

The Pursuit



“You are to appoint judges and officers for all your gates [in the cities] your G-d is giving you, tribe by tribe; and they are to judge the people with righteous judgment. You are not to distort justice or show favoritism, and you are not to accept a bribe, for a gift blinds the eyes of the wise and twists the words of even the upright. Justice, only justice, you must pursue; so that you will live and inherit the land your G-d is giving you.”

Deuteronomy 16:18 – 16:20



About *The Pursuit* Journal

The Pursuit, a publication of the Criminal Justice Association of Georgia (CJAG) is a peer-reviewed journal that focuses on the broad field criminal justice. *The Pursuit* publishes scholarly articles relevant to crime, law enforcement, law, corrections, juvenile justice, comparative criminal justice systems and cross-cultural research. Articles in *The Pursuit* include theoretical and empirically-based analyses of practice and policy, utilizing a broad range of methodologies. Topics cross the spectrum of policing, criminal law and procedure, sentencing and corrections, ethics, juvenile justice and more, both in the United States and abroad.

Authors interested in submitting manuscripts for consideration should use the link on the CJAG website (<http://cjag.us>) or email the Editor of *The Pursuit* at cjagjournal@gmail.com

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About the Criminal Justice Association of Georgia

The Criminal Justice Association of Georgia is a not-for-profit organization of criminal justice faculty, students and professionals. It exists to promote professionalism and academic advancement in all areas of inquiry related to the Criminal Justice field.

The Association holds its annual meeting in October. Those interested in presenting at the conference should contact Professor Lorna Alvarez-Rivera (llalvarezrivera@valdosta.edu).

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Marijuana Impaired Driving

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Abstract

Marijuana is the most frequently detected drug (other than alcohol) in automobile accidents and research has shown that marijuana affects a number of driving related skills. As many states continue to legalize the use of marijuana for medical and recreational purposes, there are variety of issues that need to be assessed concerning marijuana-impaired driving. The purpose of this research article is threefold: (1) first, this paper will examine the current state of research in regard to the dangers of driving under the influence of marijuana, including an examination of crash risk; (2) second, the paper will examine current law enforcement practices with regard to the detection and arrest of drivers driving under the influence of marijuana, (3) lastly, the paper will examine an emerging technology known as the DRUID mobile application that may that utilized as a tool to help detect impairment among drivers under the influence of marijuana.

Introduction

Marijuana is the second most commonly used intoxicant in the United States and next to alcohol, marijuana is the most common illicit drug detected in drivers (Berning et al., 2015; Legrand et al., 2013; Pilkinton et al., 2013). It is believed that the prevalence of driving under the influence of marijuana will continue to increase as the as the general acceptance of marijuana by the public rises and additional states legalize the recreational use of marijuana (Eichelberger, 2019, *National Drug Threat Assessment*. U.S. Department of Justice, National Drug Intelligence Center; 2020). However, the scope and magnitude of marijuana-impaired driving in the United States cannot clearly be understood at this time because there only a few studies that have collected data on the use of marijuana by drivers, and most of these studies are outdated.

Over the last five decades, the National Highway Traffic Safety Administration (NHTSA) has conducted five national studies on the use of alcohol by drivers in the United States, from 1986 to 2014. In 2007, the NHTSA began collecting blood and oral fluid samples from paid volunteer drivers on the road and analyzed these samples for the presence of THC (tetrahydrocannabinol), the primary psychoactive agent in marijuana. Prior roadside surveys had only collected breath samples to determine breath alcohol concentration (BAC). The NHTSA study showed that THC was by far the most prevalent drug detected in this representative sample of drivers. Eight percent of the drivers tested positive for THC in 2007 and 12.6 percent of survey drivers tested positive for THC in 2014. On the other hand, the percentage of drivers testing positive for alcohol declined from 12.4 percent in 2007 to 8.3 percent in 2014 (Berning, et al., 2015).

In addition to the NHTSA studies, there have been two State-wide surveys of alcohol and drug use by drivers; one conducted in California in 2010 and 2012, and one in the State of Washington in 2014 and 2015. Both studies were designed to examine the effects of the legalization of recreational marijuana on the number of marijuana impaired drivers. The California study (Lacey et al., 2012) assessed the prevalence of alcohol, marijuana and other drugs used by nighttime drivers across six different California jurisdictions. Researchers collected oral fluid samples from over 1000 individuals and found that 8.5% of these drivers tested positive for THC, with a surprising degree of variability between jurisdictions (from 4.3% to 18.3%). This study found very little change in the prevalence of THC positive drivers after California decriminalized marijuana in 2012. The study in Washington State (Teft, 2016, Banta-Green et al., 2016) was designed to assess whether or not the percentage of drivers who tested positive for THC increased after retail sales of marijuana became legal in July 2014. The results of the study did show an increase in THC positive drivers. In 2012, 14.6 of drivers in Washington State tested positive for THC, and in 2014, 21.4 percent of drivers tested positive for THC. There was also a statistically significant increase in daytime prevalence of THC-positive drivers between 2012 (7.8%) and 2014 (18.9%).

As states continue to legalize the use of marijuana for medical and recreational purposes, there are variety of issues that need to be assessed concerning marijuana-impaired driving. The purpose of this research article is threefold: (1) first, this paper will examine the current state of research in regard to the dangers of driving under the influence of marijuana, including an examination of crash risk; (2) second, the paper will examine current law enforcement practices with regard to the detection and arrest of drivers driving under the influence of marijuana, (3) lastly, the paper will examine an emerging technology known as the DRUID mobile application

that may that utilized as a tool to help detect impairment among drivers under the influence of marijuana.

The Risks of Marijuana Impaired Driving

While the risks posed by driving under the influence of alcohol have been well known for decades, a much small number of studies have examined the associated risks of driving under the influence of marijuana. Unlike alcohol, marijuana is classified as a Schedule I substance under the Controlled Substances Act. Schedule I drugs are defined as drugs, substances, or chemicals with no accepted medical use and a high potential for abuse. Marijuana being classified as a scheduled I drug may contribute to the lack of research in this area. U.S. researchers face daunting regulatory hurdles to studying any Schedule I drug, including a rigorous approval process by both the Drug Enforcement Administration (DEA) and Food and Drug Administration (FDA) for every purposed study. Several of these barriers include: the need for a government license to obtain, store and use marijuana, security requirements for storage, and documentation requirements and disposal requirements. The substantial layers of bureaucracy that emerges from cannabis's Schedule I categorization is reported to have discouraged a number of cannabis researchers from applying for grant funding or pursuing additional research efforts. Many scientists have been calling for the federal government to reschedule the drug, which would open the door to more medical research into marijuana and its potential effects, both beneficial and harmful (Nutt et al., 2013).

Several studies have shown that marijuana affects a number of driving-related skills (Lacey et al., 2009; Walsh et al., 2005; Berning, Compton & Wochinger, 2015). The effects of

marijuana on driving includes impaired motor skills, poor judgement, delayed reaction times, and a decreased ability to track objects (Menetrey, et. al., 2005; Lenné, M.G., et al., 2010; Hartman, 2013). Driving simulator research has found that the standard deviation of lane position (SDLP), or weaving within a lane, is the most sensitive measure of cannabis impairment, and is commonly exhibited in cannabis impaired drivers. SDLP has been demonstrated to be dose-dependent and performance on this measure results in an additive deficit when alcohol is also involved (Hartman et al., 2015). A 2015 study on driving after smoking cannabis found that THC in marijuana also impairs a driver's ability to multitask, a critical skill needed behind the wheel (Desrosiers et al., 2015).

On the other hand, other simulator studies show the drivers under the influence of marijuana typically drive slower, follow cars at greater distances, and take fewer risks than when sober. In contrast, subjects under the influence of alcohol typically drive faster, follow at closer distances, and take greater risks. (Stein, et al., 1983; Smiley, et al., 1981; Smiley, et al., 1986; Casswell, 1977; Robbe and O'Hanlon, 1993). Researchers have suggested that drivers under the influence of marijuana often tend to compensate for the effects of marijuana by taking less risks. In fact, a study conducted by Hartman et al. in 2016 found that those drivers who used both marijuana and alcohol were less like to speed than those drivers who used only alcohol. It seems that marijuana appeared to mitigate some of the effects of marijuana by causing drivers to drive more "carefully" than drivers who were only under the influence of alcohol. In fact, Ramaekers (2014) found that marijuana impaired individuals tend to overestimate impairment resulting from marijuana use, which may result making the less likely to attempt to drive, or at least driving more carefully if they do drive.

Several studies have found that there is a greater crash risk for drivers under the influence of marijuana compared to sober drivers, however, that risk is still not as great as it is for drivers driving who are under the influence of alcohol. Data from a 2010-2012 study in Virginia Beach examining over 3,000 crashes found that drivers under the influence of marijuana were 1.25 times more likely to be in an accident than that of an unimpaired driver (Compton and Berning, 2015). A meta-analysis by Li (2012) examined nine studies on marijuana and crash-risk found that crash risks estimates ranged from 3.42 to 0.85 times. The overall risk estimated for being involved in an accident while driving under the influence of marijuana was 2.66 times, which is roughly comparable to the increased crash risk of having a blood alcohol content of between .01% and .05%, well below the legal *per se* impaired level of .08 BAC. For purposes of comparison, a driver with a BAC of .08% is considered to be five to 20 times more likely to be involved in a crash than an unimpaired driver.

Other studies have found that being under the influence of marijuana while driving does not increase crash risk. Unlike, alcohol, these studies show that the percentage of drivers involved in a crash who tested positive for marijuana was extremely low. A study in Arizona, for example, found that less than one percent of drivers involved in a crash in 2012 were under the influence of marijuana (Fernando, 2014) and similar nationwide study conduct by the United States Traffic Safety Administration in 2014 showed that out of 986,173 drivers who were involved in a fatal accident, only .13 percent tested positive for marijuana (Berning et al., 2015).

While there is evidence that shows that marijuana use does negatively affect driving skills, there is a not a clear association between marijuana-impaired driving and risk of fatal accidents. More research in this area is needed to learn about the risks of marijuana-impaired driving and how best to address the problem. In January 2018, the National Highway Traffic

Safety Administration launched a new initiative to address drug-impaired driving that includes more research on the effects of marijuana on driving (Governors Highway Safety Association, 2018).

Marijuana Impaired Driving and the Enforcement of Per Se Laws

Most states have two driving under the influence (DUI) laws: (1) a per se law and (2) a less safe law. The Illegal Per Se Law makes it an offense in and of itself to drive while having a drug or alcohol level that is at or above state's level. To convict a driver of a per se violation, it is sufficient to establish that the driver's blood alcohol level (BAL) was at or above state's level while operating a vehicle in the state. It is not necessary to establish that the driver was impaired nor is required for the state to demonstrate that the driver's ability to drive was affected by drugs and/or alcohol. The illegal per se law makes it an offense in and of itself to drive while having a BAL at or above the legal limit (Lacey, 2010).

In most states, the "per se" level of impairment for drivers under the influence of alcohol is 0.08 grams or more, meaning that if your BAL is at or greater than that level you are, by law, under the influence of alcohol and "too drunk to drive." While police can use breathalyzer tests to detect the level of alcohol in a driver's blood at the time of his arrest, not such reliable breath test currently exists to immediately determine the degree to which a driver is impaired by marijuana. If an officer has reasonable suspicion that a driver is under the influence of drugs, the office can request a blood or urine to test for the presence of drugs. If a driver refused this test, it leads to an automatic suspension of the driver's license. In most case, when a driver consents to

a drug test he or she is taken to a testing facility (such as a hospital) where a lab technician takes a blood sample to test for drugs (Lacey, 2010).

Tetrahydrocannabinol (THC) is the chemical responsible for most of marijuana's psychoactive effects. Several states have established per se laws that are based upon the level of THC a driver has in his or her blood or urine. In Illinois, Colorado, and Montana, for example, a driver is per se intoxicated if he or she has more than 10ng/ml (nanograms per milliliter) of THC in their blood or urine. In fifteen states, such as Arizona, Delaware, Georgia, Indiana, and Pennsylvania, a driver is considered per se intoxicated if he or she has any amount of THC in their blood or urine. These states are known as zero tolerance states and prohibit driving with any amount of marijuana (including drug metabolites and derivatives) in the blood or urine.

