Approach to the Global Human Trafficking Crisis: Analyzing Applications of Social Network Analysis

By

Amira Tahama Vivrette

Thesis

Submitted to the Faculty of the

Graduate School of Vanderbilt University

in partial fulfillment of the requirements

for the degree of

MASTER OF ARTS

in

Medicine, Health, and Society

May 13, 2022

Nashville, Tennessee

Approved:

JuLeigh Petty, Ph.D.

Caroline Randall Williams, M.F.A.

To my family,

For standing beside me

Every step of the way.

ACKNOWLEDGEMENTS

"Why do you go away? So that you can come back. So that you can see the place you came from with new eyes and extra colors. And the people there see you differently, too. Coming back to where you started is not the same as never leaving."

Terry Pratchett

Foremost, I would like to express gratitude to my advisor, Dr. JuLeigh petty for her guidance, support, and grace throughout my research process and years at Vanderbilt. Besides my advisor, I would like to thank my other thesis committee member, Prof. Caroline Randall-Williams, for her encouragement, insightful comments, and endless joy. Their guidance helped me in all the time of research and writing of this thesis. Furthermore, words cannot express how grateful I am for my mother, Shalanda Vivrette, and my siblings, Ariel Jordan and Omarion Vivrette. They were by my side through all the highs and lows within the past year, providing unending love and support each day. Additionally, I am thankful for the new friends I made along the way, who supported my research and provided a strong sense of community. Finally, I have learned so much about the world and myself during my time at Vanderbilt University, but I am most thankful for my semester abroad in Copenhagen, Denmark. For it was during this semester that my interest in human trafficking blossomed. I returned home with new eyes, which led to the making of this thesis.

TABLE OF CONTENTS

Page

LIST OF FIGURES

INTRODUCTION

Shamere McKenzie was a college student struggling to pay her tuition when she met her trafficker. On a sunny afternoon in January 2005, McKenzie was approached by her trafficker who lured her in with his politeness and ability to stimulate her mind through conversation. As time passed, the two met frequently and McKenzie's attraction to him grew. He spent several weeks getting to know her—gaining her trust. While she shared more personal information about herself, the trafficker never disclosed information about his profession or who he was as a person. In getting to know him, McKenzie disclosed her financial struggles. At the time, she was a student athlete at St. John's University, but needed to save $3,000 to pay her remaining tuition balance. The trafficker offered her a way. He promised her safety, a place to live, and an opportunity to make money quickly by dancing for clients. With no other options, McKenzie agreed. The trafficker bought her new dresses and dance shoes and took her to a strip club where she made $300 in a few hours. McKenzie felt excited and thought she'd be able to stop dancing soon. Later that night, her trafficker took her to a house where she was forced to perform sexual acts with men. From then on, for the next two years, McKenzie's trafficker forced her into prostitution (Murphy, 2014, p. 47-53).

Although Shamere McKenzie's story is only one narrative, it is a "familiar tale of a pimp who used love and well-being as a lure" before manipulating "the rhetoric of family and the notion of home to entrap his victims" (Murphy, 2014, p. 19). Her story is quite familiar for many people trafficked, or enslaved, during the twentieth and twenty-first centuries.

Each year, millions of people are forced to work against their will, without pay for subsistence, facing the threat of violence and no means of escape (Murphy, 2014). As of 2016, approximately 40.3 million men, women and children were victims of some form of human

trafficking globally (ILO, 2017). This number includes 24.9 million people in forced labor.

Like McKenzie, many victims of human trafficking are women. Today, one in every 130 women and girls is living in modern slavery (Walk Free, 2020). Also, women and girls account for 71 percent of all victims of human trafficking (ILO, 2017). While sexual exploitation accounts for 79 percent of all cases of human trafficking, women and girls are 99 percent of all victims of forced sexual exploitation (Van der Laan et al., 2011; Walk Free, 2020). In general, women and girls are disproportionately vulnerable to modern slavery during their life, which also makes them more vulnerable to negative health outcomes of being enslaved and exploited.

During any form of exploitation, and particularly with sexual exploitation, women and girls are impacted by adverse health effects. Some health effects of human trafficking include mental illness, trauma, and increased substance use or dependence. Much of the psychosomatic effects and trauma of being trafficked stems from high levels of physical and sexual violence, in addition to emotional and verbal abuse, isolation, and coercive tactics traffickers use. The intent of sharing these findings is not to detract from the trafficking of men and young boys, but to illuminate the increasing threat and disproportionate vulnerability to modern slavery facing women and girls.

Over the past three decades, the rise of technology has facilitated human trafficking. Within the past 15 years, the share of children among detected trafficking victims has tripled (UNODC, 2021). In recent years, the overall trend in human trafficking has worsened. There is some indication that the COVID-19 pandemic has influenced this trend. Due to the pandemic, children and teenagers time online increased, making their risk of being victims of online human trafficking even greater. Restrictions caused by the pandemic have provided new opportunities for human traffickers, who are using technologies and resources of online networks to

consolidate their networks and systems of trafficking humans (Save the Children, 2021). With the increased use of the internet and social media platforms, the risk of being trafficked is even greater for those most vulnerable to exploitation, such as women and children. Thus, it is critical to explore how trafficking networks operate.

Social network analysis has become a major analytical tool for studying clusters of people and the relations among them. During this analysis, network graphs are generated and analyzed using various measurements and metrics to draw conclusions based on flows of communication among members of a network. The methodology is used as a tool for studying criminal enterprises among a wide variety of disciplines, enabling researchers to explain crime phenomena occurring within criminal networks. However, few studies have demonstrated the practicality and benefits of using existing data to detect human trafficking networks.

Cockbain et al. explored the advantages of using social network analysis as a tool to assist law enforcement in the investigation of internal child sex trafficking in the UK (Cockbain et al., 2011). Their study illustrates how social network analysis is a useful tool for finding key actors in a network, detecting notable ties, and generating more effective policies, while also bridging agencies and facilitating their collaboration (Cockbain et al., 2011). Ibanez and Suthers applied social network analysis techniques to study online advertisements for adult services to investigate and detect trends in U.S. domestic human trafficking in online environments (Ibanez and Suthers, 2014). Mancuso also used social network analysis to study “madams”; formerly sex trafficked Nigerian women who later become sex traffickers to pay off their debts (Mancuso, 2014). The application of social network analysis in Mancuso’s study revealed the critical role of madams in the buying of women and girls in Nigerian sex trafficking networks. Sabon et al. used social network analysis to study the types of network structures and factors influencing

collaboration between sex traffickers and their victims in a regional Latino sex trafficking network (Sabon et al., 2021). Together these studies demonstrate successful applications of social network analysis, and the practicality of using existing data to reveal critical information about human trafficking networks. But they also illuminate a gap in research on the human trafficking networks and their online operations.

The objective of this paper is to evaluate literature on social network analysis and its application to organized crimes, including human trafficking. Research from the fields of criminology, sociology, computer science, and communication studies are drawn on to provide a more holistic view of the methodology and its application to crime phenomena. The results support using social network analysis to disrupt and target key figures in human trafficking networks. Ultimately, this research seeks to deepen our understanding of the challenges and practicality of using social network analysis to study and disrupt human trafficking networks.

The remaining sections are organized in the following order: The next section, titled "Social Network Analysis: Definitions and Methods," provides an overview of the methodology, including background on the origins network theory and social network analysis. This section provides definitions of basic network terms and contains a discussion of network measures. The strengths and limitations of the methodology are also discussed. The succeeding section, titled "Human Trafficking and Social Network Analysis: Recent Research," features a review of literature on both human trafficking and social network analysis. In the subsections on the social network analysis literature, its application to organized crime and human trafficking is reviewed. The section on "Future Directions" offers a review of the literature review findings and addresses gaps in the literature. Finally, in the "Conclusion," closing remarks are provided along with potential areas for further research.

SOCIAL NETWORK ANALYSIS:

DEFINITIONS AND METHODS

Social network analysis enables researchers to quantify social connections and links existing between members of social groups (networks). The methodology provides an opportunity for social scientists, criminologists, and policymakers to generate analytical models that explain crime phenomena occurring within criminal networks. Using social network analysis to study human trafficking networks advances knowledge of human trafficking networks and their structure; resulting in a better understanding of how these networks can be disrupted. The following section discusses the origins of social network analysis, highlighting several of the basic features.

Origins of Social Network Analysis

Over the last few decades, network analysis has become a major analytical tool for a wide variety of disciplines. Network analysis, an innovative approach in investigating social communities, traces back to the 1930s and the field of sociometry (Proskurnikov and Tempo, 2017). Moreno (1934) pioneered the field of network analysis, introducing a notable graphical tool called the sociogram. This tool was a graph depicting the underlying structure or pattern of a group and the position each individual actor (individual or group) has within it (Moreno, 1934). In his works, Moreno (1934); 1951) frequently used the term "network" to describe a collection of actors that are "bound together" by long-term connections (Moreno, 1951). Subsequently, the term "social network" was derived to denote structures or patterns established by social actors (individuals or groups) and the social ties among them.

