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Improving Positive Food Waste Behaviors: An Egocentric Network Analysis Evaluation of Leading Women in Agriculture's Advice Networks

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Abstract

The multidimensionality of COVID-19's consequences on food access and food waste behaviors was not immune to one gender versus another. The role of agricultural women leaders in alleviating food security concerns is not widely understood. An egocentric network analysis was conducted to assess the attributes possessed by social network peers and to discover variables that impact women's food waste behavior. Researchers found that women's advice networks were composed primarily of family or friends, known for more than five years, communicate weekly, can be described as an opinion leader, and share mutual trust. The density of women's networks needs to be researched further to determine a strategic plan to expose women leaders to new information and other social networks. Data indicated women's food waste behavior was influenced by their perceptions of COVID-19 as an opportunity for food waste change, innovation, and reputation enhancement. The need to develop current and future women agricultural leaders to improve food access and food sovereignty within global communities cannot be overstated.

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Introduction and Problem Statement

Food security, the physical and economic access to safe nutritious food, affects approximately 800 million people who suffer from poverty according to the United Nations Sustainable Development Goals (Ahn et al., 2022; United Nations, 2015). Research indicates that around one-third of food is wasted globally, meaning those leading in the agricultural industry need to prioritize the implementation of disposal practices to achieve food security (Slorach et al., 2019). Consumers' intention to reduce food waste stems from social emotions of guilt and shame (Jagau & Vyrastekova, 2017). Individuals' become more worried about food waste as they grow older, especially women, whose attitudes are more disturbed by the negative impacts of wasted food (Cantaragiu, 2019).

COVID-19 increased poverty and food insecurity levels for marginalized populations which were already vulnerable (Palmer & Strong, 2022; Pereira & Oliveira, 2020), requiring changes to the way people think and react to these issues. Proactivity, critical incident preparation, quick implementation, communication, and both a realistic and optimistic attitude have been cited as critical leadership competencies during COVID-19 (Stoller, 2020).

Previous research indicated women were associated with more successful leadership qualities that led to a higher quality performance compared to male leaders (Gardner, 2017; Offerman et al., 2020). The Farm Bureau and other agricultural leadership organizations and the field of agricultural leadership shifted towards supporting women as the primary decision makers in both home and government (Satyavathi et al., 2010). The Farm Bureau supplies its leaders and members with the opportunity to develop professionally as leaders and become more effective during times of crisis (American Farm Bureau Federation, n.d.), therefore, the chosen sample was derived from a leadership program supported by the American Farm Bureau.

Theoretical and Conceptual Framework

Three theories framed this study: crisis leadership, opinion leadership, and trust. A crisis leadership model developed by Brockner and James (2008) was used to determine participants' ability to view crises as an opportunity.

Learning, reflection, damage control, treatment, divergent thinking, long-term outcomes, and stakeholder collaboration were factors described by Brockner and James' (2008) crisis leadership theory that researchers chose to develop into a construct. Researchers in this study analyzed women's perception of COVID-19, the most recent crisis, as an opportunity for food waste change, innovation, and reputation enhancement. Several crises have occurred over the past few decades increasing the opportunity for researchers to investigate crisis leadership (Wu et al., 2021). According to the literature, a crisis is referred to as a rare public situation that causes unwanted outcomes for many individuals, including firms and their stakeholders, requiring immediate and effective leadership (James & Wooten, 2006). Crises differ among varying individuals and circumstances. Brockner and James (2008) discuss how innovation, change, and reputation enhancement are opportunities to be realized. Crises are predicted to

be perceived as opportunities when organization leaders adopt a learning orientation (Wooten & James, 2004). A leader's ability to reflect and learn is critical for the success of an organization (Brockner & James, 2008).

Rogers' (2003) diffusion of innovations theory was used to determine the effect of women's opinion leadership in promoting food waste and food recovery strategies along with the effect from their personal networks. An opinion leader is a credible and trusted individual within a social system (Rogers, 2003). A role of an opinion leader is to reduce the uncertainty of an innovation in a social system (Rogers, 2003). To fulfill this role, an opinion leader must be aware of where the social system is relative to the innovation (Rogers, 2003). Rogers (2003) explains several attributes distinguished by opinion leaders: greater connection to the outside world, greater exposure to diverse media, high social engagement, higher socioeconomic status, more innovation, and greater interaction with change agents.

