Better together: A transdisciplinary approach to disrupt human trafficking

ISE tools, advisory group guidance applied to tackle global crisis

By Thomas C. Sharkey, Kayse Lee Maass, Yongjia Song, Kelle Barrick, Amy Farrell and Lauren Martin

Human trafficking is a human rights abuse and a documented global issue. Although it is difficult to determine the exact scale of the problem, it is estimated that nearly 24.9 million people are victims of human trafficking (*International Labour Organization* and *Walk Free Foundation*, 2017). Although there is an internationally agreed-upon definition, national and state definitions differ over what constitutes trafficking.

The common elements are that traffickers use force, fraud or coercion to exploit someone for the purpose of labor or services (i.e., labor trafficking) or a commercial sex act (i.e.,

sex trafficking). Although sex trafficking is the focus of much of our discussion, both types are complex social problems that require a thoughtful, targeted approach to address the root causes and systemically alter the landscape.

Sex traffickers employ a variety of tactics to recruit and control their victims. These tactics include various forms of violence and abuse, including rape, psychological manipulation, fraudulent promises and exploiting social and economic vulnerabilities. Sex trafficking is also misunderstood and often misrepresented in the media (Rachealle Sandford, Daniel E. Martinez and Ronald Weitzer R., *Journal of Human Trafficking*,

2016; Lauren Martin and Annie Hill, *Anti-Trafficking Review* 2019). This is especially concerning since people often frame their knowledge on the subject through media (Amy Farrell and Stephanie Fahy, *Journal of Criminal Justice* 2009). In terms of misconceptions, it is often assumed "trafficking" implies someone has been "moved" or "kidnapped" when, in reality, many victims know their trafficker prior to their exploitation (J.A. Reid, *Sexual Abuse: A Journal of Research and Treatment*, 2016; Maite Verhoeven, Barbra van Gestel, D. de Jong and E.R Kleemans, *European Journal on Criminal Policy and Research* 2015).

For example, in sex trafficking cases involving minors reported to the U.S. National Human Trafficking Resource Center's hotline from 2007 to 2012, 15.6% involved allegations that the minor was trafficked by a parent or legal guardian (*Polaris Project*, 2013). Due to their proximity to the commercial sex industry, trafficking victims often end up being treated erroneously as criminals (Michelle M. Dempsey, *American Criminal Law Review*, 2015; *Shared Hope International*, 2020). This is further complicated by the fact that victims may be forced to perform other illicit activities such as selling illegal substances, drug smuggling or committing theft during their exploitation.

Innovative approaches are necessary to address the complexities of disrupting and dismantling human trafficking operations in ways that put the needs of the victims, survivors and potential victims first and systematically address the vulnerabilities often exploited by traffickers. It likely will need to be a coordinated effort across diverse stakeholders including healthcare workers, government policymakers, law enforcement and social service providers. Unfortunately, these approaches are also currently hindered by data challenges inherent to this problem space (Amy Farrell and Ieke de Vries, *The Palgrave International Handbook of Human Trafficking*, 2019).

The underlying networks that support human trafficking, those that recruit victims and those that exploit, have been analyzed from multiple perspectives within the social science, engineering, legal and business fields. These analyses can help identify potential actions to disrupt the networks. We emphasize potential disruptions to highlight the fact that certain actions may simply displace trafficking rather than reduce it.

For example, police activity in one geographic area is likely to push activities to new locations rather than dismantle the network (Erin C. Heil and Andrea J. Nichols, *Contemporary Justice Review*, 2014). Similarly, trafficking operations often survive despite the removal or punishment of particular members of the operation. In general, potential disruptions can have unintended and profound consequences for the victims; therefore, care must be taken as analytical methods are created to study how to disrupt trafficking networks.

Industrial and systems engineering can help address the issue of human trafficking. For example:

- Network interdiction models can be applied to capture the operations of sex trafficking networks and then to disrupt them ("Interdicting Restructuring Networks with Applications in Illicit Trafficking," Daniel Kosmas, Thomas C. Sharkey, John E. Mitchell, Kayse Lee Maass and Lauren Martin, Cornell University, 2011).

- Location models can be used to identify optimal locations for shelters that support survivors (Kayse L. Maass, Andrew C. Trapp and Renata Konrad, *Socio-Economic Planning Sciences*, 2020).

