98 | 1.00 |
| **Graduate degree**      |                    |                                       |                                  |         |       |
| Income at Wave 1         |                    |                                       |                                  |         |       |
| <$50,000                 | 8,876              | 27.6%                                 | 3,632                            | 40.9%   | 5,244  | 59.1%  | 1.00   | 0.98 | 1.01 |
| ≥$50,000 to <$150,000    | 19,249             | 59.8%                                 | 6,974                            | 36.2%   | 12,275 | 63.8%  | 0.99   | 0.98 | 1.00 |
| ≥$150,000                | 4,050              | 12.6%                                 | 1,623                            | 40.1%   | 2,427  | 59.9%  | 1.00   | 1.00 | 1.00 |
| **Age at 9/11 (years)**  |                    |                                       |                                  |         |       |
| 0–17                     | 852                | 2.4%                                  | 438                              | 51.4%   | 414    | 48.6%  | 2.44   | 1.86 | 3.20 |
| 18–24                    | 1,720              | 4.8%                                  | 845                              | 49.1%   | 875    | 50.9%  | 2.42   | 1.84 | 3.17 |
| 25–44                    | 1,8212             | 51.1%                                 | 7,442                            | 40.9%   | 10,770 | 59.1%  | 2.37   | 1.81 | 3.11 |
| 45–64                    | 1,4310             | 39.3%                                 | 4,551                            | 32.5%   | 9,459  | 67.5%  | 2.08   | 1.58 | 2.73 |
| ≥65                      | 835                | 2.3%                                  | 159                              | 19.0%   | 676    | 81.0%  | 1.00   | Reference |
### Table 1. Cont.

| Eligibility group                                      | Total (N = 35,629) | Sought Counseling (N = 13,435, 37.7%) | No Counseling (N = 22,194, 62.3%) | aRR $^a$ | 95% CI | N     | %     | N     | %     |
|-------------------------------------------------------|---------------------|--------------------------------------|----------------------------------|---------|--------|-------|-------|-------|-------|
| Rescue/recovery worker                                 | 16480               | 5732                                 | 10748                            | 65.2    | 1.00   | 0.98  | 1.01  |
| Lower Manhattan resident                              | 5103                | 2266                                 | 2837                             | 55.6    | 0.99   | 0.95  | 1.02  |
| Lower Manhattan area worker/passerby                  | 14046               | 5437                                 | 8609                             | 61.3    | 1.00   | Reference |
| WTC exposure score                                     |                     |                                      |                                  |         |        |       |       |       |       |
| None/low                                              | 15620               | 5083                                 | 10537                            | 67.5    | 1.00   | Reference |
| Medium                                                | 11923               | 4518                                 | 7405                             | 62.1    | 1.08   | 1.04  | 1.12  |
| High                                                  | 6203                | 2743                                 | 3460                             | 55.8    | 1.09   | 1.04  | 1.13  |
| Very high                                             | 1883                | 1091                                 | 792                              | 42.1    | 1.10   | 1.06  | 1.14  |
| Traumatic experiences after 9/11 $^b$                  |                     |                                      |                                  |         |        |       |       |       |       |
| No                                                    | 21859               | 6700                                 | 15159                            | 69.3    | 1.00   | Reference |
| Yes                                                   | 13770               | 6735                                 | 7035                             | 51.1    | 1.08   | 1.05  | 1.12  |
| Ever-PTSD $^c$                                         |                     |                                      |                                  |         |        |       |       |       |       |
| No                                                    | 17572               | 5156                                 | 12416                            | 70.7    | 1.00   | Reference |
| Yes                                                   | 6543                | 3726                                 | 2817                             | 43.1    | 1.27   | 1.20  | 1.33  |
| Ever-Depression $^d$                                   |                     |                                      |                                  |         |        |       |       |       |       |
| No                                                    | 22209               | 6691                                 | 15518                            | 69.9    | 1.00   | Reference |
| Yes                                                   | 6451                | 3973                                 | 2478                             | 38.4    | 1.17   | 1.11  | 1.23  |
| Counseling before 9/11                                 |                     |                                      |                                  |         |        |       |       |       |       |
| No                                                    | 27971               | 7460                                 | 20511                            | 73.3    | 1.00   | Reference |
| Yes                                                   | 6340                | 4810                                 | 1530                             | 24.1    | 2.25   | 2.16  | 2.34  |
| Doctor-diagnosed depression (ever)                    |                     |                                      |                                  |         |        |       |       |       |       |
| No                                                    | 28099               | 7366                                 | 20733                            | 73.8    | -      | -     | -     |
| Yes                                                   | 7530                | 6069                                 | 1461                             | 19.4    | -      | -     | -     |
| Doctor-diagnosed PTSD (ever)                          |                     |                                      |                                  |         |        |       |       |       |       |
| No                                                    | 29816               | 8490                                 | 21326                            | 71.5    | -      | -     | -     |
| Yes                                                   | 5813                | 4945                                 | 868                              | 14.9    | -      | -     | -     |
| Doctor-diagnosed anxiety (ever)                       |                     |                                      |                                  |         |        |       |       |       |       |
| No                                                    | 30950               | 9695                                 | 21255                            | 68.7    | -      | -     | -     |
| Yes                                                   | 4679                | 3740                                 | 939                              | 20.1    | -      | -     | -     |

