ISSN: 2576-2842

Research Article

Journal of Gynecology & Reproductive Medicine

Health Dynamics Through Psychometric Networks in Gynecology, Obstetrics, Reproductive Health And COVID-19 Research

Cristian RamosVera[1,2*]

[1]*University Cesar Vallejo. Faculty of Health Sciences. Research area, Lima, Peru*

[2]*Peruvian Society of Psychometry, Lima, Peru*

[*]Corresponding author
Cristian Ramos Vera. Av. Del Parque 640, San Juan de Lurigancho 15434. Lima. Peru.https://orcid.org/0000-0002-3417-5701.

Submitted: 07 Oct 2021; **Accepted:** 21 Oct 2021 **Published:** 28 Oct 2021

Citation: *Cristian Ramos Vera(2021) Health Dynamics Through Psychometric Networks in Gynecology, Obstetrics, Reproductive Health And COVID-19 Research. J Gynecol Reprod Med, 5(2): 28-31.*

Abstract
Network analysis offers a valuable methodological and practical contribution to research in gynecology, obstetrics and reproductive health. This analysis enables clinicians to interpret and translate the information derived from their research into better integrated care in the clinical population of interest, allowing them to focus a concrete intervention based on network results, from the perspective of complex model systems. The evaluation of the network reinforces a better explanation of the functioning of various reproductive and maternal health conditions to explain how their etiological mechanisms and concomitant variables interact with each other, of major clinical importance in the current COVID-19 pandemic context.

Keywords: Network Analysis, Reproductive Health, Gynecology, Obstetrics, Maternal Health, Mental Health, COVID-19

Introduction
Health issues by COVID-19
Given the current context of the COVID-19 pandemic, it led to changes in the daily routine of the population as a whole, with measures of social restriction that have generated alterations in physical and mental health, with a greater perception of risk and latent threat. Another complex situation is the coronavirus infection (COVID-19) that presents a higher latent risk of comorbidity and mortality in various health states [1].

Such chronic diseases of multifactorial nature reinforce inflammatory biomarkers affecting adaptive immunity and other potential pathogenic mechanisms leading to a condition of increased risk of death from multiple causes. This raises new questions about the psychological and physiological effects of the impact of COVID-19 and new recommendations for its clinical approach, based on the results obtained in health sciences research. Therefore, it is urgent to promote and disseminate methodological alternatives to evaluate the associations between all study variables simultaneously, considering the most characteristic etiological, pathophysiological and modulating factors or components in the health states that present the highest prevalence of risk in the pandemic context, and it is necessary to explore their interaction.

Characteristics of the Network Model and Its Implications in Health Dynamics and The Pandemic Context
Clinical research on COVID-19 poses specific challenges given its critical comorbidity status with other chronic physical and mental health diseases whose evaluation requires a complex multifactorial and etiological interaction. This urges more robust analyses that simultaneously include all the study variables beyond the use of univariate methods in the health sciences, given that these statistical models do not allow explaining the global phenomenon under investigation since they capture the isolated action of each variable with respect to the result analyzed and do not allow interpreting the results in a systematic way.

During the last decade a network variant has emerged in the clinical setting: the analysis of statistical correlation networks (directed or undirected) based on graph theory and psychometrics [2,3]. In this model, the associations are total or partial, connecting the nodes (variables) and structuring the dynamic model. Its graphical representation facilitates the interpretation in a simple way, where it can be observed that the wider the line of connection between the variables, the greater their causal relationship [2,3].

The present network model is a multivariate analysis composed of multiple regularized nonlinear relationships (elimination of more spurious relationships by means of the LASSO estimator) after multivariate control of the elements of the residual relationship network [4]. This feature allows more than one variable to be included in the analysis to assess various health aspects and their associated morbidity, in addition to the "interaction between their various etiological and modulating factors" [5,6]. For example, a network study in older adults included various clinical conditions such as diabetes, osteoporosis, urinary incontinence, in addition to anthropometric physiological measures, and neuropsychiatric measures such as depression and frailty [5]. Another network research in Singapore evaluated the relationships between chronic health conditions such as diabetes, hypertension, asthma, back problems, migraines, smoking, as well as quality of life, physical and mental health status, and psychiatric variables such as anxiety, depression and psychosis [6].

This network method makes it possible to estimate the most central elements (centrality and high-strength predictability indices) that have a greater clinical implication in the study sample, since they make it possible to explain the essential pathophysiological links that aggravate the functioning of the different comorbid clinical conditions in the face of the negative impact of COVID-19. These elements affect the interactions of the other concomitant components, i.e., a greater extension of these more essential elements increases the probability that the other relationships will be strengthened, and vice versa, their decrease or a lesser extension allows us to hypothesize that the network connections weaken or disappear, and entrench the overall collapse of the network [2,3].

This is essential in the planning and personalized development of clinical interventions based on the results obtained in the group of interest. The present variant of the psychometric network is essential for future research in this journal to explore the global phenomenon and the complexity of all study variables related to maternal and reproductive health.

