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Awareness and use of support services following mass violence incidents

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ABSTRACT

Mass violence incidents (MVIs) result in significant psychological distress for survivors and the broader community. Support services (mental health services, support groups, religious support) can buffer negative effects of MVIs and facilitate recovery. However, the extent to which community members are aware of and use support services post-MVIs is unknown. A probability sample of 5991 adults ($M_{ean\ age} = 45.6$, SD = 17.6), mostly female (53%) and White (71%), were recruited from six communities that had experienced an MVI. Participants answered questions on their awareness and use of support services after the MVI and completed measures assessing predisposing, enabling, and need factors that may influence service use. Approximately 20% of participants reported they were aware of mental health services, 20% reported awareness of support groups, and 16% reported awareness of religious support. Younger participants with higher income (predisposing factors), high social support (enabling factor), and direct MVI exposure and psychological distress (need factors) were more likely to report awareness of support services. Of those aware of services, approximately 21% reported using support services. Those with direct MVI exposure and psychological distress were more likely to use each type of service. Otherwise, use of mental health services, support groups, and religious support varied across predisposing factors (race, age, income). Overall, findings suggest there is limited awareness of support services post-MVI, despite the well-documented mental health burden after these incidents. This suggests the need for improved communication about available services after MVIs.

1. Introduction

Mass violence incidents (MVI) are a frequent and re-occurring problem in the United States (US) that result in significant psychological distress for survivors, family members, and the broader community. MVIs are defined as intentional killings of four or more victims in a public place and can involving stabbings, shootings, bombings, riots, and other acts of terrorism (Fox, 2024). In the US, an average of three MVIs have occurred per month over the past three years (Fox, 2024). Among adults in communities where an MVI occurred, approximately 15% report a past-year major depressive episode (Abba-Aji et al., 2024) and nearly a quarter (24%) report past-year post-traumatic stress disorder (PTSD) (Moreland et al., 2024). These rates are substantially higher than the 12-month prevalence estimates of major depression (10%) and PTSD (5%) reported in national surveys (Hasin et al., 2018; Kilpatrick et al., 2013). One strategy to address this substantial burden of psychological distress following MVIs is to connect community members with support services.

Support services are a broad category of resources including mental health treatment, support groups, and support from a religious or spiritual leader. Mental health treatment typically involves individual counseling or administration of medication with a trained behavioral health provider. Support groups may be organized by behavioral health providers, lay community leaders, paraprofessionals, or peers with lived experience, but typically provide an open-ended group opportunity for members to share personal experiences and feelings. Support from a religious or spiritual leader varies across beliefs and denomination, but typically involves a spiritual leader (e.g., ordained minister, spiritual advisor, or prayer leader) providing comfort and support in the context of religious faith, including spiritual counseling and prayer. Theoretically, these types of services mitigate the psychological consequences of MVIs by challenging maladaptive cognitions about safety, normalizing experiences of distress and grief, and fostering hope for recovery. Following MVIs, support services have been found to reduce

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psychological distress and foster community resilience (Alexander, 2020; Cowan et al., 2020). Unfortunately, there are significant gaps in the availability of support services following MVIs (Pirard et al., 2020; Strøm et al., 2024; Stuber et al., 2006) – although most of this research has focused on the limited availability of mental health resources. Information on the provision and accessibility of support services following MVIs is critical for providers and policy makers to help communities recover.

Despite the potential value of these support services, myriad factors can mitigate use of these resources following MVIs (Pirard et al., 2020; Stuber et al., 2006). Andersen's Behavioral Model (Andersen, 1995) provides one conceptualization of support service use. The Behavioral Model posits three groups of factors influence healthcare services utilization: predisposing, enabling, and need factors. *Predisposing* factors are variables that existed prior to the index event, such as demographic characteristics or exposure to previous stressors. These factors, such as sex, race, income, or prior exposure to assault, can influence an individual's resources, preferences, or previous experiences that define their interest in seeking support services. *Enabling* factors include variables that might reduce stigma or encourage accessing support. It is reasonable to hypothesize that individuals with more positive, supportive social relationships might receive more encouragement to engage in support services (Maulik et al., 2011). *Need* factors are markers that an individual is more likely to need and be able to benefit from services. Because some individuals naturally recover from stressful events or experience only minimal levels of distress (Felix et al., 2021), they do not necessarily need support services. In the context of MVIs, markers of this need factor are the level of direct MVI exposure as well as levels of psychological distress.