There are, however, two major problems with using blood or urine tests to charge a person with a per se DUI. First, unlike alcohol, which is totally eliminated from one's body after 48 hours, it is possible that THC can be detected in the blood as long as 30 days after use. This is because THC remains in fatty tissues in the body and can be released back into the blood sometimes long after ingestion. Thus, while the acute psychoactive effects of THC may only last for hours, THC can be detected in blood long after use, sometimes weeks (Heustis, 2007).

Second, also unlike alcohol, which is metabolized at a relatively steady rate, THC is metabolized at an exponentially declining rate, where the THC blood level drops rapidly after the smoking of marijuana. THC levels in the blood peak approximately eight minutes after one uses marijuana. Within 30 minutes of use, THC levels in a user's body can drop to 80-90 percent of the initial peak level (Huestis, et al. 1992). However, the peak cognitive impairment of marijuana can occur almost 90 minutes after using the drugs (Huestis, 2002).

Blood alcohol levels are correlated with cognitive impairment. The higher the blood alcohol level a person has, the higher his or her cognitive impairment. This is not true for marijuana. Unlike alcohol, a person's peak THC level in their blood is not directly correlated with their level of impairment. Low concentrations of THC in the body may not be a good indicator of whether or not someone is experiencing lower levels of impairment, and high amounts of THC in a user's blood does not necessarily mean that the user is impaired. The few studies that have examined the relationship between THC levels and degree of impairment have consistently found that the level of THC in the blood and the degree of impairment do not appear to be closely related. Peak impairment does not occur when THC concentration in the blood is at or near peak levels (Deepak, 2008; Ward, 1999; Ramaekers et al., 2004; Menetrey et. al., 2005).

Scientists are not exactly sure why the blood levels of THC are not correlate with impairment. It may be the combination of several factors. One important factor may be tolerance, habitual or long-term users who develop a tolerance to marijuana may not exhibit impairment at blood levels that will impair first time users. In a 2012 study by Bosker et al., for example, persons who used cannabis daily and occasional cannabis users (those used cannabis 5-36 times a years) were administered 20mg of oral THC on separate occasions prior to participating driving session. The researchers found that magnitude of impairment was much stronger in occasional users than daily users. A study, by Papafotiou & Battistella (2005) found that there may be a lag time between when THC appears in blood and when THC enters the brain, putting blood THC levels out of synch with the occurrence of impairment. Some, or all of these factors, and perhaps others, may account for the inability of science to find a valid biochemical proxy for marijuana impairment.

In summary, detection of THC in blood or urine is indicative of prior cannabis use, but there is no reliable method of determining the timing of that use. The police, for example, may stop a suspected for driving under the influence of marijuana, however, it could take more than 90 minutes to assess the driver's state and collect a blood sample. In this case, police are likely to collect a blood sample that has long since passed the peak THC level. In another words, the police could collect blood samples from persons who are impaired from using marijuana and yet have very low levels of THC in their blood. On the other hand, if a police officer manages to process a suspect in a small amount of time (e.g. under 20 minutes), it is possible that they may obtain a blood test that has a high level of THC from a driver who may have a low level of impairment. Due to these limitations, per se laws and zero tolerance statues that rely solely on blood and urine tests should not be used to charge or prosecute someone with driving under the influence of marijuana. A number of states have successfully passed criminal laws imposing per se THC limits for drivers because they desire to have a law that mimics the .08 law used for alcohol. These laws, however, have no scientific merit and have serious errors in their application. In fact, in 2016 the National Highway and Traffick Safety Administration (NHTSA) stated that is it "inadvisable to try and predict effects based upon blood THC concentrations alone" (NHTSA, 2016: 26)."

Marijuana Impaired Driving and the Enforcement of Less Safe Laws

Since the accuracy of drug test that determine THC levels have recently come under scrutiny, many law enforcement agencies use a "Less Safe DUI (Driving Under the Influence)" law to prosecute motorists for driving under the influence of marijuana. This charge is not

dependent on blood or urine tests, instead it is based upon whether or not a law enforcement officer believes that a driver is “less safe” or impaired because of the use of alcohol or a drug. Under most state’s Less Safe DUI statute, a driver’s ability to drive must be impaired to such an extent that they pose a risk to the safety of others. In other words, a driver must show some sign of impairment—such as weaving, driving on the wrong side of the road, or swerving, for example. Under Georgia’s Less Safe Law, for example, a person shall not “drive or be in actual physical control of any moving vehicle while under the influence of alcohol to the extent that it is less safe for the person to drive” (Georgia Department of Safety, 2022)

An officer can use his observations during the DUI investigation to charge a driver with a Less Safe DUI. Several of the clues law enforcement officers look for when observing a possible drunk/drugged motorist are:

1. problems in maintaining proper lane position (e.g. weaving, straddling a lane line, swerving, and turning with a wide radius)
2. speed and braking problems (e.g. jerky or abrupt stops, unnecessary acceleration or deceleration)
3. vigilance problems (e.g. driving in the wrong lane, driving without headlights at night)
4. judgment problems (e.g. following too closely, not stopping at a stop sign)

Studies have found that all four of these cues are significantly related drunk driving and drivers who demonstrate such driving behavior have a high probability of being under the influence of alcohol. As discussed previously, marijuana can also cause a driver to fail to maintain proper lane position and have delayed reaction times, such as stopping too slowly.

After a driver has been stopped by the police, an officer will make personal contact with the driver and begin to interview them. During this interview, the officer observes the driver's behavior and looks for several detection cues of alcohol or drug impaired driving, such as red eyes, slurred speech, odor of alcohol or marijuana, or difficulty answering questions. During this interview, police often use divided attention test to help ascertain whether or not the suspect is under the influence of alcohol or drugs. Divided attention tests often require the driver to concentrate on two or more things at the same time. They include both questioning techniques and psychophysical (mind-body) tasks. An example of a divided attention test may be asking the driver to produce his driver's license and asking where he or she is going. Such a task forces the driver to divide attention between searching for his or her license and answering the question.

Possible evidence impairment during a divided attention test may be:

- ignores the question and concentrates only on finding their license or registration
- forgets to resume the search after answering the question
- supplies a grossly incorrect answer to the question
- produces documents other than the ones requested
- fails to find the license while searching through wallet or purse
- fumbles or drops wallet, purse, or license

If an officer suspects a driver is under the influence of alcohol, he or she may ask the driver to exit the vehicle and perform a Standardized Field Sobriety Tests (SFSTs) which are administered roadside. The standardized field sobriety test battery consists of the Horizontal Gaze Nystagmus (HGN), the Walk and Turn (WAT), and the One Leg Stand (OLS) test. HGN stands for Horizontal Gaze Nystagmus and refers to an involuntary jerking occurring as the eyes

gaze toward the side. In addition to being involuntary, the person experiencing the nystagmus is unaware that the jerking is happening. Involuntary jerking of the eyes becomes readily noticeable when a person is impaired. As a person's blood alcohol concentration increases, the eyes will begin to jerk sooner as they move to the side. In administering the HGN test, the officer has the suspect follow the motion the tip of his fingers or a pen. As a suspect's eyes follow the pen or fingertip, officers observe whether not the eyes move from side to side smoothly, or if they jerk (lack of smooth pursuit). Jerking of the eyes (nystagmus) may be a sign that the driver is under the influence of alcohol and/or a drug.

The second test in the Standardized Field Sobriety Test (SFST) is the Walk-and-Turn. During this test, the subject stands with their feet in heel-to-toe position, keep their arms at their sides, and listen to the instructions. This test divides the subject's attention between a balancing task (standing while maintaining the heel-to-toe position) and an information processing task (listening to and remembering instructions).

The third test in the Field Sobriety Test is the one-leg-stand. During this test, the subject must raise one leg, either leg, with the foot approximately six inches off the ground, keeping raised foot parallel to the ground, and count out loud for 30 seconds. The one-leg-stand divides the subject's attention between a balancing task (maintaining a stance) and an information processing task (listening to and remembering instructions). The decision is to arrest a driver for DUI is based upon all of the evidence a police officer has obtained before a driver is pulled over, during the officer's interview with the driver, and the results of the field sobriety tests.

In general, research has validated field sobriety tests for drivers under the influence of alcohol. In 1995, for example, the National Highway Traffic Safety Administration found that an officer's decision to arrest drivers under the influence of alcohol were correct 93% of the time

and their decision a driver who had used alcohol but was not impaired was 86% correct. The decision to arrest or not arrest was validated by blood tests. This study found that the horizontal gaze nystagmus has a 77% accuracy rate in detecting drivers under the influence of alcohol, the walk and turn a 68% accuracy rate, and the one-leg stand a 65% accuracy rate—and when all three were used together, they were correct 93% of the time in detecting whether or not a driver is under the influence of alcohol (Burns & Anderson, 1995). A more recent study by Stuster (2006) found that the SFST correctly identified 98% of individuals with blood alcohol levels above .08 and identified 71% of individuals who were had blood alcohol levels below .08.

While the SFST battery can detect alcohol impairment, studies have been relatively mixed in concluding whether or not the SFT battery can accurately detect marijuana impairment. In 2005, Papafotio et al. conducted a study which examined the effects of marijuana after subjects smoked a marijuana cigarette that contained three different doses of marijuana, no dose (0%), a medium dose (1.74% THC), and a high dose (2.93% THC). Papafotio et al. (2005) found that impaired performance on the SFST was positively related to the dose of the THC administered in that the subjects who received higher doses of the drug were more likely to fail the SFTS battery. In another study, Bosker and colleagues (2012) assessed the effects of smoking cannabis with and without alcohol on SFST performance in a study of heavy cannabis users. The results from this investigation showed that cannabis use was significantly related to impairment on the OLS test, however, was not significantly related to impairment on the WAT or the HGN tests. A large study of 2,000 drivers conducted by Porath-Waller & Beirness (2014) also found that cannabis adversely affects performance on the one leg stand (OLS) test, but not the HGN or the walk and turn (WAT) tests. In summary, studies have shown that the one-leg-stand test can

be a significant predictor of marijuana impairment, but the not the walk-and-turn test nor the HGN test.

Drug Recognition Experts and Marijuana Impaired Driving

Most police officers are not trained beyond SFST certification and have no other training to recognize behavioral signs of drugs other than alcohol. There are times, however, when a driver passes a standardized field sobriety test for the use of alcohol, but still appears under the influence of another drug. If a driver's impairment seems to be due to a drug other than alcohol, a patrol officer will often call a Drug Recognition Expert (DRE) to help him or her with the case. A Drug Recognition Expert (DRE) is a law enforcement officer trained to identify persons whose driving is impaired by drugs other than alcohol. In Georgia, for example, to become a DRE, a law enforcement office must complete a 240-hour course known as the Drug Evaluation and Classification Program (DECP), developed by the National Highway Traffic Safety Administration (NHTSA). The DECP trains law enforcement in the recognition of individuals who have been driving under the influence of drugs and helps them identify the type of drug causing impairment. Upon completion of the training officers are certified as a DRE

All DREs follow the same 12-step procedure called a Drug Influence Evaluation (DIE), to determine which category of drugs is causing the driver to be impaired. A DIE involves the following 12 steps:

1. Breath Alcohol Test: The arresting officer reviews the subject's breath alcohol concentration (BAC) test results and determines if the subject's apparent impairment is

consistent with the subject's BAC. If so, the officer will not normally call a DRE. If the impairment is not explained by the BAC, the officer requests a DRE evaluation.

2. Interview of the Arresting Officer
3. Pulse Rate
4. Eye Examinations
5. Divided Attention Psychophysical Tests
6. Blood Pressure and Second Pulse
7. Dark Room Examinations
8. Examination for Muscle Tone
9. Check for Injection Sites and Third Pulse
10. Subject's Statements and Other Observations
11. Analysis and Opinions of the Evaluator
12. Toxicological Examination: After completing the evaluation, the DRE normally requests a urine, blood and/or saliva sample from the subject for a toxicology lab analysis.