Sociometry birthed the interdisciplinary science of social network analysis (Scott, 2012; Scott & Carrington, 2011; Wasserman & Faust, 1994). Since then, social network analysis has

matured and flourished in the fields of sociology, social psychology, and anthropology. By the late 1970s and 1980s, many practitioners of network analysis developed analytical concepts and measures to study the modern world and data collected on its economic, political, and social structures. The International Network for Social Network Analysis (INSNA) was established in 1976 and has served as a forum for network analysts in the social sciences. INSNA founded its own journal, *Social Networks*, in 1978, to publish the increasing literature on network research (Wetherell, 1998).

Today, social network analysis is a well-known theoretical and methodological approach to studying individuals, their relationships, and entire social networks. The approach is utilized in the fields of mathematics, communication science and criminology. Broad use of mathematical approaches, algorithmic tools, and analytical models are used to investigate the structural properties of social networks and social activities (Proskurnikov and Tempo, 2017). Social network analysis is a more mathematical approach than a statistical one, meaning it presents data as deterministic rather than probabilistic. The mathematical approach to social network analysis uses entire populations rather than a sample of a population. Therefore, data is seen as real and final, rather than a statistical possibility.

With the rapid development of technology, network analysts are using social network analysis to study online networks as well (Can and Alatas, 2019). Widespread use of the internet has driven researchers to generate innovative concepts for social network analysis and its application. The development of computational paradigms enhanced the potential of social network analysis, allowing for more extensive analysis of data (Can and Alatas, 2019). Since its formation, social network analysis has flourished as an analytical perspective, allowing its practitioners to identify precepts and assumptions about social structure and behavior (Wetherell,

1998).

Basic Network Terms

The following section provides definitions of terms most used in network analysis. These terms establish the foundations of any network.

Node or Actor

A "node," also known as an "actor," refers to any entity (individual, object, or group) in the study population that can have relationships with other entities within the same population. Nodes can also represent a variety of entities (Denny, 2014).

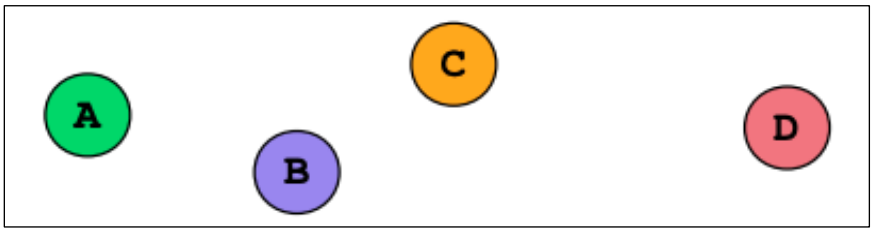

Figure 1
Four Nodes/Actors (Denny, 2014)

Tie or edge

A "tie," also known as an "edge," refers to a specific relation between two actors. Ties connect actors, representing a variety of relationships between actors. This could refer to connections like "went to the same school" or "trades with" (Denny, 2014).

There are two types of ties, or edges: **undirected** and **directed** (Figure 1). Ties are undirected when the relationship means the same thing to both actors; these relationships are reciprocated by both parties without a definite starting or ending node. When undirected, the direction of ties is meaningless. Thus, if there are two actors (actor A and actor B), then both actors are related in the same way. For example, consider friendship as an undirected

relationship. It is no different saying actor A is a friend of actor B than to say actor B is a friend of actor A. However, the direction of ties is extremely relevant in a directed relationship. Directed ties have a definite starting node and ending node; these relationships are applied from one actor to another. For example, consider that actor A sells a product that actor B wants to buy. Actor A can sell the product to actor B, but not vice versa.

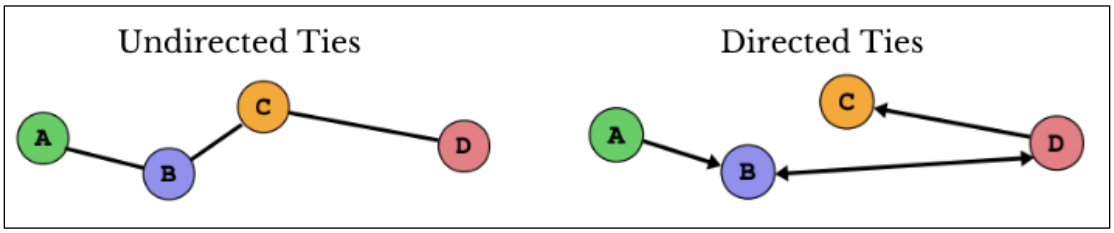

Figure 2
Undirected and Directed Ties (Denny, 2014)

Network Graph

A network graph is a visual representation of a collection of actors and the ties between them. Figure 3 depicts a network connecting victims in UK sex trafficking networks.

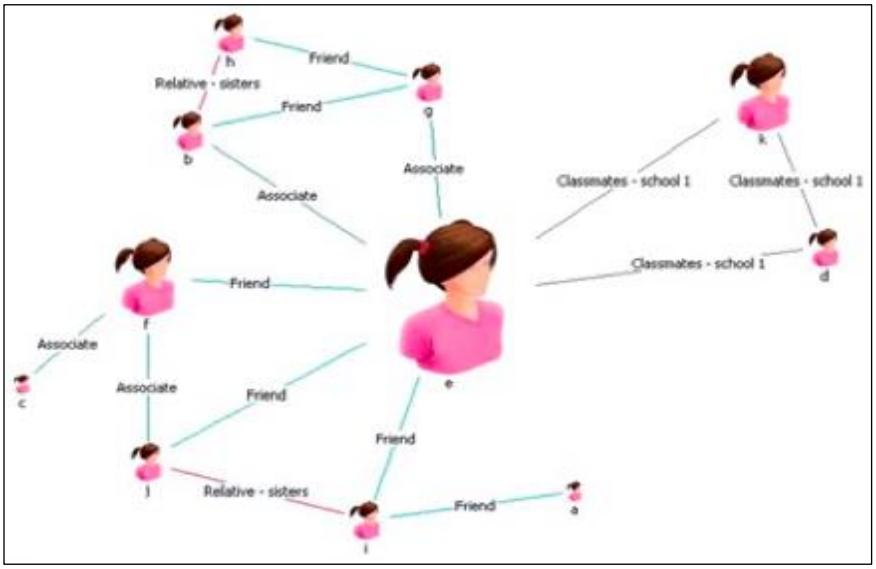

Figure 3
Sample Human Trafficking Victim Network Graph (Cockbain et al., 2011)

Tie Weight

Tie weight is a measure of the strength of connection between different actors in a network. A tie's weight is determined by the number of times that tie appears between two specific actors. As networks contain multiple types of ties between actors, they also contain ties of varying strengths. For example, in a weighted tie network, actor A can have a strong relationship with actor B, but actor B and D have a weak relationship. The tie between actor A and B is significantly thicker than that of actor B and D (see figure 4).

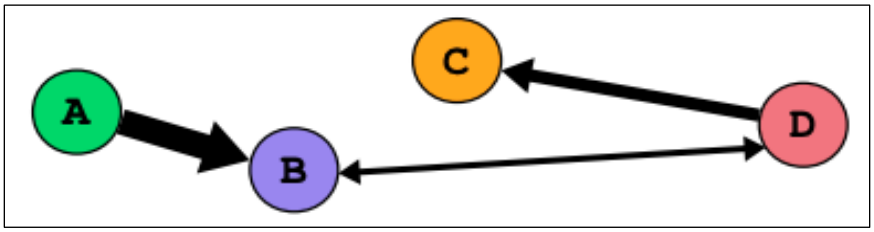

Figure 4
A Directed Network with Weighted Ties (Denny, 2014)

Geodesic Distance

Geodesic distance measures shortest path between two actors, or the least number of connections (ties) that must be passed through to get between any two actors (Denny, 2014). In the network depicted below (figure 5), the shortest path between actors A and D is the A-B-C-D route which has three ties. Therefore, the geodesic distance between actors A and D is 3, which is equivalent to the geodesic distance between actors A and F.

