Social Networks and Mental Health Outcomes of Women Survivors of Intimate Partner Violence

Intimate partner violence (IPV) affects the health of millions of women across all social groups in the United States and around the globe. The World Health Organization defines IPV as, “any behavior in an intimate relationship that causes physical, psychological or sexual harm to those in the relationship” (WHO, 2012). Controlling behaviors such as isolating, monitoring and restricting access to resources are considered a form of IPV as well.

IPV has a detrimental impact on the mental health of those currently experiencing violence and after leaving a violent relationship. Physical, psychological, and sexual IPV are associated with increased negative mental health outcomes. Depression, PTSD and anxiety are mental health sequelae associated with IPV (Beydoun et al., 2012; Devries et al., 2013; Lagdon et al., 2014; Pill et al., 2017). A number of factors influence the relationship between IPV and mental health outcomes; notably, severity and extent of abuse contribute to mental health outcomes (Lagdon et al., 2014). Additionally, when victims experience more than one form of IPV, also known as polyvictimization, there is an increased risk for mental health disorders (Lagdon et al., 2014; Sabina & Straus, 2008)

Several large population-based studies, and a number of smaller observational studies, show a positive association between depressive symptomology and IPV (Beydoun et al., 2012; Devries et al., 2013). Most of these studies showed a moderate to strong positive association between depressive symptoms and IPV. Meta-analysis of these studies suggested a two to three-fold increased risk of diagnosed major depressive disorder and 1.5-2-fold increased risk of elevated depressive symptoms and postpartum depression (Beydoun et al., 2012). Among women, the association between incident depressive symptoms and IPV is significant in both directions and IPV is associated with incident suicide attempts (Devries et al., 2013).

Post-traumatic stress disorder (PTSD) and Complex PTSD are significant consequences of IPV (Pico-Alfonso, 2005; Dutton et al., 2006; Pill et al., 2017). The concept of Complex PTSD was developed within the context of prolonged trauma and is characterized by six alterations: alterations in regulation of affect and impulses, attention or consciousness, self-perception, regulations with others, somatization, and systems of meaning (Pill et al., 2017). More research is needed to understand the clinical significance of Complex PTSD in IPV survivors and to clarify the relationship between PTSD and Complex PTSD (Pill et al., 2017).

Social support has been identified as a protective factor that enhances resilience against negative mental health outcomes (Carlson et al., 2002; Coker et al., 2002; Kamimura et al., 2013; Machisa et al., 2018). Among 117 women accessing IPV services from a community organization, social support was identified as the most important factor for better health, including mental health outcomes (Kamimura et al., 2013). In a New Zealand population-based study, support from friends and family were the greatest contributors to positive mental health among women exposed to IPV (Pir et al., 2023). Neighborhood support also contributed to positive mental health outcomes.

A growing body of research utilizes a social network analysis (SNA) approach to understanding the relationship between social environments and health outcomes (Burgette et al., 2021). Egocentric network methods have been applied to depression and mental health in several studies (Burgette et al., 2021; Child & Lawton, 2020; Lam et al., 2017). Child & Lawton (2020) explored the relationship between ego-networks and psychological distress. They found the presence of supportive network ties were associated with lower distress among adults between the ages of 50 to 70. Network characteristics were not associated with psychological distress among adults between the ages of 21 to 30. Lam and colleagues (2017) explored the relationship

between ego-networks, smoking and depression among Ohio Appalachian women. Higher density networks reduced the risk of depression (Lam et al., 2017).

To date, the relationship between IPV survivors' social network structure and mental health outcomes has yet to be examined. The purpose of this pilot study was to explore the relationship between mental health and general perceived health outcomes and social network characteristics including social network size, density, and tie strength for those with and without IPV.

Method

A matched two-group cross-sectional study design was employed. The pilot study was set in the United States and participants were recruited from March 2022 to February 2023. Data collection was completed in March 2023.

Sample

Adult (>- 18 years old) women in the United States were recruited online using an IRB approved electronic flyer. The electronic flyer was posted on social media and shared through the newsletters of IPV organizations. The electronic flyer contained a link with a six-item screening questionnaire. Inclusion criteria for participant selection were as follows: 1) Identify as a woman, 2) Age 18 years or older, 3) Reside in the US, 4) Able to answer questions in English, and 5) Able to answer questions via Zoom or phone. For the IPV group, participants were selected if they had experienced a form of intimate partner violence in the past 2 years. All others were placed in the "non-IPV" group.

