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Good Tech, Bad Tech: Policing Sex Trafficking with Big Data

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Abstract

Technology is often highlighted in popular discourse as a causal factor in significantly increasing sex trafficking. However, there is a paucity of robust empirical evidence on sex trafficking and the extent to which technology facilitates it. This has not prevented the proliferation of beliefs that technology is essential for disrupting or even ending sex trafficking. Big data analytics and anti-trafficking software are used in this context to produce knowledge and intelligence on sex trafficking. This paper explores the challenges and limitations of understanding exploitation through algorithms and online data. It also highlights the key dimensions of exploitation ignored in big data-oriented research on sex trafficking. By doing so, the paper seeks to advance our theoretical understanding of the trafficking–technology nexus, and it is argued that sex trafficking must be reframed along a continuum of exploitation that is sensitive to the social context of exploitation within the sex market.

Keywords

Big data; sex trafficking; exploitation; policing.

Introduction

With the rise of big data analytics, actors in the tech industry are increasingly involved in the social world and apply their knowledge in attempts to resolve fundamentally social problems; sex trafficking is not exempt from this. In 2017, actor and entrepreneur Ashton Kutcher, speaking on behalf of Thorn, delivered a powerful speech to the United States (US) Senate:

> We build software to fight human trafficking and the sexual exploitation of children … And it's working. In six months … we've identified over 6,000 trafficking victims, 2,000 of which are minors … we're reducing the investigation time by 60%. This tool is effective. It's efficient. It's nimble. It's better. It's smarter … as an entrepreneur and as a venture capitalist in the technology field, I see technology as simply a tool—a tool without will. The will is the user of that technology. (Kutcher 2017)

Kutcher's statement raises several questions: Given that human trafficking is a notoriously complicated crime to investigate, is it possible to arrive at this number and be certain that the algorithms have accurately captured trafficking victims? How do we, both algorithmically and conceptually, draw a line between voluntary sex work and sex trafficking? How do Kutcher's 'trafficking victims' define themselves? Is there any room or consideration for agency—the feature that primarily distinguishes voluntary sex work from trafficking—within big data analytics?

In societies such as the US and the United Kingdom (UK), technology is often embedded within experiences of crime and victimisation (Stratton, Powell and Cameron 2017). The changes brought upon by the emergence of the internet and communication technologies mean many crimes have been augmented with an online dimension (Leukfeldt et al. 2019). Nevertheless, our knowledge concerning how this affects sex trafficking is only partial and fragmented (Milivojevic and Segrave 2017). Beyond anecdotal data and small convenience samples, little is known of the extent to which technology facilitates sex trafficking (Milivojevic, Moore and Segrave 2020). This has not prevented the proliferation of beliefs that there has been an explosion in sex trafficking due to technology (e.g., Farley, Franzblau and Kennedy 2014; Hughes 2002; Yu 2015) and, subsequently, that technology in itself is the solution to these injustices (e.g., DeliverFund n.d.; Tech Against Trafficking n.d.). It is crucial that we unpack these assumptions, not only to challenge the view that we can end sex trafficking with technology but to examine the risks associated with the integration of technology in anti-trafficking efforts (Musto 2020).

This paper seeks to illuminate the complexities of applying big data analytics in the context of policing sex trafficking and the challenges of researching vulnerability and exploitation within the sex market through the analysis of online data. A blind faith in big data analytics, coupled with a lack of theoretically informed understandings of sexual labour and exploitation, serves to reconfigure a deeply complex social phenomenon into a technological issue requiring technological solutions. As a result, the social structures and processes and underlying motivations of victims and offenders alike, which all contribute to the emergence and expansion of exploitation in the first place (Turner 2016; Wijkman and Kleemans 2019), are effectively ignored. To further elaborate upon this point, this paper seeks to address the following two questions: (1) How do the epistemological assumptions underpinning big data analytics contribute to the production of knowledge on sex trafficking? (2) Why has technology been so successfully constructed as a key facilitator of sex trafficking and, paradoxically, as the panacea to human exploitation? These questions will be explored through a theoretical framework consisting of feminist perspectives on migration, sexual labour and exploitation (Agustín 2006, 2007; Andrijasevic 2010; Doezema 2010; O'Connell Davidson 2013, 2015; Sanders et al. 2018a) and critical data studies (boyd and Crawford 2012; Dalton, Taylor and Thatcher 2016; Iliadis and Russo 2016).

After briefly setting out the context of this paper, the epistemological underpinnings of big data analytics will be examined. Thereafter, a critical review of research on sex trafficking involving the application of big data will follow. Here, it is argued that epistemological assumptions associated with big data analytics contribute to the reification of stereotypical and binary understandings of sex trafficking. Five

commonalities of current research are identified: (1) a limited understanding of exploitation within the sex market; (2) an inadequate understanding of the data; (3) unsubstantiated operationalisations of key concepts; (4) opaqueness and lack of contextual details; and (5) an uncritical appreciation of the identified patterns. In light of the categorisation of these issues, the paper seeks to advance our theoretical understanding of internet-mediated sex trafficking by elaborating upon four dimensions of the social context of exploitation ignored within current technological anti-trafficking discourse: (1) the social structures contributing to exploitation; (2) the conflation of sex work with sex trafficking; (3) that all exploitation within the sex market is not necessarily sexual exploitation; and (4) that sex trafficking cannot be separated from legal contexts and immigration policies. Based on these complexities, it is argued that sex trafficking needs to be reframed along a continuum of exploitation.