A trust theory was chosen to determine the trust types between participants and their personal networks. McKnight and Chervany (2001) developed a model discussing five trust types: disposition to trust, institution-based trust, trusting beliefs, trusting intentions, and trust-related behavior. The following terms are related to interpersonal trust. When an individual trusts interpersonally they do so by trusting other people, either personally, as in trusting behavior and trusting intentions, or based on their attributes, meaning trusting beliefs (McKnight & Chervany, 2001). Trusting beliefs mean the extent to which an individual confidently believes the other person has beneficial characteristics (McKnight & Chervany, 2001). This is person-specific, not situation-specific. The willingness to depend on the other party with a sense of relative security, with the lack of control over the party, and the possibility of negative consequences is known as trusting intentions (McKnight & Chervany, 2001). Trusting intentions differ from disposition to trust in that it refers to specific other people rather than general other people (McKnight & Chervany, 2001). An individual who voluntarily depends on another with confidence even with the possibility of negative consequences is trust-related behavior (McKnight & Chervany, 2001).

Purpose

The purpose of this study was to describe the personal advice networks of women committee members in the southern region state Farm Bureau women's leadership programs during COVID-19 that impact their food waste behavior, opinion leadership, and crisis leadership. Two objectives guided this study:

1. Determine the attributes possessed by the leading women in agriculture's network peers.
2. Understand the relationships between independent variables and food waste behavior.

Methods

Egocentric network research is achieved by asking egos to elicit a set of alters from their social system (Wasserman & Faust, 1994). Egocentric data collection consisted of asking questions in

which individuals' responses provided relational information to better understand the influence of their personal network on egos' behavior (Valente, 2010). Participating women were "egos" and the individuals in their social networks were "alters" (Borgatti et al., 2013). The population was (*N* = 159) women among 11 of the 12 U.S. southern regions state's women's leadership committees. The southern region states that participated in this study included Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, and Virginia. We were unable to collaborate with Kentucky due to lack of communication between the research team and leadership coordinator of Kentucky's Farm Bureau. Data was collected in the fall of 2022, and 50 women responded, generating a response rate of 31.45%. We compared early and late respondents, and no significant differences occurred (Lindner et al., 2001). Therefore, data was generalizable to the population.

An electronic cross-sectional survey was distributed, via Qualtrics, to a sample comprised of women holding leadership positions within their states' Farm Bureau Women's Leadership Program. All 11 leadership coordinators who agreed to participate in this study were contacted and asked to share the survey link with their committee, once a week for five weeks. To assess egocentric networks, egos were asked three types of questions: name generators, name interpreters, and alter-alter ties (Borgatti et al., 2013). The name generator asked egos for a list of five people who sought advice since COVID-19 began, and the name interpreter questions asked egos to describe their alters. Alter-alter ties are the connections among alters and allow for the analysis of networks' composition (Perry et al., 2018).

All ego-level assessments were measured on a five-point scale (-2 = *Strongly Disagree*, -1 = *Disagree*, 0 = *Neither Agree or Disagree*, 1 = *Agree*, 2 = *Strongly Agree.*). The research team chose to code scales from negative two to positive two for better interpretation and readability. Ego's food waste behavior was measured using a seven-item assessment developed by the researchers to determine egos' food waste decisions and behaviors. Researchers developed the food waste behavior assessment using factors discussed by Brockner and James (2008) that relate to the behavioral responses of individuals during a crisis. Crisis leadership was determined by a three-item assessment with a five-point scale (*strongly disagree* = -2 to *strongly agree* = 2) for innovation, change, reputation enhancement based on women's perception of crises as an opportunity according to Brockner and James (2008).

