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ARTICLE



Porch pirates: examining unattended package theft through crime script analysis

Ben Stickle^a, Melody Hicks^a, Amy Stickle^b and Zachary Hutchinson^a

^aCriminal Justice Administration, Middle Tennessee State University, Murfreesboro, TN, USA; ^bUniversity Studies, Middle Tennessee State University, Murfreesboro, TN, USA

ABSTRACT



Package theft is an emerging crime type due to the tremendous growth in online shopping and the delivery of goods directly to a home. Unattended delivery creates an opportunity for thieves to steal packages after delivery and before the resident collects them. It is believed that these types of incidents are increasing dramatically, and media attention has amplified awareness and concern of 'porch pirates.' Currently, little is known about unattended package theft and the present study represents the first known scholarly examination of this crime. Using Video Data Analysis to examine 67 YouTube videos of porch pirates engaged in criminal activity, the authors develop a Crime Script Analysis and identify Situational Crime Prevention (SCP) practices that can interrupt porch piracy. Findings indicate porch piracy occurs during daylight hours, at homes closer to a roadway, and most often with packages that can be easily seen from the roadway which are of medium size and usually have brand names on the box. Further, traditional SCP techniques such as fences, cameras, and guardians appear to have little impact on the thieves. Prevention techniques are discussed with the most promising including: increasing the risks, concealing packages, and removing packages. Additional findings, prevention techniques, and limitations are discussed.

KEYWORDS

Package theft; unattended home delivery; crime script; delivery theft; porch pirate; video data analysis; last-mile delivery

Introduction

In recent years, retailers have increasingly relied on unattended home deliveries to meet the consumer demand for products, as well as to make the package delivery process convenient. This trend has inadvertently added a new twist to the typical residential theft; it has resulted in a crime colloquially known as 'porch piracy.' This unusual term is used to describe when a package is stolen from a residential property after it has been delivered; it can also be referred to by a variety of other names, including package theft and delivery theft. Not only is package theft a problematic crime for consumers because of the associated cost and accompanying frustration it entails, but it is also a concern for retailers because the crime is a by-product of current delivery practices. Unfortunately, there is very little information about package theft, in general, and even less information is available concerning how it is committed. Therefore, to understand how porch pirates

CONTACT Ben Stickle  Ben.stickle@mtsu.edu  Department of Criminal Justice Administration, Middle Tennessee State University, Murfreesboro, TN 37132, USA

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steal packages, we conducted a Video Data Analysis (VDA) of recorded package thefts to study criminal actions. Next, we identified a Crime Script Analysis (CSA), allowing us to classify the steps involved in stealing a package. Finally, from a Situational Crime Prevention (SCP) perspective, we identify the most likely ways to interrupt the script and reduce package theft. This present research is useful to consumers, retailers, and police leaders to prevent or mitigate package theft losses potentially.

Porch piracy

Due to its relative infancy, package theft has not been researched in-depth by scholars. However, a review of the available industry research reveals pertinent information regarding home delivery trends, the estimated number of victims, and the approximate cost of the crime for the consumer, where package theft is likely to occur, the criminal charges that offenders may face, and existing preventative technologies.

In 2017, consumers around the world spent over 2.3 trillion dollars on online retail goods (eMarketer, 2018). Because of the immense volume of packages that must be delivered, online retail and delivery companies have readily embraced a package delivery method that is called 'unattended home delivery,' meaning delivery companies drop off the package(s) at the consumers' property regardless if they are home. Companies have adopted this method because it can cut delivery costs by an estimated fifty percent as opposed to attended deliveries where the purchaser must be at the drop-off location to receive packages (Punakivi, Yrjölä, & Holmström, 2001).

Unfortunately, unattended deliveries offer little protection against theft. One consumer survey by August Home indicated that in 2016, an estimated eleven million individuals in the United States were victims of package theft. Victims had to pay, on average, approximately \$200 to replace stolen items (Business Wire, 2016). This cost to consumers is likely to increase as the average value of each package is also increasing (McKinnon & Tallam, 2003; Ogonowski, 2019). This represents a growing concern as the number of packages being delivered unattended is increasing, and so are the values of these packages.

The financial aspect of package theft is also a cause for concern for retailers. A 2017 survey by the Shorr Packing Corporation, reported that forty-one percent of the respondents avoided buying certain items for fear that they may get stolen, and sixty-one percent felt that online retailers are not currently doing enough to deter thefts. A more recent report by C + R Market Research (2019) also found that fear about package theft is substantially influencing consumers to avoid making purchases online.