Fifty-four women were enrolled and completed both study sections. Group 1 (IPV; n=26) consisted of women who had experienced some form of intimate partner violence within the two

years prior to enrollment. Group 2 (Never-IPV; n=28) included all other women enrolled in the study who had not experienced intimate partner violence in their lifetime.

Procedures

Following consent, participants completed an online Qualtrics survey. Participants answered demographic questions, the Short Form- 12 survey, Center for Epidemiologic Studies Depression Scale, PTSD Checklist- Civilian version, and 7 IPV questions. Once participants completed the online survey, they were asked to schedule a Zoom or phone interview. Participants provided ego-network data by responding to name generators and interpreters. Participants in the IPV group answered additional open-ended questions about support from network members. The procedures are described in more detail in Manuscript 2.

Materials

The health outcome measures are described here. Demographic, IPV and social network instruments are described in Manuscript 2.

SF-12 Health Survey

The SF-12 Health Survey, an abbreviated version of the SF-36 Health Survey (Ware et al., 1996), was used to gauge participants' perception of their general health. The SF-12 has strong validity and reliability scores. The SF-12 was scored based on scoring guidelines for version 1 of the scale.

Center for Epidemiologic Studies Depression Scale

The CES-D scale was entered into the Qualtrics survey as a matrix. The scale includes 20 items. A score of 20 was used as the cut off score to identify depressive symptomatology. The

CES-D scale has been found to be valid and reliable as a measure of depressive symptoms among women experiencing IPV.

PSTD Checklist- Civilian Version

The PTSD-Civilian Version scale was entered into the Qualtrics survey as a matrix. This scale has 17 items on a 5-point scale measuring PTSD symptomology in the last month.

Analysis

Data was analyzed using Statistical Package for the Social Sciences (SPSS) for Windows, Version 29.0. Descriptive statistics were calculated for demographic and health outcome variables of each group. Results were expressed as proportions for categorical variables and mean and standard deviations for continuous variables. The prevalence of positive depressive and PTSD symptomology was calculated as the percentage of women who scored ≥ 20 in CES-D and ≥ 44 respectively. The prevalence of negative perception of overall health was calculated as the percentage of women who nominated their overall health as “poor” or “fair.” Demographic and social network variables were entered into separate logistic regression models to test for their significance. Then, only the independent variables identified as significant were included in the final logistic regression model.

Prior to running the final logistic regression models, linearity of the continuous variables with respect to the logit of the dependent variable was assessed via the Box-Tidwell (1962) procedure. Five terms were included in the model for depressive symptom screening. A Bonferroni correction was applied using all five terms in the models resulting in statistical significance being accepted when $p < .01$ (Tabachnick & Fidell, 2014). The model used for PTSD symptom screening included four terms and a Bonferroni correction was applied resulting

in statistical significance set at $p < .0125$. Based on these assessments, all continuous independent variables were found to be linearly related to the logit of the dependent variable. Model fit was assessed using the Hosmer-Lemeshow test.

Results

Sample characteristics are listed in Table 1.

Table 1

Characteristics of Social Network Sample

Descriptor	IPV Subjects (n= 26)	Non-IPV Subjects (n=28)	Statistic (two tailed p)
Age (Mean)	33.12 ± 10.84	43.18 ± 13.37	***t* = -3.05 (.004)**
Race/Ethnicity (% Hispanic)	11.54	0	$\chi^2 = 3.42$ (.64)
Income level (% below 35k/year)	46.15	14.29	**χ^2= 6.57 (.010)**
Education level (% HS or less)	3.85	3.57	$\chi^2 = .003$ (.957)
# of children	0.35 ± 0.75	0.54 ± 0.999	$t = -0.79$ (.436)
Disability (% Any)	15.38	17.86	$\chi^2 = 0.06$ (.808)
SF-12 (% report poor or fair health)	19.23	3.57	$\chi^2 = 3.35$ (.067)
CES-D (% positive screening)	80.77	39.29	**χ^2 = 9.61 (.002)**
PCL-C (% positive screening)	80.77	25.00	**χ^2 = 16.80 (< .001)**

Levene's test- $p < .05$, equal variance NOT assumed

Independent variables (age, income, network size, network density, and ego average tie strength) were tested individually for significance in separate regression models. Age, income, and network size were significant in predicting depressive symptomology when entered individually. Age, education and network size were significant in predicting PTSD symptomology. However, none of the independent variables, when tested individually or in combination, were significant in predicting general perceived health. The final models are described in the sections hereunder.