Context

The terms 'modern slavery' and 'human trafficking' do little to illuminate the plethora of acts and complexities associated with them (Malloch and Rigby 2016; Musto 2009). Definitions of human trafficking and modern slavery are by no means neutral and imbued with ideology (Wijkman and Kleemans 2019). In popular discourse, victims of exploitation are commonly referred to as 'slaves', and sex work itself is often labelled 'sexual slavery', without any consideration that the decision-making processes involved in migration and sexual labour are, to say the least, complex (Weitzer 2007). Although a full discussion on the challenges of defining sex trafficking is beyond the scope of this article, it is important to recognise that sex trafficking is a highly contested concept (see Doezema 2005; Gadd and Broad 2018; Kempadoo 2004; Malloch and Rigby 2016; Musto 2009; Weitzer 2007), with some writers (e.g., Farley, Franzblau and Kennedy 2014) arguing that sex work is indistinguishable from sex trafficking, while others (e.g., O'Connell Davidson 2010, 2015; Sanders et al. 2018a) recognise that the sex market encompasses a plurality of experiences. This article favours the latter conceptualisation and situates sex trafficking at the extreme end of a continuum of exploitation within the sex market. This article is focused on exploitation within the sex markets of the UK and the US. In both these countries, there are powerful narratives at work in which technology is believed to have contributed to an increase in trafficking and that technology is an essential component of responding to human trafficking:

> Any notion that prostitution websites introduce 'safety' to the sex trade by making procurement visible is a dangerous and misleading fallacy. They hide sexual exploitation in plain sight. The websites significantly contribute to the ease and scale of sex trafficking. (All-Party Parliamentary Group on Prostitution and the Global Sex Trade 2018: 24)

> Innovation and technology are essential in the fight against human trafficking. The private sector, anti-trafficking advocates, law enforcement officials, academics, and governments are working together to develop innovative solutions to address the complexities involved in both fighting this crime and supporting victims as they strive to restore their lives. (United States of America Department of State 2014: 22)

Concerns about the role of online technologies in facilitating exploitation are certainly nothing new (e.g., Hughes 2002). Nevertheless, there are uncertainties about precisely how this assumed trafficking–technology nexus works (Milivojevic and Segrave 2017; Musto and boyd 2014), and the distinction between sex work and trafficking is often neglected within this nexus (Milivojevic, Moore and Segrave 2020; Musto 2020). Technology is paradoxically constructed both as a dangerous threat to the wellbeing of women and a powerful, disrupting force (Musto and boyd 2014). In a neoliberal landscape, relying increasingly on public–private partnerships, there is a coalition of law enforcement agents, for-profit and non-profit organisations, faith-based groups and, more recently, technology innovators promulgating this narrative (Musto 2016). The founder of DeliverFund, a non-profit organisation devoted to eradicating modern slavery by technological means, exemplified this shared vision:

> Our generation is the first to leverage internet technology as a scalable solution to social injustice, our technology has allowed us to build more value and subsequent wealth than all the previous generations combined, and we understand the technology being used to exploit these slaves, therefore our generation is uniquely positioned to end this scourge. (McKinley 2017)

Non-state actors are increasingly involved in responding to sex trafficking and even carry out their own rescue operations or act as 'trafficking experts' consulting in the process of victim identification (Musto 2016). Hence, a non-trivial amount of power over decisions affecting the lives of sex workers is at the discretion of these actors, which are part of what Musto (2016) has described as the framework of 'carceral protectionism': interventions involving a mixture of control, rehabilitation and punishment designed to protect and safeguard at-risk populations such as sex workers. Technology extends the grasp of carceral protectionism by offering novel methods of surveillance and control (Musto 2020), and while technological innovation is celebrated in the sphere of anti-trafficking, 'the impact of tech-augmented efforts is mixed at best and questionable at worst' (Musto 2020: 1149). Despite this, various anti-trafficking software has been adopted by police forces in the US and the UK (Deeb-Swihart, Endert and Bruckman 2019; Kearns and Muir 2019).

The 'Big Datafication' of Sex Trafficking

Much of our behaviours, from using social media to online shopping, generate digital traces. Humans are becoming increasingly 'datafied', constantly generating data that can be used to gain insight into a variety of behaviours (Lupton 2018). Data are by-products of many daily activities and are collected and analysed on an unprecedented scale (Christin 2017). Kitchin (2014) has previously pointed out that the widespread adoption of big data analytics resembles a paradigm shift. Indeed, there is a powerful narrative at work in which big data analytics are proposed to offer superior methods of knowledge production (Kitchin 2014). Rather than explaining causal mechanisms operating within the social world, there is an emphasis on prediction (Dalton, Taylor and Thatcher 2016) or, as Mayer-Schönberger and Cukier (2013: 14) argued, 'big data is about what, not why. We don't always need to know the cause of a phenomenon; rather, we can let data speak for itself'. When the 'data can speak for themselves, free of human bias or framing, and any patterns and relationships within big data are inherently meaningful and truthful' (Kitchin 2014: 4), the need for domain-specific knowledge and contextual understandings are reduced to a minimum. The assumption that data speak for themselves obscures the distinction between entities *existing* in the world and data as *representations* of those entities (Resnyansky 2019); uncritically obfuscating this distinction certainly poses challenges for inquiries into the social world.