- Data analytics tools can be used to understand trends in advertising commercial sex ads (Benedikt Boecking, Kyle Miller, Emily Kennedy and Artur Dubrawski, *Journal of Human Trafficking*, 2018; "COVID-19 Pandemic's Impact on Online Sex Advertising and Sex Trafficking," Julia Coxen, Vanessa Castro, Bridgette Carr, Glen Bredin and Seth Guikema, 2021), characteristics of illicit massage parlors (Anna White, Seth Guikema and Bridgette Carr, 2021) and efficient and/or effective intervention strategies.

However, these tools are only valuable when created in a socially responsible manner in order to identify potential unintended consequences and have buy-in on modeling choices, assumptions and results from human trafficking domain matter experts. We present a transdisciplinary approach to create ISE tools that are built by including perspectives from a diverse team composed of ISE researchers, social scientists, a human trafficking investigative task force and a survivor-centered advisory group. Each group brings a unique viewpoint and helps ensure the results address the roots of the underlying issues surrounding human trafficking.

The underlying transdisciplinary approach

Transdisciplinary research has been defined by Gaetano R. Lotrecchiano and Shalini Misra (*Informing Science*, 2018) as "knowledge production through integration and collaboration in the pursuit of addressing complex societal problems." It typically refers to a deep integration of methods from multiple disciplines in such a way that new cross-cutting theory and methods are created that defy classification within a single field (Martin, M. Gupta, Maass, Christina. Melander, Emily Singerhouse, Kelle Barrick, T. Samad and Sharkey, 2021). It is related to interdisciplinary research, which focuses on integration and collaboration across disciplines but may lack the creation of new cross-cutting methods. Thus, we would argue that all transdisciplinary research is interdisciplinary but not all interdisciplinary research is transdisciplinary. Our approach is transdisciplinary in that it integrates a variety of qualitative research methods into the process of building and analyzing ISE models to disrupt sex trafficking networks.

To understand the underlying transdisciplinary approach, a discussion on how to analytically model decision-making

FIGURE 1

OR modeling flow chart

The operations research modeling approach and areas where help is needed from human trafficking domain experts.
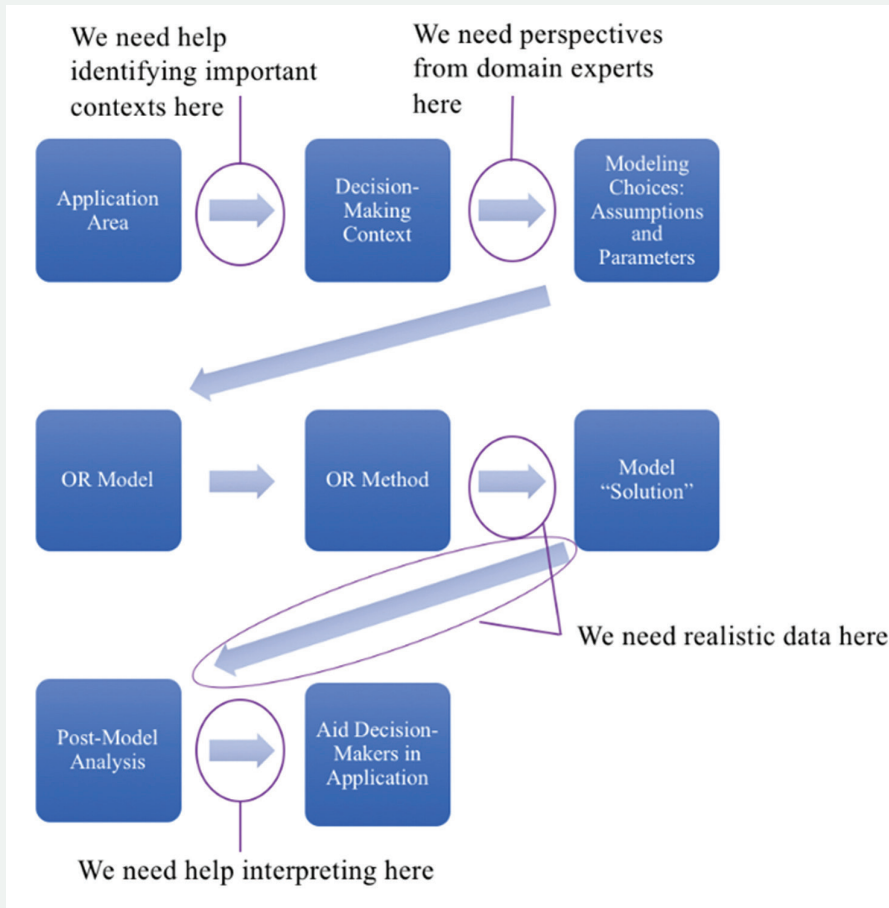
problems is important. The quote, "All models are wrong; some are useful," by George Box highlights the fact that no abstract model is able to capture the complexities of the real world and one must understand the model's focus and limitations for it to be useful. It is important to highlight that in modeling human trafficking operations, we are essentially abstracting horrific acts of violence, manipulation and coercion. Therefore, it must be stated that ISE models cannot capture all the complexities of the lived experiences of trafficking victims and survivors.