Depressive Symptomology

A binomial logistic regression model was performed to ascertain the effects of age, income and network size on the likelihood that participants screen positive for depressive symptomology. Increasing network size was associated with decreasing odds of positive screening of depressive symptomology. For every additional network member, the odds of a positive screening for depression decreased by 12%. Of the three predictor variables only network size was statistically significant (as shown in Table 2). The final logistic regression model was statistically significant, $\chi^2(3) = 14.70$, $p < .01$. The model explained 32.1% (Nagelkerke R^2) of the variance in positive screenings and correctly classified 74.1% of cases. Sensitivity was 78.1%, specificity was 68.2%, positive predictive value was 78.1% and negative predictive value was 68.1%.

Table 2

Logistic Regression Predicting Likelihood of Depressive Symptomology based on Age, Income and Social Network Size

	B	SE	Wald	*df*	*p*	95% CI for Odds

						Odds Ratio	Lower	Upper
Age	-.055	.029	3.690	1	.055	.947	.895	1.001
Income	-.787	.801	.967	1	.326	.455	.095	2.186
SN Size	-.123	.051	5.809	1	**.016***	.884	.800	.977
Constant	4.900	1.513	10.483	1	.001	134.281		

PTSD Symptomology

Age and network size were entered into the model to ascertain their effects on the likelihood that participants screen positive for PTSD symptomology. Increasing network size was associated with decreasing odds of positive screening of PTSD symptomology. For every additional network member, the odds of positive screening for PTSD decreased by 19%. The final logistic regression model was statistically significant, $\chi^2(2) = 15.72$, $p < .001$. The model explained 33.7% (Nagelkerke R^2) of the variance in PTSD symptomology and correctly classified 75.9% of cases. Sensitivity was 82.1%, specificity was 69.2%, positive predictive value was 74.2% and negative predictive value was 78.3%. Of the two predictor variables only network size was statistically significant (as shown in Table 3).

Table 3

Logistic Regression Predicting Likelihood of PTSD Symptomology based on Age and Social Network Size

	B	SE	Wald	*df*	*p*	95% CI for Odds

						Odds Ratio	Lower	Upper
Age	-.026	.024	1.109	1	.292	.975	.929	1.022
SN Size	-.191	.060	10.136	1	**.001***	.826	.735	.929
Constant	3.736	1.337	7.813	1	.005	41.923		

General Perceived Health

None of the independent variables were identified as significant in predicting poor or fair general perceived health. Therefore, a final adjusted model was not included in the analysis of general perceived health.

Discussion

Network size predicted depressive symptomology and PTSD symptomology in the adjusted model. The odds of screening positive for either depressive or PTSD symptomology decreased with each additional network member. Age and income did not predict any of the health outcomes tested in the adjusted models. Network size was the only significant predictor in the final model for both depressive and PTSD symptomology. Age and income did not predict depressive or PTSD symptomology.

Network characteristics, including network size, density and average tie strength, did not appear to be associated with general perceived health, nor were age or income. However, a larger sample size may be needed to detect a relationship between general perceived health and the aforementioned network and demographic characteristics. Social network characteristics have been shown to have a relationship with well-being metrics across a number of other study

samples, particularly among the elderly. Wang (2016) found subjective well-being was associated with network size and perceived support among a sample of elderly adults. Future social network analyses of IPV survivors with a larger sample size should include measures of perceived general well-being and health.

As the authors predicted, increase in network size appeared to have an association with decreased odds for screening positive for depressive symptomology. In other populations, such as the elderly, depression appears to be associated with smaller networks and increased loneliness (Houtjes et al., 2014). Age at baseline had a modifying effect on the relationship between depression course type (chronic, fluctuating, remission) and network size. Higher depressive symptomology was also associated with a decrease in the number of close relationships (Shouse et al., 2013). A future longitudinal study with a large representative sample of IPV survivors could assess the impact of depressive symptoms on network size and the interaction with age at baseline and IPV victimization.