Theories have always been central within the social sciences, as has the practice of deductive reasoning and hypothesis testing. The belief that data are axiomatic has led to, as its strongest proponents argue, 'the end of theory' (Anderson 2008). The return to this naive form of empiricism favours inductivist reasoning to derive insights from the data while assuming that this can somehow be an objective exercise (Dourish and Gómez Cruz 2018; Kitchin 2014). Relying on large quantities of data and inductively identifying correlations is deemed a superior strategy to derive actionable insights rather than adequately contextualising and elaborating upon the causal mechanisms at play (Reid 2016; Symons and Alvarado 2016).

The processing of vast amounts of data is an alluring prospect for organisations tasked with producing intelligence to inform decision-making, such as law enforcement (Smith 2018), and big data analytics have been quick to respond to this challenge. Nevertheless, as will be clear in the next section, the epistemological assumptions associated with the big data paradigm contribute to the reification of stereotypical and binary understandings of sex trafficking and victimhood.

Big Data and the Trafficking–Technology Nexus

Latonero (2011) pioneered the computational exploration of digital traces associated with the off-street sex market. Online escort adverts were scraped from Backpage—an online classified that dominated the adult services market at the time—during the period leading up to the Super Bowl and an increase in adverts posted throughout this period was noticed. Further, Latonero (2012) released another report in the following year that involved an analysis of the phone numbers listed in online escort adverts scraped from Backpage. It was found that some phone numbers were associated with a disproportionate number of adverts, suggesting a certain degree of cooperation or organisation.

Much of the research relies on indicators to signal the presence of trafficking. For instance, Ibanez and Suthers (2014) scraped Backpage adverts to develop indicators of sex trafficking. Among these, references to ethnicity and nationality were identified as important indicators. Besides the epistemological conundrum that it is *not* possible to derive indicators of human trafficking from a data source that we cannot confirm *contains* instances of trafficking, the identified indicators could equally apply to any migrant sex worker being part of a collective. However, the authors do successfully demonstrate that it is possible to observe patterns suggesting mobility.

Another example of an uncritical appreciation of trafficking indicators was provided by Whitney et al. (2018), who examined the relationship between 'known' indicators of sex trafficking and emoticons. Keywords related to these 'known' indicators (e.g., ethnicity, country of origin or 'new' status) were extracted from a sample of Backpage adverts and used in logistic regression to predict the presence of certain emoticons. They claim, for instance, that the use of a cherry emoticon is used to signal a woman's virginity, though the reader is left clueless as to exactly how they reached this conclusion. In a similar spirit, Mensikova and Mattmann (2018: 6) used sentiment analysis and machine learning to identify possible instances of sex trafficking from Backpage adverts and argued that 'possible ideas for improvement could include completely removing any bias from the data'. This neglects the fact that bias is potentially present in all datasets and that all forms of interpretation are susceptible to human bias (Goldberg 2015; Symons and Alvarado 2016).

The methods used in this context are often sophisticated and seemingly capable of identifying interesting patterns; however, the problem is usually linked to questionable interpretations. For instance, Li et al. (2018) used unsupervised machine learning to identify patterns of trafficking from approximately 10 million Backpage adverts. More specifically, a template matching algorithm was used to cluster adverts with similar textual content. While this approach seems promising for uncovering networks from vast amounts of unstructured data, the contention that their method 'provides deeper insights into the complex structures of sex trafficking organizations' (Li et al. 2018: 3111) is highly questionable. Indeed, the interpretation of data is always restricted to the conceptual framework of the interpreter (Kitchin 2014); in this case, the lack of knowledge of sex trafficking is manifested in the assumption that the patterns reflect trafficking networks. Conversely, a more critical reading of the data would suggest the patterns are indicative of various online market prerogatives, some of which may be linked to exploitation and/or trafficking.

Within this body of literature, sophisticated models are often trained on questionable data. For example, Tong et al. (2017) randomly sampled 10,000 Backpage adverts, and two 'experts' manually annotated these on a seven-point Likert scale, ranging from not suspicious of sex trafficking to highly suspicious. In addition, two law enforcement officers annotated 600 of these adverts, and the relatively low rates of inter-rater agreement (Krippendorff's alpha = 0.42) suggest that rating isolated adverts—even by police officers—is a challenging and subjective task that hinges upon the annotator's understanding of trafficking. Further, Wang et al. (2020: 1) applied deep learning in the form of an ordinal regression neural network to the dataset created by Tong et al. (2017) to 'predict the likelihood of an ad coming from a trafficker'. It seems common to fall into the trap of conflating what the data are actually representing; in this case, it is not 'trafficking' as much as it is an individual's understanding of trafficking. Alvari, Shakarian and Snyder (2017) also fall into this fallacious form of reasoning in their application of semi-supervised

machine learning to Backpage adverts. One law enforcement officer dichotomously coded 200 of these into being of interest or not. Even when models are successfully trained to distinguish between suspicious or non-suspicious adverts, it is important to recognise that the very conception of 'suspiciousness' is constructed from the perspective of the annotator and not necessarily reflective of broader patterns related to trafficking.