Previous research has found that factors in the Behavioral Model can help identify individuals who seek mental health services post-MVI, but there have been some contradictory findings. For example, one study found that predisposing factors (younger age, White race) are associated with a greater likelihood of seeking mental health services among college students exposed to MVIs (Felix et al., 2021). However, there is also evidence suggesting neither age nor race is associated with using mental health services post-MVI (Stuber et al., 2006). Despite literature suggesting that women are more likely to report major depression and PTSD compared to men (Hasin et al., 2018; Kilpatrick et al., 2013), some have found no differences across sex for those who used mental health services post-MVI (Felix et al., 2021). In general there is more consistent support that a greater need (direct MVI exposure and psychological distress) is associated with the use of mental health services (Felix et al., 2021; Pirard et al., 2020; Strøm et al., 2024; Stuber et al., 2006). While studies like these highlight some factors that can drive use of support services, it is also unknown whether these findings are generalizable beyond mental health services (i.e., to support groups and religious support) and to more diverse populations with varying exposure to an MVI. Given mental health stigma and historical barriers to accessing mental health services – including racial discrimination, cost of services, and availability of providers (Crosby and Bossley, 2012; Nadeem et al., 2008) – it is critical to understand whether participants are aware of, and actually use, other types of support.

This study addresses this gap by documenting awareness and use of support services offered across six communities that experienced an MVI. We report on participant awareness and use of support services, including mental health services, support groups, and religious support. Following Andersen's Behavioral Model, we explored differences in support service awareness and use across predisposing, enabling, and need factors. Given the scarcity of research examining support services post-MVI, we made no directional hypotheses.

2. Methods

2.1. Participants and procedures

Data were collected from a household probability sample of adults living in communities that experienced an MVI between 2015 and 2019: Dayton, OH, El Paso, TX, Parkland, FL, Pittsburgh, PA, San Bernadino, CA, and Virginia Beach, VA. Each community received an Antiterrorism and Emergency Assistance Program grant from the Office for Victims of Crime. Participants were identified through address-based sampling. Invitations to complete a self-administered web-based survey were mailed to randomly selected households within these communities. Oversampling procedures targeted households that were more likely to have had exposure to the MVI (e.g., addresses within 5 miles of the MVI site). Full description of sampling methods can be found (Moreland et al., 2024). Paper surveys were mailed to those who did not initially respond to the web-based survey. Participants provided written informed consent and the study was approved by the Institutional Review Board at the last author's institution.

Of the 6867 participants who accessed the survey and informed consent procedures, 433 (6%) did not complete the survey, 443 (7%) were deemed ineligible (i.e., did not live in the community at the time of the MVI), and 5991 (87%) completed the survey. Participants (N = 5991) ranged in age from 18 to 97 years ($Mean$ = 45.6, SD = 17.6) and were mostly female (53%) and non-Hispanic (74%). Most participants identified as White (71%), 17% as Black, 4% as Asian, 1% as American Indian or Alaskan Native, and 8% as Multi-racial or Other. Approximately 26% reported their annual household income was equal to or less than $25,000.