There are conflicting results among consumer surveys and studies about where package theft occurs. One study found that rural areas have more problems with package theft on a per capita basis (Campo, 2017). However, package theft is also an issue in urban areas. For example, according to a recent analysis by SafeWise, California has the worst package theft problem in the U.S., with San Francisco being the U.S. city most affected by it (Edwards, 2019). Moreover, a recent analysis by the *New York Times* indicated that the city of New York attributes the loss of around 90,000 packages per day to a combination of package theft and other unknown reasons (Hu & Haag, 2019).

As package theft becomes more common, the question arises as to who the legal victim is and how they should be compensated. The criminal cases thus far have generally

seen offenders charged with theft and place the consumer as the victim, instead of the retailer. Although the majority of states consider package theft to be a misdemeanor offense, some states, such as Texas, are making it a felony (Fischer, 2019). However, a criminal charge does not necessarily result in the return of the victim's package. Therefore, victims are attempting to cover their loss by insurance claims, paying out of pocket, or turning to the supplier. Some major online retailers are footing the bill for these thefts. One such example is Amazon's 'A-to-Z Guarantee,' which guarantees delivery or else a full replacement/refund will be given.

Companies are also taking more pro-active initiatives in an attempt to thwart package thieves. Amazon has started a service known as 'AMZL Photo on Delivery,' which has package couriers take a photo of the package once it has been dropped off on the purchaser's property and notifies the customer. Additionally, Amazon has also initiated a service known as 'Amazon Key,' which gives delivery employees one-time access into a consumer's home to deliver packages inside. Similarly, companies like Phrame give shoppers the option to have packages delivered to the trunk of their car (Phrame, 2018).

For some customers, services like Amazon Key and Phrame may be cost-prohibitive, costing around \$200 each. For those in the market for cheaper alternatives, there are several versions of lockboxes and package bags that let users share a lock combination with their known delivery workers. Consumers also have the option of having their items delivered to an alternate address, which is a relatively low-cost solution but could be inconvenient.

While any of these theft prevention options may serve as a good starting point to deter and prevent porch piracy, no known research has examined how porch pirates steal packages. In the present study, we use Video Data Analysis and Crime Script Analysis to identify Situational Crime Prevention techniques that can be used by scholars, consumers, retailers, and police to interrupt and prevent porch piracy.

Video Data Analysis (VDA)

Video Data Analysis provides unique analytic potential that enables researchers to study crime by 'capturing events frame by frame, observe them in slow-motion, focus on different actors at different replays, examine behavior and emotion expression that only last very briefly, and focus meticulously on temporal dynamic events' (Legewie & Nassauer, 2018, p. 8). VDA provides the opportunity to evaluate 'crime in action' as Wright and Decker (1994), Wright & Decker (1997) and others (see Jacobs, 1999; Stickle, 2017) have demonstrated is highly valuable to criminology. VDA also creates an 'incomparably richer record' (Jordan & Henderson, 1995, p. 52) of situational details that occur during dynamic criminal events while reducing researcher bias and enhancing accuracy and validity (Nassauer & Legewie, 2018). VDA has been successfully applied to a variety of crime situations, including violent protests (Bramsen, 2018; Nassauer, 2016; Nassauer, 2018b), robberies (Mosselman, Weenink, Lindegaard, 2018; Nassauer, 2018a), police use of force (Willits & Makin, 2018), drug sales (Moeller, 2018; Sytsma & Piza, 2018), and shoplifting (Dabney, Hollinger, & Dugan, 2004). Combining VDA with other analytic tools is encouraged by Nassauer and Legewie (2018), which will create a robust analysis for understanding criminal behavior.

Crime Script Analysis (CSA)

Crime Script Analysis is a method for outlining the consequential steps and actions that occur to prepare for, undertake, and complete a crime. CSA gained popularity in criminology after Derek Cornish (1994) adapted it from the cognitive sciences. As criminals make decisions based on their knowledge, the environment, witnesses, victims, and so forth, they develop 'scripts' they tend to follow during the next crime unless there are 'inhibitory factors present' (Tedeschi & Felson, 1994, p. 181). Identifying these scripts is beneficial because it enhances the understanding of a crime by viewing criminal acts as a process rather than a singular event. CSA is a versatile tool and has been applied to a variety of crimes including mass shootings (Osborne, Capellan, 2017), drug markets (Chiu, Leclerc & Townseley, 2011; Jacques & Bernasco, 2013), sex offenses (Brayley, Cockbain, Laycock, 2011; Leclerc, Wortley, & Smallbone, 2011), illegal waste dumping (Thompson & Chainey, 2011), stalking (Leclerc, 2013; Yanowitz & Yanowitz, 2012), online crimes (Willison & Siponen, 2009), and money laundering (Gilmour, 2014). CSA is an especially suitable technique for ascertaining how a 'new or complex crime' is committed (Braley et al. 2011, p. 133) which, positions it well for use in the present study of an emerging and unstudied crime, porch piracy.