It is apparent that the current body of research is struggling with what their data are representing; axiomatic interpretations of escort adverts do indeed lead to deeply flawed conclusions. Miller, Kennedy and Dubrawski (2016) exemplified this in their attempt to assess whether public events affect sex trafficking. With a vast dataset of approximately 32 million escort adverts, the authors identified correlations between public events occurring throughout the US and Canada with the frequency of posted adverts. Noting a statistically significant increase in escort adverts during certain events, the authors claimed:

> our analysis has shown that in some cases, such as the Super Bowl ... one can see a correlation between the occurrence of the event and noticeable and statistically significant evidence of an influx of sex-workers, and, we may imply, sex trafficking activity ... our analysis highlights that human trafficking affects our country across varied locations, communities, and events. (Miller, Kennedy and Dubrawski 2016: 6-8)

This is a peculiar claim, given the underlying source of data. Nonetheless, these authors were correct in pointing out that 'reliance on quantitative evidence accessible through data-driven analysis can inform wise resource allocation, guide good policies, and foster the most meaningful impact' (Miller, Kennedy and Dubrawski 2016: 8). However, it is clear from their study that they are not—in any form—relying on quantitative evidence of human trafficking and that the insights borne from this particular data can in no meaningful way 'guide good policies'. It is worth pointing out that one of the authors is the founder of the artificial intelligence anti-trafficking company (Marinus Analytics), which also created the dataset used by Tong et al. (2017) and Wang et al. (2020). This reinforces the point that we need to be sceptical about the assumptions underlying commercial anti-trafficking software.

Fedorschak et al. (2014) also suffered from considering their data uncritically. While they are correct to point out that 'data analytics has immense potential to elucidate trends in complex social data and inform future policy' (Fedorschak et al. 2014: 69), this can only be achieved if the analysis is both theoretically informed and applied to substantially meaningful data. The researchers scraped news stories and created an algorithm to select cases based on their relevance to trafficking while extracting reported demographics and other characteristics. They went on to propose that their research 'helped us advance the cause of evidence-driven approaches to combatting human trafficking' (Fedorschak et al. 2014: 82). Suggesting that the corroboration of news articles can lead to good policy demonstrates an acute lack of awareness regarding the flaws of the underlying data. The common denominator of much research using big data to inform policies is the naive belief that novel methods will revolutionise our understanding of social problems when, in reality, it is the lack of high-quality data that hinders evidence-based policies.

Unpacking the Assumptions of Digital Anti-Traffickers

The vast majority of big data research on sex trafficking share several commonalities that bring their validity into question. The following five issues will be discussed in more detail: (1) a limited understanding of exploitation within the sex market; (2) an uncritical and inadequate understanding of the data; (3) unsubstantiated and unconvincing operationalisations of key concepts and general issues of measurement validity; (4) an unnerving opaqueness and lack of contextual details surrounding data and methods; and (5) an uncritical appreciation of the identified patterns.

A Limited Understanding of Exploitation Within the Sex Market

In the research reviewed, a limited understanding of sex trafficking and sexual labour is evident. Certainly, much of the literature is based within the US context, in which there is a tendency to equate organised sex work with sex trafficking; nevertheless, trafficking victims are often portrayed unequivocally as sex slaves, with a complete disregard of their agency (Farrell and Cronin 2015; Farrell et al. 2019; Weitzer 2007). As Scoular et al. (2019) pointed out, when a third party is involved in the facilitation of sexual labour, it is often assumed to be a relationship based upon control. This can naturally be the case, though we also know that there is considerable variation. For instance, some independent escorts outsource the marketing of their services to online agencies, and not all workers employed in brothels are subject to control (Sanders et al. 2018a). We must be wary of labelling certain categories of sex workers as 'trafficking victims' when drawing only on open-source data; these adverts do not provide nearly enough contextual details to inform such a judgement.

An impact statement from Thorn (n.d.) claimed that they had identified 18,119 victims of human trafficking. While there is little reason to doubt that their algorithms have successfully *labelled* those individuals as potential trafficking victims, we might be surprised to find that their experiences can be neatly categorised into a binary variable of victims and non-victims (O'Connell Davidson 2015). Paradoxically, while big data analytics are preoccupied with gaining insights borne from the data, this example perfectly illustrates how a severely limited conceptualisation of trafficking is forced upon the individuals represented within these adverts.

An Uncritical and Inadequate Understanding of the Data

Most research reviewed relied on publicly available online data, primarily in the form of escort adverts. There are numerous issues with these as a source of data, including inconsistencies, contradictory information and a lack of details. However, the most pressing issue is that they are not reflections of the lived reality of sex workers as much as they are market prerogatives aimed at attracting clients on a vibrant market characterised by heterogeneity (Sanders et al. 2018b). There has not been enough systematic research on how the online market prerogatives compare across independent escorts, sex worker collectives, agencies and criminal networks.

Data are created and situated in particular contexts and unequivocally require interpretation and narration for any understanding to occur (boyd and Crawford 2012). The interpretation of data cannot occur without an adequate understanding of the social processes giving rise to them (Törnberg and Törnberg 2018). Without any domain-specific knowledge of sexual labour, exploitation and migration, we are unlikely to produce any meaningful insights. Although machines can outperform humans in classification tasks, the patterns identified lack any meaning unless interpreted by a human analyst; it is when we begin to narrate the patterns identified that they become meaningful (Dourish 2016; Dorish and Gómez Cruz 2018).

Konrad et al. (2017: 738) contended that 'social media mining is one of the few areas for which concrete quantitative anti-trafficking studies have emerged'. From a social scientific epistemological standpoint, the research reviewed in this article involving social media mining of digital traces cannot be considered particularly 'concrete'. Perhaps many issues with the current body of research can be attributed to an uncritical view of online data as mirroring reality (Bolin and Andersson Schwarz 2015). Digital traces are by no means naturalistic, and the very notion of 'raw data' is an epistemological fantasy and oxymoron (Gitelman 2013). Inherently subjective decisions are made in any analysis, including data collection, data cleaning and simply choosing an algorithm or method for analysing the data (boyd and Crawford 2012; Crawford, Miltner and Gray 2014; Diesner 2015).

