Network Size or Proximity? Association of Network Characteristics with Violence-Related Stress and PTSD Among Racial/Ethnic Minorities in Chicago

J Gen Intern Med 37(1):255–7
DOI: 10.1007/s11606-021-06607-w

BACKGROUND

The growing epidemic of violence in urban cities has been linked to stress-related health disorders and PTSD.[1] Social networks, broadly defined as an individual's personal and professional relationships, may be protective against these consequences.[2] However, studies on network *size* have been mixed.[2] We hypothesized that network *proximity*, the physical closeness of network confidants, may help explain differences in the level of protection conferred by social networks. In this study, we compared network size alone versus network size *and* proximity, to examine associations between these characteristics and psychosocial health (violence-related stress and PTSD) in a high-risk population.

METHODS

A sample of 504 adults were surveyed from two South and West side Chicago clinics in 2018. We limited analysis to 297 participants who self-reported lifetime exposure to community violence as a direct victim, witness, close friend, or family member of someone who died violently, using items from the Brief Trauma questionnaire.[3] Network size and proximity were measured using survey items from the National Social Life Health and Aging Project. Participants were asked to list each network confidant ("Who are the people that you've most often discussed important things with over the past year?") and their time-based proximity ("How far in minutes or hours does [listed individual] live from you?"). Violence-related stress and PTSD were measured using validated items adapted from the Jackson Heart Study and Primary Care-PTSD Screen. Detailed study methods are described in prior work.[4]

We used logistic regression models to assess stress due to violence and PTSD as independent functions of network size and proximity,[5] controlling for age, gender, race/ethnicity, education, insurance status, and clinic location.

Received August 31, 2020
Accepted January 5, 2021
Published online January 27, 2021

RESULTS

Among the subset of participants reporting prior exposure to community violence ($n = 297$; Table 1), the majority were female (69%) and non-Hispanic Black (75%). Two-thirds were direct victims of robbery or assault (66%); one-third (31%) screened positive for PTSD. The median number of network confidants was 2. Larger network size *alone* was not associated with stress due to violence or PTSD (Table 2). However, having a larger network size (≥ 3 confidants) within 30 min from home was significantly associated with 67% lower adjusted odds of PTSD (95% CI, 0.12–0.96), compared to those with no confidants within 30 minutes from home. Associations with stress due to violence were not statistically significant (Table 2).

DISCUSSION

In this sample of high-risk, racial/ethnic minority adults in Chicago, we found that network proximity, rather than network size alone, was associated with lower odds of PTSD. This study is among the first, to our knowledge, to compare network size and proximity, and their respective associations with the psychosocial consequences of violence. Our findings raise the possibility that close proximity to network confidants may be a key factor for mitigating the harmful effects of community violence. One possible reason is that physical proximity may facilitate a type of "extended kinship," providing reliable socioeconomic and emotional resources that are responsive to neighborhood events and conditions.[6]

Table 1 Participant Characteristics: Subgroup with Prior Exposure to Community Violence, Chicago, IL 2018

Participant *N* = 297	No.	%
Clinic		
Academic Medical Center	254	85.5
Federally-Qualified Health Center	43	14.5
Age (years)		
18–34	4	1.4
35–49	63	21.2
50–64	130	43.8
65–79	90	30.3
80 and older	10	3.4
Gender		
Female	205	69.0
Male	92	31.0
Race		
White non-Hispanic	23	7.7
Black non-Hispanic	224	75.4
Hispanic or Latino	35	11.8
Other	15	5.1
Primary language		
English	275	92.6
Spanish	20	6.7
Other	2	0.7
Educational attainment		
Less than high school graduate	50	16.8
High school graduate or GED equivalent[a]	58	19.5
Some college or 2-year degree	105	35.4
4-year college graduate or more	77	25.9
Do not know or refused	7	2.4
Insurance status		
Private	106	35.7
Medicaid or dual-eligible	107	36.0
Medicare	65	21.9
Other	7	2.4
None	9	3.0
Do not know or refused	3	1.0
Type of exposure to community violence		
Direct victim of robbery or assault	196	66.0
Indirect witness, friend, or family member	236	79.5
Stress due to violence at least some of the time	215	72.4
Post-traumatic stress disorder (PTSD)[b]	89	30.0
Network size		
No confidants	34	11.4
Small network (1–2 confidants)	130	43.8
Large network (3 + confidants)	130	43.8
Missing	3	1.0
Network size and proximity[c]		
No confidants within 30 min from home	82	27.6
Small network within 30 min from home	167	56.2
Large network within 30 min from home	39	13.1
Missing	9	3.0

[a]GED indicates General Educational Development certification. [b]PTSD indicates a positive screen for post-traumatic stress disorder using the Primary Care PTSD Screen (PC-PTSD), developed by the US Department of Veterans Affairs' National Center for PTSD. [c]Of the 1,030 travel times in our dataset, median travel time was 20 min with an interquartile range of 44 min

Neither network size nor proximity was associated with reductions in violence-related stress. We theorize that while stress may be more pervasive in populations with chronic exposure to violence, PTSD, which is more closely associated with personal exposure to violence, may be more responsive to the benefits of local networks. For instance, individuals with PTSD may rely on close confidants to navigate daily activities and regulate hypervigilance symptoms.