$^a$ Risk ratio represents the comparison of seeking counseling vs. not seeking counseling (reference). $^b$ Traumatic experiences were defined as one or more of the following: experiencing a serious accident (e.g., in a car or a fall), an intentional attack with or without a weapon, forceful unwanted sexual contact, and serious family or work problems. $^c$ As measured by a score of $\geq 44$ on the 9/11-specific PTSD Checklist (PCL)-17 on at least one wave (Waves 1–4). $^d$ As measured by a score of $\geq 10$ on Patient Health Questionnaire (PHQ)-8 on at least one wave (Waves 3–4).
Figure 1. Unadjusted Kaplan–Meier curves and 95% confidence intervals of time to first counseling after 11 September 2001 (9/11) among those who had not sought counseling before 9/11 (N = 27,971), World Trade Center (WTC) Health Registry, 2003–2016: (A) by race/ethnicity; (B) by age at 9/11; (C) by WTC exposure summary score.

Females were more likely to seek counseling compared with males (44.1% vs. 33.5%, although in adjusted models, sex was not a predictor of counseling (aRR = 1.01, 95% CI: 0.99, 1.03). While Blacks (aRR = 0.83, 95% CI: 0.76, 0.90) and Asians (aRR = 0.72, 95% CI: 0.63, 0.82) were less likely
to seek counseling compared with Whites, Hispanics and those of other races were equally likely to seek counseling compared with Whites. This was also apparent in the examination of time to counseling (Figure 1A). Asians were the most likely to delay counseling after 9/11 (i.e., had the longest times to counseling) compared with those of other races (i.e., who had the shortest times). Age at 9/11 was a strong predictor of counseling. Those who were younger at 9/11, especially those aged 0–17 years, were the most likely to seek counseling compared with those aged 65 years and older (Table 1). This observation was consistent in the distributions of times to counseling (Figure 1B). Those who were children (0–17 years) at the time of 9/11 sought counseling sooner than those who were older. This relationship between age at 9/11 and time to counseling was monotonically positive such that, as age increased, the delay in seeking counseling also increased (i.e., longer times). Other demographic characteristics showed mixed associations with seeking counseling; while those with less than a high school education were slightly less likely to seek counseling compared with those with a graduate degree, income was not associated with seeking counseling (Table 1).

Measures of exposure to the WTC attacks, other post-9/11 traumatic experiences, and mental health symptomology were positively associated with seeking counseling. For example, those with very high scores of WTC exposure were more likely to seek counseling compared with those with none or low exposure (aRR = 1.10, 95% CI: 1.06, 1.14), and again this pattern was visible when times to counseling were considered (Figure 1C). Those who experienced the greatest number of traumatic exposures on 9/11 sought counseling soonest, such that there was a negative dose–response relationship between the WTC exposure summary score and time to counseling; the greater the number of exposures, the sooner counseling was sought (i.e., shorter times). Other traumatic experiences after 9/11 were similarly associated with an increased likelihood of seeking counseling (aRR = 1.08, 95% CI: 1.05, 1.12).

Although residents were the most likely to seek counseling (44.4%) compared with rescue and recovery workers (34.8%) or area workers and passersby (38.7%) in bivariate analyses, all were equally likely to seek counseling in adjusted models (Table 1). Those who had threshold PTSD symptoms at any wave (ever-PTSD), as well as those who had threshold depressive symptoms at Waves 3 and/or 4 (ever-depression), were more likely to seek counseling after 9/11 compared with those who did not meet symptom thresholds for each condition. Although not included in models, those who received diagnoses of depression, PTSD, and anxiety were more much more likely to have sought counseling compared with those without diagnoses. Finally, having sought counseling before 9/11 was a strong predictor of seeking counseling after 9/11 (aRR = 2.25, 95% CI: 2.16, 2.34).

When this analysis was conducted among those with PTSD or depression symptoms (N = 9391), results did not change (data not shown). Although the prevalence of having sought counseling after 9/11 was greater among those with PTSD or depression symptoms over time (57.1%) compared to the total (37.7%), the associations between enrollee characteristics and seeking counseling did not materially vary.

Among those who sought counseling after 9/11, psychiatrists (40.2%), psychologists (50.0%), and/or other mental health professionals (i.e., social worker, therapist, or counselor) (47.3%) were the most common types of practitioners sought (Table 2). Type of practitioners sought varied across most demographic characteristics, but did not vary by sex. Whites, Hispanics, and those of other races were more likely to see psychiatrists or psychologists compared with Blacks or Asians. However, Blacks and those of other races were more likely to seek counseling from nurses/occupational therapists or religious or spiritual advisors than Whites or Asians. Finally, Asians were the most likely to report seeking general practitioners for counseling compared with other race/ethnicity groups. In addition, although seeing a psychiatrist did not vary by education or income, these demographic characteristics were positively associated with seeking a psychologist such that those with the highest level of education or income were more likely to see a psychologist compared with those with lower levels. In contrast, those with lower education or income were more likely to see a general practitioner, nurse/occupational therapist, or religious advisor compared with those more educated and/or who earned more income.
Table 2. Distributions of personal characteristics, WTC exposures, and mental health symptomology among those that sought counseling post-9/11 by type of practitioner.