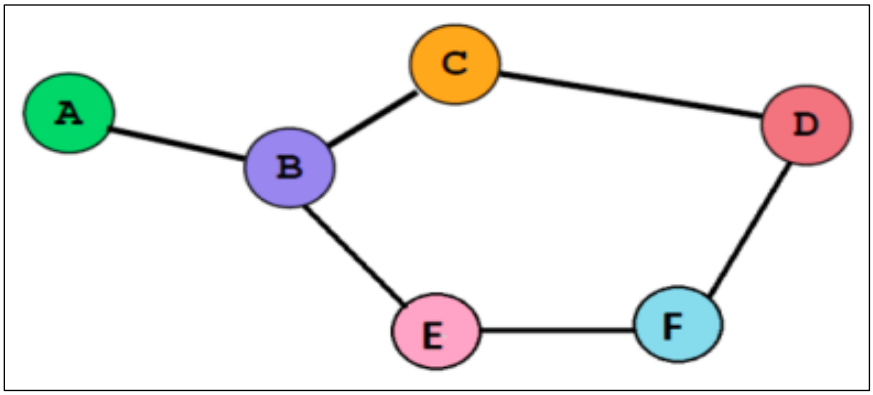

Figure 5
Geodesic Distance between Actors (Denny, 2014)

Application of Social Network Analysis

Social network analysis is a distinctive set of techniques used to map, measure, and analyze the relationships, interactions, and flows of communication among people, groups, and organizations (Scott, 2012). It allows for the exploration of patterns and types of relationships between actors, which may be individuals, groups, or organizations, through visual representations known as network maps. Network maps are composed of actors (individuals or groups) represented by structural nodes and the relationships (ties or edges) between the nodes. Analysts may use nodes to represent events, ideas, and actions based on the area of research. By generating network maps, social network analysis allows the role and influence of network actors to be analyzed. Social network analysis is also used to identify, describe, and map out relationships in a network, or analyze the structure of a system (Blanchet and James, 2012).

Researchers and practitioners can explore the interactions between actors in a system and theorize about collective behaviors and social interactions occurring within a network (Wasserman and Faust, 1994). Analytic technologies, mathematical tools, and specialized software packages allow researchers to explore how patterns of relationships operate to facilitate communications and actions within networks (Borgatti, Everett & Freeman, 2002). The goal of

social network analysis is to understand communities by mapping the relationships connecting them as a network, identifying key individuals, groups, or components within a network, and the associations between individuals.

It is important to establish the study's focus prior to completing a network analysis, requiring consideration of several elements of the analysis: the group of focus, the individuals of focus within the group, the period of focus, and the amount of available data (Home Office, 2016). The group of focus may vary depending on geographic location or operational need. Social network analysis works well for relatively small areas, meaning smaller groups may allow for more complete data collection and analysis. It is beneficial to look for key individuals (actors) within the group who may reveal more about the network structure, as the entire group may be too large to study with available resources. The identification of key members within a network can be done by asking participants to identify members of their network in relation to a question of interest (De Brún and McAuliffe, 2018). Network questions may prompt binary or value-based responses. Binary responses indicate the presence of a tie or relationship; value-based responses emphasize tie strength (De Brún and McAuliffe, 2018).

The sample network question "Does your organization rely on *Person A* for direction?" might be coded as yes (1) or no (0). The question, "To what extent does your organization rely on *Person A* for direction?" might be coded on a Likert scale to differentiate between the strength of individuals in the network. Once the group and individuals are identified, it is important to define the window of time. Longer periods may provide a more holistic view of the network structure and show how it has changed over time. Determining the amount of data for analysis will influence how long the process takes (Home Office, 2016).

Social network analysis focuses on relational data and may be applied to any data

highlighting relationships between people, objects, and events. This approach works well with organized crime groups such as human trafficking networks. Intelligence and criminal data are especially useful for exploring criminal and non-criminal ties, revealing useful information regarding their connection. By using police intelligence data for collection, names may be obtained from logs and information coded based on set categories. The information may be organized in a spreadsheet (dataset) to generate visual representations based on the results of the network analysis (Home Office, 2016).

Since there is no singular way of undertaking analysis, network analysis methods can be used to investigate varying research questions. The application of mathematical models and statistical analysis allows researchers to answer questions about the real world and the actors within. The insights revealed on maps generated from this analysis are dependent on the properties of the network and nodes within. There are several network and node properties that can be measured when creating and analyzing social networks. Depending on the dataset and population of focus network measures can generate different results for the same object of study, and lead to varying analyses (Mancuso, 2014; Rostami and Modani, 2015).

Properties of nodes can be measured using centrality measures to further investigate network characteristics, highlighting how the network operates and which actors are influential. There are three key centrality measures: degree, betweenness, and closeness. Degree centrality quantifies how important and influential a specific actor is in a network by examining and comparing the roles and characteristics of different actors in the network. This measure is applied to specific nodes within a network and does not provide network-level information. A node's degree centrality is the number of ties the node has; the number of connections an individual has in the network. The degree centrality of a node reveals how connected an

individual is to others.

Betweenness centrality refers to the influence a node has on the flow of information in a network; it identifies unique links in the network. Betweenness centrality measures the significance of an individual's connections in allowing an individual to reach others. To calculate betweenness centrality, the number of shortest paths the node is included in is divided by the total number of shortest paths; the resulting sum is the betweenness centrality (Denny, 2014).

Closeness centrality quantifies the number of ties necessary for a specific actor to access every other actor in the network; it measures how well connected an individual is to every other person in a network (Denny, 2014). To calculate closeness centrality, the inverse distance of each node is determined and compared to other nodes in a network. An actor's closeness is the average number of connections that must be crossed to reach every other actor in a network (Denny, 2014). A shorter distance from all other actors, or higher closeness centrality, denotes an individual's significant position in a network. Network gatekeepers have higher betweenness and lower degree of centrality, highly visible figures have both lower betweenness and higher degree of centrality, and central figures have higher betweenness and degree centrality (Home Office, 2016).

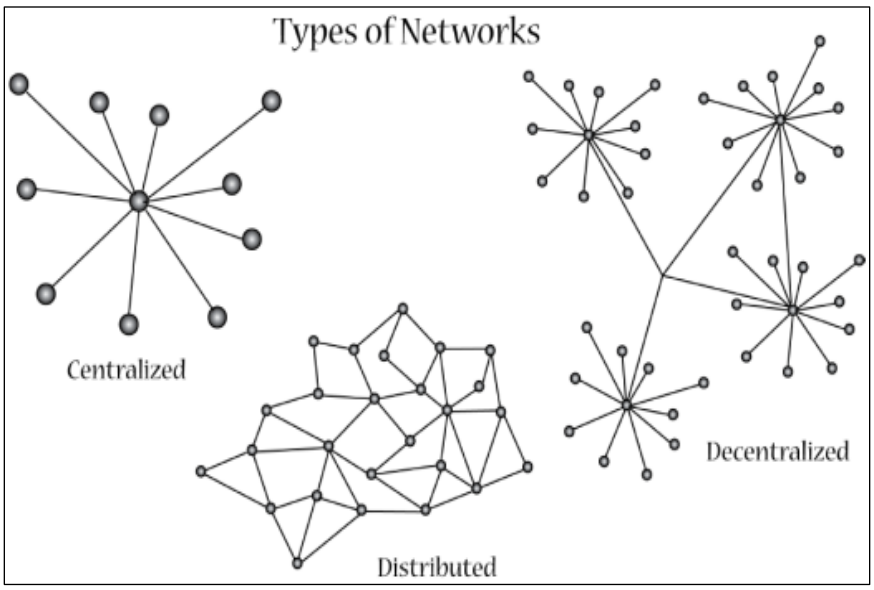

Figure 6
An example of a highly centralized network, a decentralized network (small, centralized components that are connected), and a disrupted network (actors all have a similar degree) (Denny, 2014)

Cohesion and shape are network properties that can be measured to learn more about the general structure of a network. Cohesion refers to the total number of connections in a network; more connections mean higher network density. The shape of the network refers to the distribution of ties within the network and helps differentiate core actors from periphery actors (Borgatti, Everett & Johnson, 2013).

Strengths

Social network analysis has many benefits for analyzing criminal networks. It may provide information about the reach of the network, its impact, and the activity of the criminal network. Social network analysis may identify individuals at risk of being involved in the network. It may also reveal those who are at risk of being exploited by human traffickers in a network. The social network analysis approach provides an objective and practical representation of communities, not requiring practitioners to have extensive knowledge of the group or

analytical training. The systematic approach to understanding network issues and relationships has potential to aid in community interventions. Applications to sex trafficking enterprises revealed key information about human trafficking network relationships. Kinship relationships may be the core of these networks, (Cockbain et al., 2011; Sabon et al., 2021) providing potential for network specific community interventions. Mapping networks allows for interventions targeting key network members and allowing law enforcement agencies to target leaders or gatekeepers in human trafficking networks.

Limitations

Software packages are necessary for data collection, analysis, and visualization. These software tools include spreadsheet software, social network analysis software, and network visualization software. Data collection and analysis for social network analysis requires extensive time and manpower for proper completion. Furthermore, due to the covert nature of organized crimes and the difficulty with studying criminals, intelligence data used for analysis may be incomplete, inaccurate, or untimely. It is recommended to combine this data with other sources of information. It is important to properly gather network data and achieve completeness, but this can be challenging when studying criminal networks. Difficulty can arise when interpreting analyses results, as the method is more sensitive to missing data than other methods (Home Office, 2016).