Unsubstantiated Operationalisations of Key Concepts and Measurements

It has previously been noted how big data analytics 'struggles with the social' (Kitchin 2014: 9), and this becomes particularly obvious when applied to complex behaviour, such as human trafficking. Part of the issue is that the demarcation of criminal and non-criminal behaviour on the sex market, which is not entirely clear-cut even for law enforcement investigators with contextually rich data (e.g., Pájon and Walsh 2018; Verhoeven 2017), must be translated into a digital format. In other words, the social dimension of sex trafficking must be operationalised before we can elucidate any trends or patterns within the data (Kaufmann, Egbert and Leese 2019). This has proven to be a challenging task, especially for machine learning approaches in which the indicators used for labelling training data are problematic and could equally apply to individuals and groups that are not subjected to exploitation (Volodko et al. 2019). These are issues of measurement validity; it is difficult to operationalise a concept for statistical analysis without any substantive knowledge about the market prerogatives used by criminal networks. If we are to identify the presence of exploitation from online data, the statistical concepts, measurements and indicators must be coherent and firmly embedded within the current body of social scientific literature (Resnyansky 2019; Shaw 2015).

Using big data analytics to identify human trafficking (and, more widely, security threats) tends to provoke apophenia: interpreting patterns in random data as intrinsically meaningful (Gradecki and Curry 2017). Given that much of the research reviewed used samples of well over a million cases, it is of little surprise to find an abundance of statistically significant relationships. With a multitude of variables and large quantities of observations, we are bound to find correlations, including many spurious relationships (Omand, Miller and Bartlett 2014). Nevertheless, deciding which relationships are valuable requires no small amount of domain-specific knowledge. As a point of illustration, poor grammar and English skills are often highlighted as an important indicator for identifying trafficking victims in escort adverts (e.g., Antonopoulos et al. 2020). However, this is hardly of causal interest because migrants tend to make up the majority of sex workers in certain localities (Mai 2009) and, generally speaking, will not have the language skills to match the local population.

Opaqueness and a Lack of Context

A commonality of the reviewed research relates to the absence of contextual information about how the insights were produced. Whether presenting accuracy scores for predictive models or, in the case of tech companies, showcasing 'success stories', there is a conspicuous lack of details regarding the data. Statistics about how technologies identify thousands of trafficking victims and reduce the time spent on investigations often share a common denominator, namely, a lack of transparency about how they arrived at those numbers. Indeed, unless we know how the issue is conceptualised and operationalised, what indicators are used to identify potential exploitation and at what point the individual is labelled as a trafficking victim, decontextualised numbers are not very informative.

Dourish (2016: 9) pointed out that we 'need to resist fetishizing technical objects such as source code or algorithm … a capitulation to purely technical accounts risks obscuring the social and cultural practices by which those technical objects are animated in practice'. Instead, we must adequately report the research process with contextual information supporting our assertions. Perhaps part of this algorithmic opacity (Pasquale 2015) can be attributed to trade secrets (Gillespie 2014), particularly with regards to tech companies selling anti-trafficking software in which important information may not be reported to maintain a competitive advantage. However, it is problematic to present accuracy scores as empirical insights; it becomes impossible to assess whether the research or products offer a reasonable level of reliability and validity. Trade secrets, in combination with a lack of transparency and algorithmic opacity, render it impossible to assess the relationship between the data and the conclusions drawn from the analysis (Burrell 2016; Dourish 2016; Mittelstadt et al. 2016). Hence, there is little reason to believe that anti-trafficking software is adequately capturing the complexities of exploitation through the analysis of online escort adverts, which are a very fragmented source of data (Sanders et al. 2018b).

An Uncritical Appreciation of Identified Patterns

The strive for actionable insights at the expense of robust empirical investigations is also problematic, especially because data scientists and tech companies are increasingly involved in shaping public policies and policing practices (Benbouzid 2019). The rise of predictive policing and governmentality of patterns inevitably contributes to narrower conceptualisations of crimes (Kaufmann, Egbert and Leese 2019). With regards to sex trafficking, the big data analytics informing policing through actionable insights serve to reduce the nuances of exploitation.

It has been pointed out by Mittelstadt et al. (2016) that algorithms themselves can affect how we conceptualise and interpret the social world. This has been evident throughout the studies reviewed, which tend to rely on classification algorithms that further entrench the dichotomous belief of sex work as either coerced or voluntary, drawing an artificial boundary that fails to recognise the spectrum of exploitation (O'Connell Davidson 2015). Gradecki and Curry (2017: 4) highlighted an important point related to this: 'automated classification does not make erroneous data more accurate, it only automates the same errors across a larger dataset'. If we perceive trafficking as a dichotomous phenomenon and continue to label adverts as being either *indicative* or *not indicative* of trafficking, machine learning will only serve to reinforce this dichotomy and take us further away from a more nuanced understanding that recognises exploitation within a continuum of experiences. When we focus upon identifying patterns of trafficking from decontextualised online data and believe them to be inherently meaningful, there is also a risk that we further entrench the erroneous belief that we can find technological solutions to fundamentally social problems. A statement from DeliverFund (n.d.) provided an excellent example of this naive and inadequate understanding of trafficking:

> The proliferation of technology has made it easier for human traffickers to search for and groom potential victims … It may have gone high-tech but it is every bit as malicious as historical slavery, complete with physical, psychological and emotional abuse. These girls are in chains, metaphorically and literally … We've challenged the status quo in the fight against human trafficking by targeting the root cause: the trafficker … The ultimate prevention program is to take human traffickers out of the equation. Without human traffickers, there are no victims of human trafficking.