Situational Crime Prevention (SCP)

The combination of VDA and CSA lends naturally to the Situational Crime Prevention techniques developed by Clarke (1997). SCP, 'seeks to identify changes in the design and management of the environment that have the potential to reduce crime with the fewest economic and social costs possible' (Clarke, 2010, as cited in Mayhew & Hough, 2012, p. 18–19) and provides an established structure to develop methods to prevent package theft. The application of SCP techniques is only successful when it is focused on a specific category of crime (Clarke, 2017), such as porch piracy rather than 'theft' (broadly speaking). For example, SCP has been used to examine the use of gas poisoning to complete suicide in the UK (Clarke & Mayhew, 1988), residential burglary in a particular town (Poyner & Webb, 1991), occupational corruption (Tunley, Button, Shepherd, & Blackburn, 2018), public transportation crime in El Salvador (Natarajan et al., 2015), wildlife poaching in Uganda (Moreto, 2019), and more (see Guerett, 2009 for a review of 206 SCP projects).

Method

Data

We searched for videos available on YouTube.com from February to March 2018 using the following terms: 'porch piracy,' 'package theft,' and 'package thieves.' When selecting videos, we applied the working definition of optimal capture, 'visual data must enable researchers to establish a seamless sequence of relevant lower-level action and provide compelling empirical evidence for systematic links between those actions' (Nassauer & Legewie, 2018, p. 21). In other words, inclusion in this study required, (1) a video of at least one individual removing a package(s), (2) from a residential property, (3) and captured the majority of the suspects' entry onto the property, the theft, and the exit. We excluded

videos that showed the same location being targeted multiple times, the theft of only non-packaged items (e.g. letters, bicycles), videos of poor quality, and those that did not capture the suspects' approach, theft, and exit. Sixty-seven videos ($n = 67$) met the criterion and were incorporated into the analysis.

Variables

After an initial screening of many of the videos and review of the crime scripting literature, we identified three unique stages of porch piracy; (1) entry: how the criminals approached the property, (2) execution: how they executed the theft and (3) exit: how they exited the property. In addition to collecting data in these areas, we also collect information about the offenders and packages. [Table #1](#) displays the variables recorded in the present study.

Analysis

Two of the authors used an iterative process of inductive coding by viewing dozens of videos together while discussing, interpreting, and identifying the possible coding schemes. Once the initial codes were established, a third researcher tested the coding scheme and

Table 1. Variable table.

Variables	Categories
<i>Perpetrator Characteristics</i>	
Number of perpetrators who committed theft	1, 2, 3, 4+
Number of accomplices	1, 2, 3, 4+
Did the accomplice(s) stay in the vehicle	yes/no
Sex of perpetrators involved	male/female
Race of perpetrators involved	Black, Hispanic, White, Asian, other
Blatant attempt to disguise appearance	sunglasses, hoodie/coat, hat, other
<i>Transportation Characteristics</i>	
Means of Transportation	car, truck, van, SUV, motorcycle, bicycle, skateboard, by foot
Vehicle Parking/Idling Location	in the street, in driveway, other
Vehicle Orientation in Driveway	pulled in, backed-in the driveway
Was a vehicle door left open to facilitate escape	yes/no
<i>Place Characteristics</i>	
Distance from theft location to road	close (0–25 ft.), intermediate (26–50ft.), far (51+ ft.)
Time of Day	day/night
Gate Presence	yes/no
Was the gate closed	yes/no
Fence presence	yes/no
Property owner's vehicle	vehicle was on the property/was not on the property
<i>Stolen Package Characteristics</i>	
Number of packages/items	1, 2, 3, 4+
Size of packages/items	small, medium, large
Is the package visible from the street	yes/no
The package marked by a specific retailer	yes/no
<i>Approach Characteristics</i>	
The approach of the property	walk/run
Vehicle cased the neighborhood	yes/no
<i>Theft Characteristics</i>	
Attempted to see if anyone was home	doorbell, knocked, looked through windows, looked around
Return for multiple packages (same theft incident)	returned 1 time, 2 times, 3+ times
<i>Exit Characteristics</i>	
The exit of the property	walk/run