HUMAN TRAFFICKING AND SOCIAL NETWORK ANALYSIS: RECENT RESEARCH

In research on human trafficking and social network analysis there are gaps present, primarily on the application of SNA to human trafficking networks. The literature discussed in this review has been published in various journals within the disciplines of computer science, communication studies, criminology, public policy, and sociology. The following search terms were used on databases such as Google Scholar and ProQuest: "social networks," "network analysis," "human trafficking," and "organized crime." Articles were selected based on their relevance to the subject matter. Access to the literature was obtained through Vanderbilt University's Jean and Alexander Heard Library. This literature review discusses definitions and prevalence of human trafficking, potential victims' vulnerability and health impacts, offender tactics and current prevention strategies. Then, the challenges, feasibility, and application of social network analysis to criminal networks are presented, with a goal of demonstrating the benefits of applying social network analysis to human trafficking networks.

Human Trafficking

Human trafficking, a contemporary form of slavery, is one of the world's fastest growing criminal enterprises. After drug dealing, human trafficking is tied with the illegal arms industry as the second largest, fastest growing, and most profitable criminal enterprise globally. Although the number is growing, it is estimated that the human trafficking industry generates approximately $150 billion in illegal profits per year (ILO, 2017). Human trafficking is clandestine by nature, making it a difficult crime to detect and prevent. For generations, this crime, a grotesque violation of human rights, has been a major problem. Within the past three decades the issue has garnered a tremendous amount of public attention (Weitzer, 2014).

Definitions

There are varying definitions of human trafficking, but there is a general understanding that it involves the trafficking of human beings into circumstances where they undergo exploitation, including practices of forced labor, debt bondage, domestic servitude, forced marriage, sex trafficking, and organ removal (ILO, 2017). The Trafficking Victims Protection Act (TVPA) of 2000 defines 'Severe Forms of Trafficking in Persons' as:

1. *Sex Trafficking*: the recruitment, harboring, transportation, provision, or obtaining of a person for the purpose of a commercial sex act, in which a commercial sex act is induced by force, fraud, or coercion, or in which the person forced to perform such an act is under the age of 18 years; or
2. *Labor Trafficking*: the recruitment, harboring, transportation, provision, or obtaining of a person for labor or services, through the use of force, fraud, or coercion for the purpose of subjection to involuntary servitude, peonage, debt bondage, or slavery (United States, 2000).

Since 2000, the TVPA, and its reauthorizations have aided in the increase in federal, state, and community anti-trafficking efforts across the United States. The definitions provided by this act center on the exploitation of human trafficking victims, the sum and substance of slavery. Other scholars frame human trafficking as a form of contemporary slavery. Murphy (2014) applies this framing to include seven definitions of human trafficking, or contemporary slavery, that center on the enslavement of people, including:

1. *Forced Labor*: any person being unpaid or held captive by their employers.
2. *Chattel Slavery*: the form of slavery most like American antebellum slavery, involving ownership and inheritance, where victims are legally owned by other

human beings.

3. *Debt Bondage*: forcing a person to work off a debt that is accrued in times of hardship by providing labor free of charge to the lender or party assigned by the lender, typically without a termination date. Debt bondage becomes difficult to escape due to lender claims that the victim's basic consumption and accrued interest constantly adds to debt, making it impossible to fully repay loans.
4. *Forced Sex Work*: also referred to as commercial sexual exploitation or sex slavery, this form of enslavement involves the performance of commercial sex work by men, women, and children under duress for the profit of another person. This includes all sex workers unable to walk away from employers when facing unsatisfactory working condition. Forced sex work excludes those performing sex work by choice, and should not be confused for adult, free, professional sex work.
5. *Child Labor Slavery*: the illegal forced labor of children without payment.
6. *Military Conscription*: anyone forced to become a soldier for an army against their will. Most visible in the case of child soldiers.
7. *Forced Fosterage*: forced domestic work performed by children being fostered by relatives or other adults to improve their life circumstances; children forced to work for their foster families in brutal conditions (Murphy, 2014, pp. 3-4).

Prevalence and Health Impacts

The exact number of human trafficking victims remains unknown due to the clandestine nature of the crime, differences in definitions, methodologies, and nomenclature used to describe human trafficking crimes and its victims (Development Services Group, 2014). It is likely that the current estimates of the extent of human trafficking are inaccurate. Based on the data source

or study, the number of trafficked persons ranges from hundreds of thousands to millions. There are various reasons for the lack of firm estimates. According to the Vera Institute of Justice's study report on Measuring Human Trafficking, the various prevalence estimates for human trafficking are a result of methodological issues within existing research on the matter (Vera Institute of Justice, 2008). This report addresses the need for further development and implementation of rigorous screening tools and supporting protocols when measuring human trafficking estimates (Vera Institute of Justice, 2008). Methods for studying human trafficking ought to be grounded in practice, collaboration, and an action-oriented research strategy (Vera Institute of Justice, 2008). Thus, greater attention to studying the prevalence of human trafficking, and the crime itself, is needed to ensure the accuracy of estimates going forward. Nonetheless, the significantly high statistics on human trafficking should be addressed.

Annually, millions of people are forced to work against their will, without pay for subsistence, facing the threat of violence and no means of escape (Murphy, 2014). The International Labor Office (ILO) estimates that globally approximately 40.3 million men, women and children are victims of some form of human trafficking each year (ILO, 2017). This number includes 24.9 million people in forced labor. Many victims of human trafficking are young children, teenagers, men, and women. However, women and girls are disproportionately vulnerable to being trafficked during their life span. Today, one in every 130 women and girls is living in some form of enslavement (Walk Free, 2020). Women and girls also account for 7 percent of all victims of human trafficking (ILO, 2017). The most common form of trafficking among women and girls is forced sex work, or sexual exploitation, which accounts for 79 percent of all cases of human trafficking (Van der Laan et al., 2011). Walk Free reports that women and girls are 99 percent of all victims of forced sexual exploitation (Walk Free, 2020).

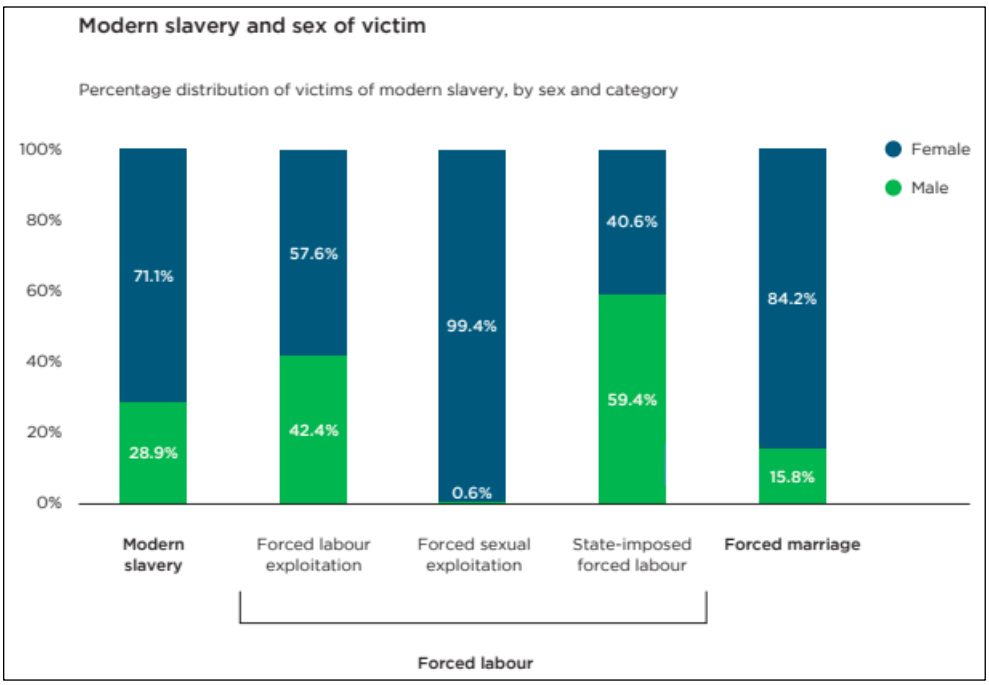

Figure 7
Percentage of distribution of victims of modern slavery by sex and category (ILO, 2017, p. 23)

The disproportionate vulnerability of women and girls to human trafficking makes them more vulnerable to the negative health outcomes of being enslaved and exploited. During any form of exploitation, and particularly with sexual exploitation, women and girls are impacted by adverse health effects. Some health effects of human trafficking include mental illness, trauma, and increased substance use or dependence. The non-consensual and manipulative nature of forced sex work makes these even more prevalent among trafficked sex workers. Trauma may manifest in apathy, memory loss, hostility, shame, self-destructive behavior, and many psychosomatic disturbances. Much of the psychosomatic effects and trauma of being trafficked stems from high levels of physical and sexual violence, in addition to emotional and verbal abuse, isolation, and coercive tactics traffickers use (Kara, 2009). Drug and alcohol use is frequently used as means of coping for victims of sexual violence or to sedate trafficked individuals, increasing their likelihood of future substance dependence. In addition to biological,

behavioral, and structural risk factors, trafficked female sex workers are a population at heightened risk of HIV. Trafficked sex workers face a higher prevalence of unprotected sex, malnutrition, high volumes of male clients, and unclean working conditions within their line of work, which may result in many adverse health outcomes including but not limited to abdominal pain, unwanted pregnancy, and a significant risk for HIV and other sexually transmitted infections (Kara 2009; Silverman et al. 2011).