There are obvious concerns here, especially because this organisation is involved in educating law enforcement on sex trafficking. However, DeliverFund is not alone in promulgating the belief that we can arrest our way out of human trafficking. For instance, Petter, Giddens and Fullilove (2020: 3) also argued that 'another approach to reduce and eliminate human trafficking is to eradicate traffickers, thus removing the supply of victims'. This completely ignores how everyday and extreme exploitation is produced and reproduced within our current global economy (Cockbain 2020). Moreover, it also fails to recognise that the lines between victims and offenders are often blurred; many who were previous victims of exploitation are either forced to exploit others or do so to improve their own situation of victimisation (Broad 2015; Rodríguez-López 2020).

As Burrows and Savage (2014) have previously pointed out, big data analytics challenge the social sciences regarding knowledge production. In the case of sex trafficking, it is increasingly clear that we need theoretically grounded approaches—especially given the paucity of quantitative empirical evidence—to understand the mechanisms of the sex market.

Discussion: Towards a Continuum of Exploitation

Big data research into the trafficking–technology nexus has not managed, in any convincing or meaningful way, to advance our understanding of the complexities associated with sex trafficking. In their strive to either augment policing efforts with technology or end human trafficking, big data evangelists have nevertheless been remarkably successful in contributing to the technologisation of sex trafficking.

The epistemological underpinnings of the big data paradigm contribute to the reification of simplistic and stereotypical conceptualisations of sex trafficking and victimhood. The uncritical view of data as objective or naturalistic, the lack of theory and the predictive nature of big data are all manifested in the production of knowledge about the trafficking–technology nexus. This becomes highly problematic when these studies are presented as advancing our knowledge on sex trafficking. It is difficult to be convinced that the patterns identified by big data evangelists are capturing the complexities of exploitation; rather, its epistemological foundations are more likely to exacerbate pre-existing misconceptions regarding sex trafficking.

One question remains to be answered: why has technology been so successfully constructed as a key facilitator of sex trafficking and the panacea to human exploitation? First, when technology is perceived as the main driving force behind increasing sex trafficking, there is little incentive to address the underlying structural processes that create vulnerability towards exploitation in the first place (Gadd and Broad 2018; Lammasniemi 2017; Turner 2016). For instance, when technology is to blame, we do not need to be concerned with how restrictive immigration policies create a demand for irregular migration services (Castles, de Haas and Miller 2014; O'Connell Davidson 2013), which increases the risk of migrants becoming exploited due to the debts incurred to finance migration (Agustín 2006; Mai 2009; Plambech 2017). Similarly, the focus on technology means that there is less scrutinisation of the mechanisms of neoliberal capitalism, which create more precarious forms of labour and hollowed-out welfare systems and contribute to different forms of exploitation across a multitude of labour markets (Milivojevic, Moore and Segrave 2020; Musto, Thakor and Gerasimov 2020; O'Connell Davidson 2016b). Therefore, the explanation that technology is driving sex trafficking is a convenient justification for not challenging and changing the current systems of inequality.

When technology is perceived as the causal factor of increasing sex trafficking, it also follows that technology is considered capable of disrupting or even ending sex trafficking. This is a compelling prospect for several actors, not least for governments unwilling to change their economic, welfare and immigration policies or laws regulating sex work (Cockbain 2020). However, this narrative is also attractive to moral entrepreneurs, whether non-profit organisations that carry out their own intelligence and rescue operations or tech companies developing 'solutions' to social problems. For others, who already perceive sex trafficking as solely an issue of 'evil traffickers' exploiting 'gullible victims', the idea that sex trafficking becomes a more severe issue due to technology fits with individualised narratives of trafficking heralded within the 'rescue industry' (Thakor and boyd 2013; Agustín 2007).

If we unequivocally embrace technology as both the driver and solution to sex trafficking, there is little reason to critically reflect upon the efficacy and consequences of technology-mediated anti-trafficking efforts (Musto 2020; Musto, Thakor and Gerasimov 2020). Perhaps this is particularly true for organisations selling software 'solutions' to trafficking or non-profit organisations educating law enforcement where there is a financial incentive to continue to uphold this narrative. For instance, Marinus Analytics (n.d.) claimed their software 'innovates toward victim-centered, trauma-informed policing' and helps law enforcement 'stop human trafficking'. Sex workers who have been falsely identified and labelled trafficking victims, had their premises raided or been arrested or even deported may not be inclined to agree that such efforts are particularly 'victim-centred' or 'trauma-informed'. Even victims of exploitation and trafficking may be subjected to the long, punitive arm of carceral protectionism and still be arrested, incarcerated, detained or deported (Mai et al. 2021; Malloch 2016; Musto 2016; Milivojevic, Moore and Segrave 2020); however, concerns regarding this are conspicuously absent from companies selling 'solutions' to trafficking.