Interestingly, the density of the network did not appear to have any association with how likely participants screen positive or negative for depressive symptomology. The author predicted a more connected network, in other words a network with higher density, would be a protective factor of depressive symptomology. In a study of Ohio Appalachian women, higher density networks reduced the risk of depression (Lam et al., 2017). Additionally, average tie strength did not appear to have any association with the mental health outcomes tested in this study. However, some elements of social networks have been found to influence depressive symptomology (Rosenquist et al., 2011). Depressive symptomology appears to be associated with symptomology among friends and neighbors, with female friends being the most influential in the spread of depression (Rosenquist et al., 2011). In a sample of Chinese adolescents,

network centrality appeared to be associated with depression (Okamoto et al., 2011). Ultimately, the causal direction between network characteristics and depressive symptomology cannot be determined by this pilot study. Future studies should further explore possible relationships between social network characteristics and depressive symptoms. More data is needed to understand the relationship between network characteristics, particularly network density and tie strength and their association with mental health outcomes.

Similarly, network size appears to be a significant predictor of PTSD symptomology among the participants in this study. Neither age nor income were significant predictors of PTSD symptomology. Social role diversity, rather than perception of strong social support, may have a greater protective effect against PTSD symptomology (Platt et al., 2014). A larger network may allow for greater relational diversity whereby the survivor may have more options for seeking support and resources. Social diversity may also provide the survivor with more diverse opinions and information. Programs that engage survivors in social groups where they may create meaningful relationships can promote social diversity in their networks.

To the authors' knowledge, this pilot study is the first to explore the relationship between social network characteristics and health outcomes among IPV survivors. Nurse researchers should consider applying social network analysis techniques to understand the relationship between social network structure and measures of well-being among their populations of interest. SNA can be applied to a number of nursing research questions.

Several implications can be drawn from the findings of this study. Social support interventions, such as community-based programs that promote participation in social groups, may be beneficial to survivors with small social networks. Future studies are needed to test the impact of social support interventions on survivors' social network characteristics and mental

health outcomes. Additionally, social network mapping may be used in future social support interventions for survivors to understand the current state of their social networks. Education on the importance of social diversity could be included as part of such an intervention. Additionally, concerned network members should be educated on the importance of staying engaged with the survivor and providing support, particularly emotional support. Emotional support, such as listening, was the most helpful form of support for survivors.

Limitations

The small sample size limits the generalizability of the study. A matched-group design was chosen during the planning phase of the study to address the issue of sample size. Multiple methods of recruitment were utilized, such as electronic flyers on social media sites and reaching out to national and state IPV organizations to send out electronic flyers in organization newsletters. However, the two groups were ultimately not matched on age and percent of participants with a household income of $35,000 or less. These differences were addressed in the regression analysis by entering the demographic variables in the model. More social network data is needed from survivors. The authors recommend a large population-based social network survey of IPV survivors.

The social network instruments used in participant phone interviews required at least an hour of participants' time. Several participants found the alter-to-alter matrix instrument to be tedious, but still completed all sections of the interview. The interviewer conducted 'check-ins' with participants between each section and during the alter-to-alter matrix. Future studies may consider alternative ways to elicit alter-alter ties or use a lower cutoff for the number of alters that may be listed by the participant. Some egocentric network studies have limited the number of alters to 15 to 20 alters while still eliciting enough data for ego-network measures (Perry et al.,

2018). Doing so may prevent discomfort and the potential of incomplete data from future participants.

Conclusion

This study is the first to address social network structure and its potential relationship with mental health outcomes of IPV survivors. These initial findings suggest there may be a relationship between depressive and PTSD symptomology with social network characteristics with network size being the greatest predictor of mental health outcomes. Future studies should utilize SNA methods to further explore relationships between social network characteristics and health outcomes of IPV survivors.

References

Beydoun, H. A., Beydoun, M. A., Kaufman, J. S., Lo, B., & Zonderman, A. B. (2012). Intimate partner violence against adult women and its association with major depressive disorder, depressive symptoms and postpartum depression: a systematic review and meta-analysis. *Social Science & Medicine, 75*(6), 959-975.

Burgette, J. M., Rankine, J., Culyba, A. J., Chu, K. H., & Carley, K. M. (2021). Best Practices for Modeling Egocentric Social Network Data and Health Outcomes. *HERD, 14*(4), 18–34. https://doi.org/10.1177/19375867211013772

Carlson, B. E., McNutt, L. A., Choi, D. Y., & Rose, I. M. (2002). Intimate partner abuse and mental health: The role of social support and other protective factors. *Violence Against Women, 8*(6), 720-745.

Child, S. T., & Lawton, L. E. (2020). Personal networks and associations with psychological distress among young and older adults. *Social Science & Medicine, 246*, 112714.