In addition, since the specialties of interest of the present journal encompass the care of higher risk groups such as the female condition or pregnancy, new clinical hypotheses should be explored in such populations. Especially considering that women report a greater increase in endocrine, affective, and arousal responses to stress that generate a greater vulnerability to psychological distress compared to men, this is of great concern given the pandemic context and impact on pregnant women, older women, and healthcare workers, a highly feminized sector for the most part [7].

Clinical research has guided new hypotheses through the simultaneous evaluation of two or more networks, for example, to compare two or more networks: with and without the control of covariates or between two different times: before and after an intervention (pre-posttest), where the dynamic variation between networks allows to determine the effects of a treatment through a lower measure of connection between the central components of the network. In addition, networks have been included to evaluate two particular temporal events: before and after quarantine by COVID-19 [8]. Another article evaluated four simultaneous networks of body dissatisfaction symptoms in non-pregnant women with first, second and third trimester pregnancies, where measures of dissatisfaction with shape and/or weight stood out with a higher degree of connection with other elements in those networks of pregnant women [9].

Review of the Network Model in Gynecology, Obstetrics and Reproductive Medicine Research.

After a brief scientific review of network articles in gynecology, obstetrics and reproductive medicine journals, two investigations were found: the most recent study was "Links between perinatal risk factors and maternal psychological distress: A network analysis" [10]. This study assessed the simultaneous relationships of 28 perinatal risk factors and 8 sociodemographic conditions. Direct associations of postnatal psychological distress (PPD) at 9 months postpartum were reported with measures of lower level of happiness about pregnancy, history of depression and anxiety, maternal ethnicity, and infection during pregnancy, while the remaining network elements showed indirect connections with PPD through the referenced components. The most predictive items in this dynamic study (highest variance explained by all network items) were history of anxiety or depression (88.5%) and maternal ethnicity (78.4%), this study included 17531 British mothers.

Another research published this year in the Archives of Women's Mental Health evaluated depressive and anxious symptomatology during the preconception and second trimester periods of pregnancy in 1032 Singaporean women planning to have a baby, the results evidenced that high interactive prevalence of anxiety and depressive symptoms are maintained during both periods [11]. Such network findings present greater measures of connectedness in the dynamic symptomatology of depression, which highlights an increase in the centrality ratings of self-injurious ideation items and greater intensity of rejection or disappointment during pregnancy in contrast to the preconception period.

In addition, other network studies related to maternal health were also found. One of which included variables related to maternal psychological distress that were assessed at 26 weeks of pregnancy and 3 months after the birth of the baby [12]. A change in dynamic variation over time favorable to the postpartum network was reported, with higher levels of connectedness on measures of greater centrality of feelings of exhaustion and rejection, and the most influential postpartum symptoms were "Punishment feelings" and "State of tension". Central depressive symptoms during pregnancy were more linked to worse child development outcomes, anxiety symptoms were bridges of interconnection between the other network measures, which had higher levels of comorbid prevalence with depressive symptoms reinforcing psychological distress symptomatology after childbirth.

One of the investigations based on previous network analyses reported a network structure that included 20 perinatal depressive symptoms (PDS), then presented another network model that incorporated reproductive and stress biomarkers into the network, and another that compared the network structure of PDS symptoms between depressed and non-depressed women. Such analyses sampled 515 Latina women in the second trimester of pregnancy[13].The results reported five strong symptom-to-symptom associations (e.g., crying-sadness), and the most influential symptoms in the network (i.e., high centrality) were depressed mood, happiness, sadness, loneliness, and feeling blue. Regarding the relationship of PDS symptoms with stress and reproductive biomarkers, some weak relationships were found. According to the results of the comparison of the networks of depressed and non-depressed women, it was found that depressed participants had a symptom network of higher prevalence of causal interaction, however the relationships were invariant at the level of network structure.

Research recently published in the Journal of Psychiatric Research evaluated five network models over time in a group of 418 American women with a history of neuropsychiatric illness. These simultaneous networks assessed depressive symptoms during the first, second, and third trimester of pregnancy, as well as the early (1 to 8 weeks) and late (9 to 61 weeks) postpartum periods[14]. The results show that affective, cognitive and somatic symptomatology had greater predictive centrality (greater variance explained by network connections) during the late postpartum period. In this period such depressive measures were more influential, however during the third trimester of pregnancy the affective symptomatology of depression presented a higher degree of centrality. Affective and cognitive variables of depressive symptomatology were better clustered by a common underlying cause during the second trimester of pregnancy, unlike somatic symptomatology which maintained a higher degree of clustering during the late postpartum period.

The network methodological proposal is an opportunity for the areas of interest of this journal to improve the knowledge of various aspects of maternal and reproductive health, which allows identifying the central elements of the network to intervene to improve the welfare of the population. This is recommended for university programs in Gynecology and Obstetrics that include this methodology to analyze statistical inference and explore new avenues of clinical research in such clinical settings, given the comorbid maternal health dynamics of COVID-19 and its possible consequences.