|                                | Total (N = 13,435) | Psychiatrist (N = 5399, 40.2%) | Psychologist (N = 6720, 50.0%) | Other Mental Health Professional (N = 6360, 47.3%) | General Practitioner/Doctor (N = 3082, 22.9%) | Nurse/Occupational Therapist (N = 726, 5.4%) | Religious or Spiritual Advisor (N = 2092, 15.6%) |
|--------------------------------|--------------------|-------------------------------|-------------------------------|--------------------------------|---------------------------------|--------------------------------|--------------------------------|
| **Sex**                        |                    |                               |                               |                                 |                                 |                                 |                                 |
| Men                            | 7240               | 53.9%                         | 3009 41.6                    | 3591 49.6                       | 3376 46.6                      | 1650 22.8                     | 404 5.6                        | 1155 16.0                      |
| Women                          | 6195               | 46.1%                         | 2390 38.6                    | 3129 50.5                       | 2984 48.2                      | 1432 23.1                     | 322 5.2                        | 937 15.1                       |
| **Race/Ethnicity**             |                    |                               |                               |                                 |                                 |                                 |                                 |                                 |
| White                          | 9857               | 73.4%                         | 3998 40.6                    | 5140 52.1                       | 4759 48.3                      | 2118 21.5                     | 432 4.4                        | 1362 13.8                      |
| Black                          | 1045               | 7.8%                          | 369 35.3                     | 419 40.1                        | 458 43.8                       | 272 26.0                      | 95 9.1                         | 240 23.0                       |
| Hispanic                       | 1550               | 11.5%                         | 649 41.9                     | 703 45.4                        | 713 46.0                       | 408 26.3                      | 123 7.9                        | 308 19.9                       |
| Asian                          | 470                | 3.5%                          | 142 30.2                     | 178 37.9                        | 186 39.6                       | 143 30.4                      | 32 6.8                         | 48 10.2                        |
| Other race                     | 513                | 3.8%                          | 241 47.0                     | 280 54.6                        | 244 47.6                       | 141 27.5                      | 44 8.6                         | 134 26.1                       |
| **Education at Wave 1**        |                    |                               |                               |                                 |                                 |                                 |                                 |                                 |
| ≤ High school/GED              | 2619               | 19.6%                         | 1126 43.0                    | 1156 44.1                       | 1115 42.6                      | 726 27.7                      | 209 8.0                        | 419 16.0                       |
| Some college                   | 3138               | 23.5%                         | 1293 41.2                    | 1513 48.2                       | 1578 50.3                      | 805 25.7                      | 197 6.3                        | 575 18.3                       |
| College                        | 4470               | 33.5%                         | 1729 38.7                    | 2328 52.1                       | 2142 47.9                      | 936 20.9                      | 203 4.5                        | 650 14.5                       |
| Graduate degree                | 3115               | 23.4%                         | 1215 39.0                    | 1686 54.1                       | 1481 47.5                      | 585 18.8                      | 109 3.5                        | 420 13.5                       |
| **Income at Wave 1**           |                    |                               |                               |                                 |                                 |                                 |                                 |                                 |
| <$50,000                       | 3632               | 29.7%                         | 1521 41.9                    | 1718 47.3                       | 1778 49.0                      | 1007 27.7                     | 300 8.3                        | 676 18.6                       |
| ≥$50,000 to <$150,000          | 6974               | 57.0%                         | 2729 39.1                    | 3523 50.5                       | 3399 48.7                      | 1548 22.2                     | 327 4.7                        | 1064 15.3                      |
| ≥$150,000                      | 1623               | 13.3%                         | 659 40.6                     | 881 54.3                        | 651 40.1                       | 282 17.4                      | 38 2.3                         | 185 11.4                       |
| **Age at 9/11 (years)**        |                    |                               |                               |                                 |                                 |                                 |                                 |                                 |
| 0–17                           | 438                | 3.3%                          | 203 46.3                     | 258 58.9                        | 232 53.1                       | 50 11.4                       | 22 5.0                         | 40 9.2                         |
| 18–24                          | 845                | 6.3%                          | 331 39.2                     | 468 55.4                        | 442 52.3                       | 157 18.6                      | 32 3.8                         | 114 13.5                       |
| 25–44                          | 7442               | 55.4%                         | 3033 40.8                    | 3787 50.9                       | 3726 50.1                      | 1686 22.7                     | 384 5.2                        | 1270 17.1                      |
| 45–64                          | 4551               | 33.9%                         | 1791 39.4                    | 2168 47.6                       | 1922 42.2                      | 1141 25.1                     | 268 5.9                        | 656 14.4                       |
| ≥65                            | 159                | 1.2%                          | 65 25.8                      | 39 42.4                        | 38 23.9                       | 48 30.2                      | 20 12.6                        | 12 7.5                         |
| **Eligibility group**          |                    |                               |                               |                                 |                                 |                                 |                                 |                                 |
| Rescue/recovery worker          | 5732               | 42.7%                         | 2287 39.9                    | 2811 49.0                       | 2910 50.8                      | 1361 23.7                     | 354 6.2                        | 1059 18.5                      |
| Lower Manhattan resident        | 2266               | 16.9%                         | 956 42.2                     | 1217 53.7                       | 978 43.2                       | 457 20.2                      | 120 5.3                        | 205 9.0                        |
| Lower Manhattan area worker/passerby | 5437          | 40.5%                         | 2156 39.7                    | 2692 49.5                       | 2472 45.5                      | 1264 23.2                     | 252 4.6                        | 828 15.2                       |
| **WTC exposure score**         |                    |                               |                               |                                 |                                 |                                 |                                 |                                 |
| None/low                       | 5083               | 37.8%                         | 1901 37.4                    | 2416 47.5                       | 2364 46.5                      | 1092 21.5                     | 238 4.7                        | 769 15.1                       |
| Medium                         | 4518               | 33.6%                         | 1797 39.8                    | 2227 49.3                       | 2098 46.4                      | 918 20.3                      | 213 4.7                        | 585 12.9                       |
| High                           | 2743               | 20.4%                         | 1141 41.6                    | 1464 53.4                       | 1320 48.1                      | 705 25.7                      | 161 5.9                        | 487 17.8                       |
| Very high                      | 1091               | 8.1%                          | 560 51.3                     | 613 56.2                        | 578 53.0                       | 367 33.6                      | 114 10.4                       | 251 23.0                       |
Table 2. Cont.