It is evident that trafficking has serious and long-lasting health consequences. Research on the health consequences of trafficking "is fundamental to developing well-informed mechanisms of identifying, referring and caring for" trafficked individuals (Ottisova et al., 2016). The intent of sharing these findings is not to detract from the trafficking of men and young boys, but to illuminate the increasing threat and disproportionate vulnerability to modern slavery facing women and girls, and increased risk of adverse health effects that arise from the increased prevalence of trafficking among them.

Identifying Victims

As previously noted, human trafficking is a very covert and clandestine crime, making it difficult to study. All the misconceptions about the crime make it hard to identify victims and traffickers. While there are no specific characteristics or physical traits to look for when identifying victims and perpetrators of human trafficking, there are few indicators for spotting vulnerable victims and traffickers that exploit their vulnerability.

Many victims of trafficking are women and children of low socio-economic status seeking a better life in more developed and affluent countries; they make up the largest group to experience trafficking on an international scale (The International Human Rights Law Institute, 2001). Migration to affluent countries has become a common response to the sweeping changes

in many developing nations stemming from “poverty, wars and other political [and] economic patterns of adjustment” (Elabor-Idemudia 2003; p. 101). In pursuit of safety, many migrants face an increased risk for even more harms and higher chances of entering exploitation, debt bondage, and slavery-like working conditions in their destination countries (Elabor-Idemudia 2003). Many of these migrants become victims of human trafficking.

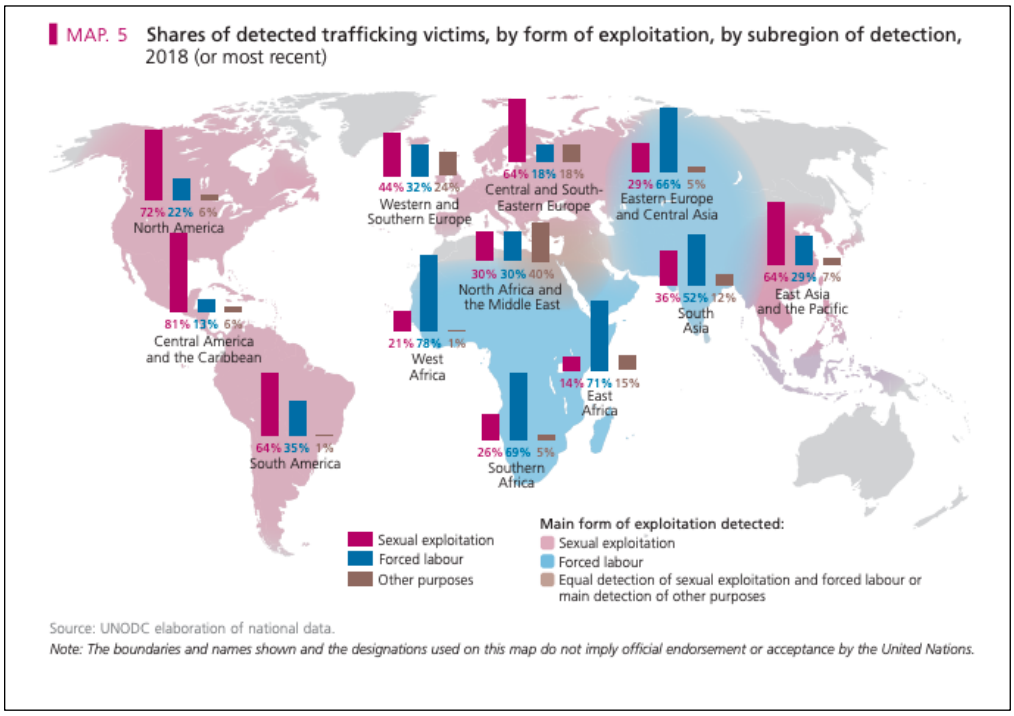

Figure 8
Map of detected trafficking victims by region and form of exploitation (UNODC, 2020, p. 35)

A large proportion of victims are undocumented migrants from Asia or Africa being brought to various destination countries, including “West African countries (Côte d’Ivoire, Mali, Benin, Equatorial Guinea, Cameroon, Gabon, and Guinea), European countries (Italy, Belgium, Spain, the Netherlands, Germany, and the United Kingdom), North Africa (Libya, Algeria, and Morocco) and Middle Eastern countries (Saudi Arabia)” (Tempitope, 2018). When migrating, women may end up in the control of criminal employers who often steal their passports, block

their mobility, force them to do work without pay in brothels, perform sexual acts, or provide cleaning and childcare services in homes (Ehrenreich, 2002). Along with sexual exploitation, women and girls are also trafficked for domestic and agricultural labor, and organ harvesting (Elabor-Idemudia 2003). Upon arrival in destination countries, trafficking victims are more vulnerable, yet accessible targets for authorities. Often, they are treated as criminals by authorities, leading to arrests, detainment, and criminal charges for working illegally and holding false documentations (Portland State University, 2011).

The experiences of human trafficking victims vary widely. Lebov (2010) found that while some victims were willing and aware of the work they would be doing before reaching their destination countries, many others were deceived or coerced into the work they were doing (Lebov, 2010). In some instances (27%), victims are acquaintances with their traffickers; these individuals may be neighbors, teachers, family friends, or youth organization leaders (Mitchell et al., 2011). Other times (26%), victims are related to their traffickers, who may be family members such as parents, stepparents, a parents' intimate partner, or another adult relative (Mitchell et al., 2011). Many teens and younger children are also lured by adults into sexual exploitation over the internet (Urbas, 2010). New technologies and an increased use of social networking sites enable traffickers to buy, sell, and exchange images and videos of sexual exploitation in more efficient and anonymous ways (Hughes, 2002; Grubb, 2020).

Identifying Offenders and Tactics

There are many perpetrators of human trafficking, who often remain undetected. While it is challenging to determine who the perpetrators are, it is evident that there are many people involved in human trafficking operations (Portland State University, 2011). Recruiters, transporters, and receivers of trafficking victims between origin and destination countries may

include “investors, transporters, corrupt public officials, informers, guides, debt collectors, and money launderers” (GAO, 2006). Though there are few common characteristics of perpetrators, they tend to be male (75%), and older than victims (UNODC, 2020). For offenders of internet-based sexual exploitation of children in the U.S., who use the internet as a means for their crimes, a large majority are male (99%), over the age of 40 (47%), and non-Hispanic white (84%) (Mitchell, et al., 2011).

There are regional differences in the sex profiles of offenders who are investigated, arrested, or convicted for trafficking. Eastern Europe and Central Asia convict more females than males (80%), while Central American and East Asia have a near-equal share of convicted females and males (UNODC, 2020). Conversely, Western and Southern Europe, North America and North Africa and the Middle East hold lower shares of convicted females (UNODC, 2020). These regional variations in sex profiles indicate differences in operational activities of trafficking networks. The differences in sex profiles of perpetrators may be due to the higher prevalence of women traffickers used for recruitment (UNODC, 2020).

Offenders use various methods to lure victims: Some recruit victim by befriending them in public spaces. Victims are also targeted and picked up by traffickers who tend to coerce them into performing sex acts in exchange for food and shelter. To control, exploit, and make victims subservient, offenders use intimidation, isolation, drugs, the threat of force, or emotional and financial tactics (UNODC, 2020). Often, women are trained to recruit other victims and run teams of sex traffickers, as they are not suspected to be sex traffickers.

Current Prevention Strategies

While the trafficking of persons occurs globally, each country has different means of combating the issue. What is more, the prevalence of trafficking in each country influences the

health care strategies being used to mitigate the adverse effects of trafficking. In general, advocacy and outreach are used to increase public awareness of the issue and combat human trafficking. Organizations such as the A21 Campaign, an international non-governmental organization (NGO), use advocacy to fight human trafficking of all forms through raising awareness, intervention, and aftercare. Outreach may include referrals to health services, mobile clinics, and other protective resources, including temporary shelters. These strategies and efforts aim to combat the stigma placed upon trafficked individuals, provide them with proper services, and enable them to seek help in the future. Other approaches to prevention include changing laws, increasing training for law enforcement, facilitating collaboration among agencies, and enabling victims to interact and collaborate with law enforcement (Portland State University, 2011).