The network model allows for the inclusion of multilevel measures of analysis of biochemical, neuroanatomical, anthropometric, polygenic risk scores nature [15, 16]. The joint analysis of these various clinical measures allows the complexity of maternal health status conditions to be elucidated. For example, one can include biomarker measures of perinatal depression or postpartum depression or stress, genetic markers of reproductive affective disorders, eating disorders, metabolic factors, self-report measures, etc., given different clinical aspects of maternal health status [13]. Considering the different related clinical aspects such as comorbidity, the clinical relevance of certain symptoms and signs, the understanding of etiological mechanisms, the study of risk and protective factors, for a better interpretation of the results and subsequent clinical decision making from the model of complex systems [17,18].

Conclusion

The implication of the network model is mentioned given that the use of univariate analyses has serious limitations to comprehensively explain the study phenomenon, as it ignores possible confounding relationships and more important risk factors, of greater requirement given the unique and complex nature of the pandemic context of COVID-19 and aspects comorbid to maternal and mental health. This points to the need to find novel alternatives, such as network analysis, which offers the advantage of considering the simultaneous evaluation of all study variables and allows exploring new avenues of reproductive and maternal health research, since after a brief review in indexed databases of Wos and Scopus, to date there are only a couple of journals that report the psychometric network model in the areas of interest of the journal.

References

1. Ramos-Vera CA (2021) Las redes de relación estadística en la investigación psiquiátrica: el caso del delirio en el contexto de COVID-19. Rev Colomb Psiquiatr2021: 1-2.
2. Fried EI, van Borkulo CD, Cramer AO, Boschloo L, Schoevers RA, et al. (2017) Mental disorders as networks of problems: a review of recent insights. Soc Psychiatry Psychiatr Epidemiol52:1-10.
3. Robinaugh DJ, Hoekstra RHA, Toner ER, Borsboom D (2020) The network approach to psychopathology: a review of the literature 2008–2018 and an agenda for future research. Psychol. Med50:353-366.
4. Epskamp S, Borsboom D, Fried EI (2018) Estimating psychological networks and their accuracy: A tutorial paper. Behav Res Methods50:195-212.
5. Leme DEDC, Alves EVDC, Fattori A (2020) Relationships Between Social, Physical, and Psychological Factors in Older Persons: Frailty as an Outcome in Network Analysis. J Am Med Dir Assoc21:1309-1315.
6. Isvoranu AM, Abdin E, Chong SA, Vaingankar J, Boorsbom D, et al. (2021) Extended network analysis: from psychopathology to chronic illness. BMC Psychiatry21: 119.
7. Hodes GE, Epperson CN (2019) Sex differences in vulnerability and resilience to stress across the life span. Biol Psychiatry86: 421-432.
8. Di Blasi M, Gullo S, Mancinelli E, Freda MF, Esposito G,et al. (2021) Psychological distress associated with the COVID-19 lockdown: A two-wave network analysis. J Affect Disord284:18-26.
9. Fuller-Tyszkiewicz M, Broadbent J, Richardson B, Watson B, Klas A, et al. (2020) A network analysis comparison of central determinants of body dissatisfaction among pregnant and

non-pregnant women. Body Image32:111-120.
10. Speyer LG, Hall HA, Ushakova A, Murray AL, Luciano M, et al. (2021) Links between perinatal risk factors and maternal psychological distress: A network analysis. Acta Obstet Gynecol Scand100:917-926.
11. Kee MZL, Ponmudi S, Phua DY, Rifkin-Graboi A, Chong YS,et al. (2021) Preconception origins of perinatal maternal mental health. Arch Womens Ment Health 24:605-618.
12. Phua DY, Chen H, Chong YS, Gluckman PD, Broekman BFP,et al. (2020) Network Analyses of Maternal Pre- and Post-Partum Symptoms of Depression and Anxiety. Front Psychiatry 11:785.
13. Santos H Jr, Fried EI, Asafu-Adjei J, Ruiz RJ (2017) Network Structure of Perinatal Depressive Symptoms in Latinas: Relationship to Stress and Reproductive Biomarkers. Res Nurs Health40:218-228.
14. Baez LM, Newport DJ, Stowe ZN, Knight BT, Heller AS (2021) The severity and role of somatic depressive symptoms in psychological networks in a longitudinal sample of peripartum women. J Psychiatr Res142:283-289.
15. Hilland E, Landro N, Kraft B, Tamnes CK, Fried EI, et al. (2020) Exploring the links between specific depression symptoms and brain structure: A network study. Psychiatry Clin Neurosci74:220-221.
16. Kappelmann N, Czamara D, Rost N, Moser S, Schmoll V,et al. (2021) Polygenic risk for immuno-metabolic markers and specific depressive symptoms: A multi-sample network analysis study. Brain Behav Immun. 2021.
17. Ramos-Vera C, Baños-Chaparro J, Ogundokun R (2021) Network structure of depressive symptoms in Peruvian adults with arterial hypertension. F1000 Research10:19.
18. RamosVera C (2021) Conceptos de interés en la atención integral de los pacientes con multimorbilidad. Aten Primaria53: 101969.