| Conditions for which received counseling | Total (N = 13,435) | Psychiatrist (N = 5399, 40.2%) | Psychologist (N = 6720, 50.0%) | Other Mental Health Professional (N = 6360, 47.3%) | General Practitioner/Doctor (N = 3082, 22.9%) | Nurse/Occupational Therapist (N = 726, 5.4%) | Religious or Spiritual Advisor (N = 2092, 15.6%) |
|------------------------------------------|-------------------|-----------------------------|-------------------------------|------------------------------------------|-----------------|-----------------|-----------------|
| Depression                               | 6421              | 47.8                        | 3944                          | 41.6                                    | 3892            | 40.6            | 3383            | 38.93                     |
| PTSD                                     | 4768              | 35.5                        | 2751                          | 35.3                                    | 3020            | 30.2            | 2704            | 29.9                      |
| Anxiety disorder                         | 3990              | 29.7                        | 2506                          | 29.0                                    | 3020            | 29.2            | 2704            | 29.9                      |
| Other mental health problem              | 3773              | 28.1                        | 1848                          | 23.4                                    | 2155            | 20.6            | 1153            | 12.2                      |
| Alcohol/drug problems                    | 833               | 6.2                         | 509                           | 7.1                                     | 485             | 5.2             | 345             | 3.9                       |
| Any ≥2 conditions                        | 5734              | 42.7                        | 3619                          | 45.4                                    | 3607            | 42.9            | 3222            | 41.4                      |
| None of the above                        | 3095              | 23.0                        | 329                           | 10.8                                    | 999             | 32.9            | 73              | 2.4                       |

*a* Respondents could select all that apply; thus, counts sum to greater than the total and percentages sum to greater than 100%. *b* Other mental health professional, such as a social worker, counselor, or therapist. *c* As measured by a score of ≥44 on PCL-17 on at least one wave (Waves 1–4). *d* As measured by a score of ≥10 on PHQ-8 on at least one wave (Waves 3–4).
Those who were children (aged 0–17 years) at 9/11 were more likely to seek counseling from mental health specialists (e.g., psychologists, psychiatrists, or other mental health professionals) compared with those who were older. However, older individuals, especially those 65 years and older, were more likely to seek general practitioners and nurses for counseling compared with those of younger age groups, whereas middle aged individuals were the most likely to see religious advisors. Rescue and recovery workers, residents, and area workers/passersby generally saw different practitioners with similar frequencies, although residents were the least likely to seek counseling from religious or spiritual advisors (9.0%) compared with rescue and recovery workers (18.5%) or area workers/passersby (15.2%).

Those with high WTC exposures were more likely to see all types of practitioners compared with those with lower exposures. The most common practitioners sought overall were psychologists; 56.2% of those with high WTC exposures reported seeing a psychologist for counseling. Similarly, those with threshold PTSD or depression symptoms were more likely to seek counseling from all types of practitioners compared with those without symptoms, although these differences were smallest for seeking counseling from other mental health professionals. Specifically, 47.4% of those who never had threshold PTSD symptoms reported seeking counseling from other mental health professionals compared with 50.2% of those who did have threshold PTSD symptoms. This pattern was similar across those who reported receiving a formal diagnosis of depression, PTSD, or anxiety compared with those who did not. There was also little difference between the types of practitioners sought comparing those who had sought counseling before 9/11 and those who had not. Finally, the conditions for which individuals sought counseling affected the type of practitioner they sought. Specifically, more of those who sought counseling for alcohol or drug problems saw all types of practitioners other than psychiatrists or psychologists, such as general practitioners, nurses/occupational therapists, and religious advisors, compared to those who sought counseling for other conditions. Overall, these trends did not change when the sample was restricted to those who experienced PTSD or depression symptoms over time (data not shown).