Social Network Analysis

Social network analysis has grown immensely and produced several works among scholars of various disciplines since its emergence from sociometry, a field of research in social psychology that analyzes interpersonal interactions between individuals within a group (Scott, 2012). Social network analysis has been used widely in social computing, an area of computer science which focuses on the intersection of social behavior and computational systems. It has been developed as a research method in the fields of sociology and communication science due to its focus on patterns of relations among people and groups. Social network analysis is used to analyze social structures using network analysis. Graphs are used to represent and study social phenomena which are represented "by data on overlapping dyads as the units of observation" (Brandes, 2015). Social network analysis can be carried out using various diagram techniques based on the study being done. Brender (2006) describes the diagram techniques as "networks

with the knots being the actors and the relationships being described as named arrows between the knots."

Social network analysis uses graphs to create webs of individuals and their network ties. The graphs can be used to study individual behaviors at the micro level, network structure patterns of relationships at the macro level, and the interactions between the two (Stockman, 2001). Social network analysis views social networks as both the cause of and the result of individual behaviors, as social networks may provide or limit opportunities for individual choices. Individuals may determine the structure of their networks due to their ability to initiate, construct, maintain, and break up relationships (Stockman, 2001). Social network analysis makes it possible to see the structure of a criminal enterprise and analyze the structural properties using social network measures (Berlusconi et al., 2016). Many scholars have adopted social network analysis to explore and model the organization of crime and to analyze street gangs, terrorist groups, organized crime groups, and illicit markets (Boivin, 2013; Bright, Hughes & Chalmers, 2011).

Application to Organized Crime

In criminology, intelligence analysis is a means of approaching the investigation of crime and criminals. Analysts use intelligence data and criminal case information to study existing trends, relationships, or connections between different crimes based on activities, events, and places. Link charts are created to identify key actors in criminal networks (Sparrow, 1991; van der Hulst, 2009). Criminal intelligence analyses help support law enforcement activities and assist in criminal investigations. Proper criminal intelligence analysis is essential for understanding the driving factors of criminal enterprises and crime phenomena. Scholars studying organized crime agree, social network analysis "is considered as the scientific

equivalent of link analysis" (van der Hulst, 2009). Law enforcement agencies are increasingly using social network analysis for criminal intelligence because of its added "value in refining criminological concepts and theories to aid in the understanding of social processes behind crime problems" (Berlusconi, 2016).

Boivin's (2013) study on illegal drug trafficking concluded global drug markets are structured as a "series of logical, rational, but independent choices" motivated by profit and risk management. When studying organized crime networks, such as illegal drug trafficking networks, social network analysis highlights network features, revealing the network's structural vulnerabilities. The features which reduce network vulnerability can be used by law enforcement for interventions that decentralize power and lower inner-connectedness of gatekeepers in the network (Bright et al., 2011). Social network analysis may aid law enforcement agencies in identifying aliases within criminal networks during large investigations. Applying social network analysis to criminal groups aids in investigations and may lead to effective interventions for destabilizing or disrupting criminal networks (Berlusconi et al., 2016).

Social network analysis is useful for understanding the role an individual plays and the impact they have within a criminal network. Sparrow (1991) found weak ties may be particularly useful for finding vulnerabilities in criminal communication networks. Weak ties add efficiency of communication within these networks. Disabling weak tie communication channels has the greatest effect on network transmission and speed (Sparrow, 1991).

Rostami and Modani (2015) generated three social networks using three separate datasets to investigate a Swedish street gang. Their network analyses were based on intelligence, surveillance, and co-offending datasets; the most common information sources in criminal networks (Rostami and Modani, 2015). A comparison of the three networks using distance,

centrality, and clustering measures, illustrates how using data from different sources may produce different results for the same object of study. Based on the dataset and measure, the same individuals may have different rankings in the network. The researchers concluded that the data source could have a critical impact on the results of the study and plays a critical role in understanding the complexity of the phenomenon of focus (Rostami and Modani, 2015). Rostami and Modani suggest that those using the results of different social network analyses (i.e., researchers, policy makers, and practitioners) should consider the influence of the source of information on the results of their analysis and be cautious when drawing conclusions or making policy from their results to ensure they are not drawing conclusions based on limited network data. Nonetheless, this study is significant for its contribution to strengthening social network analysis as a reliable tool for investigating and understanding crime phenomena and criminal networks.

One of the key challenges of researching criminal networks is gaining access to data documenting relationships between offenders. Social network analysis requires data identifying the connections or relationships between individuals in a group or community. This data may be difficult to access when investigating criminal networks as it is often held by law enforcement agencies (Bright et al., 2011). Some studies use publicly available court data for social network analysis, proving court documents and judge sentencing comments to be a fruitful data source for the application of social network analysis to criminal networks (Sabon et al., 2021; Bright et al., 2011).

Application to Human Trafficking

Social network analysis establishes structures of relationships and flows of activities, making it suitable for studying human trafficking networks. However, few scholars have applied

social network analysis to human trafficking.

In a study on child sex trafficking in the UK, Cockbain et al. (2011) identify social network analysis as a beneficial tool for police. The study demonstrates how law enforcement agencies can utilize existing police data and software to contribute to the limited research on sex trafficking networks and develop intervention ideas. Using existing information and software in a more efficient and logical manner can lead to new understandings of human trafficking networks without increasing expenses. Cockbain et al. (2011) advocate for and explore the advantages of social network analysis as a tool for police to identify targets for disruption, encourage multi-agency collaboration, and further develop policy and research.

In this study, social network analysis demonstrates how victims and traffickers are embedded into webs of social relations and interactions which influence their behaviors (Cockbain et al., 2011). The data analyzed was collected during two main internal child sex trafficking operations in the UK and relates to both victim and offender networks. The study examines the structural properties and powerful individuals existing within both victim networks and offender networks. Using data from 25 offenders and 36 victims obtained during police investigations, two networks were generated for both the victim data and offender data (four networks in total). Cockbain et al. (2011) demonstrate that it is necessary to analyze both the network of victims and offenders to understand offender networks. The results show that a clear understanding of network composition allows for interventions to target structural weaknesses in human trafficking networks and aid in disruption (Cockbain et al., 2011).

Police investigation data were used, including records from court visits, victim records of video interviews, video footage from offenders' and victims' mobile phones, text messages between offenders and victims, and formal charge lists (Cockbain et al., 2011). A network was

created, calculating centrality measures for all actors within the network, to examine patterns of child sex trafficking in the UK. Cockbain et al. (2011) found that few actors in the network had strong ties to other actors and played the role of ringleader in child sex trafficking networks. The findings suggest that offender networks should be used more to study child sex trafficking. While offender networks have always been active, victim networks are primarily studied (Cockbain et al., 2011).

Ibanez and Suthers (2014) applied network analysis techniques to online advertisements for adult services to investigate U.S. domestic human trafficking in online environments. Their study aimed to identify indicators, trends, and circuits of online sex trafficking (Ibanez and Suthers, 2014). Using online advertisements from open internet sources such as Backpage, the researchers searched for indicators or characteristics of sex trafficking and mapped relocation patterns of victims. The study revealed that victims of trafficking were consistently transported to various locations across the U.S. based on demand, and thereafter victims were advertised by traffickers through online classified advertisements (Ibanez and Suthers, 2014).

This study uncovered several sex trafficking circuits around the U.S., one of which is illustrated in Figure 9. Based on these figures, it is evident sex traffickers move around frequently, and move across and between various coasts of the United States. Ibanez and Suthers' (2014) study demonstrates the possibility to detect sex trafficking indicators and map patterns of movement for both traffickers and victims. While the researchers note that the presence of sex trafficking indicators does not quite prove that trafficking is present, their study shows the significance of identifying high-risk ads and calls for further investigation (Ibanez and Suthers, 2014). Understanding the ways in which the human trafficking community uses the internet can provide insight on how to enhance networking techniques and disrupt these

networks.