A driver under the influence of marijuana may present several “physiological markers.” These may include an elevated pulse, dilated pupils (in all light conditions), lack of eye convergence (one cannot cross their eyes), rebound dilation (dilation of pupils after a light has been applied and after eyes initially constrict), bloodshot eyes, eyelid tremors when eyes are closed, and body tremors while standing.

The Validity of the DREs Evaluation (DIE) in Detecting Marijuana Impaired Driving

Most of the studies that examine DREs ability to detect marijuana in impaired drivers can be divided into two categories: (1) laboratory studies and (2) field studies. Laboratory studies involve more controlled environments where some of the subjects are carefully administered cannabis (the experimental group), while other subjects are not administered cannabis (the control group). DREs are asked to identify which subjects are under the influence of marijuana and which subjects are not under the influence of marijuana.

There are only three laboratory studies, and all three studies show that DREs do not have a high success rate in identifying subjects under the influence of cannabis. All three studies have small sample sizes, less than 100 subjects. The first study conducted in 1985 by Bigelow et al. at the John Hopkins University School of Medicine found that DRE were very good at detecting subjects who were not under the influence of marijuana, however, officers were not very good at detecting subjects who were under the influence of marijuana. Only 48 percent of those who were administered marijuana were detected by DREs as being under the influence of a drug. Two laboratory studies conducted in the 1990s by Heishman et al. (1996 and 1998) found that DRE officers were not extremely accurate in detecting marijuana use among volunteers. In Heishman's 1996 study, 56 percent of the subjects who were administered marijuana were correctly identified by DREs and in 1998 study, only 39.7 percent of those subjects who used marijuana were correctly identified by DREs.

Field studies involve data that is collect from law enforcement officers who are observing real driver's that have been stopped because they are suspected of being under the influence of drugs. Most field studies usually involve larger samples and take place in more "realistic

environments,” however, field studies are more prone to more extraneous variables that may affect the results of the study. Like laboratory studies, there are very few DRE field studies, and the majority are outdated. The primary purpose of most field studies was to compare DRE officers’ evaluations with toxicology results to determine the accuracy of the DREs in identifying motorists who were under the influence of marijuana. The first DRE field study took place in 1985 in Los Angeles (Compton, 1986). In this study, 173 California drivers stopped by police because they were suspected on being under the influence of a drug. Of those 173 drivers, 143 agreed to give provide a blood sample. Of those 143 drivers, 65 had marijuana in their blood. Of those 65 drivers, DRE officers correctly identified 87 percent (56) drivers who were under the influence of marijuana. In a 1993 study, of 1,469 drivers in five different states, DRE officers were able to correctly identify 75.4 percent of drivers who were under the influence of marijuana (Hardin et al, 1993). A study conducted in Canada in 2008, found that out 600 drivers who were suspected to be under the influence of marijuana, DRE officers correctly identified 87 percent (Beirness et al, 2008). All three of these studies were presented at academic conferences, however, none of the three studies were published in peer reviewed journals.

More recent field studies have begun to examine the most effective cues or signs of marijuana use among suspected impaired drivers, rather than simply assessing the accuracy of DRE officers in identifying marijuana impaired drivers. These studies have assessed the validity and reliability of the DRE drug matrix (presented in Figure 1). Hartman et. al in 2016 examined the physical effects of marijuana of 302 drivers whose blood tested positive for THC with a control group of 302 police officers who had not used marijuana. The study found that the best predictors of marijuana use among subjects were an increased pulse rate, an elevated blood pressure, and dilated pupil size. However, there were not significant differences in these

predictors among subjects who had a THC level of 5ng/ml from those who had THC concentrations below 5ng/ml. In other words, drivers with THC concentrations below 5 ng/mL are just as likely as those with higher THC concentrations to show signs and symptoms consistent with cannabis use and impairment.

A recent study conducted in Declues et al. in 2017 calls in the question of many of cues or signs of marijuana uses used by DRE officers. The goal of this study was to examine DRE evaluations of drivers and to determine whether or not there is a correlation between THC use and DRE evaluations. This study was comprised of a total of 363 cases and examined three physiological indicators of marijuana impairment: (1) pulse rate, (2) blood pressure, and (3) pupil dilation. According to the DRE matrix in the DRE handbook, it is expected that a subject under the influence of marijuana should have a high pulse rate and a high blood pressure. DRE officers in this study did find that the majority of subjects with THC in their blood had an elevated pulse (83 percent), however, there was no correlation found between the amount of THC in the blood and the blood pressure exhibited by subjects. Per the DRE handbook, it is also would be expected for a subject under the influence of Marijuana to exhibit dilated pupils. However, in this study 61 percent of the subjects with THC in their blood had dilated pupils, not an overwhelming percentage.

Drug Symptom Matrix

	CNS Depressant	Inhalants	PCP	Cannabis	CNS Stimulants	Hallucinogens	Narcotic Analgesics
HGN	Present	Present	Present	None	None	None	None
VERTICAL NYSTAGMUS	Present* (High Dose)	Present* (High Dose)	Present	None	None	None	None
LACK of CONVERGENCE	Present	Present	Present	Present	None	None	None
PUPIL SIZE	Normal (1)	Normal (4)	Normal	Dilated (6)	Dilated	Dilated	Constricted
REACTION to LIGHT	Slow	Slow	Normal	Normal	Slow	Normal (3)	Little to none visible
PULSE RATE	Down (2)	Up	Up	Up	Up	Up	Down
BLOOD PRESSURE	Down	Up/Down (5)	Up	Up	Up	Up	Down
BODY TEMPERATURE	Normal	Up/Down/ Normal	Up	Normal	Up	Up	Down

A study conducted in 2021 by Olla, P. et al. found that visual testing (eye exams) was not an effective diagnostic tool in detecting marijuana use. In this study, the subjects of the study were given four rounds of visual testing: (1) before the use of marijuana, (2) 20 minutes after marijuana use (via inhalation), (3) 30 minutes after marijuana use, and (4) 90 minutes after the use of marijuana. With THC blood levels over 5nh/ml (the legal limit is several states) the majority of the participants maintained normal pupil sizes, indicating that visual testing may not be an effective diagnostic tool for the detection of marijuana use.

Discussion and Conclusion

The recently successful movements in many states to decriminalize or legalize some combination of medical and recreational marijuana have caused a predicament in the enforcement of marijuana-impaired driving. The predicament: What evidence is necessary to convict a driver of marijuana-impaired driving? In fifteen states, such as Arizona, Delaware, Georgia, Indiana, and Pennsylvania, a driver is considered per se intoxicated if he or she has any amount of THC in their blood or urine. These states are considered zero tolerance states and prohibit driving with any amount of marijuana in one's blood or urine is illegal. The problem with zero-tolerance approach THC can be detected well after (sometimes weeks) after the effects of the drug wear off (Heustis, 2007). Zero-tolerance laws may particularly punish those who used medical marijuana and maintain cannabis metabolites in their blood or urine, even though they may not be impaired while driving. Zero-tolerance laws targeting drivers with any illegal drugs in their systems simply do not make sense in states that have legalized marijuana or least medical marijuana.

Other states have attempted to treat marijuana like alcohol by establishing per se laws that are based upon the level of THC a driver has in his or her body. These laws attempt to be analogous to the per se .08 percent blood-alcohol concentration (BAC) impairment law by defining a marijuana DUI as driving with a certain quantifiable amount of THC in one's blood. In Illinois, Colorado, and Montana, for example, a driver is per se intoxicated if he or she has more than 10ng/ml of THC in their blood or urine. These states have reasoned that the way to criminalize DUI marijuana is simply to import the DUI alcohol model. The problem with this approach is that THC concentrations in blood or urine are not correlated with marijuana impairment (Deepak, 2008; Ward, 1999; Ramaekers et al., 2004; Menetrey et. al., 2005). Peak THC level can occur when low impairment occurs, and high impairment can occur when THC levels are low (Papafotiou & Battistella, 2005). Due this limitation, per se laws have no scientific merit and have serious errors in their application.

Face with the previous problems of using drug tests to charge persons with marijuana-impaired driving, law enforcement agencies have continued to rely on the testimony of Drug Recognition Experts (DREs) to detect and prosecute drivers under the influence of marijuana. DREs use "less safe" laws to prosecute motorists for driving under the influence of marijuana. In most courts, a DRE is considered an expert witness and his or her testimony is legally admissible because the DRE evaluation is considered to be a scientifically valid. A strong argument, however, could be made that there is not enough evidence to establish that the DRE evaluation is scientifically valid and therefore, the testimony of DRE officer should not be admissible in court. The DRE program itself is based upon the results of three outdated studies as proof that the DRE evaluation can reliably identify marijuana impaired drivers. These are the Adler (1994) study, the Compton (1986) study, and the Bigelow (1985) study. All three of these

three studies were funded, designed, and carried out for the purpose of establishing the admissibility of the DRE protocol. None of these three studies have been published in a scientific or medical journal, and none have been subjected to peer review by the scientific or medical communities.

When examining studies that have evaluated the DRE program the results of laboratory studies do not provide strong support for the accuracy of DRE program in detecting and correctly identifying marijuana impaired persons. The detection and identification of marijuana impaired persons were typically better than chance, while many cases were missed. Field studies, on the other hand, showed more positive results in that officers were often highly accurate in detecting marijuana impairment. Field studies, however, may exaggerate the accuracy of DREs due to the fact that there is no way to know the number of marijuana-impaired drivers who were stopped, but not suspect of drug use by the police and thus not subjected to a DRE evaluation. It could also be argued that laboratory studies are considered to be methodologically stronger than field studies, due to the controlled conditions under which volunteer participants are tested, the highly controlled conditions in which the experiment takes place. Field studies usually have no control groups and most field studies in this area of research have not been peer reviewed.

More recent studies have examined the specific physiological tests that DRE officers use to detect marijuana impairment, such as pulse rate and blood pressure. Some of these studies found that there is no correlation between the amount of THC in one's blood and blood pressure, pulse rate, or pupil size (Olla, 2021; Hartman, et al, 2016; Declues et al, 2017). One could also debate whether or not police officers themselves should be conducting medical tests that should be completed by trained health professions. Police officer are valuable in serving the community and enforcing laws, however, they are not health care professionals. Even so, the DRE 12-step

protocol requires the DRE police officer to test for blood pressure, pulse rate, pupil dilation, and other psychological functions that may be administered in a manner that distorts the results of some of the tests. Physicians, for example, are well acquainted with “white coat hypertension” in which a patient’s blood pressure jumps simply because the patient is nervous in the presence of a doctor. At the same time, it would not be unimaginable if a suspect’s blood pressure and pulse rate are high simply because of the stress of being pulled over by the police. In addition, approximately half of all adult Americans have high blood pressure, and many have elevated pulse rates, making these two detection cues practically useless as indicators of marijuana impairment.

On September 19, 2017 the Massachusetts Supreme Court decided the case of *Commonwealth v. Gerhardt*, SJC-11967 that dealt with the admissibility of field sobriety tests as they relate to operating a motor vehicle under the influence of marijuana. In this case, the defendant (Gerhardt) was stopped for driving without working taillights. Once stopped, an officer detected the odor of marijuana and in a subsequent search, officers found several marijuana roaches. Following the completion of several standardized field sobriety tests, Gerhardt was charged with operating a motor vehicle under the influence of marijuana. Gerhardt’s attorney motioned for a Daubert hearing, seeking to challenge the admissibility of evidence concerning his performance on the standardized field sobriety tests. A Daubert motion is used to assess whether or not an expert witness’s testimony is scientifically valid. This standard comes from the Supreme Court case, *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 509 U.S. 579 (1993). Under the Daubert standard, the factors that may be considered in determining whether the methodology is valid are: (1) whether the theory or technique in question can be and has been tested; (2) whether it has been subjected to peer review and

publication; (3) its known or potential error rate; (4) the existence and maintenance of standards controlling its operation; and (5) whether it has attracted widespread acceptance within a relevant scientific community (Owen, 2002).