The alter variables (gleaned from name interpreter questions) we chose to measure were: alter gender (0 = *female*, 1 = *male*, and 2 = *other*), alter relationship (0 = *family*, 1 = *friend*, 3 = *neighbor*, 4 = *Farm Bureau*, 5 = *other*, 6 = *rancher*, 7 = *pastor*, and 8 = *neighbor*), alter communication (0 = *less than once per year*, 1 = *1-2 times per year*, 2 = *every few months*, 3 = *every month*, 4 = *every few weeks*, 5 = *every week*, 6 = *every few days*, 7 = *every day*), alter length known (0 = *less than 6 months*, 1 = *6 months - 1 year*, 2 = *1 to almost 2 years*, 3 = *2 to almost 3 years*, 4 = *3 to almost 4 years,* 5 = *4 to almost 5 years*, 6 = *5 or more years*). The last five name interpreter questions measured alter trust in ego, ego trust in alter, ego describe alter as opinion leader, alter describe ego as opinion leader, and ego lead alter toward positive food waste decision on five-point scales (-2 = *never*, -1 = *rarely*, 0 = *sometimes*, 1 = *usually*, 2 = *always*).

Statistical Package for Social Sciences 27 was used to assess descriptive statistics for ego and alter-level data. Stata assisted with conducting more accurate correlation coefficients. The 11 variables included in the correlation matrix were composed of two types: ego-level variables and network-level variables. There were three ego-level variables: crisis leadership sum score, opinion leadership sum score, and food waste sum score. These scores were based on the grand mean of responses to the three ego-level assessments described above. The remaining eight variables were network-level: proportion of network the ego has known five or more years, proportion of network that are Farm Bureau members, proportion of the network that ego communicates with weekly plus, proportion of network alter trusts ego "always," heterogeneity of alter describe ego opinion leader, heterogeneity of egos lead alter toward positive food waste, heterogeneity of alter trusts ego, and heterogeneity of ego trusts alter. Researchers used ENet to calculate structural and compositional variables based on ego's responses to the name interpreters mentioned above.

A panel of faculty experts from a School of Public Health and a College of Agriculture at Texas A&M University assessed criterion and face validity and revised the opinion leadership construct, resulting in the removal of an item. The internal reliability of the instrument was determined by post-hoc Cronbach's alpha scores (Cronbach, 1951). Cronbach's alpha scores were determined for the three assessments within the instrument: food waste behavior (α = 0.92, 7-items), crisis leadership (α = 0.96, 3-items), and opinion leadership characteristics (α = 0.76, 5-items).

Findings

To answer objective one, researchers assessed attributes possessed by the alters to describe egos' advice networks. The participants (n = 50) were able to collectively identify 243 (n = 243) alters through the name generator question. There was a total of 154 female alters (63.4%), while the other 36.5% were men (n = 89).

The major type of relationship between ego and alter was family (43%, n = 105), followed by friend (66%, n = 27), Farm Bureau member (25%, n = 61), professional (2.9%, n = 7, rancher (0.4%, n = 1), pastor (0.4%, n = 1), and neighbor (0.4%, n = 1).

Most egos communicated with the alters every day (25.9%, n = 63), every few days (20.6%, n = 50), every week (17.3%, n = 42), every few weeks (15.2%, n = 37), every few months (11.5%, n = 28), or every month (7.4%, n = 18). There were 2.1% (n = 5) of alters that communicated with ego less than 1-2 times per year.

Many alters (89.3%, n = 216) have known the ego for five or more years. Fewer egos have known alters four to almost five years (3.7%, n = 9), three to almost four years (2.9%, n = 7), one to almost two years (2.5%, n = 6), less than six months (0.8%, n = 2), six months to a year (0.4%, n = 1), and two to almost three years (0.4%, n = 1).

A majority of alters *always* trust ego (85.6%, *n* = 208). There was 35 (14.4%) alters who *usually* trust ego. Regarding egos' trust in alter, many alters are *always* trustworthy (82.7%, *n* = 201). There were 32 (13.2%) alters described as *usually* trustworthy, 4 (1.6%) as *never*, 3 (1.2%) as *sometimes*, and 3 (1.2%) as *rarely*.

Opinion leadership used a five-item assessment to determine how likely women feel the possess the opinion leadership characteristics discussed by Rogers (2003): *greater connection to the outside world*, *greater exposure to diverse media*, *high social engagement*, *higher socioeconomic status*, *more innovative*, and *greater interaction with change agents*. The results were interpreted on a five-point scale (*strongly disagree* = -2, - 1 = *disagree*, 0 = *sometimes*, 1 = *agree*, to *strongly agree* = 2).