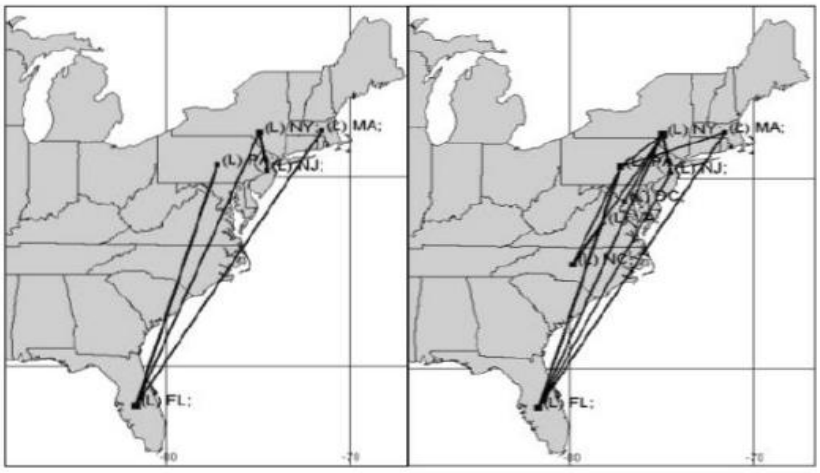

Figure 9
Two Eastern Circuits (Ibanez and Suthers, 2014)

Mancuso (2013) uses social network analysis to study the role madams play in a Nigerian sex trafficking network in a case study. “Madams” refers to formerly sex trafficked Nigerian women who pay their debts and then become sex traffickers (Mancuso, 2013). Using judicial materials, such as arrest warrants, Mancuso gathered information on members of Nigerian criminal groups. Relational data on telephone conversations were used to calculate network centrality measures. The results were consistent with prior research, revealing that madam play a crucial role in the sex trafficking networks. Madams are major actors in the sex trafficking networks of Nigeria, as they are frequent buyers of women and girls who become sex slaves. Mancuso revealed that madams manage the transition process Nigeria to destination countries, in which sex trafficking victims are turned into sex slaves (Mancuso, 2013).

A social network analysis was conducted to understand the centrality of madams’ and the control they have on other actors in Nigerian sex trafficking systems. The degree of betweenness centrality measures were calculated after creating a network. While madams play a crucial role

in Nigerian sex trafficking networks, the betweenness and centrality measures revealed that all madams do not have similar centralities regarding brokerage (Mancuso, 2013). A combination of content analysis and analysis of ego networks was used to explain the differences in terms of brokerage. The primary factor determining the madams' control over other network members were economic, social, and relational resources. The content analysis revealed a split among the madams into two different groups. The first group being madams with strong resources and the ability to manage the whole trafficking process, and the second being madams who are primarily used for recruiting work (Mancuso, 2013). The results of this study suggest that a high betweenness centrality value, or more resources (economic, social, and relational), are more likely to traffic their victim internationally. Thus, brokerage positions do not warrant the same rank or dominance for madams in Nigerian sex trafficking networks.

Sabon, Yang, and Zhang (2021) disproved the earlier findings of Cockbain et al (2011). Their Latino case study used social network analysis to study intra-ethnic immigrant sex trafficking. This study addresses what types of network structures make up a regional Latino sex trafficking network and what factors influence collaboration between traffickers and victims. The authors hypothesize romantic and biological relationships increase the likelihood of having ties and experiencing exploitation in regional sex work enterprises. While the results do not support the proposed hypothesis, they reveal actors in this network function in cliques or subgroups. These groups or cliques provide protection, safety, and support to members of sex trafficking networks. A key limitation to this study is its highly focused scope limits the broader applications of the findings.

FUTURE DIRECTIONS

The growing body of literature on social network analysis illustrates that it can be used as a methodological tool for understanding organized crime networks, specifically human trafficking networks. Scholars of varying disciplines such as criminology and sociology argue for the application of social network analysis to understand organized crime and disrupt criminal networks. Social network analysis has been used in criminological research to systematically analyze the structure, operations, and association between actors in networks of organized crime. Studies show social network analysis "offers a valuable opportunity [for law enforcement] to maximize current resources, without need for additional software or training" (Cockbain et al., 2011). Social network analysis has potential to assist law enforcement "in the prevention and investigation of crime" while providing "a deeper understanding of criminal enterprises, the circumstances, and opportunities which allow them to occur" (Sabon et al., 2021).

This methodology is well-suited for examining human trafficking networks because of its focus on relational data and analysis of social ties between individuals. Social ties between individuals are at the core of criminal networks and allow them to function and prosper. Sabon, Yang and Zhang's (2021) study on a regional Latino sex trafficking enterprise suggested this is especially true for preexisting and kinship relationships. Further research on social network analysis as a methodology for understanding and disrupting human trafficking networks is critical for developing well-informed interventions for caring for survivors of trafficking and has the potential to bridge law enforcement and public health.

The increasing development of new communications and information technologies in the 21st century has facilitated global human trafficking, especially the sexual exploitation of women and children (Hughes, 2002). A transnational study on sex trafficking identified

technology as the "single greatest facilitator of the commercial sex trade," illustrating how sex trafficking supplies the demands for sex tourism (Shared Hope International, 2012). Technologies such as the Internet, Web TV, scanners, and video cameras, digital video disks, chatrooms, and live video chat enable human traffickers to buy, sell, and exchange images and videos of sexual exploitation (Hughes, 2002). Technology has enabled exploitation of human beings online, causing the already clandestine phenomenon of human trafficking to be even more efficient and anonymous.

The increasing use of online social media platforms has given traffickers a means of exploiting vulnerable populations, especially women and children. With young people being more vulnerable to human trafficking online through new social media platforms, it is critical to explore how trafficking networks operate. Although there is limited research on the function of human trafficking networks, research on the applications of social network analysis to human trafficking networks has proven to be effective in understanding how these communities operate. Network analysts have applied social network techniques to study online networks (Can and Alatas, 2019). The rapid development of technology has led to the development of innovative studies applying social network analysis. Future research might explore the increasing use of technology and rise in trafficking rates, especially during the COVID-19 pandemic. Social network analysis could be applied to online social networking platforms to detect perpetrators of online trafficking of children and teens.

CONCLUSION

A thorough review of the literature reveals social network analysis is well suited for studying organized crimes and criminal networks. Many disciplines have found social network analysis serves as a tool for understanding crime phenomena and the driving factors of criminal enterprises. Studies applying social network analysis to criminal networks reveal organized crime networks may be well structured but can be disrupted by targeting prominent members and weak ties. Using social network analysis as a method for studying human trafficking networks will allow law enforcement agencies to understand the inner workings of these networks and the best approaches to destabilizing or disrupting them. Proper implementation of this methodology offers a mode of bridging agencies and facilitating collaboration among professionals. Applying social network analysis to the study of human trafficking networks allows practitioners to take a multidisciplinary approach by combining experiential and contextual knowledge with scientific methods.

Social network analysis is a powerful tool for understanding the complexities of social relationships and the driving forces behind individual behaviors within a network. Social network analysis has significant value as an approach offering opportunities to explore, depict, and understand how networks function. The potential of social network analysis in research on human trafficking networks is considerable, yet little research has employed the method to study these networks. Future research studies employing social network analysis will reveal more about lines of communication within trafficking networks, how they operate, and how they are susceptible to disruption. As such, it is important that future studies explore the gaps in research on online trafficking networks and advertisements. This research demonstrates that social network analysis is a suitable tool for exploring this gap. In the future, the application of this

methodology has great potential to reveal novel insights on online trafficking through social media and the structures of online human trafficking networks.

REFERENCES

Berlusconi, Calderoni, F., Parolini, N., Verani, M., & Piccardi, C. (2016). Link Prediction in Criminal Networks: A Tool for Criminal Intelligence Analysis. *PloS one*, *11*(4), e0154244. https://doi.org/10.1371/journal.pone.0154244

Blanchet, & James, P. (2012). How to do (or not to do) . . . a social network analysis in health systems research. *Health Policy and Planning*, *27*(5), 438–446. https://doi.org/10.1093/heapol/czr055

Boivin. (2013). Risks, prices, and positions: A social network analysis of illegal drug trafficking in the world-economy. *The International Journal of Drug Policy*, *25*(2), 235–243. https://doi.org/10.1016/j.drugpo.2013.12.004

Borgatti, Everett, M.G., & Freeman, L.C. (2002). *Unicet for Windows: Software for Social Network Analysis*. 6th ed. Analytic Technologies.

Borgatti, Everett, M.G., & Johnson, J.C. (2013). *Analyzing Social Networks*. SAGE Publications Limited.

Brandes. (2015). Social network Algorithms and Software. *International Encyclopedia of Social & behavioral Sciences, 2,* 454-460. https://doi.org/10.1016/B978-0-08-097086-8.43121-1

Brender McNair, & Brender, J. (2006). Handbook of Evaluation Methods for Health Informatics. Elsevier Science & Technology.

Bright, Hughes, C. E., & Chalmers, J. (2011). Illuminating dark networks: a social network analysis of an Australian drug trafficking syndicate. *Crime, Law, and Social Change*, *57*(2), 151–176. https://doi.org/10.1007/s10611-011-9336-z

Can, & Alatas, B. (2019). A new direction in social network analysis: Online social network

analysis problems and applications. Physica A, 535, 122372–. https://doi.org/10.1016/j.physa.2019.122372

Cockbain, Brayley, H., & Laycock, G. (2011). Exploring Internal Child Sex Trafficking Networks Using Social Network Analysis. *Policing: A Journal of Policy and Practice*, 5(2), 144–157. https://doi.org/10.1093/police/par025

De Brún, & McAuliffe, E. (2018). Social Network Analysis as a Methodological Approach to Explore Health Systems: A Case Study Exploring Support among Senior Managers/Executives in a Hospital Network. *International Journal of Environmental Research and Public Health, 15*(3), 511–. https://doi.org/10.3390/ijerph15030511

Denny. (2014) Social Network Analysis. University of Massachusetts Amherst, Institute for Social Science Research.