The Massachusetts Supreme Court ruled that the term “field sobriety tests” cannot be used in court, rather the tests can be called “roadside assessments” and made several important rulings relating to marijuana impaired driving:

1. There is no current scientific agreement as to whether the field sobriety tests administered for suspected alcohol impairment are “indicative of marijuana intoxication”,
2. officers testifying in DUI marijuana cases cannot conclude that the performance of the tests resulted in the defendant passing or failing the test,
3. the roadside assessments do have some probative value,
4. police officers may not, absent being qualified as an expert, render the opinion that a defendant was under the influence of marijuana.

As more and more marijuana-driving cases come forward, the decision by the Massachusetts Supreme Court may play an important role in other states. It is yet to be seen whether or not the Massachusetts Supreme Court ruling in Gerhardt has set the stage for how courts should treat standard field sobriety tests for marijuana-driving-impairment cases. If so, there may be a need for a less invasive, more mobile, and more accurate means of detecting marijuana impairment than the tests given by DRE officers. One such test may be the DRUID mobile application.

Developed in 2018, the DRUID application is a mobile device developed for smartphones and I pads to be used as a computerized cognitive/psychomotor performance task to measure impairment. The DRUID test is intended to identify and measure impairment from alcohol and various drugs by measuring changes in divided attention, decision making, reaction time, motor tracking, and balance movement control. The DRUID app operates similar to a video game in that participants perform four 30-45 second tasks on a Iphone or Ipad. While a participant takes the test, the DRUID test measures neurophysiological indicators of impairment (Richman and May, 2019).

A recent study by Richman and May (2019) found that the scores of the two-minute version of the DRUID application of were significantly correlated with blood alcohol concentrations. The higher the scores on the DRUID application, the higher a subject's blood alcohol level. Two recent studies assessed the DRUID application's ability to measure impairment due to marijuana use (Spindle et al. 2021; Karoly et al, 2002). Both studies found that DRUID was successful in measuring marijuana impairment in subjects who used marijuana orally and through inhaling vapors. The use of DRUID mobile application showed that psychomotor impairment emerges immediately after marijuana use, but then decreases significantly one hour after use. The results of these two studies may show the value and the potential utility of the DRUID app as an effective tool for measuring marijuana-related driving impairment. The DRUID application and/other similar mobile apps could be another tool used by police officers to help them corroborate neurophysiological manifestations of chemical impairment. Future research should examine the validity and reliability of the DRUID application by law enforcement officers in the field.

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Single-Parenthood and Minor Children: Vulnerability Factors for Fear of Crime

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Abstract

Based on the literature, single parenthood can be considered as being a vulnerability factor for fear of crime. This vulnerability may vary as a function of children's age. Using multi-wave General Social Survey (GSS) data and Binomial Logistic Regression Modeling, this study examined the relationship between single parenthood and fear of crime and the role of children's age in this relationship. The results showed that having children under age 6 was a vulnerability factor for parents' fear of crime. This vulnerability was especially notable for single parents. The limitations and the policy implications of the current study are discussed.

Keywords: Fear of Crime; Vulnerability, Single-Parenthood with Minor Children; Children's Age

Fear of crime is a key measure of a society's well-being. People who are afraid of crime may change their behavior dramatically. They may reduce walking in public spaces (Foster, Giles-Corti & Knuiiman, 2014) or other social and recreational activities (Rader, Cossman, & Allison, 2009). For children, such changes are impediments to their mental health and well-being (Jackson et al., 2021). In addition, people who are afraid of crime may increase self-protective behavior (e.g., owning a gun for self-protection) (Pritchard, Jordan, & Wilcox, 2015). For families with children, owning guns elevates children's risk of unintentional firearm death (Hemenway & Solnick, 2015).

Criminologists have long endeavored to understand the etiology of fear of crime. Killias (1990) proposed a vulnerability hypothesis suggesting that people who are vulnerable to crime are more likely to have fear of crime, relative to those who are not. According to Killias (1990), vulnerability to crime is shown in three dimensions – an individual's exposure to non-negligible risks, loss of control (e.g., not having effective defense or protective measures), and serious consequences of victimization. Certain physical and social characteristics of individuals may render them especially vulnerable to crime and prone to fear of crime. By affecting the three dimensions of vulnerability, these characteristics increase individuals' vulnerability to crime, which in turn leads to elevated levels of fear of crime (Killias, 1990).

A number of characteristics have been identified as increasing individuals' vulnerability to crime. These include, but are not limited to, being elderly, female, a racial minority, poor, foreign-born, and having low educational levels. For example, the elderly may be more vulnerable to crime relative to their younger counterparts. They may have increased exposure to risks due to their limited ability of self-protection and are thus easy targets for offenders. Elderly people may also have a heightened sense of loss of control due to the fact that they, compared to

their younger counterparts, are generally less able to protect themselves in case of crime victimization. In addition, the consequence of victimization is especially serious for the elderly. Compared to their young counterparts, they are more likely to experience serious physical injuries, which usually takes longer for them to recover. Through affecting the three dimensions of vulnerability, being elderly increases people's vulnerability to crime, which in turn results in elevated fear of crime (Baumer, 1985; Lagrange & Ferraro, 1987).

Vulnerability Factors for Fear of Crime

The vulnerability hypothesis (Killias, 1990) has received some empirical support since its publication (e.g., Cossman and Rader, 2011; Rader, Cossman, & Porter, 2012). Empirical research showed different levels of support for the identified physical and social characteristics as vulnerability factors for fear of crime. Gender, race, and low income received relatively consistent support; while age, educational level, and foreign-born status as vulnerability factors received either mixed support or only attracted a small number of empirical examinations.

Consistent with Killias' (1990) vulnerability hypothesis, gender showed significant effects on fear of crime. Women generally reported higher levels of fear of crime than men, regardless of their actual risks of victimization (Fox, Nobles, & Piquero, 2009; Jennings, Gover, & Pudrzynska, 2007; Swartz et al., 2011). Using a sample of college students, Tomsich, Gover, and Jennings (2011) found that female students reported higher levels of fear of crime and perceived risk of victimization, relative to male students. Similar research findings were reported by Fox and associates (2009). Gender differences in fear of crime were also found among

community residents (Gover et al., 2011) and among the general population (Smith & Torstensson, 1997).

Consistent with the vulnerability hypothesis, race was shown to be a vulnerability factor related to fear of crime (Bernat, Aleman, & Gitelson, 2003; Burnham, Lomax, & Hooper, 2013). Comparing the fear of crime of elderly residents living in three adjacent communities, Bernat, Aleman, and Gitelson (2003) found that Mexican heritage elders reported higher levels of fear of crime, relative to their White counterparts. Using a sample of racially diverse students, Burnham, Lomax, and Hooper (2013) found African Americans were more afraid of drive-by shootings, relative to White Americans. Using data from a nationally representative survey, Rader, Cossman, and Porter (2012) reported similar differences in fear of crime between White respondents and Black and Hispanic respondents.

Empirical evidence also showed that low income was a vulnerability factor for fear of crime. Using data from a nationally representative survey, Rader, Cossman, and Porter (2012) found that those with higher income reported less fear of crime, compared to their lower-income counterparts. Using data collected from a sample of respondents in their middle to late twenties, Stiles, Halim, and Kaplan (2003) found that impoverished respondents had significantly higher odds of reporting fear of crime, relative to their non-impoverished counterparts. Staunton (2006) found that respondents residing in the private, rented sector showed higher levels of fear of crime, relative to those who were homeowners.

While gender, race, and low income as vulnerability factors for fear of crime received relatively consistent empirical support, age, low educational level, and foreign-born status as vulnerability factors either received mixed support or only attracted very limited research attention. Earlier studies showed that the elderly reported higher levels of fear of crime,

compared to younger adults (Baumer, 1985; Lagrange & Ferraro, 1987). However, using a sample of public housing residents where all the respondents shared the same socioeconomic status, DeLone (2008) found that the age of residents was not related to their fear of crime. Similar findings were reported by Cossman and Rader (2011). Only a small number of empirical studies specifically tested low educational level and foreign-born status as vulnerability factors for fear of crime. Using data from a random sample from Kansas City, Missouri, Scarborough, et al. (2010) found that, among other factors, respondents' education level had a significant effect on their fear of crime. Using a random urban and rural sample, Karakus, McGarrell, and Basibuyuk (2010) found that urban residents who had higher levels of education reported lower levels of fear of crime, but this effect did not show up for rural residents. Using 2010 European Social Survey data, Andreescu (2013) found that immigrant respondents (i.e., respondents with foreign-born status) reported significantly higher levels of fear of violent crime than their native counterparts.

Single-Parenthood as a Vulnerability Factor

Given the growing attention on vulnerability factors for fear of crime, there is a scarcity of research focusing on the social vulnerability of a subpopulation - single parents with minor children. According to the U.S. Census Bureau (2020; calculated based on Table A3), there are more than 9 million single parents who live alone with their minor children, which accounts for 15.1% of all parents living with their minor children in the U.S. Among these single-parent families, about 82.9% of them are single mothers (U.S. Census Bureau, 2020; calculated based on Table A3). About 18.6 million minor children (25.4% of all the minor children) either live

alone with their mothers (82.4%) or with father (U.S. Census Bureau, 2020; calculated based on Table C2).

According to Killias' (1990) vulnerability hypothesis, single-parenthood with minor children can be considered a social vulnerability factor that leads to elevated fear of crime. There are a number of reasons why single-parenthood with young children may be a social vulnerability factor. First, single parents with minor children often shoulder the primary responsibilities of caring for and protecting their minor children. Unlike adult children, minor children often have limited ability to protect and care for themselves and tend to rely heavily on their single parents physically, emotionally, and financially. Being responsible for the care and protection of their minor children, these parents may have a heightened sense of loss of control – feeling that they cannot defend or protect their children from crime victimization. Studies showed that individuals' fear of crime might be altruistic in that the fear might come from their concerns about other family members' safety (Drakulich, 2015; Rader, 2010).

In addition, single parents may be vulnerable in that victimization is especially costly for them, compared to other populations without those responsibilities or with more resources to fulfill those responsibilities. While shouldering the responsibilities of caring for and protecting their minor children, single parents often do not have resources that are available to married parents (such as emotional and financial support from their spouses). In case of victimization, married parents can usually rely on their spouses for both their own care and their children's care. Single parents do not have access to this type of spousal support. In addition, according to U.S. census data (U.S. Census Bureau, 2019; Table B-2), the poverty rate is 4% for married-couple-headed households. However, it is 22.2% and 11.5% for single-mother-headed and single-father-headed households, respectively. If single parents are injured as a result of

victimization, the temporary or permanent loss of their ability to work will be detrimental to the overall family's financial well-being. It will be especially hard for single parents to cover the costs associated with victimization including medical treatment, counseling, unpaid sick leave, and child care. Shouldering the responsibilities of child care and protection with limited resources makes crime victimization especially costly for single parents with minor children.

Single parenthood is not a newly created construct. **However**, it has been primarily used as a measure of neighborhood characteristics (e.g., Cates, Dian, & Schnepf, 2003; Newman & Franck, 2017) in research studies on fear of crime. The presence of single-parenthood or the percentage of single-parent-headed households in a community is often used as an indicator of neighborhood social disorder/disorganization and as a risk factor for fear of crime (e.g., Scarborough et al., 2010; Doyle, Gerell, & Andershed, 2021). Single parenthood has also been studied at the individual level. However, instead of being studied as a vulnerability factor for single parents' fear of crime, it is used as a risk factor for youth's fear of crime (Williams, Singh, & Singh, 1994). That is, youths from single-parent-headed families are more likely to report fear of crime, relative to youths coming from non-single-parent-headed families (Williams, Singh, & Singh, 1994). There is a scarcity of research focusing on how the single-parent status affects single parents' fear of crime.