2.2. Measures

Participants answered one question assessing their awareness of support services availability following the MVI. Responses were coded on a dichotomous scale (yes/no) for 1) mental health services, 2) support groups, and 3) religious support. Participants who reported that they were aware of a support service, were asked if they used that service, and responses were coded on a dichotomous scale (yes/no). Participants completed four items assessing a history of physical and sexual assault and 20 items assessing past-year PTSD symptoms from the National Stressful Events Survey Posttraumatic Stress Disorder Module (Kilpatrick et al., 2013). Responses were aggregated and coded to determine a history of physical or sexual assault (yes/no) and diagnostic-level past-year PTSD using the *Diagnostic and Statistical Manual of Mental Disorders* (Fifth Edition). For the items assessing PTSD coefficient alpha was 0.93. Participants completed nine items assessing past-year depression using a modified version of the National Women's Study Depression Module (Kilpatrick et al., 2003). Responses were aggregated and coded to determine diagnostic-level past-year depression. For the items assessing depression coefficient alpha was 0.90. Participants completed five items assessing social support from the Medical Outcomes Study Module (Sherbourne and Stewart, 1991). Responses were summed. For the measure of social support coefficient alpha was 0.91. Participants reported whether they had direct MVI exposure and completed self-report items assessing demographic characteristics.

2.3. Statistical analyses

Missing data analyses indicated <5% missing data across all study variables. Analyses were weighted to adjust for potential nonresponse bias based on the US Census Bureau's 2018 American Community Survey five-year estimates (U.S. Census, 2018). See (Moreland et al., 2024) for details on the weighting procedures. We examined the unique variance of each predisposing (demographic characteristics and physical or sexual assault), enabling (social support), and need (exposure to the

MVI, PTSD, and depression) factor by simultaneously entering each variable into a linear mixed-effects model or multilevel model (MLM) using IBM SPSS Statistics Version 28. SPSS defaults to using a logistic regression approach for binary response outcomes. MLM allows us to account for the variance associated with individual-level observations (level 1) nested within community (level 2). MLM also includes all participants, regardless of missing data. Each model used the diagonal error covariance matrix, as we would not expect any correlation between the order of the dummy coded community sites. We used maximum likelihood estimation. Prior to examining our fixed effects, we examined the random effects model, which indicated significant differences across sites, justifying our use of a mixed effects model. Given the dependent nature of our data, MLM also helps avoid underestimating the standard errors of the fixed effects. Each model included the predisposing, enabling, and need factors as fixed effects as well as the random intercept for site to account for the variability across communities. Using the entire sample of $N = 5991$ participants we conducted three separate models examining awareness of mental health services, support groups, and religious support. We then examined the conditional portion of participants, the subsample of those that were aware of a support service, to assess use of mental health services, support groups, and religious support. Materials and code are available upon request to the first author. This study was not preregistered.

Table 1
Demographic characteristics.

	M (SD)	
	N	Weighted %
Predisposing factors		
Age	45.56 (17.58)	
Race		
White	63	1%
Black or African American	231	4%
American Indian or Alaskan Native	617	17%
Asian	4528	71%
Other and Multi Racial	441	8%
Ethnicity		
Hispanic	1328	26%
Non-Hispanic	4623	74%
Sex		
Male	2129	47%
Female	3825	54%
Income		
Less than $25,000	1059	26%
$25,000 to $49,999	1167	25%
$50,000 to $74,999	980	17%
$75,000 to $99,999	755	11%
$100,000 or more	1735	21%
Physical or sexual assault		
No	3422	57%
Yes	2553	43%
Enabling Factor		
Social support	14.31 (4.63)	
Need factors		
Direct exposure to MVI		
No	4670	82%
Yes (onsite or friend/family onsite at MVI)	1261	19%
Past-year PTSD		
No	4535	76%
Yes	1416	24%
Past-year Depression		
No	4879	84%
Yes	954	16%

Note. Data are reported using available case analyses.

3. Results

3.1. Descriptive Statistics

Descriptive characteristics are reported in Table 1. In the present sample, 19% reported direct MVI exposure, 24% reported past-year PTSD and 16% reported past-year depression. Nearly half of the participants (43%) reported a history of physical or sexual assault.

