

The Life Expectancy of Phone Numbers in Escort Ads

James Van Scotter, Louisiana State University; Miriam McGaugh, Oklahoma State University,
Denise McManus, University of Alabama

ABSTRACT

Most people would be surprised by the extent to which “the oldest profession” depends on the newest technology. Websites that sell classified ads for escort services enable human traffickers to reach customers while shielding them from law enforcement. The phone numbers that connect potential customers to the victims of human trafficking are an important clue for finding ties to the traffickers and pimps who profit from these activities. Our paper describes how we used SAS® to take the first steps toward using phone numbers to uncover the traffickers. We used a custom web-scraping program to capture the text of nearly 700,000 classified ads from backpage.com. Then we examined the length of time that phone numbers appeared in ads, whether one phone number was used in different locations, and whether ad categories are associated with the amount of time a phone number remains active.

INTRODUCTION

The internet has been a great boon to human traffickers. Classified ad sites that specialize in escort ads have made it easier for them to reach prospective customers and harder for law enforcement to catch them (Kuzma, 2012; Wang, et al., 2012). Skilled investigators can extract valuable information from these classified ads but, combing through the thousands upon thousands of ads that appear each week is virtually impossible. There just isn't enough time. A better approach is needed.

HUMAN TRAFFICKING AND THE INTERNET

While sexually-oriented classified ads have a huge presence on the internet, identifying the pimps and traffickers behind the ads can be challenging. The Polaris Project (Polaris, 2018) reports that illicit massage parlors posing as legitimate businesses are often involved in human trafficking. Human traffickers associated with escorts are not the only people posting sexually-oriented ads on classified ad sites. In addition to ads for escorts, illicit massage parlors and ads intended to recruit new people into the oldest profession, web sites such as backpage.com contain ads from legal businesses. Some examples are strip clubs, therapeutic massage parlors, phone sex and web cam sites, dating sites, and even legal prostitution houses in Nevada.

Investigators often focus on the phone numbers displayed in online sex ads because they link the traffickers and pimps to the ads and to their customers. Law enforcement officials assume many of the phone numbers used in online sex ads come from free services such as Google Voice (Google, 2018) or inexpensive “burner” phones that are used for a few months and then disposed of when the prepaid minutes run out. Anecdotal reports of old phone numbers disappearing and new phone numbers appearing support this assumption, but it has not been tested systematically. Learning about the phone numbers used by pimps and human traffickers is a first step towards identifying and interpreting their behavioral patterns.

RATIONALE AND SPECIFIC QUESTIONS

We divided the overall objective into four more specific questions which are described next. Not much is known about how human traffickers use the phone numbers that link them to their customers over time. Much of the evidence is anecdotal or based on a single data collection effort. More systematic study is needed. Finding that a phone number appears over a long period of time might suggest the owner is using a personal phone to post ads. In this case, law enforcement may be able to learn a lot by tracking the phone number over time and locations. Finding that a phone number disappears after a few months, suggests the owner was using a throw-away phone. It is also possible that traffickers move victims to locations every few months to evade local law enforcement. In this case, more sophisticated methods will

be needed to track the traffickers. All of these patterns of behavior are important if corroborated by other results. Determining the life expectancy of phone numbers displayed in the ads is a good place to start.

QUESTION 1. HOW LONG ARE PHONE NUMBERS IN USE BEFORE THEY DISAPPEAR?

Phone numbers are an important communication channel that both legitimate and illicit businesses use to connect with customers. Some phone numbers in our data set are used by legal businesses, others are used by organizations posing as legal businesses (e.g., spa owners), and others are used by organizations whose activities are clearly illegal. The length of time a phone number is in use may reveal important characteristics about the organization behind it. Changing phone numbers may cause legitimate businesses to lose customers. We expect phone numbers to be especially important for illicit businesses because they have fewer options. On the other hand, people engaged in criminal activities may change phone numbers frequently or employ multiple phone numbers to disguise their activities and make tracking them more difficult.

QUESTION 2. IS THE LIFE EXPECTANCY OF PHONE NUMBERS RELATED TO THE TYPES OF ADS THEY APPEAR IN?