Age of Minor Children and Single Parents' Fear of Crime

Although single parents with minor children are expected to have elevated levels of fear of crime relative to married parents with minor children, fear of crime may vary depending on their children's age. Very young children (e.g., under age 6) have no ability for self-care and

therefore need parents' constant attention, care, and protection. In addition, at this age, children's care primarily relies on daycare services, and oftentimes these services are not free. As a result, children of this age group may especially heighten their parents' fear of crime. As children grow older (e.g., ages 6 through 12), they are less reliant on their parents' care. At this age, they are in school and have acquired some skills to take care of themselves, to help parents do house chores, or even start to be a help to parents in case of victimization (e.g., making phone calls or bringing parents food or water, etc.). Still, they need close supervision from parents (some states do not even allow children at this age to be left alone at home). Parents still play a significant role in terms of their children's care and protection.

As children reach their teenage years (e.g., 13-17), they become more capable of self-care and therefore start making more independent decisions, and going about their daily lives without as much supervision. Their growing independence and decreased need for parental care and protection may ease parents' fear of crime. In case of parents' victimization, they might even be able to provide assistance in the form of taking care of their parents, running errands, and aiding their parents in transportation. The assistance with which they are able to provide their parents in case of victimization may further mitigate their parents' fear of crime.

The Current Study

While a growing number of empirical studies have tested individuals' physical and social vulnerability and fear of crime, there is a void of research focusing on the vulnerability of single parents and the effect of children's age on parents' fear of crime. To fill this void, the current study examined if single parents with minor children were a vulnerability factor for fear of

crime. In addition, the current study tested single parents of which age groups of minor children were the most vulnerable in terms of fear of crime.

Minor children in this study were grouped into three age categories – under age 6, age 6 to 12, and age 13 to 17. This categorization of age groups is commonly used in public surveys such as the GSS and corresponds to children’s development reflected by children’s levels of education. In general, under the age of 6 is considered the age before formal schooling; age 6-12 is considered as the age of elementary school; and age 13-17 is considered the age of junior high and high school.

Using single-parenthood with minor children as a measure of social vulnerability, the current study empirically tested the validity of the vulnerability hypothesis (Killias, 1990). Specifically, we tested whether this social vulnerability factor led to elevated fear of crime among parents. We tested if minor children’s age affected parents’, especially single parents, fear of crime. We expected that single parents with minor children were more likely to report fear of crime, relative to their married counterparts. Single parents with minor children younger than 6 were more likely to report fear of crime, relative to single parents with older minor children (ages 6-12 and/or ages 13-17). Single parents with younger minor children (i.e., younger than 6 years of age and/or ages 6-12) were more likely to report fear of crime, relative to single parents with older minor children (ages 13-17).

Methodology

Data

The current study utilized multiple waves of General Social Survey (GSS) data (1972-2018), which is a national survey that started in 1972 (National Opinion Research Center, 2018).

Using a nationally representative sample of individuals aged 18 years or over and that lived in non-institutional arrangements within the United States, GSS Data were collected using structured interviews annually or every other year (National Opinion Research Center, 2018). GSS measures and monitors Americans' well-being and opinions and attitudes toward social issues such as crime and punishment, racial tolerance, and morality. For its continuity, GSS includes some questions that are included in every wave of data collection. To capture participants' opinions or attitudes towards some trendy issues of political and/or social significance, GSS also includes questions that focus on these trendy issues and vary across waves. The dependent variable of the current study, fear of crime, was available in all of these waves of data. The final sample size of the current study was 27,628, including all the cases that had valid data on the studied variables. The current study was approved by the Institutional Review Board of a University in the South (Protocol# 0079-21).

Measures

Dependent Variable

Fear of crime was measured using a single item. In GSS, the respondents were asked to indicate if there is any area around here (the respondents' residence) – that is, within a mile – where (the respondent) would be afraid to walk alone at night. This item was coded as Yes (1) and No (0). This one-item measure is by no means a perfect measure of fear of crime. However, this is the only item available in GSS data. In addition, this one-item measure is commonly adopted by researchers using survey data, e.g., GSS and British Crime Survey (Chadee & Ditton, 2003; Cossman & Rader, 2011; Williams, McShane, & Akers, 2000). Considering the

availability of data and the common practices in the field, this item was used as the measure of fear of crime.

Independent Variables

The key independent variable was single-parenthood with minor children. This variable was a composite variable constructed using two variables – the marital status of respondents and the age of minor children in the respondents’ households. In the GSS, respondents were asked to indicate their marital status. Based on respondents’ responses, a set of dummy variables were coded, including married, widowed, divorced, separated, and never married. In the GSS, respondents were also asked to indicate the number of household members that were less than 6 years old (babies), 6 through 12 years old (preteens), and 13 through 17 years old (teens). For ease of data presentation and discussion, children who were less than 6 years old were referred to as babies; 6 through 12 years old as preteens; and 13 through 17 years old as teens. Based on respondents’ responses to the three questions, a dummy variable Children was coded. When a respondent’s responses to all of the three questions were 0, the variable Children was coded as 0; when a respondent’s response to any of the three questions was greater than 0, the variable children was coded as 1.

Two different parenthood measures were coded based on respondents’ marital status and the number of minor children. Parenthood (measure 1) was constructed without considering the age categories of minor children. It consists of four dummy variables – married without children, single without children, married & with minor children, and single with minor children. In data analysis, married & with minor children were used as a reference group. Here “single” included divorced, widowed, never married, and separated. Although respondents who separated from their spouses were not legally divorced yet, they were included in the group of singles in that

they were analogous to those who were divorced in terms of the support and resources they received from their spouses.

Parenthood (measure 2) was coded based on marital status and the number of minor children (in three age groups). It consisted of sixteen dummy variables: married without children, single without children, married & with babies only, single with babies only, married & with preteens only, single with preteens only, married & with teens only, single with teens only, married & with babies and preteens, single with babies and preteens, married & with preteens and teens, single with preteens and teens, married & with babies and teens, single with babies and teens, married & with babies, preteens, and teens, and single with babies, preteens, and teens.

Control Variables

A number of control variables were included in the analysis. These variables were commonly studied physical and social vulnerability including age, sex, race, educational level, family income, and foreign-born status. Age was measured using one item. In the GSS, respondents were asked to state their age in actual years. The actual age was used in the analysis. Sex was coded as male (0) and female (1). The variable “race” was measured using three dummy variables, White, Black, and Other. In data analysis, White was used as a reference group. Respondents’ educational level was measured using one item. In the GSS, respondents were asked to report on their highest years of education achieved which ranged from no formal schooling (0) to eight years of college education (20). In this study, education level was treated as a continuous variable. The variable “foreign-born” was also included in the analysis. Respondents were asked to indicate whether or not they were born in the U.S. Born in the U.S. was coded as 0 and not born in the U.S. as 1.

Family income was also included as a control variable in the data analysis. In the GSS, respondents were asked to indicate which of the income brackets their previous year's total family income fell. In waves of the GSS data collected in the 1970s, these income brackets included under \$1,000, \$1,000 to \$2,999, \$3,000 to \$3,999, ..., and \$25,000 or over. This item was suitable to measure the incomes in the 1970s. Due to economic development and inflation, these income brackets were not able to capture the variations in family incomes in later years that fell in the highest income bracket (\$25,000 and over). Later waves of the GSS broke the highest income bracket into multiple income brackets. While these changes made it possible to capture the variation in the highest family income bracket, they created some difficulties in cross-wave comparisons of family income. To make the family income measures consistent and comparable across waves, family income was coded using the 1970s family income brackets in the current research.

Analytical Strategies

Because the dependent variable, fear of crime, was a dichotomous variable, binary logit models available in STATA 16 were used to evaluate how single-parenthood with minor children and minor children's age affect the likelihood of respondents' reports of fear of crime.

Results

The descriptive statistics (Table 1) showed that the average age of the respondents in the sample (N=27,628) was 47.42 years old. 39% of the respondents reported fear of crime. 56% of the sample were women, and 80% of the sample were White and 14% were Black. Only 9% of the sample were foreign-born. The average educational level of the respondents in the sample

was 13.08 years. Among the sample, 8,263 (30%) respondents were married and without minor children; 9,480 (34%) were single without minor children; 7,083 (26%) were married and with minor children; and 2,802 (10%) were single with minor children.

The descriptive statistics of parenthood (measure 2) are shown in Table 1 as well. Among the sample, 8,263 (29.91%) were married without minor children; 9,480 (34.31%) were single without minor children. 1,784 (6.46%) were married parents with babies only; and 555 (2.01%) were single parents with babies only. 1,275 (4.61%) were married and with preteens only; and 628 (2.27%) were single with preteens only. 1,377 (4.98%) were married with teens only; 686 (2.48%) were single with teens only. 1,251 (4.53%) were married and with babies and preteens; 377 (1.36%) were single with babies and preteens. 1,014 (3.67%) were married and with preteens and teens; 358 (1.3%) were single with preteens and teens. 145 (0.52%) were married and with babies and teens; and 103 (0.37%) were single with babies and teens.

Table 1: Descriptive Statistics.

Variable	Mean/% composition	Min	Max	Parenthood 2	f	%
Fear	39.12	0	1	0 Married, no child(ren)	8,263	29.91
Age	47.42	18	89	1 Single, no child(ren)	9,480	34.31
Gender	0.56	0	1	2 Married, with babies only	1784	6.46
Race	80.42/14.19/5.39	1	3	3 Single, with babies only	555	2.01
Foreign	0.09	0	1	4 Married, with preteens only	1275	4.61
Education	13.08	0	20	5 Single, with preteens only	628	2.27
Income	10.31	1	12	6 Married, with teens only	1377	4.98
Marital	55.55/9.74/14.40/3.69/16.6	1	5	7 Single, with teens only	686	2.48
Children	0.36	0	1	8 Married, with babies and preteens	1251	4.53
				9 Single, with babies and preteens	377	1.36
				10 Married, with preteens and teens	1014	3.67
				11 Single, with preteens and teens	358	1.3
				12 Married, with babies and teens	145	0.52
				13 Single, with babies and teens	95	0.34
				14 Married, with babies, preteens, and teens	237	0.86
				15 Single, with babies, preteens, and teens	103	0.37
N	27,628					

Because the variable fear of crime is a nominal variable, chi-square tests were used to test the significance of the associations between fear of crime and independent variables that are nominal or ordinal. The results (Table 2) showed that gender, race, foreign-born, and family income were significantly associated with fear of crime. The two parenthood measures were also significantly associated with fear of crime. Because age and education levels were continuous variables and fear of crime was a dichotomous variable (which can also be considered as a continuous variable), the correlation coefficients (Pearson's *r*) were calculated. The results showed that both age and educational level were significantly associated with fear of crime at .05 level.

Table 2. Associations between Fear of Crime and Independent Variables.

Fear Variable	Chi²	<i>p</i>-value	Variable	Chi²	<i>p</i>-value
Gender	2700	.000	Parenthood 1	330.13	.000
Race	278.63	.000	Parenthood 2	363.18	.000
Foreign Born	20.11	.000			
Income	684.33	.000		<i>r</i>	<i>p</i> -value
Marital Status	443.39	.000	Age	0.03	.000
Children	34.27	.000	Education	-0.07	.000
N	27,628				

The multivariate analyses were conducted using the Binomial Logistic Regression model available in STATA 16. The results were presented in Tables 3 - 5. In Model 1, control variables including age, gender, race, foreign-born, educational level, and family income were entered into the model. The results showed that all of the control variables had significant effects on fear of crime. Older respondents, relative to younger respondents, were more likely to have fear of crime. Women, relative to men, were more likely to have fear of crime. Both Black and Other

racial groups, relative to White, were more likely to be afraid of crime. Respondents who were born outside of the U.S., relative to those born in the U.S., were more likely to have fear of crime. Respondents who received higher levels of education, relative to those with lower levels of education, were less likely to have fear of crime. Respondents who had higher family income, relative to their lower family income counterparts, were less likely to be afraid of crime.

Table 3: Results from Regressing Fear of Crime on Parenthood (Measure One).