Coker, A. L., Smith, P. H., Thompson, M. P., McKeown, R. E., Bethea, L., & Davis, K. E. (2002). Social support protects against the negative effects of partner violence on mental health. *Journal of Women's Health & Gender-based Medicine, 11*(5), 465-476.

Devries, K. M., Mak, J. Y., Bacchus, L. J., Child, J. C., Falder, G., Petzold, M., ... & Watts, C. H. (2013). Intimate partner violence and incident depressive symptoms and suicide attempts: a systematic review of longitudinal studies. *PLoS Medicine, 10*(5), e1001439.

Dutton, M. A., Green, B. L., Kaltman, S. I., Roesch, D. M., Zeffiro, T. A., & Krause, E. D. (2006). Intimate partner violence, PTSD, and adverse health outcomes. *Journal of Interpersonal Violence, 21*(7), 955-968.

Houtjes, W., van Meijel, B., van de Ven, P. M., Deeg, D., van Tilburg, T., & Beekman, A. (2014). The impact of an unfavorable depression course on network size and loneliness in older people: a longitudinal study in the community. *International Journal of Geriatric Psychiatry, 29*(10), 1010-1017.

Kamimura, A., Parekh, A., & Olson, L. M. (2013). Health indicators, social support, and intimate partner violence among women utilizing services at a community organization. *Women's Health Issues, 23*(3), e179-e185.

Lagdon, S., Armour, C., & Stringer, M. (2014). Adult experience of mental health outcomes as a result of intimate partner violence victimisation: a systematic review. *European Journal of Psychotraumatology*, *5*(1), 24794.

Lam, J. A., Lu, B., Doogan, N. J., Thomson, T., Ferketich, A., Paskett, E. D., & Wewers, M. E. (2017). Depression, smoking, and ego-centric social network characteristics in Ohio Appalachian women. *Journal of Rural Mental Health, 41*(1), 30.

Machisa, M. T., Christofides, N., & Jewkes, R. (2018). Social support factors associated with psychological resilience among women survivors of intimate partner violence in Gauteng, South Africa. *Global health action*, *11*(sup3), 1491114.

Marin, A., & Hampton, K. N. (2007). Simplifying the personal network name generator: Alternatives to traditional multiple and single name generators. *Field Methods, 19*(2), 163-193.

Okamoto, J., Johnson, C. A., Leventhal, A., Milam, J., Pentz, M. A., Schwartz, D., & Valente, T. W. (2011). Social network status and depression among adolescents: An examination of social network influences and depressive symptoms in a Chinese sample. *Research in Human Development, 8*(1), 67-88.

Perry, B., Pescosolido, B., & Borgatti, S. (2018). *Egocentric Network Analysis: Foundations, Methods, and Models (Structural Analysis in the Social Sciences).* Cambridge: Cambridge University Press. doi:10.1017/9781316443255

Pico-Alfonso, M. A. (2005). Psychological intimate partner violence: The major predictor of posttraumatic stress disorder in abused women. *Neuroscience & Biobehavioral Reviews, 29*(1), 181-193.

Pill, N., Day, A., & Mildred, H. (2017). Trauma responses to intimate partner violence: A review of current knowledge. *Aggression and Violent Behavior, 34*, 178-184.

Pir, S., Hashemi, L., Gulliver, P., McIntosh, T., & Fanslow, J. (2023). Which aspects of social support enhance positive mental health in the context of intimate partner violence?. *Violence Against Women, 29*(9), 1787-1810.

Platt, J., Keyes, K. M., & Koenen, K. C. (2014). Size of the social network versus quality of social support: which is more protective against PTSD?. *Social Psychiatry and Psychiatric Epidemiology, 49*, 1279-1286

Rosenquist, J. N., Fowler, J. H., & Christakis, N. A. (2011). Social network determinants of depression. *Molecular Psychiatry, 16*(3), 273-281.

Shouse, J. N., Rowe, S. V., & Mast, B. T. (2013). Depression and cognitive functioning as predictors of social network size. *Clinical Gerontologist, 36*(2), 147-161.

Wang, X. (2016). Subjective well-being associated with size of social network and social support of elderly. *Journal of Health Psychology, 21*(6), 1037-1042.

World Health Organization. (2012). Understanding and addressing violence against women: Intimate partner violence (No. WHO/RHR/12.36). World Health Organization.