Human trafficking organizations that are in the “business” of prostitution may be especially dependent upon their phones. Organizations that place (and pay for) more ads are likely to be larger, more dependent on the ads for revenue, and have more to lose if they are caught. Larger human trafficking organizations may find it more difficult to avoid being noticed by law enforcement. A single phone number that is associated with 500 ads will tend to attract more attention than ten phone numbers that are each associated with 50 ads during the same period of time. Therefore, we could expect them to use more phone numbers for shorter periods of time and be more systematic about changing phone numbers.

On the other hand, legitimate businesses may be reluctant to change phone numbers because they worry about losing repeat customers. An “independent” prostitute may stick with one phone number for a long time for the same reason. Someone who posts a single ad or posts ads sporadically might use the same phone number because they perceive the risk to be low, or don’t want to spend the money for a separate phone. Therefore, we may be able to use the number of ads posted for a phone number as a proxy for the size of the organization and the skill of the owner.

QUESTION 3. IS THE LIFE EXPECTANCY OF A PHONE NUMBER RELATED TO THE NUMBER OF ADS IT APPEARS IN?

Phone numbers that are active for a longer period of time have more opportunity to appear in classified ads. However, as mentioned above, organizations can be expected to minimize exposure to risk by trying not to attract too much attention. If the risk is great, as it is for human traffickers, we would expect organizations to run a large number of ads, but avoid linking an individual phone number to too many of them. Similarly, phone numbers that are operated for a longer period of time would likely pose a greater risk. In contrast, people who post a single ad or post ads sporadically might use the same phone number or a personal phone because they perceive the risk to be low, or don’t want to spend the money.

QUESTION 4. WHEN A PHONE NUMBER DISAPPEARS FROM ADS IN ONE AREA, DOES IT SHOW UP IN ADS POSTED IN ANOTHER AREA, OR IS IT REALLY DISCARDED?

Finding that a phone number disappears from ads in one area and subsequently turns up in ads in a different area would indicate the phone’s owner has moved. The move may be long-lasting. Alternately, they may have temporarily moved to a location that is hosting an event that draws large crowds, such as the Super Bowl (Kuzma, 2012) only to return to their home turf afterwards. This would be indicated by movement to a new location and returning home after a short duration. If using the same phone number for long periods of time and discarding phone numbers after a few months are distinct behavioral patterns, then we would like to know what they tell us about people who choose to act one way or the other. By examining systematic differences in the characteristics of ads associated with the two approaches, we may gain insight on why owners of the phones chose different strategies.

METHOD

DATA.

Answering these questions requires a large set of data that encompasses multiple locations and multiple occasions. Nearly 700,000 ads were collected from backpage.com using a custom web scraping program. The initial data set consisted of 23,928 ads collected in early 2016 and covering 28 cities in Louisiana and the Southeastern U.S. In subsequent data collection efforts, the scope was expanded to a total of 116 different cities.

Data cleaning was a major task. The data are extremely messy. Some of the information in the ads is provided as pictures of text. Phone numbers are sometimes displayed as mixtures of words and letters that a human can decipher, but are hard to program. For example, (216) 599-3011 might be represented as "two 1b five 993oll," where the last 3 characters are lowercase O, lowercase L and uppercase i. The text also contains numerous misspellings and substantial use of slang words, and phrases. The intent to deceive is clear.

Meta data for each ad included the date the ad was originally posted. Renewing an ad does not change the posting date, so the data set includes phone numbers that were first displayed between November, 2015 (month 1) and February, 2016 (month 16). The lifespan of a phone number was calculated by subtracting the month of the last ad from the month of the first ad and adding one because all ads were displayed for at least part of one month. In total there were 695,968 ads that displayed 91,447 unique phone numbers with life spans of 1-15 months.

AD CATEGORIZATION.