Fear of Crime	Model 1		Model 2		Fear of Crime	Model 3	
	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>			
Age	0.004**	0.001	0.003 [^]	0.001	Age	0.001	0.001
Gender	1.32**	0.03	1.34**	0.03	Gender	1.35**	0.03
Black	0.41**	0.04	0.39**	0.04	Black	0.40**	0.04
Other	0.14*	0.06	0.13*	0.06	Other	0.14*	0.06
Foreign Born	0.24**	0.05	0.25**	0.05	Foreign Born	0.25**	0.05
Education	-0.01*	0.005	-0.02**	0.005	Education	-0.02**	0.005
Income	-0.07**	0.005	-0.06**	0.01	Income	-0.06**	0.01
Widowed			0.22**	0.05	Married, no child	0.08*	0.04
Divorced			0.07 [^]	0.04	Single, no child	0.32**	0.04
Separated			0.11	0.07	Single, with child(ren)	-0.01	0.05
Never married			0.24**	0.04			
Children			-0.16**	0.03			
Constant	-0.65**	0.09	-0.64**	0.10	Constant	-0.61**	0.11
N	27628		27628		27628		
Pseudo R ²	0.09**		0.09**		0.09**		
LR χ^2 (8)	3269.67		3365.64		3368.75		

[^] p<.10; * p<.05; ** p<.01; Male, White, and Born in the U.S. are the reference groups in all the models; Married, and Without children are reference groups in Model 2, "Married & with children" is the reference group in Model 3.

Table 4. Results from Regressing Fear of Crime on Parenthood (Measure Two).

Fear	Model 4			Model 4 (cont.)	
	<i>b</i>	<i>s.e.</i>		<i>b</i>	<i>s.e.</i>
Age	0.002*	0.001	Single, with preteens only	-0.21*	0.10
Gender	1.35**	0.03	Married, with teens only	-0.23**	0.08
Black	0.41**	0.04	Single, with teens only	-0.27**	0.10
Other	0.15*	0.06	Married, with babies and preteens	-0.17*	0.08
Foreign Born	0.25**	0.05	Single, with babies and preteens	-0.12	0.12
Education	-0.02**	0.005	Married, with preteens and teens	-0.32*	0.09
Income	-0.06**	0.006	Single, with preteens and teens	-0.30*	0.12*
Married, No child	-0.1^	0.06	Married, with babies and teens	-0.41*	0.20
Single, No child	0.14*	0.06	Single, with babies and teens	-0.36	0.22
Single, with babies only	0.04	0.1	Married, with babies, preteens, and teens	-0.37*	0.15
Married, with preteens only	-0.18*	0.08	Single, with babies, preteens, and teens	-0.13	0.21
Constant	-0.60**	0.10			
N				27,628	
Pseudo R ²				0.09**	
LR $\chi^2(8)$				3397.04	

^ p<.10; * p<.05; ** p<.01; Male, White, Born in the U.S., and “Married & with babies only” are the reference groups.

Table 5. Results from Regressing Fear of Crime on Parenthood (Measure Two) (Cont.).

Fear of Crime	Model 5		Model 6	
	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>
Married, no child(ren)	-0.14	0.1	0.12	0.09
Single, no child(ren)	0.1	0.09	0.36**	0.09
Married, with babies only	-0.04	0.1	0.22*	0.1
Single, with babies only			0.26*	0.12
Married, with preteens only	-0.23*	0.11	0.03	0.11
Single, with preteens only	-0.26*	0.12		
Married, with teens only	-0.27*	0.11	-0.01	0.1
Single, with teens only	-0.31*	0.12	-0.05	0.12
Married, with babies and preteens	-0.21^	0.11	0.05	0.11
Single, with babies and preteens	-0.16	0.14	0.09	0.14
Married, with preteens and teens	-0.36**	0.12	-0.1	0.11
Single, with preteens and teens	-0.34*	0.14	-0.08	0.14
Married, with babies and teens	-0.46*	0.21	-0.2	0.21
Single, with babies and teens	-0.40^	0.23	-0.14	0.23
Married, with babies, preteens, and teens	-0.41^	0.17	-0.15	0.17
Single, with babies, preteens, and teens	-0.17	0.22	0.08	0.2
N	27,628		27,628	
Pseudo R ²	0.09**		0.09**	
LR $\chi^2(8)$	3397.04		3397.04	

^ p<.10; * p<.05; ** p<.01; Male, White, and Born in the U.S. are reference groups in all models. “Single, with babies only” is the reference group in model 5; Single, with preteens only” is the reference group in model 6.

In Model 2, respondents' marital status and whether or not they had children at the time of data collection were entered. The results showed that widowed and never-married respondents, relative to married respondents, were more likely to be afraid of crime. Divorced respondents were marginally more likely to be afraid of crime, relative to their married counterparts. Respondents who had children, relative to those who did not, were less likely to have fear of crime.

In Model 3, parenthood (measure 1) was entered into the model replacing marital status and whether or not they had children at the time of data collection. The category, married & with minor children, was the reference group. The result showed that regardless of their marital status, respondents without minor children were more likely to have fear of crime relative to those who were married & with minor children. Single parents were not significantly different from married parents in terms of fear of crime. Because parenthood (measure 1) lumped all minor children together without distinguishing them based on their age groups, Model 4 used parenthood (measure 2) that took minor children's age into consideration. Parenthood (measure 2) divided the single-with-minor-children category in parenthood (measure 1) into seven categories. These categories include single parents with babies only, single parents with preteens only, single parents with teens only, single parents with babies and preteens, single parents with babies and teens, single parents with preteens and teens, and single parents with babies, preteens, and teens. Parenthood (measure 2) also divided the married-and-with-minor-children category in parenthood (measure 1) into seven categories with the above age-group combination of children. Thus, parenthood (measure 2) had categories that exhausted all possible combinations of parents' marital status (married v. single) and children's age groups (babies, preteens, and teens).

In Model 4, married parents with babies only were the reference group. The results showed that there were no significant differences between single and married parents with babies only in terms of their likelihood to experience fear of crime. There were also no significant differences between the reference group and any of the groups including single parents with both babies and preteens, single parents with both babies and teens, and single parents with babies, preteens, and teens at 0.5 level in terms of the likelihood of fear of crime. There were significant differences between the reference group and all other groups of married parents (regardless the age-group combinations of their children). Regardless of marital status, parents with preteens or teens only and parents with both preteens and teens were less likely to have fear of crime, relative to parents with babies only.

In Model 5, the single-parents-with-babies-only category was used as the reference group. The results showed that there were no differences between the reference group and respondents who were married and with babies only at 0.05 level. There were no significant differences in fear of crime between the reference group and any of the groups including single parents with babies and preteens, single parents with babies and teens, and single parents with babies, preteens, and teens. However, single parents with preteens only, single parents with teens only, and single parents with both preteens and teens were all significantly less likely to have fear of crime than the reference group.

In Model 6, the single-parents-with-preteens-only was used as the reference group. The results show that there is no significant difference in the likelihood of having fear of crime between the reference group and any of the groups including parents (married or single) with teens only, parents (married or single) with both preteens and teens, and married parents with

preteens only. However, it is noteworthy, that relative to the reference group, parents with babies only, regardless of marital status, showed an elevated likelihood of having fear of crime. In addition, relative to the reference group, respondents who were single without children were significantly more likely to have fear of crime.

Discussion

Consistent with prior research findings on gender and fear of crime (Fox, Nobles, & Piquero, 2009; Jennings, Gover, & Pudrzynska, 2007; Swartz et al., 2011), our study showed that women were significantly more likely to have fear of crime. Minority racial groups, relative to Whites, were more fearful of crime victimization. This finding on race and fear of crime echoes the prior findings (Bernat, Aleman, & Gitelson, 2003; Burnham, Lomax, & Hooper, 2013). In addition, consistent with prior research findings (Rader, Cossman, & Porter, 2012; Stiles, Halim, & Kaplan, 2003), our research showed that family income had a negative effect upon the likelihood of fear of crime. The higher the respondents' income, the less likely they were afraid of being victimized. Respondents' educational levels also had a negative effect on the likelihood of having fear of crime. The higher the respondents' educational level, the lower the likelihood that they had fear of crime. This research finding is consistent with prior research findings (Scarborough et al., 2010). Our research also showed that respondents' foreign-born status had a significant and positive effect on their fear of crime. Relative to their native counterparts, foreign-born respondents were significantly more likely to have fear of crime. This research finding is consistent with prior research findings (Andreescu, 2013). Consistent with some prior studies (DeLone, 2008), our study did not show that age was a significant vulnerability factor.

Although the effect of age on the respondent's fear of crime was significant in Model 1, the effect was no longer significant once parenthood was entered into the model.

Contrary to previous findings that having children increases parents' fear of crime (Drakulich, 2015), we found that both married and single respondents who did not have children were more likely to have fear of crime than married respondents who have minor children. In other words, having children itself or parenthood itself is not a vulnerability factor for fear of crime. Rather than increasing parents' fear of crime, the presence of minor children actually helped in reducing parents' fear of crime. On one hand, having children may heighten parents' sense of incapability to provide protection and make their parents' victimization especially costly, which, in turn, elevates parents' fear of crime. On the other hand, it is possible that the role of parents and ensuing responsibilities for protection may embolden them to be more courageous and braver for their children's sake. In addition, children might provide parents with companionship or even support and make parents less likely to have fear of crime. Our research seems to show support for the latter. Instead of being a vulnerability factor for fear of crime, parenthood seems to be an invulnerability factor.

We did not find that single parents with minor children, in general, was a vulnerability factor for fear of crime. However, it has to be noted that not all single parenthoods were equal. Relative to single parents with only children under age 6, single parents with older children (preteens only, teens only, or both preteens and teens) were significantly less likely to have fear of crime. The odds ratio for having fear of crime decreases by a factor of -0.26, -0.31, and -0.34 for the three groups, respectively. All of the effects are statistically significant at 0.05 level. There were no significant differences in single parents' fear of crime between those who have

preteens and teens only. The results showed support for the vulnerability hypothesis in that having children under age 6 is a vulnerability factor for fear of crime.

Having preteens (children aged 6 to 12) and/or teens (children aged 13-17) seem to be an invulnerability factor for parents' fear of crime. When there were only older children present, parents' vulnerability disappeared. This echoed our assumption that older children may pose as a source of support and help for parents. Instead of being a vulnerability factor, the presence of older children (preteens and teens) may be an invulnerability factor. The same patterns were shown in the differences in fear of crime between married parents with babies only and married parents with older children only.

However, there are differences in how having babies affects married and single parents' fear of crime. The results showed that having any child under age 6 offset the protective effects of having older children on single parents' fear of crime. For single parents with older children, as long as they also had children under age 6, the mitigating effects of having older children on their fear of crime disappeared. There were no significant differences in terms of the likelihood of fear of crime among single parents if any of their children were under age 6 (single parents with babies only, single parents with babies and preteens, single parents with babies and teens, and single parents with babies, preteens, and teens). In other words, if single parents had both older children and children under age 6, they were no longer significantly different from those with only children under age 6 in terms of their likelihood of fear of crime. The beneficial effect of having older children on parents' fear of crime disappeared simply because of their additional child(ren) under age 6. To single parents, having children under age 6 seems to be a dominant vulnerability factor for fear of crime. Its effects on their fear of crime cannot be offset by the presence of older children in the family.

This pattern of effects was not shown for married parents. Relative to married parents with babies only, married parents with older children only (preteens, teens, or both preteens and teens) were significantly less likely to have fear of crime. For married parents, if they had both older children and children under age 6, they were still significantly less likely to have fear of crime relative to those with only children under age 6. For married parents, having children under age 6 in combination with older children did not “wash away” the benefits of having older children in decreasing parents’ fear of crime. In other words, the beneficial effect of having older children on parents’ fear of crime did not disappear simply because of the additional child or children under age 6. For married parents, although having children under age 6 seems to be a vulnerability factor for fear of crime, its effects on their fear of crime can be offset by the presence of older children in the family.