3.2. Awareness and use of support services

The frequency of awareness and use of mental health services, support groups, and religious support across each community is displayed in Table 2. Both awareness and use differed across each community, $ps < 0.01$. One in five participants (20%) reported they were aware of mental health services, 20% reported awareness of support groups, and approximately 16% reported awareness of religious support. Out of the entire sample, 4% (230/5991) reported using mental health services, 3% (165/5991) reported using support groups, and 5% (312/5991) reported using religious support. Among the conditional portion of participants who were aware of services, 19% (230/1201) reported using mental health services, 14% (165/1191) reported using support groups, and 32% (312/962) reported using religious support.

3.3. Multilevel models examining predisposing, enabling, and need factors

The breakdown of support service awareness and use across the predisposing and need factors is presented in Table 3. We explored the unique variance explained by each fixed effect in MLM analyses examining support service awareness (Table 4) and use (Table 5).

3.3.1. Support service awareness

Predisposing factors. Higher income was associated with participants reporting awareness of each type of support service; otherwise, different patterns emerged. Younger adults were more likely to report awareness of mental health services and support groups, whereas older adults were more likely to report awareness of religious support. White and Asian participants were more likely to report awareness of mental health services, and Hispanic participants were more likely to report awareness of religious support.

Table 2
Awareness and use of support services across community.

Community	Mental Health		Support Group		Religious Support	
	Aware[a]	Use[b]	Aware[a]	Use[b]	Aware[a]	Use[b]
Dayton (n = 1144)	204 (18%)	55 (27%)	187 (16%)	33 (18%)	145 (13%)	63 (43%)
El Paso (n = 1139)	194 (17%)	32 (16%)	210 (18%)	19 (9%)	226 (20%)	74 (33%)
Parkland (n = 1075)	377 (35%)	74 (9%)	382 (36%)	65 (17%)	249 (23%)	82 (33%)
Pittsburgh (n = 1145)	225 (20%)	49 (22%)	242 (21%)	23 (10%)	162 (14%)	50 (31%)
San Bernadino (n = 393)	39 (10%)	8 (21%)	30 (8%)	2 (7%)	35 (9%)	11 (32%)
Virginia Beach (n = 1095)	161 (15%)	11 (7%)	141 (13%)	22 (16%)	145 (13%)	31 (22%)
Total (N = 5991)	1201 (20%)	230 (19%)	1191 (20%)	165 (14%)	962 (16%)	312 (32%)

Note. Aware [a] = weighted portion of participants aware of support services (i.e., denominator is the total sample size of each community presented in the "Community" column).
Use [b] = conditional weighted portion of participants who used services, among those aware (e.g., denominator is those aware of each service in the "Aware" column).
Awareness and use of support services differed across community, $ps < 0.01$.

Table 3
Support service awareness and use across predisposing and need factors.

	Mental Health Services		Support Group		Religious Support	
	Aware[a] (*n* = 1201)	Use[b] (*n* = 230)	Aware[a] (*n* = 1191)	Use[b] (*n* = 165)	Aware[a] (*n* = 962)	Use[b] (*n* = 312)
Predisposing factors						
Race						
White	**21%**	**18%**	**22%**	14%	**17%**	**30%**
Black or African American	**17%**	**29%**	**17%**	17%	**14%**	**49%**
American Indian or Alaskan Native	**12%**	**13%**	**10%**	0%	**7%**	**0%**
Asian	**25%**	**10%**	**17%**	3%	**17%**	**15%**
Other and Multi Racial	**14%**	**14%**	**16%**	13%	**14%**	**29%**
Ethnicity						
Hispanic	20%	16%	20%	**10%**	**18%**	30%
Non-Hispanic	20%	20%	20%	**15%**	**15%**	34%
Sex						
Male	19%	20%	20%	13%	16%	29%
Female	21%	18%	20%	14%	16%	35%
Income						
Less than $25,000	**16%**	**31%**	**12%**	15%	**12%**	35%
$25,000 to $49,999	**16%**	**22%**	**17%**	18%	**14%**	35%
$50,000 to $74,999	**18%**	**17%**	**21%**	17%	**17%**	40%
$75,000 to $99,999	**22%**	**12%**	**23%**	10%	**17%**	29%
$100,000 or more	**31%**	**15%**	**30%**	12%	**22%**	28%
Physical or sexual assault						
No	20%	**13%**	19%	**11%**	16%	**29%**
Yes	20%	**28%**	21%	**17%**	16%	**37%**
Need factors						
Direct exposure to MVI						
No	**15%**	**15%**	**16%**	**9%**	**14%**	**28%**
Yes	**42%**	**27%**	**39%**	**22%**	**26%**	**42%**
Past-year PTSD						
No	**17%**	**13%**	**18%**	**12%**	**15%**	31%
Yes	**31%**	**30%**	**25%**	**18%**	**19%**	36%
Past-year Depression						
No	**18%**	**14%**	**18%**	**10%**	**15%**	**30%**
Yes	**31%**	**35%**	**28%**	**23%**	**20%**	**39%**