Box's quote can be adapted in two different ways when thinking about ISE tools in the fight against human trafficking: "All models are wrong; some are useful; some have unintended consequences" and "All models are wrong; some are useful if you have the data to populate them." The first adaptation again speaks to the importance of understanding how suggested actions may have consequences beyond what the modeler has considered, and that unintended consequences could be harmful to the people the model is trying to help. The second adaptation speaks to the need to directly address the data challenges in this problem space and ensure that the

limitations and biases of collected data are known and discussed. Further, it highlights that the model's potential insights and recommendations are only as good as the data put into it.

However, we would argue that both of these considerations cannot be addressed solely by ISE researchers and practitioners; we need to team with human trafficking domain matter experts in the problem-framing (i.e., identifying an important question not just one that is mathematically interesting), model-building, data-gathering and model-analysis phases.

Figure 1 provides a traditional operations research (OR) modeling flow chart (similar to discussions on the OR modeling process in books such as *Introduction to Operations Research* by Frederick S. Hiller and Gerald J. Lieberman, and *Introduction to Mathematical Programming* by Wayne L. Winston and Munirpallam Venkataramanan) along with areas where integrating domain expertise in human trafficking is critical in constructing responsible and useful models. We provide an overview of each critical step along with an example of how the domain expertise is integrated.

First, we need to work together to best understand the type of decision-making context that could benefit from an OR model. The process includes understanding which consequences are going to be considered within the decision-making context – any consequences not considered are not controlled and can cause unintended harm if not identified. For example, suppose the decision-making context only focuses on removing victims from a trafficking situation without considering how the traffickers would replace victims. The unintended consequence of this choice is that new victims may be recruited by the traffickers, especially when considering the relatively small, fixed cost of recruitment (Jonathan P. Caulkins, Matt Kammer-Kerwick, Renata Konrad, Maass, Martin and Sharkey, *The Bridge: National Academy of Engineering*, 2019). This means the overall number of victims may remain unchanged in reality, whereas a model that does

not capture the full decision-making context would suggest it has decreased.

However, a reframing of the decision-making context to focus on minimizing exploitation rather than just removing victims from the environments would lead to choices that create a more accurate model to better reflect the lived reality of trafficking. Further, it would include more consequences of decisions within the model, namely that removing a victim could trigger recruitment. In fact, recent work using ISE tools for this broader context has shown that human trafficking disruption strategies should invest resources into helping victims leave the trafficking environment while simultaneously disrupting traffickers' ability to recruit victims (Kosmas, Sharkey, Maass, Mitchell and Martin, 2021).

Second, the modeling choices and their underlying assumptions need to be collaboratively identified. For example, consider the decision-making context focusing on minimizing overall exploitation within sex trafficking networks (the one that considers that traffickers may recruit new victims if victims are removed). For this context, in thinking about a network where nodes are people and arcs connect two people who know each other, there is a clear arc between a trafficker and each victim. However, there needs to be some mathematical construct of the traffickers' control over each victim to show how traffickers influence actions taken by victims.

A transdisciplinary approach can help connect the modeling choice, and the surrounding discussion, for control back to the domain in a way that respects the lived experiences of sex trafficking victims. For example, transdisciplinary partnerships help establish how to discuss the fact that mathematical models are abstractions and often will ignore victims' trauma. Even if this is the nature of modeling, discussions emphasizing that researchers understand what they are "abstracting away" helps to respectfully approach such a sensitive topic. Similarly, the process by which traffickers recruit victims should be incorporated into the model via this transdisciplinary approach.