The presentation of 'success stories' and statistics about the hundreds or thousands of victims rescued or identified are used to advance technological anti-trafficking efforts. However, this does very little to illuminate the conditions and contexts in which exploitation takes place; by unproblematically applying the trafficking victim label to the individuals behind these decontextualised numbers, we are discouraged from reflecting on how the victims may actually perceive their own circumstances. In other words, the

agency of sex workers and migrants is inconvenient to organisations devoted to technological anti-trafficking efforts. A far more convenient approach is to present the most horrid cases to represent, in the words of Christie (1986), the 'ideal' sex trafficking victim and generalise this to the experiences of individuals identified, whether by algorithms or other means, as victims. Nevertheless, this serves as a distraction from understanding the complex social contexts in which exploitation occurs (Malloch and Rigby 2016), which is crucial when responding to harms and exploitation within the sex market (Cockbain 2020; Scoular et al. 2019).

When a blind faith in big data, techno-fetishism, neoliberal ideology and ignorance of the lived experiences of sex workers and migrants intersect in the production of knowledge on sex trafficking, the social context of exploitation is effectively ignored. There are four key dimensions of exploitation unaccounted for in the technological anti-trafficking discourse. First, when sex trafficking is simply framed as an issue of traffickers exploiting victims, we fail to recognise the structures and processes that fertilise liminal agency and exploitation in the first place (Andrijasevic 2010; Munro 2016). For instance, even if poverty is attributed as a causal factor to exploitation, how poverty is produced and reproduced within current economic systems is often neglected (Howard 2018). Similarly, with the rollback of welfare systems, deindustrialisation and erosion of workers' social protections, many are driven to more precarious forms of employment or labour in informal markets (O'Connell Davidson 2016a, 2016b). An uncomfortable fact for many anti-traffickers is that our global economy is dependent upon an increasingly precarious and exploited labour force to maintain growth (Gadd and Broad 2018; Munro 2016). There is a serious risk that we may fail to adequately contextualise exploitation when technology is construed as the driver of sex trafficking. Research focused on predicting instances of sex trafficking, through big data analytics applied to open-source data, renders the contexts and complexities of exploitation unimportant; if models are seemingly capable of predicting sex trafficking, understanding the causes and nuances of exploitation is not deemed a priority.

Second, the conflation of sex work with trafficking means that we fail to understand how underlying opportunity structures shape the propensity to engage in sexual labour (Mai 2009). Sex work can be a survival strategy or a preferable option to other forms of labour simply because it can offer financial security or flexibility (Sanders et al. 2018a). Employment relations are incredibly varied within sex markets, ranging from individuals working independently with a high degree of autonomy to working through intermediaries and, at the very end of the spectrum, individuals exploited by a third party (Scoular et al. 2019; Pitcher 2015). Technology creates new opportunities to engage in sex work and affects how actors within the sex market are organised and operate (Sanders et al. 2018a; Scoular et al. 2019). Research into the online dimensions of the sex market must account for the plurality of these different actors and critically consider how vulnerability and exploitation may be manifested in online data pertaining to the sex market.

Third, and related to the previous point, not all exploitation within the sex market is necessarily *sexual* exploitation (O'Connell Davidson 2006). The assumption that all exploitation within the sex market is strictly sexual exploitation (e.g., forced or deceived into prostitution) is reminiscent of the view that sex work can never be a legitimate form of labour (e.g., Farley, Franzblau and Kennedy 2014). This logic dictates that if exploitation is present, it *must* be a case of sexual exploitation. However, this fails to acknowledge that many willingly engaging in sexual labour may nonetheless be severely exploited by working long hours for little compensation or have limited control over their working environment. In this context, the experiences of sex workers may more closely resemble labour or economic exploitation (Macioti et al. 2020). It is also possible that sexual exploitation and other forms of exploitation are intertwined to create an overarching experience of exploitation. However, such concerns are conspicuously absent from technological anti-trafficking discourse, and big data-oriented research into the sex market is preoccupied with predicting and identifying sex trafficking at the expense of critically reflecting upon the nature of exploitation in the sex market.

Finally, sex trafficking and exploitation cannot be separated from legal contexts and immigration policies (Chen and Tortosa 2020). Crimmigration—that is, the fusion of immigration and criminal laws (Stumpf 2006)—combined with the securitisation of migration (Bourbeau 2015; Léonard 2010) serves to create a demand for the illegitimate side of the migration industry, such as the services of human smugglers (Castles, de Haas and Miller 2014). Making it more difficult to migrate through legal channels and, by extension, securing employment in regulated sectors means that many irregular migrants become more vulnerable to exploitation (Koser 2011). For migrant and domestic sex workers, the criminalisation of sex work contributes to more precarious and potentially more violent working conditions (Chapman-Schmidt 2019; Hanks 2021; Levy and Jakobsson 2014; Tichenor 2020).

The introduction of the *Allow States and Victims to Fight Online Sex Trafficking Act of 2017* (Pub L No 115-164, 132 Stat 1253) in the US, designed to curb sex trafficking by reducing opportunities for online marketing, is a prime example of the negative consequences of technology-oriented narratives. The Act has been reported for making sexual labour more insecure and volatile while, ironically, rendering sex workers increasingly reliant upon potentially exploitative third parties to facilitate their sexual labour and doing very little to actually prevent sex trafficking (Blunt and Wolf 2020; Majic 2020; Musto et al. 2021; Tichenor 2020). Similarly, the current laws in the UK against brothel-keeping, that is, the criminalisation of two or more sex workers working in the same premises without a license, push individuals to work alone, even though harms can be reduced by working collectively (Scoular et al. 2019). However, trafficking victims may also be arrested—on charges related to prostitution, survival offences or migration violations—and the consequences may be dire, such as incarceration or deportation (Gadd and Broad 2018; Malloch 2016; O'Connell Davidson 2013; Sanders et al. 2018a). It is perhaps within this context that anti-trafficking organisations and the wider narrative on technology as a panacea to exploitation is faltering the most; when the identification and liberation of victims are perceived as an infallible good and there are no adequate support services available to survivors, interventions may cause more harm than good.