provided feedback. After this iteration, adjustments were made to the coding scheme (see [Table #1](#)), and data collected with each video was reviewed independently by three coders. This deductively driven process, as encouraged by Lindegaard and Bernasco (2018) and demonstrated by Liebst, Heinsku, and Ejbye-Ernst (2018), resulted in a standard coding scheme that was adopted by all researchers and enhanced consistency, reliability, and validity. Acknowledging a call to incorporate inter-coder reliability in VDA (Lindgaard & Bernasco, 2018) and enhance specification, verification, and validation in CSA (Borrion, 2013), the authors independently coded each video. Next, we used the resulting data and Kleiss's Kappa value for each variable to measure observer agreement. Values of Kappa close to 1 show perfect agreement, while values closer to 0 imply agreement expected by chance. In the present study, the Kappa values ranged from 0.307 to 0.981, with an average of 0.642. Using the scale developed by Landis and Koch (1977), the average Kappa value suggests substantial agreement among coders. Some aspects of interpreting visual data are more difficult to be precise, such as distances and the way they exited the property. Therefore, if two out of three agreed, that code was chosen. However, if no agreement was reached, the data was coded not applicable or unknown.

Findings

Offender analysis

This study is the result of a purposive sample, and therefore, findings should not be considered representative of the general population. Further, identifying demographics such as age, gender, race, and other offender features from short videos is difficult to be precise and resulted in the lowest inter-coder reliability. However, because this is the first known study of this emerging crime type, the information may be valuable for future research and is presented.

The study revealed a nearly even split of offender sex with 34 men (49%), and 35 women (51%). Due to the difficulty in determining age, we opted to define those who appeared under 45 years of age (94%), those who appeared over 45 (3%), and persons upon whom there was no coder agreement (3%). Evaluation of the suspects' race resulted in identifying 36 white individuals (54%), ten black individuals (15%), 6 Hispanic persons (9%), 2 Asian individuals (3%), and 13 persons (19%) who agreement could not be reached. We also sought to examine socioeconomic status by evaluating the offender's appearance, clothing, and transportation. Based on this information, we identified 20 people (30%) as lower status, 45 individuals (67%) as middle status, one person (1.5%) as upper status, and only one person (1.5%) could not be identified, or coders could not agree.

Package analysis

Understanding the type, size, number, visibility, and distance of the packages from the street is vital to understanding how package theft occurs and identifying prevention efforts. We set three distance ranges between the porch and roadway finding 41 thefts (61%) occurred at 25 feet or closer, 20 thefts (30%) occurred between 26 and 50 feet, no

(0%) recorded thefts took place at more than 51 feet, and in 6 incidents (9%) there was no agreement or an unknown distance.

There were 98 packages stolen within the data. In four instances, the thief was interrupted during the crime and left the packages as they fled; these packages are not included in the count of total stolen packages. Therefore, of completed thefts ($n = 63$), the averaging number of packages stolen is just over 1.5 per incident. However, the most frequent theft was of a single package (39%), followed by two packages (18%), three packages (6%), and six packages (1%).

The stolen item size was evaluated based on the largest package. Findings reveal small packages described as being 12 inches or less in all dimensions accounted for 26 (40%) of thefts, medium packages identified as between 13 and 36 inches in measurement had the highest number of thefts contributing to 32 (48%) of thefts, and large packages of greater than 36 inches in diameter accounted for 8 (12%) of thefts. Regardless of what size the packages were in 62 incidents (93%), they appeared to the researchers to be visible from the street. Lastly, 31 thefts (46%) of packages had a brand name displayed on the package (e.g. Amazon), while 33 (49%) had no identifying brand, and three (5%) were undetermined.

Crime script analysis

According to Borrion, 'crime scripts should be rich enough to include the range of information needed by designers to devise physical control measures' (2013, p. 6). However, because most videos of crimes on YouTube only include the actual crime event and perhaps a few seconds of footage before and after, the analysis was limited to the data available. Under these constraints and following previous CSA research examples, we identified three unique stages of package theft; approach, execution, exit. Each stage is explained and described below.

Approach

There were few fences to block the approach of offenders observed in the videos ($n = 5$), accounting for about 7% of all incidents. In each case, a gate was present, and in only one incident was the gate locked. In 21% of cases ($n = 14$), a resident's vehicle was clearly seen parked on the victims' property. In contrast, in the remaining cases, a vehicle was absent (48%), or it was unclear based on the video (31%). Very few of the offenders (12%, $n = 8$) appeared to 'case' the residence before the theft. We classified casing as making several trips past the residence and looking around the area. This may be an artifact of short video clips edited to show the 'theft' and not capture details before or after. Those who did case the property tended to walk or drive by several times or park in front of the property for some time observing the surroundings.