Note. Aware [a] = weighted portion of participants aware of support services (i.e., denominator is the total sample size).
Use [b] = conditional weighted portion of participants who used services, among those aware (e.g., denominator is those aware of each service).
Weighted percents are reported; Statistically significant differences across dependent variables within each level of the outcome variables are denoted in bold, *ps* < 0.05.

Enabling factors. Participants with higher levels of social support were more likely to report awareness of mental health services, support groups, and religious support.

Need factors. Participants with direct exposure to the MVI and past-year PTSD were more likely to report awareness of mental health services, support groups, and religious support. Past-year depression was only associated with awareness of mental health services. Post-hoc analyses indicated between 19% and 31% of those with past-year PTSD and depression were aware of any kind of support services (see Table 3). Sensitivity analyses examining awareness of support services within each community replicated findings that direct exposure to the MVI and past-year psychological distress were associated with awareness of support services.

3.3.2. Support service use

Predisposing factors. Those with a history of physical or sexual assault were more likely to use each type of support service. Non-Hispanic participants, Asian participants, and those with lower income were more likely to use mental health services. Non-Hispanic participants were more likely to use support groups. Older, Black participants were more likely to use religious support.

Enabling factors. Among those aware of support services, social support was not associated with support service use.

Need factors. Participants with direct exposure to the MVI were more likely to use mental health services, support groups, and religious support. Those reporting past-year PTSD and depression were more likely to use mental health services and religious support. Post-hoc analyses indicated that between 18% and 39% of those with significant psychological distress used any type of support services (see Table 3).

4. Discussion

The present study provides new information on awareness and use of support services across six communities that experienced an MVI. We found that most participants were not aware of any support services post-MVI. Approximately one in five participants (20%) reported they were aware of mental health services, 20% reported awareness of support groups, and 16% reported awareness of religious support. Across the entire sample, overall use of services was low (<5%). Of those aware of any support services, over a third (32%) indicated they used some type of support service, which has the potential to reduce the mental health burden experienced by communities post-MVI. Notably, use of mental health services in the present study (19%) was consistent with the rate of mental health service use reported post-MVI among other samples (range 9%–73%) (Felix et al., 2021; Stene et al., 2022; Strøm et al., 2024; Stuber et al., 2006).

We found potential disparities in awareness and use of support services across the predisposing factors. Consistent with prior research, we found that adults who were White, younger, and had higher incomes were more likely to be aware of mental health services (Felix et al., 2021). This suggests that information about support services may not be reaching older, non-White participants with lower incomes. We also found differences in service use, depending on type. Non-Hispanic participants were more likely to use mental health services and support groups; older, Black adults were more likely than White, American Indian or Alaskan Native, or Multi Racial participants, to use religious support services. Given previous findings on the efficacy of support groups and support from a religious or spiritual leader to reduce psychological distress (Sheikhi et al., 2021) these findings suggest the need for additional research on how to increase use of each type of service within different combinations of age, race, income, and ethnic groups.