Lastly, among those who reported receipt of counseling within the last 12 months (N = 5429), the vast majority (79.3%) reported that the counseling was at least somewhat helpful (Table 3). Women (vs. men), Blacks (vs. all other race/ethnicities), and those aged ≥65 years at 9/11 (vs. all younger age groups) were more likely to report that therapy was very helpful. In bivariate analysis, similar distributions of perceived helpfulness were observed across eligibility groups and WTC exposure levels; however, in adjusted models, those with very high WTC exposure scores (aRR = 1.21, 95% CI: 1.07, 1.36) were more likely to rate their recent counseling as very helpful compared with those with none or low levels of WTC exposures.
Table 3. Distributions of personal characteristics, WTC exposures, mental health symptomology, and care-seeking determinants among those that sought counseling in the last 12 months by perceived helpfulness of therapy and adjusted risk ratios (aRR) and 95% confidence intervals (CI).

|                                | Total  | Very  | aRR a | 95% CI | Somewhat | Slightly | Not at all |
|--------------------------------|--------|-------|-------|--------|----------|----------|-----------|
|                                | (N = 5429) | (N = 2192) |       |        | (N = 2029) | (N = 883) | (N = 217) |
| **Sex**                        |        |       |       |        |          |          |           |
| Men                            | 2934   | 54.0  | 1045  | 36.3   | 1.00     | Reference|           |
| Women                          | 2495   | 46.0  | 1147  | 46.9   | 1.29     | 1.18     | 1.40      |
| **Race**                       |        |       |       |        |          |          |           |
| White                          | 4073   | 75.0  | 1657  | 41.3   | 1.00     | Reference|           |
| Black                          | 379    | 7.0   | 172   | 47.1   | 1.25     | 1.09     | 1.43      |
| Hispanic                       | 586    | 10.8  | 241   | 42.6   | 1.05     | 0.91     | 1.20      |
| Asian                          | 170    | 3.1   | 51    | 31.5   | 0.88     | 0.64     | 1.19      |
| Other race                     | 221    | 4.1   | 71    | 33.0   | 0.72     | 0.53     | 0.98      |
| **Education at Wave 4**        |        |       |       |        |          |          |           |
| ≤High school/GED              | 690    | 12.8  | 231   | 34.7   | 0.91     | 0.77     | 1.09      |
| Some college                   | 1428   | 26.6  | 513   | 36.9   | 0.95     | 0.85     | 1.05      |
| College                       | 1594   | 29.6  | 671   | 42.6   | 0.96     | 0.88     | 1.04      |
| Graduate degree               | 1667   | 31.0  | 757   | 46.1   | 1.00     | Reference|           |
| **Income at Wave 4**          |        |       |       |        |          |          |           |
| <$50,000                       | 1360   | 26.2  | 517   | 39.2   | 1.11     | 0.98     | 1.25      |
| ≥$50,000 to <$150,000          | 2499   | 48.1  | 1016  | 41.3   | 1.04     | 0.95     | 1.14      |
| ≥$150,000                      | 1340   | 25.8  | 569   | 43.1   | 1.00     | Reference|           |
| **Age at Wave 4 (years)**     |        |       |       |        |          |          |           |
| 18–44                          | 1175   | 21.6  | 484   | 41.7   | 0.82     | 0.73     | 0.93      |
| 45–64                          | 3366   | 62.0  | 1325  | 40.1   | 0.86     | 0.79     | 0.94      |
| ≥65                            | 888    | 16.4  | 383   | 44.8   | 1.00     | Reference|           |
| **Eligibility group**          |        |       |       |        |          |          |           |
| Rescue/recovery worker         | 2429   | 44.7  | 944   | 39.8   | 1.08     | 0.98     | 1.18      |
| Lower Manhattan resident       | 948    | 17.5  | 411   | 44.1   | 1.03     | 0.93     | 1.14      |
| Lower Manhattan area worker/passerby | 2052 | 37.8  | 837   | 41.5   | 1.00     | Reference|           |
| **WTC exposure score**         |        |       |       |        |          |          |           |
| None/low                       | 2096   | 38.6  | 861   | 42.2   | 1.00     | Reference|           |
| Medium                         | 1867   | 34.4  | 765   | 41.7   | 1.05     | 0.96     | 1.14      |
| High                           | 1013   | 18.7  | 365   | 36.6   | 0.96     | 0.86     | 1.08      |
| Very high                      | 453    | 8.3   | 201   | 44.9   | 1.21     | 1.07     | 1.36      |
| Persistent PTSD c              |        |       |       |        |          |          |           |
| Never PTSD                     | 1824   | 51.1  | 882   | 49.0   | 1.00     | Reference|           |
| Non-persistent d               | 1295   | 36.3  | 454   | 35.7   | 0.76     | 0.68     | 0.83      |
| Yes                            | 450    | 12.6  | 159   | 35.7   | 0.68     | 0.58     | 0.81      |
Table 3. Cont.