While only a few 'cased' the property, a significant portion (60%, $n = 40$) looked around the surroundings while walking to the porch. In other words, as they approached the property, they could be observed visually scanning the area around the home more than a person would typically do, resulting in what could be described as suspicious behavior. As the offenders approached, 72% ($n = 48$) walked in what appeared to be a leisurely manner, 24% ($n = 16$) walk or ran quickly, and in 4% ($n = 3$), the researchers had no agreement. In only seven incidents (10%), was there any attempt by the thief to disguise themselves. Of those who did the most common method was a coat or hoodie (60%,

$n = 6$) or holding a hand to block a camera's view or wearing large sunglasses (40%, $n = 4$). None of these efforts appeared to be particularly useful.

Upon arriving at the porch, five individuals (7%) appeared to knock on the door or ring the doorbell before taking the packages. It was not always clear from the video if the suspects actually knocked and rang, and in a few cases, these efforts appeared to be a deception while looking around the property. While not explicitly coded for, the researchers noticed several cases where suspects would approach the home with something in their hands. In a few cases, this appeared to be some paperwork. During one theft, a suspect brought the empty garbage can from the street back to the house before stealing a package. In three instances, a suspect had a small package with them when they approached. In each of these cases, it seemed the item was to be used as an available ruse if interrupted; for example, a fake delivery attempt to reduce suspicion or a homeowner appearing to be returning a garbage can.

Execution

The execution stage is when the actual 'theft,' which occurs, i.e. possessing a package with the intent to deprive the owner. For the present study, we classified this as the moment the offender took the package. The following provides a description of these features as well as offender actions during the execution of the theft. All of the thefts occurred during daylight hours. It is difficult to say if this was because residential camera footage is clearer during the day, if porch pirates rely on daylight to see if packages are present, or if more residents are home in the evening, thereby reducing opportunity.

Generally, (96%), there was only one offender who approached the residence and took a package. However, in three instances, two individuals worked together to accomplish the theft. Conversely, in 25 incidents (37%), there was an accomplice. These accomplices were identified because they took some 'active' part in completing the crime, such as serving as a lookout or, most commonly (80%), serving as an escape driver.

During the actual theft, most thieves ($n = 49$, 73%) did not make any explicit attempt to determine if a resident was home. While in 13 incidents (19%), it was unclear if an attempt was made. In five incidents (8%), the thieves made a distinct effort to determine if someone was home before the theft included ringing the doorbell (2 incidents) and knocking (3 incidents). In only two cases (3%) did the thieves open the package before exiting the property.

Exit

Most often (90%), the thieves took the item from the porch area and exited the property. However, in seven cases (10%), the offender made multiple trips between the street area and the porch to retrieve multiple items. In these instances, the multiple return trip was to continue taking packages that could not be carried in a single trip. Similar to the approach, the manner they left the property was recorded as either leisurely or quickly. Generally, (60%) of offenders exited the property quickly, either running or moving fast to exit the property.

After the package had been taken, the highest portion of offenders used a vehicle to exit the scene (61%). In 22 incidents, a car was used, 13 thefts used an SUV or van, and in six incidents, a truck was used. Unusually, in two cases, a U-Haul rental vehicle was used. In 50% of incidents ($n = 34$), the vehicle was left parked on the street in front of the

residence, and in seven incidents (10%), the thief pulled the vehicle onto the victims' driveway. When the suspects' vehicle was parked in the driveway about half the time (42%), they backed the vehicle in. Further, regardless of where the vehicle was parked, a high number of suspects left a door or trunk open (54%, $n = 23$) while they approached the porch and then used the open the door to quickly place the package inside the vehicle upon return. Of the incidents that did not use a vehicle, the majority were on foot ($n = 20$), and the remainder ($n = 5$) used a skateboard or bicycle.

Discussion

Package theft is an emerging crime trend, and little is known about how often it occurs, who engages in the theft, and how the theft is accomplished. Using Video Data Analysis of actual thefts, we examined the incidents using a Crime Script Analysis and identified three stages of the theft; entry, execution, and exit. Next, we will discuss important aspects of this crime type and identify Situational Crime Prevention techniques that can be used by victims, police, and package delivery organizations to block opportunities to commit package theft.