Development Services Group, Inc. (2014). Commercial Sexual Exploitation of Children/Sex Trafficking. Washington, D.C.: Office of Juvenile Justice and Delinquency Prevention. https://www.ojjdp.gov/mpg/litreviews/CSECSexTrafficking.pdf

Ehrenreich. (2002). Global woman : nannies, maids, and sex workers in the new economy /. Metropolitan Books.

Elabor-Idemudia, P. (2003.) "Migration, Trafficking and the African Woman." *Agenda: Empowering Women for Gender Equity*, 58, 101-116.

Grubb, J. A. (2020). The Rise of Sex Trafficking Online. In T. J. Holt & A. M. Bossler (Eds.), The Palgrave Handbook of International Cybercrime and Cyberdeviance (pp. 1151–1175). Springer International Publishing.

https://doi.org/10.1007/978-3-319-78440-3_55

Home Office. (2016). Social Network Analysis: 'How to guide'. *Open Government License.*

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/491572/socnet_howto.pdf

Hughes. (2002). The Use of New Communications and Information Technologies for Sexual Exploitation of Women and Children. Hastings Women's Law Journal, 13(1), 127–146. https://repository.uchastings.edu/hwlj/vol13/iss1/9

Ibanez, & Suthers, D. D. (2014). Detection of Domestic Human Trafficking Indicators and Movement Trends Using Content Available on Open Internet Sources. 2014 47th Hawaii International Conference on System Sciences, 1556–1565. https://doi.org/10.1109/HICSS.2014.200

The International Human Rights Law Institute of DePaul University College of Law. (2001.) "Investigating International Trafficking in Women and Children for Commercial Sexual Exploitation: Phase I: The Americas." Retrieved from https://law.depaul.edu/about/centers-and-institutes/international-human-rights-law-institute/publications/Documents/Investigating.pdf

International Labor Office. (2017). Global estimates of modern slavery: Forced labor and forced marriage.

Kara. (2009.) Sex Trafficking: Inside the Business of Modern Slavery. New York: Columbia University Press.

Lebov, K. (2010). Human trafficking in Scotland. European Journal of Criminology, 7(1), 77-94.

Mancuso. (2013). Not all madams have a central role: analysis of a Nigerian sex trafficking network. Trends in Organized Crime, 17(1-2), 66–88. https://doi.org/10.1007/s12117-013-9199-z

Mitchell, K., Jones, L., Finkelhor, D., & Wolak, J. (2011). Internet-facilitated commercial sexual

exploitation of children: Findings from a nationally representative sample of law enforcement agencies in the United States. Sexual Abuse: A Journal of Research and Treatment, 23(1), 43-71

Moreno. (1951) Sociometry, Experimental Method, and the Science of Society. Beacon House, Ambler, PA.

Moreno. (1934) Who shall survive?: A new approach to the problem of human interrelations. Nervous and mental disease monograph series, no 58. Nervous and Mental Disease Publishing Co.

Murphy. (2014). Survivors of slavery : modern-day slave narratives / Laura T. Murphy. Columbia University Press.

Ottisova, L., Hemmings, S., Howard, L. M., Zimmerman, C., & Oram, S. (2016). Prevalence and risk of violence and the mental, physical and sexual health problems associated with human trafficking: an updated systematic review. Epidemiology and psychiatric sciences, 25(4), 317–341. https://doi.org/10.1017/S2045796016000135

Portland State University. (2011). Criminology and Criminal Justice Senior Capstone, "Prevention of Human Trafficking: A Review of the Literature." Criminology and Criminal Justice Senior Capstone Project. 9.

Proskurnikov, & Tempo, R. (2017). A tutorial on modeling and analysis of dynamic social networks. Part I. Annual Reviews in Control, 43, 65–79. https://doi.org/10.1016/j.arcontrol.2017.03.002

Rostami, & Modani, H. (2015) The Complexity of Crime Network Data: A Case Study of Its Consequences for Crime Control and the Study of Networks. PLoS One. 16;10(3): e0119309. DOI: 10.1371/journal.pone.0119309

Sabon, Yang, S., Zhang, Q. (2021). Social Network Analysis of a Latino Sex Trafficking Enterprise. *Journal of Human Trafficking. 10.1080/23322705.2021.1898830*

Save the Children. (2021). "COVID-19 crisis has pushed child trafficking online and out of sight." Retrieved from https://reliefweb.int/report/world/covid-19-crisis-has-pushed-child-traffickers-online-and-out-sight-save-children

Scott. (2012). *What is Social Network Analysis?* (The 'What is?' Research Methods Series). London: Bloomsbury Academic. Retrieved November 8, 2021, from http://dx.doi.org.proxy.library.vanderbilt.edu/10.5040/9781849668187

Scott, & Carrington, P.J. (2014). The SAGE Handbook of Social Network Analysis. London. SAGE Publications Ltd, 2014. doi: 10.4135/9781446294413.

Shared Hope International. (2012). *Demand: A Comparative Examination of Sex Tourism and Trafficking in Jamaica, Japan, the Netherlands, and the United States.* Human Trafficking Search. https://humantraffickingsearch.org/resource/demand-a-comparative-examination-of-sex-tourism-and-trafficking-in-jamaica-japan-the-netherlands-and-the-united-states/

Silverman, Jay G., Anita Raj, Debbie M. Cheng, Michele R. Decker, Sharon Coleman, Carly Bridden, Manoj Pardeshi, Niranjan Saggurti, and Jeffrey H. Samet. (2011.) "Sex Trafficking and Initiation-Related Violence, Alcohol Use, and HIV Risk Among HIV-Infected Female Sex Workers in Mumbai, India." Journal of Infectious Diseases, 204(5), 1229-1234.

Stockman. (2001). Networks: Social. *International Encyclopedia of Social & Behavioral Sciences*, 10509–10514. https://doi.org/10.1016/B0-08-043076-7/01934-3

Sparrow. (1991). The application of network analysis to criminal intelligence: An assessment of

the prospects. *Social Networks,* 13(3), 251–274. https://doi.org/10.1016/0378-8733(91)90008-H

Tempitope, Adebiyi Esther. (2018). Human Trafficking and Its Implications for Women in Edo State, Nigeria.

Urbas. (2010). Protecting Children From Online Predators: The Use of Covert Investigation Techniques by Law Enforcement. Journal of Contemporary Criminal Justice, 26(4), 410–425. https://doi.org/10.1177/1043986210377103

United States. (2000). *Victims of Trafficking and Violence Protection Act of 2000*. Washington, D.C.: U.S. G.P.O.

U.S. Government Accountability Office. (2006). Human trafficking: Better data, strategy, and reporting needed to enhance U.S. anti-trafficking efforts abroad. (GAO Publication No.06-825). Retrieved from: http//www.gao.gov/new.items/d06825.pdf.

United Nations Office on Drugs and Crimes. (2020). *Global Report on Trafficking in Persons*.

United Nations Office on Drugs and Crimes. (2021). *Global Report on Trafficking in Persons*.

van der Hulst. (2009). Introduction to Social Network Analysis (SNA) as an investigative tool. *Trends in Organ Crim,* 12,101-121. https://doi.org/10.1007/s12117-008-9057-6

van der Laan, Peter, Smit, M., & Pauline, A. (2011). Cross-border Trafficking In Human Beings: Prevention and Intervention Strategies for Reducing Sexual Exploitation. Campbell Systematic Review, 7(1), 1–50. https://doi.org/10.4073/csr.2011.9

Vera Institute of Justice. (2008). Measuring human trafficking: Lessons from New York City. (NIJ Publication no. 224391). Retrieved from: https://www.ncjrs.gov/pdffiles1/nij/grants/224391.pdf.

Walk Free. (2020). Stacked Odds. 2022 Minderoo Foundation Pty Ltd.

https://www.walkfree.org/reports/stacked-odds/

Wasserman, & Faust, K. (1994). Social network analysis: methods and applications. Structural Analysis in the Social Sciences. Cambridge University Press.

Weitzer. (2014). New Directions in Research on Human Trafficking. The Annals of the American Academy of Political and Social Science, 653(1), 6–24. https://doi.org/10.1177/0002716214521562

Wetherell. (1998). Historical Social Network Analysis. *International Review of Social History*, *43*(S6), 125–144. https://doi.org/10.1017/S0020859000115123