| Conditions for which received counseling in the last 12 months \(^a\) | Total \((N = 5429)\) | Very \((N = 2192)\) | aRR \(^a\) | Somewhat \((N = 2029)\) | Slightly \((N = 883)\) | Not at all \((N = 217)\) |
|---|---|---|---|---|---|---|
| | N | % | | N | % | N | % | N | % |
| Depression | 3075 | 56.6 | 1177 | 38.8 | 0.85 | 0.75 | 0.97 | 1215 | 40.0 | 526 | 17.3 | 119 | 3.9 |
| PTSD | 1922 | 35.4 | 779 | 41.1 | 1.11 | 1.00 | 1.24 | 704 | 37.2 | 339 | 17.9 | 73 | 3.9 |
| Anxiety disorder | 2109 | 38.8 | 812 | 39.0 | 0.97 | 0.87 | 1.08 | 839 | 40.3 | 357 | 17.1 | 74 | 3.6 |
| Other mental health problem | 1937 | 35.7 | 750 | 39.1 | 0.87 | 0.79 | 0.97 | 750 | 39.1 | 332 | 17.3 | 86 | 4.5 |
| Alcohol/drug problems | 327 | 6.0 | 119 | 36.6 | 0.93 | 0.77 | 1.12 | 119 | 36.6 | 69 | 21.2 | 18 | 5.5 |
| Any ≥2 conditions | 2775 | 51.1 | 1068 | 39.0 | 1.11 | 0.96 | 1.28 | 1092 | 39.8 | 480 | 17.5 | 101 | 3.7 |
| None of the above | 776 | 14.3 | 323 | 44.8 | 0.94 | 0.82 | 1.08 | 238 | 33.0 | 121 | 16.8 | 39 | 5.4 |
| Counseling frequency in last 12 months \(^b\) | | | | | | | |
| >1 per week | 299 | 5.7 | 148 | 50.7 | 1.57 | 1.34 | 1.85 | 99 | 33.9 | 40 | 13.7 | 5 | 1.7 |
| 1 per week | 1768 | 33.4 | 797 | 45.4 | 1.25 | 1.11 | 1.41 | 649 | 37.0 | 267 | 15.2 | 42 | 2.4 |
| 2–3 times per month | 1274 | 24.1 | 539 | 42.8 | 1.23 | 1.09 | 1.39 | 515 | 40.9 | 176 | 14.0 | 30 | 2.4 |
| 1 per month | 880 | 16.6 | 331 | 38.0 | 1.12 | 0.97 | 1.29 | 355 | 40.7 | 148 | 17.0 | 38 | 4.4 |
| <1 per month | 1067 | 20.2 | 348 | 33.0 | 1.00 | Reference | 36.3 | 235 | 22.3 | 90 | 8.5 |
| Received medication for a mental health problem in the last 12 months \(^c\) | | | | | | | |
| No | 2335 | 43.0 | 1011 | 44.4 | 1.00 | Reference | 829 | 36.4 | 347 | 15.2 | 92 | 4.0 |
| Yes | 3094 | 57.0 | 1181 | 42.7 | 0.91 | 0.83 | 0.99 | 1200 | 39.4 | 536 | 17.6 | 125 | 4.1 |
| Sought counseling prior to the last 12 months \(^d\) | | | | | | | |
| No | 543 | 10.6 | 175 | 32.8 | 1.00 | Reference | 209 | 39.2 | 111 | 20.8 | 38 | 7.1 |
| Yes | 4601 | 89.4 | 1937 | 42.7 | 1.34 | 1.14 | 1.57 | 1718 | 37.9 | 717 | 15.8 | 162 | 3.6 |
| Ever been without insurance in last 12 months \(^e\) | | | | | | | |
| No | 4963 | 92.1 | 2018 | 41.5 | 1.00 | Reference | 1862 | 38.2 | 794 | 16.3 | 194 | 4.0 |
| Yes | 425 | 7.9 | 159 | 38.2 | 1.17 | 0.99 | 1.38 | 150 | 36.1 | 85 | 20.4 | 22 | 5.3 |
| Unmet mental healthcare need in last 12 months \(^f\) | | | | | | | |
| No | 4982 | 94.2 | 2090 | 42.7 | 1.00 | Reference | 1899 | 38.8 | 755 | 15.4 | 147 | 3.0 |
| Yes | 306 | 5.8 | 50 | 16.9 | 0.84 | 0.76 | 0.93 | 82 | 27.8 | 100 | 33.9 | 63 | 21.4 |
| Previous unmet mental healthcare need \(^f\) | | | | | | | |
| No | 2935 | 68.9 | 1309 | 45.3 | 1.00 | Reference | 1082 | 37.4 | 416 | 14.4 | 84 | 2.9 |
| Yes | 1327 | 31.1 | 445 | 34.2 | 0.84 | 0.76 | 0.93 | 510 | 39.2 | 276 | 21.2 | 71 | 5.5 |

\(^a\) Risk ratio represents the relative probability that perceived helpfulness = very helpful vs. all other categories (somewhat, slightly, and not at all). \(^b\) Denominators exclude N = 108 missing responses for perceived helpfulness of therapy in last 12 months. \(^c\) Evaluated among those not missing any PCL items across four Waves \((N = 3569)\); persistent PTSD as measured by a score of ≥44 at all waves. \(^d\) Non-persistent PTSD was defined as those who had PCL-17 scores ≥44 on at least one Wave (1–4), but not at all four Waves. \(^e\) Respondents could select all that apply; thus, counts sum to greater than the total and percentages sum to greater than 100%. Each risk ratio represents the comparison between those who received counseling for each condition vs. not that condition (i.e., all other indications). \(^f\) As assessed at Waves 2 and 3.
Those with persistent PTSD were less likely to rate their recent counseling as very helpful (aRR = 0.68, 95% CI: 0.58, 0.81), and more likely to report that it was “not at all” (5.4%) or slightly (21.8%) helpful compared with those who never had PTSD (2.2% and 12.3%, respectively). Those who had non-persistent PTSD (i.e., intermittent, delayed, or recovered) were also less likely to rate their recent counseling as very helpful compared with those who never had PTSD (aRR = 0.76, 95% CI: 0.68, 0.83). Although similar frequencies of helpfulness were observed across the conditions for which people received counseling, in adjusted models, those who received counseling for depression (vs. all other indications) were less likely to rate their counseling as very helpful, whereas those who received counseling for PTSD (vs. all other indications) were more likely to rate their counseling as very helpful.