Ad categorization. All of the ads gathered as part of the first data collection (approximately twenty-five thousand ads) were manually classified into one of seven categories: Spa/massage parlor, escort, phone sex/webcam, dating, adult entertainment (strippers, shows, etc.), escort reviews, and rescue. Rescue ads are posted by organizations such as Children of the Night or Covenant House who offer victims a way to escape and resume a normal life. A separate code was used to indicate ads that are intended to recruit people into jobs in the spa, escort, phone sex/webcam, or adult entertainment industries. With the exception of recruitment ads, phone numbers are always associated with a single category of advertisements. Phone numbers are uniquely associated with one of the seven codes, so we extended the category data to records that contained the same phone numbers, but were gathered in later data collection efforts. A total of 6,488 phone numbers of the 91,447 total had both lifespan data and category data. They were associated with 139,864 ads.

RESULTS

Figure 1 presents an overview of the 139,864 ads, by category, and the extent to which each category includes recruitment ads. Although recruitment numbers are shown separately, recruitment is not an independent category. Ads were first assigned to a primary category and then a separate code indicating recruitment was added if appropriate. Review ads (n=1) and rescue ads (n=1555) are not included because none of the ads in either category mentions recruitment. Escort ads are the largest single category, accounting for more than half of all the ads. It is clear that traffickers depend on phones to connect with their customers.



Figure 1: Ad Categories

Question 1. How long are phone numbers active?

Figure 2 shows the percentage of phone numbers with lifespans of 1-15 months for all 91,447 phone numbers. The figure suggests that there may be two main patterns of usage. One pattern appears to involve short-term use of approximately one month. The other pattern centers on a lifespan of 12 months. This may be associated with use of 12-month long contracts for phones or phone services.

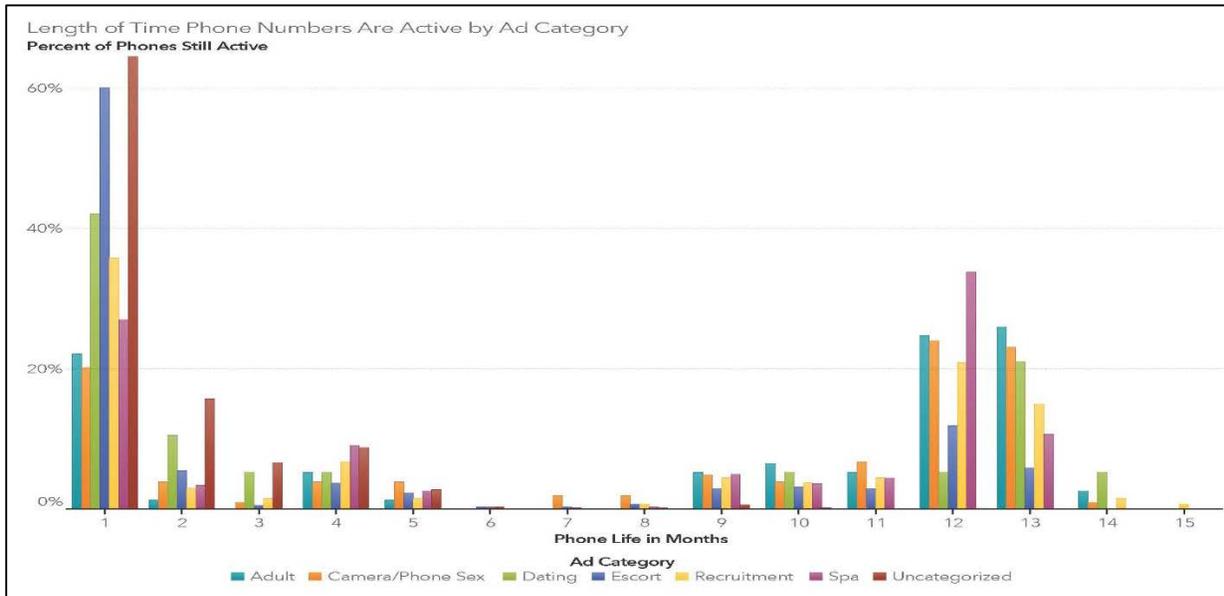


Figure 2: Length of Time Phone Numbers Are Active by Category

Unfortunately, the temporal categories are not precise. For example, a phone number first found in an ad on February 1st and a phone number first found on February 28th would both be assigned the same starting month, and the same limitation affects assignment of the ending month. In addition, we don't know how many phone numbers remained in service after February, 2017. Thus, the lifespans of phone numbers that were first detected in the later part of the data collection period may have been truncated. This may explain why more than 60% of the "uncategorized" phone numbers have a lifespan of one month. Overall, results for the 91,447 phone numbers show that 64% of the phone numbers were only used during a single month and (cumulatively) 85.2% of the phone numbers spanned 3 months or less.