Most alters were *always* described as an opinion leader (49.8%, *n* = 121). The remainder of alters were *usually* (32.1%, *n* = 78), *sometimes* (16%, *n* = 39), and *rarely* (2.1%, *n* = 5) described as opinion leaders. Alters would likely describe ego as an opinion leader *always* (41.6%, *n* = 101). Followed by 87 (35.8%) alters that would *usually* describe ego as an opinion leader, 50 (20.6%) who *rarely*, three (1.2%) who *never*, and two (0.8%) who *rarely*. The majority of alters were *sometimes* (28.8%, *n* = 70), *never* (25.9%, *n* = 63), and *usually* (21%, *n* = 51) led toward positive food waste decision by ego, while the rest of alters were *rarely* (16.9%, *n* = 41) and *always* (7.4%, *n* = 18) led toward positive food waste decisions by ego.

Objective two sought to understand the relationships between independent variables and food waste behavior. The seven items that measured women's food waste during COVID-19 were: *I assisted with food waste damage control*, *I learned about food waste*, *I reflected on my food waste management*, *I treated the food waste cause*, *I sought views of multiple stakeholders regarding food waste*, *I emphasized short and long-term food waste outcome*, and *I established norms for divergent thinking*. Correlational analyses revealed statistically significant moderate and very strong correlations between ego crisis leadership sum and ego opinion leadership sum (r = .45, p = .00), ego food waste sum (r = .71, p = .00), and heterogeneity of alter led toward positive food waste (r = -.32, p = .03). This suggests that, as ego crisis leadership sum increases, especially in relation to ego food waste sum, their opinion leadership increases, and the heterogeneity of their network led toward positive food waste behavior by ego significantly decreases. In addition, researchers found statistically moderate correlations between ego opinion leadership sum and ego food waste sum (r = .35, p = .02) and heterogeneity of ego leads alter towards positive food waste (r = -.35, p = .02). Suggesting that, as ego opinion leadership increases, ego food waste sum increases, and the heterogeneity of their network led toward positive food waste behavior by ego significantly decreases.

There was a moderate correlation between the proportion of network ego has known for five or more years and the proportion of network that communicate weekly plus (r = .30, p = .04). This indicates, as the proportion of network that ego has known for five or more years increases, their communication weekly plus increases. Low and substantial correlations were found between proportion network Farm Bureau and proportion network communicate weekly plus (r = -.66, p = .00) and proportion alter trust ego (r = -.28, p = .05). This suggests, as the

proportion of Farm Bureau members in an egos' network increase, the network communication weekly plus and alter trust decreases. Researchers found statistically significant low and moderate correlations between proportion network communicate weekly and proportion network trusts ego (r = .31, p = .03) and heterogeneity between alter trusts in ego (r = -.29, p = .04). This argues, as ego communication with network increases, the proportion alter trust increases and heterogeneity of alter trust ego decreases.

Furthermore, researchers found statistically moderate and substantial correlations between the proportion of network that trusts ego and the heterogeneity between alters that describe ego as an opinion leader (r = -.43, p = .00), heterogeneity between network trust in ego (r = -.68, p = .00), and heterogeneity between ego trust in network (r = -.39, p = .01). An increase in proportion network trusts ego, indicates a decrease in heterogeneity network describes ego as opinion leader, network trust in ego, and ego trust in network. A statistically significant moderate correlation was found between heterogeneity of network that describe ego as an opinion leader and heterogeneity network trusts ego (r = .45, p = .00). When the heterogeneity of network that describe ego as an opinion leader, the networks trust in ego increases. Lastly, a moderate correlation was found between heterogeneity network trusts ego and heterogeneity ego trusts network (r = .38, p = .01). As the heterogeneity of network trusts ego increases, so does egos trust in their network (see Table 1).

Table 1

Correlations Between Predictor Variables

	n	1	2	3	4	5	6	7	8	9	10	11
1. Crisis Leadership Sum	48	-										
2. Opinion Leadership Sum (2)	47	.45**	-									
3. Food Waste Sum	47	.71***	.35*	-								
4. Proportion Network Known Five or More Years	48				-							
5. Proportion Network Farm Bureau	48					-						
6. Proportion Network Communicate Weekly Plus	48				.30*	-.66***	-					
7. Proportion Alter Trusts Ego Always	48					-.28*	.31*	-				
8. Heterogeneity: Network Describe Ego Opinion Leader	48							-.43*	-			
9. Heterogeneity: Ego Lead Alter Toward Positive Food Waste	48	-.32*	-.35*							-		
10. Heterogeneity: Alter Trusts Ego	48						-.29*	-.68***	.45**		-	
11. Heterogeneity: Ego Trusts Alter	48							-.39**			.39**	-

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. .01–.09 = Negligible association; .10–.29 = Low association; .30–.49 = Moderate association; .50–.69 = Substantial association; .70 or higher = Very strong association (Davis, 1971).