Situational prevention of porch piracy: some proposals

Due to the purposive sample used to analyze porch piracy, these proposals for intervention are speculative. Drawing on SCP techniques described by Cornish and Clarke (2003), we have identified several techniques that appear particularly applicable to porch piracy. Specifically, we concentrate on increasing the effort, inducing the risk, and reducing the rewards.

Reduce the rewards

Reducing the rewards or benefits the offender expects to obtain from the crime is an essential step in disrupting crime. However, because offenders do not know what is inside the package, reducing the rewards must be addressed in a general sense. With porch piracy, part of the reward is likely the hunt, discovery, and successful theft of the package, with the contents being the secondary reward. Therefore, to reduce the known rewards, two efforts are practical: concealing the target and removing the target.

Concealment involves efforts to disguise, camouflage, or hide a package. This is important as the crime script analysis revealed that 98% of packages were visible from the street, with 61% estimated to be within 25 feet of the roadway. These packages tended to be of medium size (e.g. between 13 and 36 inches), and 46% had clear branding (e.g. Amazon) on the package. High visibility from roadways and easily recognized brands are likely a critical factor in package theft; therefore, concealing delivered packages should be considered. Methods to conceal unattended package delivery include placing packages inside a storm door or behind a plant, column, furniture, or another object on the porch. For areas particularly prone to porch piracy, placing an empty storage container on the porch to conceal packages could offer protection as it is unlikely that thieves would break the crime script by walking up to the house to see if a package had been delivered. Alternatively, delivering packages to a side or rear door may conceal many packages from direct street views. Retail and delivery companies may consider removing the branding from their packages, so they are less identifiable and enticing. Finally, delivery to established United States Postal Service boxes at the roadway or through

mail slots installed in a residential home, when size permits, also reduce the visibility of packages and may reduce theft.

Removing targets can be accomplished in many ways. The first is by the homeowner as soon as a package is delivered. To reduce unattended package delivery, shipping organizations may consider shifting delivery hours during the afternoon or the evening to coincide with when more people are at home. Further, when leaving a package, a knock on the door or ring of the doorbell is an inexpensive and quick way to notify the resident of the arrival of a package. For organizations with the technology in place, electronic notification of delivery may also reduce the amount of time a package is unattended on the porch. Expanding on this concept Amazon has developed Amazon Key, which allows a delivery drive onetime access to a home to place the package inside. Another technique developed by Package Guard is a small object that is secured to the porch that senses when a package is delivered and notifies the resident. Although less convenient for many persons, delivery at an alternative location such as a nearby convenience store, postal store (e.g. USPS, UPS, FedEx, Amazon Locker), or community neighbor is likely to affect rates of theft. All of these efforts either remove the package or reduce the time packages are left unattended.

Increasing the effort

All things being equal, offenders tend to select targets that require the least effort and fewest changes from their routine activities (Cohen & Felson, 1979). Increasing the effort involves making the offenders' activities more difficult or inconvenient. While the present study did not reveal that the presence of a fence inhibited thefts, prior research indicates fences are useful tools to increase the effort required to enter the property for other crimes (Wortley & McFarlane, 2011), and should be considered among other methods to increase the effort for criminals. Additionally, the present study observed no theft when the distance from the porch to the roadway was over 50 feet. Therefore, the position of houses with the roadway appears to have an impact on theft and may be related to the effort needed to walk or drive the distance from the road to the porch.

Another method for increasing the effort involves target hardening, which encompasses obstructing offenders, usually with locks, barriers, and other techniques to protect the object from crime. Several target hardening methods could be applied to block opportunities for package theft. These include methods that both conceal and secure a package such as allowing delivery companies to deliver inside a home (e.g. Amazon Key), directly to a vehicle truck (e.g. Phrame), or a lockable box on a private porch.

Other alternatives include bags (e.g. Porch Pirate Bag) made of reinforced ballistic nylon with instructions for delivery companies to insert packages into them and secure them with a lock to the door. Some residents may consider using bars and gates to block porch areas to all but residents and delivery personal. However, these alternatives may not be ideal, as the items are not concealed. Thieves may still put forth the effort to complete the theft since the item is observable.

Increase the risks

The risk of detection is generally thought of as an essential part of an offender's decision-making process. Increasing risks involves making it more likely that the offender will be observed. Therefore, increasing risk includes extending guardianship, strengthening

formal surveillance, increasing natural surveillance, reducing anonymity, and utilizing place managers (Cornish & Clarke, 2003). One popular method is the installation of home video surveillance, which is thought to extend guardianship. However, the deterrence impact by cameras is unknown as the present study only included video of criminal acts. Another technique could be to post signs indicating the home is under surveillance. However, the CSA in this study did not find thieves were concerned about cameras, as only 8% took any effort to conceal their identity – even when several observed the camera.