Regardless of marital status, parents with minor children under age 6 were more likely to have fear of crime relative to parents with older children. Having preteens and/or teens only seems to lower parents’ likelihood of having fear of crime, regardless of parents’ marital status. This beneficial effect disappeared for single parents when they also had one or more children under age 6 in combination with older children. This beneficial effect remained for married parents when they had children under age 6 in combination with older children.

Limitations

Like any other research study, this study is not without limitations. While using multiple waves of GSS data is a strength of this study, one of the key control variables (i.e., respondents’ family income) was not measured consistently across the waves. To convert them to a consistent

measurement, we had to resort to the earliest and crudest measure, which could not capture the variation in yearly family income once it exceeded \$25,000. Data analysis using this measurement of family income is likely to underestimate the effect of family income on respondents' fear of crime. Thus, if this effect was not significant, it would be erroneous to draw a no-effect conclusion. Since our data analysis results showed that respondents' family income had a significant effect on their fear of crime, the actual magnitude of the effect should be greater. Thus, there is no ambiguity as to whether or not respondents' family income has a significant effect on their fear of crime.

Another limitation of the current study is the arbitrary division of children's age groups. The divisions of the three age groups follow the GSS practices. Since K4 and K5 in the public education system are free for preschoolers, parents of four- or five-year-old children should be similar to parents of elementary-school-aged children in terms of resources for schooling and childcare. As such, their vulnerability to fear of crime should also be similar. Although we noted this pattern, we still followed the GSS way to divide age groups of minor children. This division of children's age groups may underestimate the effects of children's age on parents' fear of crime. Since our data analysis results showed that parents with children under 6 were significantly more likely to have fear of crime, relative to parents with only older children, there should not be problems drawing a conclusion as to whether or not children's age significantly affected parents' fear of crime.

In addition, the current study did not capture processual aspects of family life including the presence of pro-social and effective co-parenting between divorced parents and the cohabitation of unmarried parents. Due to the unavailability of such information in the GSS data, the current study only captured the structural aspect of the family (married vs. single parents).

The effects of the processual aspects of family life on single-parents' fear of crime can be examined in future studies.

Conclusions

Ever since the vulnerability hypothesis was proposed (Killias, 1990), an increasing number of empirical studies have tested the relationship between various social and physical vulnerability factors and fear of crime. Although single parents with minor children can be considered as a vulnerability factor for fear of crime following Killias' (1990) reasoning, there is a scarcity of research focusing on single parents' fear of crime. There is also a scarcity of research examining how minor children of different age groups affect their parents' (particularly single parents) fear of crime. To fill the void, the current study tested whether or not single-parenthood with minor children was a vulnerability factor for fear of crime. The current study also examined how children's age affected their parents' (particularly single parents) fear of crime. We found that while single-parenthood with minor children itself is not necessarily a social vulnerability, parenthood with children under age 6 is. Married parents who only have children under age 6 are especially more likely to have fear of crime, relative to other parents. For single parents, having any child under age 6 is a significant vulnerability factor for fear of crime.

Earlier research showed that elevated fear of crime felt by parents may curtail their efficacy in raising their children. Due to fear of crime, people may drastically change their routine activities. For example, parents may be less likely to take their young children out for outdoor activities (Rader, Cossman, & Allison, 2009; Foster, Giles-Corti, & Knuiaman, 2014) or

to interact with other residents in their communities (Rader, Cossman, & Allison, 2009). The curtailed outdoor activities and interactions with neighbors may affect children's physical health and the development of interpersonal skills (Jackson et al., 2021).

Given the significance of parents' responsibilities in raising the younger generation and their vulnerability, it is necessary for society to provide extra support and protection for this vulnerable population – married parents with only children under age 6 and single parents with any child under age 6. Public policy should focus on providing extra support and protection for these families to reduce the costs of crime victimization. Emergency funds for transportation, child care, and medical treatment should be made available to these parents in case of crime victimization. In addition, public policy should encourage employers to reduce these parents' exposure to risks of victimization through assigning them daytime work shifts and potentially help reduce the cost of crime victimization through providing employer daycare services and paid leave. A number of other policies can also be used to assist this population, such as giving tax reductions to parents with children under age 6 to purchase and install family security systems. These assistance and support can provide an extra safety net for this vulnerable population and may help alleviate their fear of crime and boost their efficacy in providing better familial environments for the younger generation.

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Why Me?

Sexual Violence and Target Selection

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Abstract

A plethora of research exists on the topic of sexual violence. However, few studies have explored how those who engage in sexual violence against others select their potential victims/targets. The research that does exist in this area tends to focus on stranger-on-stranger sexual violence and target selection. Nevertheless, existing body of research has established that the vast majority of sexual offenses are committed by offenders known to the victim. Using qualitative data collected via face-to-face interviews with incarcerated sex offenders, the current study examines the various factors that sex offenders consider when selecting a suitable target/victim. The results of the study suggest that sex offenders are influenced by their physical environment and that they encounter their victims in the course of their routine activities.

Keywords: sex offender, routine activities theory, target selection, accessibility, vulnerability, opportunity

Introduction

With few exceptions, no other offense receives as much official, media, and public attention as sex crimes (Kernsmith, Craun, & Foster, 2009; Letourneau, et al., 2010; Tewksbury & Lees, 2006). Sex offenders are often perceived as one of the most reprehensible and dangerous groups of criminals, and their actions often leave people feeling perplexed and disgusted. In addition to the disdain from the general public, sex offenders have also received significant attention from scholars over the past three decades (Letourneau et al., 2010; Simon & Leon, 2008). Consequently, a plethora of research has been produced on the subject of sex crimes and sex offenders. However, a great body of current research is focused on evaluating and determining the efficacy of various sex offender policies and laws that have become popular in recent decades such as Megan's Law and residency restriction and notification policies. An extant body of research also exists on the impact of these policies on recidivism, sex offender reentry, and any other iatrogenic effects (Hanson & Morton-Bourgon, 2005; Letourneau & Armstrong, 2008; Letourneau et al., 2010; Sample & Bray, 2006; Tewksbury & Jennings, 2010; Vasquez, Maddan, & Walker, 2008; Zevit, 2006). Much criminological research has also been focused on understanding the sociological, biological, and/or psychological factors that explain individuals' gravitation toward involvement in sex crimes. The importance of studying the aforementioned topics cannot be minimized; nevertheless, due to the fact that sex crimes affect victims of all ages, it is also imperative to research the decision-making process of motivated sex offenders as it relates to victim selection.

Exploring sex offenders' decision making and target selection requires studying the crime from the sex offender's point of view. Researching how offenders make victim-selection decisions require face-to-face interaction, which is the key to opening the window to "the mind

of another human being” (Lofland and Lofland, 1984). Nevertheless, “some researchers have neglected this perspective because: this kind of research is time consuming; such an approach requires that researchers deal directly with offenders, something that many criminologists have been reluctant to do; and the use of a research design that allows offenders to speak for themselves was considered ‘unscientific’ by positivists” (Beauregard, Rossmo, & Proulx, 2007, p. 449).

To date, only a handful of studies have been conducted that qualitatively explore decision and offense processes underlying target selection by sex offenders. Thus, the aim of the present study is twofold. First, the study adds to the limited body of qualitative research examining sex crimes. According to Beauregard et al. (2007), criminologists generally utilize a quantitative approach to data collection when studying sex offenders and sex crimes; however, some topics are better suited for investigation through qualitative methodology. Second, the present study aimed to fill voids in sex offenders’ decision making and target selection research through the lens of routine activities theory. Although emerging, research examining decision making underlying target selection in sex crimes is still limited.

Literature Review

Motivated offenders, including sex offenders, utilize a multifaceted decision-making process which, among other factors, includes the identification of a suitable target; one that is poorly guarded. “Targets are selected from the offender’s awareness space and are assessed against the criteria of suitability and risk” (Beauregard, Rebocho, & Rossmo, 2010, p. 138). Cohen and Felson’s (1979) routine activities theory sheds light on how/why certain targets are selected and postulates that individuals’ lifestyle and daily activities determine their probability

of offending as well as victimization. According to Cohen and Felson (1979), three elements must converge in time and space for a crime to occur: 1) motivated offender, 2) suitable target, and 3) absence of capable guardianship. In situations where the number of suitable targets is high while the presence of capable guardians is low, the probability of crime increases even if the offender's motivation remains stable (Pino, 2005). Studies have shown that criminal victimization is not a random occurrence but rather a product of the convergence of people's lifestyle and criminal opportunity. Individuals' lifestyle and routine activities can potentially increase their exposure and proximity to motivated offenders (Miethe & Meier, 1990; Mustaine & Tewksbury, 2002). Although victims are not responsible for their own victimization, criminal "opportunities are most directly influenced by the victim's situation (e.g., walking alone), target location (e.g., parks), and the involvement of facilitators" (Kaufman, Mosher, Carter, & Estes, 2006, p. 112). Researching target selection is not a new phenomenon; however, most empirical studies exploring target selection and decision-making processes among criminals have primarily focused on property crimes such as burglary (Bennett & Wright, 1984, Rengert & Wasilchick, 1985; Beauregard, Leclerc, & Lussier, 2012), robbery (Feeney, 1986; Petrosino & Brensilber, 2003), shoplifting (Carroll & Weaver, 1986), and auto-theft (Fleming, 1999).

Although differences exist between property and sex offenders, they are both highly affected by situational factors and their physical environment. Researchers have also established that in general, sex offenders are more similar to other non-sex offenders than they are different (Barbaree & Marshall, 1989; Marshall, 1996; Marshall & Hall, 1995). Both property and sex offenders make a rational decision to choose one target over another because of "target" characteristics and contextual factors. For a motivated offender, various factors influence the suitability of a target such as: anticipated reward, accessibility, and degree of guardianship.

“More specifically, previous studies have shown that the target selection processes of sex offenders depend heavily on the social, physical, and geographic environment as well as the victim’s behaviors and location prior to the crime” (Deslauriers-Varin & Beauregard, 2010, p. 320). Researchers have used existing literature on target selection and decision-making among non-sex offenders to gain a better understanding of offense process underlying target selection in sex offenders (Canter & Larkin, 1993, Lundrigan, Czarnomski, & Wilson, 2010; Rossmo, 1997; Beauregard et al., 2007; Beauregard, Rebocho, & Rossmo, 2010; Deslauriers-Varin & Beauregard, 2010). Although, research studies have clearly established that most sex offenses are perpetrated by someone known to the victim such as a family member or acquaintance (Pazzani, 2007), a sex offender must still process through the different channels of decision-making prior to engaging in a sex crime(s).

Canter and Larkin (1993) explored the spatial activity of 45 British male sex offenders who had engaged in at least two sex crimes. This study aimed to test two hypotheses concerning location choice by sex offenders: the *commuter* hypothesis and the *marauder* hypothesis. At the center of the study was the notion that sex offenders’ target selection is heavily dependent on physical environment. The *commuter* model contends that the sex offender travels away from his home in order to commit his sex crime. The new hunting ground is not unfamiliar to the sex offender but is simply at a considerable distance from his home base. Further, Canter and Larkin (1993) propose that there will be little to no overlap between the two areas. The *marauder* model suggests that the offender’s home will be found at the center of the circle if the two most distant crimes are placed on the diameter of the circle. This model asserts that the sex offender uses his home as a base from which he travels to commit his sex offense. Canter and Larkin (1993) found significant support for the *marauder* model with 87% of the sex offenders in their

study traveling from their home to surrounding regions to perpetrate their sex crimes. Similarly, Lundrigan et al., (2010) examined the spatial behavior of 76 New Zealand serial sex offenders. Consistent with prior research on target selection, the authors found that the majority of their sample committed their sex crimes closer to home confirming the notion that environmental familiarity is important in sex offenders' decision making and target selection processes.