Conclusions, Discussion, and Recommendations

This study promoted a deeper understanding of the advice networks of women leading in agriculture. The majority of an ego's network fall within one of the five trust constructs: disposition to trust, institution-based trust, trusting beliefs, trusting intentions and trust-related behavior (McKnight & Chervany, 2001). By requiring women to provide the initials of five people they would go to for advice, the type of trust among egos and alters can be referred to as interpersonal and fall under the trust-related behavior construct which consists of cooperation, information sharing, informal agreements, decreasing controls, accepting influence, granting autonomy, and transacting business (McKnight & Chervany, 2001).

Rogers (2003) explained how opinion leaders attempting to diffuse an innovation ultimately have a better outcome if they're perceived as a credible and trusted individual. Alters who view ego as an opinion leader are more apt to adopt the food waste behaviors described by ego. However, this requires ego to disseminate food waste information among their social system, and researchers found that egos were likely not. The women who participated in this study were opinion leaders sought by change agents (Farm Bureau leadership coordinators) from a change agency (Farm Bureau). Yet, most women in this study did not perceive themselves as opinion leaders and failed to identify with the opinion leadership characteristics discussed by Rogers (2003).

Crisis leadership, more specifically how women perceived COVID-19 as an opportunity for food waste innovation, change, and reputation enhancement (McKnight & Chervany, 2001), was found to be a major influence on food waste behavior. However, women in this study did not perceive COVID-19 as an opportunity for innovation, change, and reputation enhancement regarding food waste. There is a need for change agents and agencies (Seitz et al., 2022) to prioritize crisis leadership professional development among women leading in agriculture to assist with mitigating food waste during catastrophic events, like COVID-19.

The majority of women involved in this study identified as white, indicating a lack of diversity in the southern states' Women's Leadership Committees. More inclusiveness would also include access to women of other ethnicities on these types of boards and across other industries. A large majority of women were part of the baby boomer generation. This finding may also indicate a pipeline issue with recruiting and retaining younger women in these types of positions. Women were more likely to have a network that consists majorly of alters they engage with frequently (every day) and seek advice from those they view as opinion leaders, meaning the Farm Bureau needs to encourage new relationships and create more networking opportunities for these women. The typical alter was a family member or friend that the ego has known for more than five years and talks with them at least every few days. This person can be described as an opinion leader, and there is mutual trust between the alter and the ego.

A clear need exists for farm organizations to develop food waste leadership competencies so that women involved in the committees can positively influence their network peers. The ego networks were immensely dense and consisted majorly of strong ties, meaning women's access

to new information and other social networks was minimal (Perry et al., 2018). Practitioners should promote new collaborations to expand women's networks, leading to more knowledge and other social networks with various perspectives. Leadership change agents from states Farm Bureaus should consider prioritizing communication, community building, and development of opinion leaders to improve leadership competencies (Rogers, 2003; Strong et al., 2022) to achieve food security. Women leaders' communication channels need further study.

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References

Ahn, J., Briers, G., Baker, M., Price, E., Sohoulande Djebou, D. C., Strong, R., Piña, M., Kibriya, S. (2022). Food security and agricultural challenges in West-African rural communities: a machine learning analysis. *International Journal of Food Properties, 25*(1), 827–844. https://doi.org/10.1080/10942912.2022.2066124

American Farm Bureau Federation. (n.d.). *Farm Bureau*. https://www.fb.org/

Borgatti, S. P., Everett, M. G., & Johnson, J. C. (2013). *Analyzing social networks*. Sage Publications.