Third, data associated with the model needs to be collected to understand the baseline and to gain insights into the selected decision-making context through sensitivity analysis. Given the difficulty with gathering data on human trafficking, mixed-methods approaches are important and cannot be done without appropriate expertise. This is especially true given the unintended bias in data sources, which increases the importance of triangulating data across different sources.

For example, publicly available federal case files of prosecuted traffickers paint an incomplete picture of their networks. The focus of the data presented in these case files is to demonstrate the elements of the crime committed, which may omit key details about trafficking operations that are not relevant to building a prosecutable case. The data points missing from case files then can be filled by interviews with domain experts, including survivors and perpetrators, and structured interactions with advisory groups. We will discuss in detail our own process, which integrates expertise from our survivor-centered advisory group.

Fourth, results from the model should be interpreted by the entire team to ensure the recommended insights provide the desired impact. This is essentially a complementary effort to the data triangulation in that it helps triangulate what results state across multiple, diverse viewpoints. In addition, these efforts to obtain insights help to understand the steps necessary to turn insights into actionable steps. For example, insights related to small, fixed costs of traffickers to recruit victims lead to actionable steps that should address vulnerabilities to these low-cost tactics. Insights related to coupling disruptions that enable victims leaving the trafficking environment and disrupt recruitment into trafficking leads to actionable steps related to the types of agencies that should receive resources to conduct these operations.

Sex trafficking network data: A transdisciplinary approach

This transdisciplinary approach has been used to address the data gap for domestic sex trafficking networks. Each type of trafficking network carries its own specific nuances and insights obtained from ISE models for one may not directly carry over to another. For example, domestic sex trafficking networks operate differently than international networks; networks that use legal businesses as part of their operations (such as massage parlors) are different from those that do not; and networks differ by the market segment(s) in which they operate.

Similarly, this work may inform questions about labor trafficking networks, although attention to differences in the network operations across different types of trafficking is critical. Therefore, the process by which data is gathered and models constructed will likely need to be applied to or modified for each distinct type of network. Our particular goal for collecting sex trafficking network data is to use it to construct network interdiction models that can help disrupt the networks' operations.

Figure 2 (Page 38) presents the output of our data collec-

FIGURE 2

Data collection output

The relationship network of a federally prosecuted sex trafficking case.
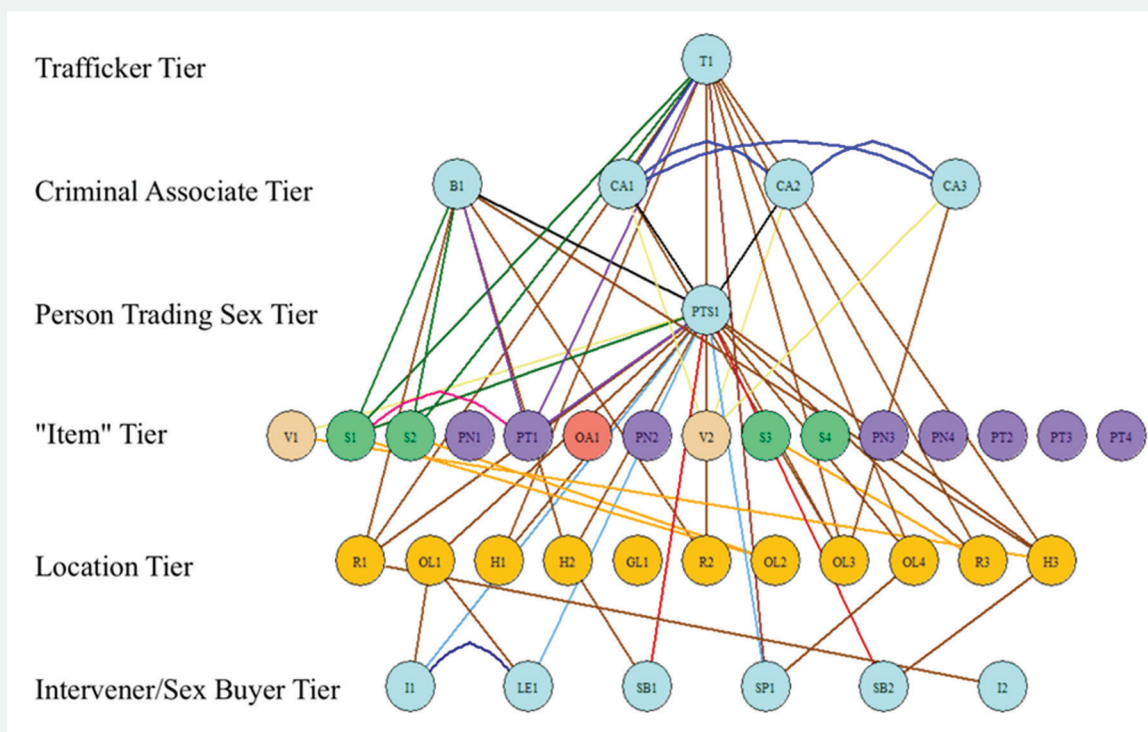
tion process applied to a federally prosecuted sex trafficking case to identify network structures. The process itself involved defining a codebook, a shared language of definitions that help classify passages from the case files into different types of nodes and arcs in a network during our qualitative coding process. The creation of the codebook was iterative in nature between ISE researchers and social scientists on the team and involved many "learning by doing" examples where the team would try to classify nodes and arcs within passages of text. Once the codebook was established, the (qualitative) coding process could then be applied to construct node and arc data from case files.