The frequency of counseling was positively associated with perceived helpfulness such that those who sought counseling more often reported it to be “very helpful” compared with those who went less often. Similarly, those who had received therapy prior to the last 12 months were more likely to report that their current counseling was very helpful compared with those who had never before received therapy (aRR = 1.34, 95% CI: 1.14, 1.57). Those who received medication for a mental health problem in the last 12 months were slightly less likely to report that their counseling was very helpful (aRR = 0.91, 95% CI: 0.83, 0.99) compared with those who did not receive medication, although this difference was small (38.8% vs. 44.4%, respectively) and not consistent among those who reported that it was somewhat helpful (39.4% vs. 36.4%, respectively). Finally, those who reported unmet mental healthcare needs in the last 12 months and previously were less likely to report that their therapy was very helpful compared to those who did not have unmet mental healthcare needs.

4. Discussion

In a large cohort of individuals exposed to the trauma of the WTC disaster, this study documented mental health treatment utilization up to 15 years after 9/11. Approximately one-third of Registry enrollees sought counseling at some time after 9/11. Counseling was sought consistently over time after 9/11 up to 15 years after, although the largest increase was observed within the first year after the disaster. Predictors of seeking counseling included race/ethnicity, age at 9/11, education level attained, exposure to the WTC attacks, other post-9/11 traumatic experiences, mental health symptomology, and pre-9/11 counseling. Whites, Hispanics, and those of other races, those who were children at the time of 9/11, and those with high levels of exposure to the WTC attacks sought counseling soonest after 9/11. Among those who sought counseling, several trends were identified across types of practitioners seen. For example, Blacks, Asians, and those with lower education and income were less likely to seek counseling from mental health specialists (e.g., psychologists) and more likely to seek counseling from general practitioners such as family doctors or religious advisors compared with their White and more highly educated counterparts. Finally, among those who sought recent counseling, most enrollees perceived their counseling to have been at least somewhat helpful. Women, Blacks, those aged ≥65 years, and those with very high WTC exposures were more likely to rate their recent counseling as very helpful. These predictors of counseling and time to counseling after 9/11, types of practitioners seen, and perceived helpfulness of recent counseling did not vary when the population was restricted to those with significant PTSD or depression symptoms.

One of the strongest predictors of seeking counseling after 9/11 was having sought counseling before 9/11. Another study among 9/11-exposed individuals reported that new uptake of mental healthcare was rare after 9/11 among those who were not already receiving care beforehand [9]. Although this study was conducted only six months after 9/11, whereas ours was conducted 15 years after 9/11, results were very similar. Stuber et al. reported that, among those who were already receiving mental health services before 9/11, 82.7% sought mental healthcare after 9/11, which is comparable to the 75.9% in our study. In addition, we found that those who sought counseling more often, as well as those who were previously connected to care, were more likely to rate their recent counseling as very helpful compared to those who went less frequently or had not sought care prior. This may indicate that those with established provider–patient relationships, or those who are
accustomed to seeking counseling fare better than those just starting out [29]. Alternatively, those already connected to care and those who go often may be experiencing more symptom abatement and, thus, satisfaction compared with those who may have intermittent care that may not be satisfying their needs [30]. This correlation between symptom abatement and reports of perceived benefit is consistent with our observation that persistent PTSD was associated with a reduced degree of perceived helpfulness of recent therapy compared with those who never had PTSD.

Another strong predictor of seeking counseling after 9/11 was younger age at the time of the event. Specifically, those who were children at the time of 9/11 were the most likely to seek mental health treatment and sought treatment more quickly compared with those of older ages at 9/11. This may reflect counseling programs that were provided in schools [31,32], as well as parents worrying about children’s potential needs after the disaster [6,33]. Given the vulnerable life stage of children who were exposed to 9/11 and the resulting psychological consequences that are thought to be of greater severity in this age group [34,35], this relatively greater degree of uptake is reassuring. However, in our study, the absolute proportions show a different perspective, with just over half of those aged 0–17 years at 9/11 having sought counseling at some time after 9/11. This represents an underutilization of the services that were available, especially in the aftermath of the events, both in this age group and in the overall population. In addition, we found that these young individuals were the least likely to rate any recent counseling as very helpful compared with older age groups. However, it should be noted that, for the majority of those who sought counseling in the 12 months before survey administration (i.e., recent counseling), the indication was likely not related to 9/11. However, we did not explicitly ask whether the counseling sought was to address 9/11-related trauma.

Consistent with other studies in post-disaster settings [12], this study documented an underutilization in counseling and mental health treatment. Despite several public health programs devoted to mental health, only about one-third of enrollees reported seeking counseling at some time in the 15 years after 9/11. This is similar to what was observed in the aftermath of Hurricane Katrina, although studied time frames were shorter [36]; however, even so, after initiation, drop-outs in treatment were common. In addition, we observed significant delays in seeking counseling across several strata. These types of delays in seeking treatment are common [37,38]. One major driver of utilization of care and delay in seeking it that was consistently documented is stigma [39,40]. Although we did not measure this, it was shown that certain populations are differentially more likely to be affected by stigma, including Blacks and Asians, males, and young people. Future studies in 9/11-exposed populations should explore race/ethnicity-specific barriers to care, including perceived stigma.