Because most package thefts are occurring during daylight hours, traditional motion lights and other techniques to increase the risk of identification of the thief may not be effective. However, a unique item mentioned before, Package Guard, not only automatically notifies homeowners when a package arrives, but also set off an audible alarm if the package is removed before the homeowner disables the alarm. While this product provides no physical prevention, the alarm may increase the risk of a thief being observed or captured and thus prevent the theft. Formal surveillance can be increased by forming neighborhood watch groups and notifying neighborhood residences as soon as theft occurs. Other forms of formal surveillance and guardianship include training delivery drivers to observe for suspicious behavior, and notifying police when and where these crimes occur so additional patrols can be implemented.

Many SCP techniques involve increasing natural surveillance; that is, the ability for others to see a home and for those in the home to see out. However, with porch piracy, careful consideration should be made when increasing natural surveillance as some efforts to increase surveillance may expose the unattended package to all who pass by on the street. A careful balance should maintain the ability for surveillance while allowing areas to conceal a delivered package.

Reducing the anonymity of delivery drivers may be an essential step to increase the risks. While difficult to determine in the present study, several criminals appeared to be masquerading as delivery drivers (i.e. in one case wearing a FedEx jacket), carrying 'dummy' packages, holding papers, and a clipboard, or driving a U-Haul were concerning. Delivery companies are encouraged to establish uniforms and clear ID to reduce anonymity and confusion among the community about who should be approaching homes.

Crime script analysis of porch piracy: some proposals

Crime Script Analysis is the process of breaking down a criminal act into stages to identify the best points to disrupt criminal activity. Due to limited video data before and after the crime, the present study was only able to approach from the roadway to the home, the execution of the theft, and the exit from the porch to the roadway.

Approach

The approach to a residence lasts only as long as it takes the offender to walk or run from the property edge to the porch – which in most cases is only a few seconds. Therefore, this is a problematic area to offer prevention techniques. The present study revealed that a fence, gate, visible cameras, residents' cars on the property, and other environmental factors did not appear to deter any thieves from approaching

a residence. Therefore, the most precise way to interrupt the approach is for the package to be hidden from view of the street. Without a visible package, the thief will likely never approach the home.

Execution

Here again, the execution of the theft takes only seconds as no tools or specialized skills are needed to acquire a package. Warning signs, cameras, and similar efforts may dissuade a thief after arriving at the porch. However, no evidence of this was observed in the present study. Moreover, a motion sensor that triggers an audible alarm or voice message acknowledging the presence of a person on the porch may increase the perception of risk and guardianship enough to discourage the theft at the point of execution. Lastly, increasing the effort at this point may reduce theft. For example, if a thief must break into a locked delivery box or cut through a cut-resistant package bag, the execution may be interrupted.

Exit

The final observable script for a porch pirate is the exit from the property. Here too, this is done quickly with few interruption points. However, neighbors, delivery personnel, and police should be observant for individuals who are walking or running from homes with packages in their hands. The present study observed only two instances of thieves who attempted to conceal the items upon exit. Similarly, in four instances, a thief was interrupted by the homeowner, and in each of these cases, the thieves were exiting the property. Therefore, the exit stage may provide the most overt circumstances that are readily identifiable to others and thus be an essential area to focus on interrupting the script.

Limitations and future directions

During a review of current VDA research and reflection on their research, Lindgaard and Bernasco (2018) described lessons learned when conducting VDA, several of which are presented here as limitations to the present study. First, there is a video selection bias when utilizing surveillance videos uploaded to YouTube, such as an overrepresentation of criminal failures or humorous events. Secondly, and related, cameras do not always capture other aspects of the crime, such as what occurs before or after the crime, or when a suspect walks out of view of the camera.

Thirdly, many of the features of VDA and SCA are difficult to be precise. For instance, deciding on the distance to the roadway, age of the offender, size of a package, if the offender ran or walk. To address this concern, we measured inter-coder reliability and had an average Kappa score indicating Substantial Agreement across the variables; however, we struggled for inter-coder reliability in imprecise areas (e.g. distance to the roadway). Therefore, the results should be interpreted cautiously. Lastly, similar caution should be taken when examining demographics and other aspects of the results as this study uses a purposive sample of YouTube videos and cannot be broadly applied in all situations.