Individuals reporting higher levels of social support were more likely to report awareness of all three types of support services. Although social support has yet to be examined in the context of support services post-MVI, these findings are consistent with a large body of research on the facilitative and protective role of social support following stressful life events (Maulik et al., 2011). This may suggest some compounding advantages. Those who already have higher levels of social support are also more likely to become aware of additional support following MVIs. Nevertheless, among those aware of support services, social support was not associated with use of any of the support services. This indicates that social support may be more important for enabling awareness of services than for determining actual service use. In other words, an advantage of having good social support may be that you have people to help you find out about services you may need.

Our findings on need factors were consistent with literature suggesting those with direct MVI exposure and psychological distress were more likely to report using mental health services (Felix et al., 2021;

Table 4
Multilevel Models Examining Support Service Awareness (N = 5991).

Variable	*Mental Health Services*(0 = no, 1 = yes)			*Support Group*(0 = no, 1 = yes)			*Religious Support*(0 = no, 1 = yes)		
	b (SE)	*t*	95% CI	*b* (SE)	*t*	95% CI	*b* (SE)	*t*	95% CI
Predisposing factors									
Race									
Black or African American	[Reference]			[Reference]			[Reference]		
White	0.05 (0.02)	2.64[b]	0.01, 0.08	0.03 (0.02)	1.78	−0.00, 0.07	0.02 (0.02)	0.89	−0.02, 0.04
American Indian or Alaskan Native	0.00 (0.06)	0.02	−0.11, 0.11	−0.01 (0.05)	−0.10	−0.11, 0.10	−0.07 (0.05)	−1.35	−0.18, 0.03
Asian	0.07 (0.03)	2.08[a]	0.00, 0.13	0.02 (0.03)	0.55	−0.05, 0.08	0.05 (0.03)	1.72	−0.01, 0.12
Other and Multi Racial	−0.03 (0.03)	−0.95	−0.08, 0.03	−0.01 (0.03)	−0.46	−0.07, 0.04	0.02 (0.03)	0.80	−0.03, 0.07
Age	−0.03 (0.00)	−7.14[c]	−0.03, −0.02	−0.02 (0.00)	−4.28[c]	−0.02, −0.01	0.01, 0.00	3.62[c]	0.01, 0.02
Ethnicity (0 = non-Hispanic, 1 = Hispanic)	0.02 (0.02)	1.34	−0.01, 0.05	0.01 (0.02)	0.98	−0.01, 0.04	0.04 (0.01)	3.15[b]	0.02, 0.07
Sex (0 = Male, 1 = Female)	0.01 (0.01)	0.59	−0.02, 0.03	0.01 (0.01)	0.51	−0.02, 0.03	−0.01 (0.01)	−1.14	−0.04, 0.01
Income	0.01 (0.00)	3.45[c]	0.01, 0.02	0.02 (0.00)	5.84[c]	0.02, 0.03	0.01 (0.00)	3.12[b]	0.01, 0.02
Physical or Sexual Assault (0 = no, 1 = yes)	0.01 (0.01)	0.50	−0.02, 0.03	0.00 (0.01)	0.30	−0.02, 0.03	−0.00 (0.01)	−0.22	−0.03, 0.02
Enabling factor									
Social Support	0.01 (0.00)	5.23[c]	0.00, 0.01	0.01 (0.00)	5.31[c]	0.00, 0.01	0.01 (0.00)	7.23[c]	0.01, 0.01
Need factors									
Direct Exposure to MVI (0 = no, 1 = yes)	0.23 (0.01)	16.38[c]	0.21, 0.26	0.22 (0.01)	15.31[c]	0.19, 0.25	0.11 (0.01)	8.13[c]	0.08, 0.14
Past-year PTSD (0 = no, 1 = yes)	0.08 (0.02)	4.89[c]	0.05, 0.11	0.05 (0.02)	2.99[b]	0.02, 0.08	0.03 (0.02)	2.02[a]	0.00, 0.06
Past-year Depression (0 = no, 1 = yes)	0.05 (0.02)	3.17[b]	0.02, 0.09	0.03 (0.02)	1.72	−0.00, 0.06	0.02 (0.02)	1.07	−0.01, 0.05

Note. MVI = Mass Violence Incident; PTSD = Posttraumatic Stress Disorder; Individual participants (Level 1) were nested within community (Level 2); each model included the random intercept for the site variable. Age is considered as a function of decade, as opposed to single years, to improve interpretability.
[a] $p < .05$.
[b] $p < .01$.
[c] $p < .001$.