Reframing Sex Trafficking: A Continuum of Experiences

There is a broader tendency in public discourse on human trafficking to frame victimisation in binaries of victims and non-victims, slave or free and choice or coercion (O'Connell Davidson 2015). This is not unique to technological anti-trafficking discourses; however, there is a risk that these misconceptions are exacerbated when algorithms and big data analytics are uncritically applied to open-source data. This takes us further away from a nuanced understanding of sexual labour as encapsulating a spectrum of experiences distributed along a continuum of exploitation.

Indeed, if we are to understand sex trafficking adequately, we need to theorise exploitation as a continuum of experiences. This becomes increasingly important when we try to understand the online dimensions of sex trafficking through the analysis of open-source data such as escort adverts, which do not contain enough contextual details to make an informed judgement about whether exploitation is present. This type of data does not allow us to understand how individuals find themselves in the sex market, the decisions and motivations for migrating to do sex work and the relationships between sex workers and others who may facilitate their sexual labour. Most importantly, these data do not illuminate how the advertised individuals may perceive their own circumstances. Therefore, we have little reason to believe that the experiences of individuals within the sex market can be neatly classified by algorithms into a binary variable of 'non-victims' and 'trafficking victims'. Here, the concept of agency is critical; sex workers, migrants and trafficking victims all exercise agency, albeit many do so in severely constrained environments (Andrijasevic 2010; Chimienti 2010; Mai 2016). At times, there may be no other options available other than to consent to work under exploitative conditions, and this may be particularly true for those with families whose very survival might depend upon vital remittances (Russell 2014). Agency is the force mobilised to navigate these structural constraints and the mechanism in which sex workers negotiate their positions along the continuum of exploitation.

Future research into the trafficking–technology nexus involving either big data analytics or online data must situate sex trafficking in a frame that recognises a continuum of exploitation (Malloch and Rigby 2016; O'Connell Davidson 2015). The realities of marginalised populations are more complex than binary constructions of victimhood or the perpetration of sex trafficking. While it is rare to be physically abducted and coerced into sexual exploitation, it is considerably more common to transgress a continuum of exploitation in the context of limited opportunities, labour market segmentation and immigration laws (Doezema 2010; Gadd and Broad 2018). With absolute volition at one end of the spectrum and absolute coercion at the other, the experiences of those we label trafficking victims are more likely to fall along the continuum than exclusively at the extreme ends. These flawed perceptions not only obscure the structures and processes creating vulnerabilities towards exploitation but also affect criminal justice responses and victim identification (Broad 2015; Cruz, O'Connell Davidson and Sanchez Taylor 2019; Gadd and Broad 2018).

It may be that open-source data and big data analytics may yet play an important part in responding to exploitation; however, our efforts are unlikely to be helpful or successful if implemented uncritically. There is a dire need to continue to investigate the trafficking–technology nexus thoroughly, examine the online dimensions of sex trafficking and evaluate the potential of using open-source data and technology when responding to exploitation. Rather than asking *how* artificial intelligence can identify trafficking victims, we should consider the extent to which open-source data and novel technology can reduce harm across the sex market. Technology can potentially provide the infrastructure to nurture cooperation between stakeholders responding to harms within the sex market and allow us to construct platforms for sex workers to share information, develop social and human capital and provide mutual support to one another. It may be that open-source data and novel analytical techniques play an important part in better understanding local and national patterns related to vulnerability and exploitation; however, to fully examine this, we need a theoretically informed model of internet-mediated sexual labour that recognises a continuum of exploitation. If we fail to resist the alluring siren call of technology as a means to end exploitation and appreciate the many shades of exploitation, there is a risk that our efforts will continue to perpetuate harmful myths or lead to ill-conceived policies that may do more harm than good.

Concluding Remarks

Technology adds further complexities to both sex trafficking and our responses to it. To fully understand and respond to sex trafficking, we need to account for its digital dimension. To do so, we need to anchor our research in social scientific epistemologies, advance our criminological imagination and push the boundaries of digital criminology forward. Throughout this paper, it has been argued that research underpinned by epistemological assumptions associated with big data contribute to the reification of binary and simplistic understandings of sex trafficking. Such research may also reinforce the narrative that technology is the great enabler and facilitator of sex trafficking and that technology can somehow *end* sex trafficking. Individualised discourses of 'evil traffickers' exploiting 'gullible victims' are certainly nothing new to the sex trafficking debate; however, technology-oriented narratives serve as a further distraction from the social structures and processes that drive exploitation in the first place. As such, this narrative is incredibly attractive to those unwilling to perceive sex work as a legitimate form of labour and uninterested in changing the current systems of inequality. It is clear that if we are to understand the complexities of sex trafficking, whether or not it is facilitated by technology, we need to move beyond dichotomies and recognise exploitation as a continuum of experiences. It is also clear that any attempt to *end* human trafficking with technology is perhaps more akin to tilting at windmills than a serious attempt to understand the issue and contribute to improved responses to exploitation.

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