As noted earlier, the publicly available case files paint a limited picture of trafficking networks in that they only focus on the elements of the crime committed and may miss key information. For example, in Figure 2, only one victim, labeled "person trading sex" (PTS1), is present since the prosecution focused on the crime of trafficking that victim; it does not allow us to conclude there were no other victims exploited by the trafficker. In addition, there is no connection between the trafficker (T1) and the bottom (B1) in Figure 2. However, by definition, a bottom is a female who started as a victim and is now acting as a trafficker's assistant and may be involved in recruiting other victims, managing money, training other victims or doing other tasks. This indicates an arc is likely missing in the network generated by the case file data. Our

approach to address this missing data is to triangulate information through comprehensive investigative case files, interviews with subject matter experts and structured activities with our survivor-centered advisory group.

Comprehensive investigative case files include additional notes, interviews and data sources that are used to build the prosecuted case but are not made publicly available. These files allow our team to build out a richer picture of with whom the trafficker(s) and their victims interact and allow identification of additional potential sources of disruption. However, a limitation to focusing on case files is that they focus on a single network even when it may intersect with other trafficking networks, since these interactions may not be included in the legal record, which may limit the generalizability of insights obtained through model analysis. To create more instances of trafficking networks, we interview subject matter experts to identify general rules and/or patterns of how trafficking networks are structured, then create analytical methods to generate networks according to these rules.

An extremely important step in this process is the structured activities with our survivor-centered advisory group to understand sex trafficking networks. This group offers first-hand knowledge of the operations from the victims' perspective and has helped to shape the type of data collected. For example, they have helped to understand the different types of traffickers and tactics used to control their victims. They also

highlighted the widespread practices that trafficking victims are not only forced to sell sex, but also to perform a variety of other illicit activities, such as selling drugs, theft, along with legal activities that support the operation, (childcare, cleaning and hair and nail services). The advisory group helps ground the research to address issues they find most important and provides an ethical check on modeling assumptions and project outcomes by discussing potential impacts to victims and trafficking survivors.

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As part of the transdisciplinary framework, we identified opportunities for improving the process we are implementing. For example, the qualitative coding of the case files is very time-consuming. Given that the result is a single network, rather than a set of general instances of sex trafficking networks, we can adapt this coding process to highlight rules to be included in methods that generate sex trafficking networks. In addition, we are working toward validation activities that can confirm the accuracy of the analytical methods to generate sex trafficking networks.

We highlight four important steps in a transdisciplinary approach to creating ISE methods to help address the problem of human trafficking:

1. Collaboratively work together to best understand the type of decision-making context that could benefit from an OR model.
2. Collaboratively identify the modeling choices and their underlying assumptions.
3. Collect data associated with the model and identify its biases and limitations to understand the baseline and to gain insights into the selected decision-making context through sensitivity analysis.
4. Interpret the results of the model by the transdisciplinary team to ensure that the recommended insights provide beneficial impacts to disrupt human trafficking.

ISE can play an important role in addressing human trafficking when researchers and practitioners team with human trafficking domain experts. It is critical for ISE methods to be created in a socially responsible manner that carefully considers the consequences of the recommendations of the model, especially how they impact those people vulnerable to being trafficked, victims of trafficking and survivors. We believe that teaming with a survivor-centered advisory group is crucial in this step as it allows the work to be driven by the needs of those people most impacted by human trafficking.

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