Another relevant issue for mental healthcare delivery in post-disaster settings is that natural reactions to disasters change over time [41]. The course of reactions is generally referred to as “threat” or “impact” (i.e., immediate), short-term, and long-term. These different phases present the need for different types of mental healthcare support. For example, in the aftermath of the Hanshin Awaji earthquake in 1995, depressive symptoms did not manifest in most of the affected population until weeks to months after the event [42]. This presents a very different need than the shock- and grief-related reactions that are more common in the “impact” phase [41]. Specifically, we reported a racial/ethnic disparity in receipt of counseling. Blacks and particularly Asians were the least likely to seek counseling after 9/11 compared with other racial and ethnic groups. It was repeatedly noted in the literature that Asian Americans are less likely to seek mental health treatment compared with other racial and ethnic groups, especially non-Hispanic Whites [43–49]. This is attributed to language barriers, deficiencies in cultural competence in the delivery of care, general lack of awareness of such service availability, and cultural differences in the conception of mental illness itself. These data have implications for improving the accessibility of culturally competent mental health services for Blacks and Asians.

This study benefited from several strengths. Firstly, this study provided long-term information on mental health treatment utilization after 9/11. Most published studies to date reported on mental
health treatment utilization up to a maximum of two years post-disaster [15,17], whereas this study had data up to 15 years after 9/11. This is an important addition to the literature because we were able to document the degree of delays in treatment in a trauma-exposed population. However, it should be noted that, due to this long follow-up time, our examination of mental health treatment likely included visits related to 9/11, as well as utilization unrelated to the events of 9/11, and we were unable to discern between the two. Another attribute was that, although several studies were published on the topic of post-9/11 mental health service utilization, to our knowledge, this is the first that collected data on the type of practitioner sought. This type of information is important because we identified trends and disparities in care-seeking behavior across various demographics. These findings may inform future disaster response plans with regard to establishing more equitable care to all those potentially affected.

However, we also note this study’s limitations. Firstly, the Wave 4 survey asked about age at first counseling, irrespective of 9/11. Thus, our analysis of time to counseling after 9/11 was limited to those who sought counseling for the first time after 9/11. This limited our ability to examine the determinants of time to counseling after 9/11 among those who had sought treatment before 9/11 as well. Secondly, despite the information we had over time on several mental health conditions and symptoms, we were not able to assess whether mental health treatment was associated with improvement in symptoms because we did not ask detailed questions over time on treatment initiation and continuation or types of therapy and specific medication use and duration of use. In order to answer this question, in addition to longitudinal data on mental health symptomology, an in-depth study would be necessary that asked about specific treatment modes, practitioner characteristics, duration of treatments, use of medications over time, and more. Thirdly, although we asked about the type of practitioner sought for counseling, it is possible that enrollees were not able to reliably report the specific type, especially more subtle distinctions such as psychologists vs. psychiatrists. However, we were able to observe differences and disparities across different providers. Fourthly, we did not collect data on specific mental health or neurodevelopmental conditions before 9/11. Having this data would have allowed us to explore whether these disorders conferred an additional risk of developing PTSD after 9/11 [50], and perhaps an increased likelihood of seeking treatment. Lastly, our study was limited to Registry enrollees who completed the Wave 4 survey, which was administered in 2015–2016. These enrollees represented just over half (51.6%) of those originally enrolled in 2003–2004. Therefore, selection bias is a concern due to the potential for selective participation across several strata. However, previous investigation of this issue showed that, although those with PTSD symptoms were slightly less likely to continue to participate in Registry surveys than those without, the degree of exposure to the WTC attacks was not associated with participation over time [51]. Furthermore, the Registry was not able to enroll all WTC-exposed individuals, which was estimated to be over 400,000, of which the Registry recruited more than 71,000 (17.4% enrollment rate) [52]. The enrollment rate was highest among rescue and recovery workers (33.5%) and lowest among passersby (12.0%). Unfortunately, however, we do not have information on those who did not enroll.

5. Conclusions

The WTC terrorist attacks exposed thousands, if not millions, of individuals in NYC to trauma, resulting in a significant mental health burden and subsequent need for services. Overall, approximately one-third of WTC-exposed individuals sought counseling up to 15 years post-9/11, which represents an underutilization that is consistent with other post-disaster literature. Those who were White or Hispanic, children at the time of 9/11, and had high levels of exposure to the WTC attacks were the most likely to seek counseling after 9/11 and had the shortest waiting times to seeking counseling. Among those who sought counseling, there was heterogeneity across several demographic strata in the types of practitioners seen, such as Blacks and Asians being less likely to seek counseling from mental health specialists compared with Whites. These results highlight the need for tailoring outreach to specific demographic subgroups in post-disaster settings. This study used data up to 15
years post-disaster to document mental health treatment utilization patterns, trends, and disparities that have implications for future preparedness plans and needs assessments.

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**Conflicts of Interest:** The authors declare no conflicts of interest. The founding sponsors had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

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