This is a limited cross-sectional study that can support theory and measurement development. Currently, network proximity is not included in most validated tools to measure network characteristics. We were unable to account for whether participants knew each other due to survey anonymity; however, eligibility criteria and the large size of each site may have mitigated this concern. Moreover, network proximity was measured using self-

Table 2 Association of Social Network Characteristics with Stress and Post-traumatic Stress Disorder in Adults Exposed to Community Violence

	Stress due to violence $n = 286$			Post-traumatic stress disorder $n = 277$		
Social isolation characteristics	**%**	**OR (95% CI)**	**Adjusted OR (95% CI)[a]**	**%**	**OR (95% CI)**	**Adjusted OR (95% CI)[a]**
Network size[b]						
No confidants	81.8	Ref	Ref	35.5	Ref	Ref
1–2 confidants	70.9	0.52 (0.20–1.36)	0.61 (0.22–1.66)	39.5	1.13 (0.50–2.57)	1.33 (0.53–3.36)
3+ confidants	70.6	0.53 (0.20–1.39)	0.62 (0.22–1.73)	21.3	0.49 (0.21–1.16)	0.42 (0.16–1.10)
Network proximity[c]						
No confidants within 30 min from home	68.8	Ref	Ref	41.3	Ref	Ref
1–2 confidants within 30 min from home	70.4	0.83 (0.46–1.52)	0.91 (0.48–1.71)	29.6	0.66 (0.37–1.16)	0.69 (0.37–1.28)
3 + confidants within 30 min from home	71.1	0.86 (0.36–2.03)	1.14 (0.45–2.86)	16.2	0.30 (0.11–0.81)*	0.33 (0.12–0.96)*

*[a]Logistic regression models were used to estimate differences between groups; adjusted for age, gender, race/ethnicity, educational attainment, insurance type, and clinic location (academic medical center or federally-qualified health center). [b]Based on the number of unique confidants, participants were asked to sequentially list confidants (i.e., "Looking back over the past year, who are the people that you most often discussed important things with?"), starting with the most important person. [c]Network proximity was measured among participants who reported at least 1 network confidant; however, all survey participants reporting no confidants were included in the referent category. *p < 0.05*

reported rather than empiric travel time. Despite these limitations, this is one of the first studies to examine both network size and proximity in comparative analyses.

Network proximity may be an important consideration, in addition to network size, for future research. We found that network proximity was associated with lower odds of PTSD in a sample of racial/ethnic minority adults who reported traumatic exposure to community violence. In an era of growing social isolation despite enhanced digital connection, further study is needed on the role of local networks in mitigating the harmful health effects of violence.

Acknowledgements: *Research reported in this publication was supported by the Agency for Healthcare Research and Quality (AHRQ) K12 grant in patient-centered outcomes research 5K12HS023007 (E.L. Tung, PI). E. Tung was also supported by the National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health 1K23HL145090-01 (E.L. Tung, PI). E. Tung and M. Peek were supported by the Chicago Center for Diabetes Translation Research P30DK092949, funded by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) of the National Institutes of Health.*

Ololade Akingbade, BS[1]
Monica E. Peek, MD, MPH[2,3]
Elizabeth L. Tung, MD, MS[2,4]

[1]Pritzker School of Medicine, University of Chicago, Chicago, IL, USA
[2]Section of General Internal Medicine, University of Chicago, Chicago, IL, USA
[3]Chicago Center for Diabetes Translation Research, University of Chicago, Chicago, IL, USA
[4]Center for Health and The Social Sciences, University of Chicago, Chicago, IL, USA

Corresponding Author: *Ololade Akingbade, BS; Pritzker School of Medicine, University of Chicago, Chicago, IL, USA (e-mail: Ololade.Akingbade@uchospitals.edu).*

Compliance with Ethical Standards:

This study was approved by the University of Chicago Institutional Review Board with written documentation of informed consent.

Conflict of Interest: *The authors declare that they do not have a conflict of interest.*

REFERENCES

1. **Tung EL, Johnson TA, O'Neal Y, Steenes AM, Caraballo G, Peek ME.** Experiences of community violence among adults with chronic conditions: Qualitative findings from Chicago. J Gen Intern Med. 2018;33(11):1913-20. https://doi.org/10.1007/s11606-018-4607-3.
2. **Aartsen M, Veenstra M, Hansen T.** Social pathways to health: On the mediating role of the social network in the relation between socio-economic position and health. SSM - Popul Heal. 2017;3(May):419-26. https://doi.org/10.1016/j.ssmph.2017.05.006.
3. **Schnurr PP, Vieilhauer MJ, Weathers F, Findler M.** The Brief Trauma Questionnaire. White River Junction, VT, National Center for PTSD, 1999.
4. **Tung EL, Cagney KA, Hawkley LC, Peek ME.** Social isolation, loneliness, and violence exposure in older adults. Health Affairs. 2019;38(10):1670-78. https://doi.org/10.1377/hlthaff.2019.00563.
5. **Giles-Corti B, Vernez-Moudon A, Reis R, et al.** City planning and population health: a global challenge. Lancet.2016;388:2912–24. https://doi.org/10.1016/S0140-6736(16)30066-6.
6. **Hardaway CR, Sterrett-Hong E, Larkby CA, Cornelius MD.** Family resources as protective factors for low-income youth exposed to community violence. J Youth Adolescence. 2016;45:1309–22. https://doi.org/10.1007/s10964-015-0410-1.