Table 5
Multilevel models examining support service use.

Variable	*Mental Health Services*(0 = no, 1 = yes)			*Support Group*(0 = no, 1 = yes)			*Religious Support*(0 = no, 1 = yes)		
	n = 1201			*n* = 1191			*n* = 962		
	b (SE)	*t*	95% CI	*b* (SE)	*t*	95% CI	*b* (SE)	*t*	95% CI
Predisposing factors									
Race									
Black or African American	[Reference]			[Reference]			[Reference]		
White	−0.06 (0.04)	−1.62	−0.13, 0.01	−0.03 (0.03)	−0.84	−0.09, 0.04	−0.25 (0.05)	−4.92[c]	−0.35, −0.15
American Indian or Alaskan Native	−0.04 (0.10)	−0.38	−0.23, 0.16	0.01 (0.10)	0.13	−0.17, 0.20	−0.47 (0.21)	−2.22[a]	−0.88, −0.06
Asian	0.12 (0.06)	2.08[a]	0.01, 0.24	−0.03 (0.06)	−0.47	−0.13, 0.08	−0.11 (0.09)	−1.21	−0.28, 0.07
Other and Multi Racial	−0.04 (0.05)	−0.74	−0.14, 0.07	0.02 (0.05)	0.33	−0.08, 0.11	−0.21 (0.07)	−2.80[b]	−0.35, −0.06
Age	−0.01 (0.01)	−0.99	−0.02, 0.01	0.01 (0.01)	1.07	−0.01, 0.02	0.02 (0.01)	3.74[c]	0.02, 0.05
Ethnicity (0 = non-Hispanic, 1 = Hispanic)	0.07 (0.02)	−3.07[b]	−0.12, −0.03	−0.08 (0.02)	−3.69[c]	−0.12, −0.04	−0.02 (0.04)	−0.62	−0.09, 0.05
Sex (0 = Male, 1 = Female)	−0.02 (0.02)	−0.79	−0.06, 0.02	0.02 (0.02)	1.14	−0.02, 0.06	0.06 (0.03)	1.84	−0.00, 0.11
Income	−0.03 (0.01)	−4.06[c]	−0.04, −0.02	−0.01 (0.01)	−1.64	−0.02, 0.00	−0.01 (0.01)	−0.89	−0.03, 0.01
Physical or Sexual Assault (0 = no, 1 = yes)	0.05 (0.02)	2.65[b]	0.01, 0.09	0.04 (0.02)	2.43[a]	0.01, 0.08	0.06 (0.03)	2.10[a]	0.00, 0.12
Enabling factor									
Social Support	0.00 (0.00)	1.37	−0.00, 0.01	−0.00 (0.00)	−0.84	−0.01, 0.00	0.01 (0.00)	1.58	−0.00, 0.01
Need factors									
Direct Exposure to MVI (0 = no, 1 = yes)	0.13 (0.02)	6.35[c]	0.09, 0.17	0.11 (0.02)	5.93[c]	0.07, 0.15	0.09 (0.03)	3.03[b]	0.03, 0.16
Past-year PTSD (0 = no, 1 = yes)	0.08 (0.02)	3.19[c]	0.03, 0.13	0.02 (0.02)	0.66	−0.03, 0.06	0.08 (0.04)	2.07[a]	0.00, 0.16
Past-year Depression (0 = no, 1 = yes)	0.12 (0.03)	4.76[c]	0.07, 0.17	0.05 (0.02)	1.93	−0.00, 0.09	0.13 (0.04)	3.15[b]	0.05, 0.21

Note. MVI = Mass Violence Incident; PTSD = Posttraumatic Stress Disorder; Individual participants (Level 1) were nested within community (Level 2); each model included the random intercept for the site variable. Age is considered as a function of decade, as opposed to single years, to improve interpretability.
[a] $p < .05$.
[b] $p < .01$.
[c] $p < .001$.