Due to the limited nature of this research, we call for future studies to triangulate these findings with other sources. Specifically, we believe that focusing on victim surveys, offender interviews, and official police data (when it becomes available) will provide

continued insights into this unique problem. We also recommend police agencies encourage victims to report thefts and begin keeping records of package theft as most agencies include package theft within a general code of 'theft' or 'larceny.' Without adequate and specific data on this crime, additional efforts to reduce it will be hampered.

Conclusion

Online shopping is exploding in growth in the United States, and along with that is a dramatic increase in shipping and unattended package delivery. As a result, package theft is a growing concern, as indicated in a survey of 2,000 consumers finding 36% have experienced a package theft (C + R, 2019). This present study is the first known scholarly research addressing this emerging crime trend. It provides valuable insights into the techniques thieves use to steal packages along with methods to prevent this crime.

The present study reveals important and unique features of this crime, the offenders, the environment, and criminal methods. The offenders were split evenly between women and men, racially mirrored the general population, and most (67%) appeared to be middle class. In this study, there were 98 packages stolen during 67 theft incidents. Thefts all occurred during daylight and more frequently when the home was closer to the roadway, with 61% occurring within 25 feet and the remaining between 26 and 50 feet. In 93% of cases, the packages were visible from the roadway, and 46% had some brand clearly on the package. Medium-sized packages (between 13 and 26 inches) were stolen more frequently (48%), followed by smaller packages (12 inches) at 40%.

A Crime Script was developed to allow for close examination of package theft and to enable Situational Crime Prevention techniques to be applied at different stages. These stages were identified as the approach to the residence, the execution of the theft, and the exit of the property. During the approach, gates, cameras, and resident vehicles on the property did not appear to interrupt the crime. Further, few thieves were observed 'casing' the area or taking any precautions to conceal their identity. During the execution of the theft, generally, only a single thief (96%) took the packages; however, in 37% of cases, an accomplice was serving as a lookout or escape driver. Few thieves, 8%, made any effort to determine if anyone was at home during the theft. During the exit from the property, only 10% returned for additional packages, most (60%) exited the property quickly (running or walking fast), and 60% used a vehicle to exit.

The most useful Situational Crime Prevention techniques that can be used to interrupt the crime script involve reducing the rewards, increasing effort, and increasing the risk. Within these techniques, concealing packages and removing packages are likely the most effective. These efforts can occur in many ways, including concealing packages behind items on the porch or inside non-locking boxes so they cannot be seen from the roadway. Additionally, notifying residents of package arrival, delivering later in the day, or delivering directly to stores, neighbors, package delivery points, inside the home or vehicle, or within a locked box on the porch will likely be effective. Finally, increasing the risk via formal surveillance, including monitored cameras (e.g. Amazon Ring), neighborhood watches, police patrols, training on suspicious behavior to delivery drivers, alarms and more, may also interrupt the crime.

Unfortunately, with limited information on how often package theft occurs, where it most frequently occurs, who commits the crime, likely victims, and other vital factors, this

crime will likely continue to grow in popularity. This present study has taken the first step in understanding how package theft occurs and offered suggestions to prevent and interrupt the crime. Additional data and research into this emerging crime must be undertaken to have a full understanding of prevention methods. What does seem clear is that any efforts of increasing risks, reducing the rewards, or increasing the risk at any point in the crime script will need the cooperation of residents, delivery companies, researchers, innovative private companies, and police. We, therefore, encourage collaborative efforts to address this crime by collecting and sharing data and continued evaluation of Situational Crime Prevention and Crime Script Analysis to identify methods to prevent this emerging crime type.

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Notes on contributors

Ben Stickle, Ph.D., is an Associate Professor of Criminal Justice Administration at Middle Tennessee State University. With nearly twenty years of practitioner experience, his research focus is on applying theory to practice in the areas of policing, crime prevention, and property crime (metal theft & package theft). Ben has published several scholarly journal articles as well as the book *Metal Scrapper and Thieves: Scavenging for Survival and Profit* (2017, Springer).

Melody Hicks, BS, is a graduate teaching assistant in the Criminal Justice Administration Department at Middle Tennessee State University. Her research interests include crime analysis, situational crime prevention, corrections, and substantive criminal law.

Amy Stickle, MAE, is a Mathematics Lecturer in the University Studies Division at Middle Tennessee State University. Teaching courses in Algebra and Statistics, her research interests include math anxiety and the application of mathematical and statistical concepts in criminal justice.

Zachary Hutchinson holds a bachelor's degree in Criminal Justice Administration and is pursuing a degree in Computer Science from Middle Tennessee State University. His research interests involve crime data analysis and crime trend modeling.

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