Brockner, J., & James, E. H. (2008). Toward an understanding of when executives see crisis as opportunity. *The Journal of Applied Behavioral Science*, *44*(1), 94–115. https://doi.org/10.1177%2F0021886307313824

Cantaragiu, R. (2019). The impact of gender on food waste at the consumer level. *Journal in Economics, Business, Management, Finance, and Accounting*, *29*(4), 41–57. https://doi.org/10.2478/sues-2019-0017

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*, 297–334. https://doi.org/10.1007/BF02310555

Davis, J. A. (1971). *Elementary survey analysis*. Prentice-Hall.

Gardner, R. A. (2017). Hannah and her sisters: Theorizing gender and leadership through the lens of feminist phenomenology. *Leadership, 14*(3), 291–306. https://doi.org/10.1177/1742715017729940

Jagau, H. L., & Vyrastekova, J. (2017). Behavioral approach to food waste: An experiment. *British Food Journal, 119*(4), 882–894. https://doi.org/10.1108/BFJ-05-2016-0213

James, E. H., & Wooten, L. P. (2006). Diversity crisis: How firms manage discrimination lawsuits. *Academy of Management Journal*, *49*(6), 1103–1118. https://doi.org/10.5465/amj.2006.23478091

Lindner, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education*, *42*(4), 43–53. https://doi.org/10.5032/jae.2001.04043

McKnight, H. D., & Chervany, N. L. (2001). *Trust and distrust definitions: One bite at a time.* Springer.

Offerman, L. R., Thomas, K. R., Lanzo, L. A., & Smith, L. N. (2020). Achieving leadership and success: A 28-year follow-up of college women leaders. *The Leadership Quarterly, 31*(4), 101345. https://doi.org/10.1016/j.leaqua.2019.101345

Palmer, K., & Strong, R. (2022). Evaluating impacts from natural weather-related disasters on farmers mental health worldwide. *Advancements in Agricultural Development*, *3*(1), 43–56. https://doi.org/10.37433/aad.v3i1.175

Pereira, M., & Oliveira, A. M. (2020). Poverty and food insecurity may increase as the threat of COVID-19 spreads. *Public Health Nutrition*, *23*(17), 3236–3240. https://doi.org/10.1017/S1368980020003493

Perry, B. L., Pescosolido, B. A., & Borgatti, S. P. (2018). *Egocentric network analysis: Foundations, methods, and models*. Cambridge University Press. https://doi.org/10.1017/9781316443255

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). The Free Press.

Satyavathi, C. T., Bharadwaj, C., & Brahmanand, P. S. (2010). Role of farm women in agriculture: Lessons learned. *Gender, Technology and Development*, *14*(3), 441–449. https://doi.org/10.1177/097185241001400308

Seitz, P., Strong, R., Hague, S., & Murphrey, T. P. (2022). Evaluating agricultural extension agent's sustainable cotton land production competencies: Subject matter discrepancies restricting farmers' information adoption. *Land, 11*(11), 2075. https://doi.org/10.3390/land11112075

Slorach, P. C., Jeswani, H. K., Cuéllar-Franca, R., & Azapagic, A. (2019). Environmental and economic implications of recovering resources from food waste in a circular economy. *Science of The Total Environment*, *693*, 133516. https://doi.org/10.1016/j.scitotenv.2019.07.322

Stoller, J. K. (2020). Reflections on leadership in the time of COVID-19. *BMJ Leader, 4*(2), 77–79. https://dx.doi.org/10.1136%2Fleader-2020-000244

Strong, R., Wynn, J. T. II, Lindner, J. R., & Palmer, K. (2022). Evaluating Brazilian agriculturalists' IoT smart agriculture adoption barriers: Understanding stakeholder salience prior to launching an innovation. *Sensors*, *22*(18), 6833. https://doi.org/10.3390/s22186833

United Nations. (2015). *The 17 goals*. https://sdgs.un.org/goals

Valente, T. W. (2010). *Social networks and health: Models, methods, and applications.* Oxford University Press.

Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications.* Cambridge University Press.

Wooten, L. P., & James, E. H. (2004). When firms fail to learn: Perpetuation of discrimination in the workplace. *Journal of Management Inquiry, 13*(1)*,* 23–33. https://doi.org/10.1177/1056492603259059

Wu, Y. L., Shao, B., Newman, A., & Schwarz, G. (2021). Crisis leadership: A review and future research agenda. *The Leadership Quarterly, 32*(6), 101518. https://doi.org/10.1016/j.leaqua.2021.101518