Question 2. Is the life expectancy of phone numbers related to the types of ads they appear in?

Results in Figure 1 show the lifespans of phones do differ across categories of ads. In particular, the results seem to confirm the notion that escort organizations involve greater risk and that traffickers recognize that phone numbers are important clues for law enforcement. About 60% of escort phone numbers are active for only one month compared with 21% for cam/phone sex, 22.1% for adult entertainment, 30.2% for spas, and 40% for the dating category. Similarly, nearly 50% of the adult and cam/phone sex phone numbers, 40% of the spa numbers are active for about 12 months, but only 20% of the escort phones are active for that long.

Question 3. Is the life expectancy of a phone number related to the number of ads it appears in?

Results confirm that phone numbers which are active for a longer periods of time have a greater opportunity to appear in ads. Linear regression results show that the number of months a phone number is active is associated with the number of ads it appears in. After conducting natural log transformations on both variables to make their distributions more normal, lifespan predicted the number of ads ($R^2=0.479$, $p<.01$).

Question 4. When a phone number disappears from ads in one area, does it show up in ads posted in another area, or is it really discarded?

Table 1 shows that about 40% of the phone numbers from months 1-4 were found in the same locations several months later, about 10% were found in different cities, and about 50% were not present in subsequent data collections. The phone numbers found in different cities either represent changes from one location to another or an expansion of the target locations.

Table 1 What Happens to the Phone Numbers?

Results for 4278 Phone Numbers From Months 1-4			
Months	Found in the Same Cities	Found in Different Cities	Not Found Anywhere
9-12	1713 (40.0%)	440 (10.3%)	2125 (49.7%)
13-16	1770 (41.4%)	474 (11.1%)	2034 (47.5%)

DISCUSSION

This research provides additional evidence that classified ad web sites play an important role in human-trafficking by helping traffickers connect with customers while maintaining a degree of anonymity. Figure 1 confirms investigators beliefs that human trafficking-related ads for escorts and spas account for the majority of sexually-oriented classified ads on backpage.com. Results also show that the pattern of use

for escort ads is different from the patterns exhibited by legal businesses. Compared with other categories, phone numbers used in escort ads are more likely to have a life span of one month.

Overall results indicate a phone number is likely to be active about one month or about 12 months. At least two distinct patterns of phone use are likely to be responsible for this. We hope to learn more about them in future research. Unfortunately, it is difficult to determine the extent to which these results were affected by the relatively short time span covered by the data set. Our analysis also showed that the number of months a phone number is active is related to the number of ads it appears in.

The final question asked what happens to phone numbers that appear to drop out of the data for a given location. By comparing the locations phone numbers had in the first four months of our data with results for the same phone numbers 9-12 months and 13-16 months later, we found that about 50% of the missing phone numbers did not reappear in our dataset and presumably were gone. About 40% reappeared in the same locations later, and another 10% were found to be active in other cities. This suggests that some people associated with escort ads may move frequently to avoid law enforcement. The geographical and temporal breadth of our data are a limiting factor. It is difficult to explain why phone numbers associated with spas would be likely to show up in a new location. Dating sites, webcam/phone sex, and adult entertainment may advertise over a wider area, but they also tend to use a much smaller number of phones.

CONCLUSIONS

Our study is an initial response to the Louisiana State Police Special Investigations Division's request for help. Although this research provides some initial information about the use and life expectancy of phone numbers, there is much more work to be done.

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CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

James R. Van Scotter
Louisiana State University
225-578-4792

jvanscot@lsu.edu