Pirard et al., 2020; Strøm et al., 2024; Stuber et al., 2006). We extend research in this area in our observation that these need factors were also associated with greater awareness of services and use of religious support. This is encouraging because it suggests that those most in need, and potentially who would most benefit, are more likely to access support. However, it is worth noting that only a small portion of those with significant levels of psychological distress indicated any awareness of support services (range 19–31%) and, among those aware of these services, less than half of those with significant distress actually used support services (range 18–39%). It may be that certain features of

distress following an MVI, such as avoidance of reminders of the stressful event or fears that talking about the MVI will exacerbate symptoms, may continue to present barriers to engaging in support services.

4.1. Limitations

There are some important limitations of this research to keep in mind. Foremost, we were unable to ascertain either the quantity or the quality of the three types of services available in each of the six communities. In some cases, people may not have been aware of services because they did not exist. This limitation precludes our ability to evaluate effectiveness of service use in reducing mental health problems after MVIs, although that was not the primary focus of the study. We did not assess the degree of religious beliefs or spirituality, or details about the nature of religious support. However, it seems plausible there were heterogenous experiences within each type of support that warrant additional research. Our assessment of PTSD and depression used a highly-structured and well-validated self-report measure, but significant levels of distress were not confirmed with clinician-administered interviews. It seems plausible that some participants were likely experiencing psychological distress unrelated to the MVI, which would weaken the association between distress and the need for support services related to the MVI. Another limitation is the small number of individuals who were direct victims/survivors of the MVI, which precluded comparative analyses between those living in the community with those who may have directly experienced the MVI. Although data were weighted to correct for nonresponse, it is possible that there are meaningful differences between those adults in the community who agreed to complete a survey on the effects of the MVI and those who declined. Another limitation is that the field currently lacks empirically supported methods for evaluating the "severity" of MVIs, which precluded our ability to make comparisons between different types of MVIs each community experienced and the association with awareness and use of support services.

5. Conclusion

Altogether, the present research provides novel documentation of the extent to which adults in communities that experienced an MVI are aware of and use support services. It extends previous literature on mental health services and considers other types of understudied support—support groups and religious support. Findings suggest that most community members are neither aware of nor use any kind of support services even when they know about them. In some ways, this is unsurprising as this sample comprised of community members, only a small proportion of whom lived in proximity or were directly exposed to the MVI. However, given recent findings suggesting MVIs can have wide-spread effects on the mental health of the surrounding community (Abba-Aji et al., 2024; Moreland et al., 2024), it becomes a critical public health issue to enhance awareness of and access to support services. Fortunately, those who do use support services are more likely to be those with the greatest need (i.e., direct exposure to the MVI and psychological distress). Possible clinical implications of this research include bolstering the resources provided to community resiliency centers or leveraging technology to disseminate support services through virtual resiliency centers to those who may otherwise not be able to access support. These findings provide critical insight into identifying adults who are less likely to know about and use support services following MVI.

Author note

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CRediT authorship contribution statement

Caitlin Rancher: Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Angela D. Moreland:** Writing – review & editing, Funding acquisition, Conceptualization. **Sandro Galea:** Writing – review & editing, Conceptualization. **Faraday Davies:** Writing – review & editing, Formal analysis, Data curation. **Jamison Bottomley:** Writing – review & editing, Formal analysis, Data curation. **Mohammed Abba-Aji:** Writing – review & editing, Data curation. **Salma M. Abdalla:** Writing – review & editing, Data curation. **Dean G. Kilpatrick:** Writing – review & editing, Methodology, Funding acquisition.

Declaration of competing interest

The authors declare no conflict of interest.

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