Rossmo (1997) developed a more comprehensive sex offender hunting-pattern typology that consists of four distinct victim-search methods. Rossmo's (1997) typology focuses on the search and attack patterns that are utilized by sex offenders, especially those who target strangers. The hunting-pattern typology includes: hunters, poachers, trollers, and trappers. Hunters typically commit their sex crimes within their local geographic area. They prefer searching for suitable targets in their city of residence due to their familiarity and awareness of the environment. Whereas hunters specifically seek out victims within their local areas, poachers, like *commuters*, travel outside of their localities to commit their sex crimes. Trollers on the other hand are opportunistic sex offenders who encounter suitable targets through the course of their routine activities. They often fantasize about deviant sexual activities and are ready to take advantage of an opportunity if it resembles their sexual fantasy. Lastly, trappers use their occupation or position to recruit potential victims. They either have an occupation that facilitates easy access to suitable targets or trick their victims to an environment that they can control such as their home (Rossmo, 1997, 2000). Furthermore, Rossmo (1997) also identified three different types of attack strategies commonly employed by sex offenders including the raptor, stalker, and the ambusher. Rossmo (1997) suggests that raptors attack their targets immediately after identifying them, whereas stalkers take their time, follow and/or watch their victims and wait for an opportune time to attack. Finally, a sex offender who employs the ambush technique attacks

his victims at locations where he has a great degree of control such as his house. This attack technique is most common among trappers, whereas hunters most commonly utilize the raptor method.

Over the years, other scholars have attempted to complement Rossmo's (1997) hunting-pattern typology and have identified other significant parameters related to target selection and decision-making by sex offenders (Beauregard et al., 2012). Beauregard, Rebocho, and Rossmo (2010) developed a more comprehensive target selection and decision-making model that not only focuses on hunting patterns, but also on cognitive, behavioral, and geographic facets associated with sexual violence. They proposed that prior to their sexual offense, offenders must make a number of choices including: choice of hunting ground, which refers to the type of area where offenders search for victims; choice of victim, this would depend on the victim's sensual appeal to the offender, age, sex, vulnerability, and familiarity among other attributes; choice of method to approach the selected victim; and choice of tactic to gain the victim's compliance such as manipulation, force, threat of force, weapon, or seduction (Beauregard et al., 2010). Futher, Beuregard et al., (2007) examined the routine activities of offenders preceding the commission of their sex crimes. Half of the offenders in the study encountered their victims through the course of their routine activities (i.e., occupation, recreational activity etc.). The other half of the sample was actively involved in searching for suitable targets in familiar locations (e.g., malls, parks etc.). Moreover, 74% of the sex offenders selected their targets because of their location and availability. Easy access to the victim was the determining factor in sex offenders' decision making and target selection processes. Although, existing research provides much needed insight into sex offenders' decision making and target

selection processes, additional research is needed to gain a deeper understanding of motivated sex offenders' decision making as it relates to the selection of suitable targets.

Methodology

Research Design: A qualitative research design was utilized to explore decision making underlying target selection in sex crimes. A qualitative research design using semi-structured/open-ended interviews allowed the researcher to gather thick, rich descriptive data (For discussion, see, Geertz, 1973, p.3-30). Because the aim of this study was to gain a deeper understanding of the various factors that may play a role in sex offenders' target selection processes, a qualitative methodology was considered most suitable.

Sample: A total of 22 male sex offenders incarcerated in a western Pennsylvania correctional facility were selected to participate in the current study. Offenders who were formally convicted and serving a sentence for a sex crime were selected with one exception (offender was found guilty but not yet formally sentenced). Men simply charged with a sexual offense, but awaiting further legal proceedings, were excluded from the study because the researcher concluded that these participants will not be forthcoming with information. Thus, the unit of analysis for the present study was individual males over the age of 18, currently serving time for a sex crime, or who have served time in the past for a sexual offense. In order to draw the desired sample, a nonprobability sampling technique was utilized.

Demographics	Number	Percent
Age		
21-30	11	50%
31-40	5	23%
41-50	2	9%
51-60	3	14%

61-71	1	4%
Race		
Caucasian/White	18	82%
Other	4	18%
Education		
Some high school	3	14%
High school diploma/GED	12	54%
Some college	4	18%
College (AA, BS)	3	14%
Marital Status		
Married	5	23%
Single	11	50%
Divorced	2	9%
Other	4	18%
Employment Status		
Employed	11	50%
Unemployed	9	41%
Social Security	2	9%
Religious Affiliation		
Christian	11	50%
Catholic	3	14%
Lutheran	1	4%
None	7	32%
Victim-Offender Relationship		
Knew victim	16	73%
Did not know victim	2	9%
Cyber sexual offenders	4	18%
Childhood Abuse		
Yes	7	32%
No	15	68%
Previous Criminal History		
Yes	4	18%
No	18	82%

Demographics of Research Participants

Four (18%) men in the sample had a previous criminal history, compared to 18 (82%) who had no previous convictions. None of the men had previous convictions for sex crimes. With regards to childhood abuse history, 7 (32%) men reported having experienced some type of abuse in their childhood. Of the 7, 2 (9%) men reported having been sexually abused as a child by someone they knew. Further, an overwhelming majority of the men in the sample reported having committed sexual violence against someone they knew; a finding consistent with existing sexual violence and victimization research which has established that “sexual assaults are more often committed by people the victims know, such as friends, family members, boyfriends, and husbands” (Pazzani, 2007, p. 717). Of the sample, 73% (or 16) of the men had targeted someone that they knew compared to 9% (or 2) who had targeted a stranger victim. Four (18%) of the men in the sample were cyber-sex offenders (e.g., possession/distribution of child pornography and unlawful contact of minor). Of the 16 men, three had committed sexual violence against their own child(ren).

Of the 18 men in the sample with a victim, 10 had committed a sexual offense against a minor(s), 6 were involved in a sexual attack against an adult, and 2 were involved in incestuous sexual violence against their daughters, which started when the victims were minors and continued into their adulthood. In addition, 16 of the 18 men in the study had targeted a female (including young girls) victim(s) compared to two who had targeted a young boy. With regards to race, all of the victims were Caucasian.

Data Collection and Analysis: Face-to-face, in-depth interviews were conducted for the purposes of collecting data for the present study. Face-to-face, semi-structured interviews were considered most appropriate because it permitted the researcher to examine what factors are important to sex offenders when selecting a potential target/victim from their own perspective.

Face-to-face, semi-structured interviews served as a tool to ensure that all participants were asked the same set of general questions, but still allowed for deviation depending on the respondent and situation at hand. A semi-structured interview technique afforded the researcher an opportunity to ask follow-up questions, provide clarification, and/or adjustments when necessary. Previous researchers have found that male sex offenders are generally more willing and forthcoming with information when face-to-face in-depth interviews are conducted especially by female researchers (Scully & Marolla, 1984), which was true in the current study. A thematic content analysis revealed that motivated sex offenders took advantage of available opportunities for sex crimes through the course of their routine activities and selected targets that were accessible and vulnerable.

Findings and Discussion

The present study explores sex offenders' decision making and target selection processes. Particular attention was paid to the factors that may make a person a more suitable target to the motivated sex offender versus another. From the respondents' narratives, themes emerged with regards to how they selected potential targets/victims that they encountered through the course of their routine activities. For the majority of sex offenders in the study, the following three factors, grounded in routine activities theory, appeared as influential in their target selection decision: accessibility, vulnerability, and opportunity. It is significant to note that not all three factors influenced the decision of every single sex offender, but that at least one of these factors had an impact on the offenders' decision when selecting a potential victim.

A great majority of the offenders in this study (n=16) could be classified as opportunistic or *trollers* (Rossmo, 1997) with regards to their decision-making and target/victim selection

processes. They encountered their victims through the course of their routine activities and took advantage of opportunities for sex crimes as they became available. They did not actively search for their victims but selected them simply because the social context had limited the presence of capable guardians leading to an increase in the number of suitable targets. Overall, the participants in this study had selected their targets because they were accessible, were easy to control, manipulate, and coerce (i.e., vulnerable), and an opportunity/opportunities for sex crime(s) presented itself. To determine how/why a potential target was selected over others, each respondent was posed with some version of the following question: Why did you choose this particular victim (why her/him)? Their responses are categorized and presented below.

As stated above, the majority of the participants in the present study were *trollers* (Rossmo, 1997) and did not actively prowl for victims to sexually exploit. They encountered their victims through the course of their and the victims' routine activities. Their victims were suitable targets because they were easily accessible and poorly guarded. Their responses to the researcher's question pertaining to victim/target selection encompassed at least one of the following three factors: accessibility, vulnerability, and opportunity. In other words, their decision to select a potential target was driven by the victims' level of accessibility, whether the victims possessed any vulnerability that could be potentially exploited, and whether there were opportunities for sex crimes.

Accessibility. As stated previously, a great majority of the men in the sample had sexually victimized someone they knew and had regularly encountered through the course of their routine activities. The victims were selected as potential targets because they were easily accessible and did not need to be hunted. Their mere presence in the offenders' lives, sans guardianship, increased their chances for potential sexual victimization. Similar findings have been reported

by existing research suggesting that sex offenders, especially those who target children, which many of the men in the sample did, target “children to whom they have easy access” (Robertiello & Terry, 2007, p. 513). The respondents in the present study, sexually victimized someone that they knew, both adult and juvenile victims, because the victims were easily accessible. These findings are consistent with prior research which suggests that the ease of accessibility is a determining factor in sex offenders’ decision making and target selection processes (Rossmo, 1997, Beauregard et al., 2007, Deslauriers-Varin & Beauregard, 2010).

Chris explained how Allison’s [victim’s pseudonym] constant presence at their house provided him easy access and opportunities for his sex crimes. Allison was his teenage daughter’s best friend. They lived in close proximity to one another, and Allison routinely visited her best friend (Chris’ daughter). On one occasion, while looking for her friend around the house, Allison walked in on Chris as he was changing and was physically exposed. It was an accident, which according to Chris was inevitable due to her routine presence in their house. Following that unfortunate incident, Chris continued to knowingly and willingly exposed his genitalia to Allison on multiple occasions. For a period of time, Allison did not bring Chris’ exhibitionism to anyone’s attention. Consequently, Chris gained enough “courage” to proceed to caressing Allison’s breasts and fondling her genitalia on more than one occasion. Eventually, Allison confessed Chris’ actions to her mother who then reported him to the appropriate authorities. Chris’ actions rendered charges of corruption of a minor, molestation, and multiple counts of lewd devious act. Chris explained how his and Allison’s routine activities made it possible for him to continue his sexual offending:

Chris: She was always over...always over at our house. If she hadn’t come over so fucking much, none of this would’ve happened. You know how drinking or smoking too much can increase your chances of becoming an addict; well this situation is kind of like

that...sort of. Allison was over too much and this was bound to happen [accidental exposure of his genitalia]. After the first time, it...this situation... just spiraled out of control...I spiraled out of control.

She continued to come...to come over [after Chris had exposed himself a couple of times]...she'd know that I am home, but she'd still come over to see [my daughter]. She'd act all normal, even around me...not weird or anything like that. I was like okay she's okay...its all good...we're good, she's not weirded out...Her continuing to come and acting fine like nothing had happened gave me the courage to...you know...try to touch her.

Chris, a *troller*, took advantage of Allison's presence in their home as opportunities for his continuous sexual offending.

Similarly, Tyler explained how babysitting the victim provided him with ample opportunities to have access to his victim on a regular basis. Tyler explained that available opportunities in conjunction with the absence of guardianship made it possible for him to sexually violate his young victim:

Tyler: I'd babysit him at least once a week if not more. His mother and grandmother usually worked opposite shifts and he'd stay home with one of them, but at least once a week they'd both have work at the same time or one would've to go to work while the other was still at work...on those days I'd watch him. I didn't mind...I didn't mind babysitting. I was just helping out my girlfriend you know. She couldn't afford to pay a babysitter and I was available...I didn't mind helping out.

George discussed how his daughter having to live with him alone made her effortlessly accessible. He began to sexually assault her soon after she moved in with him following the parents' divorce. Her sexual victimization continued over the span of two decades and resulted in multiple viable pregnancies. She was a suitable target because she was easily accessible and was dependent on George, her abuser, to provide capable guardianship.

George: After her mother and I split, they moved to [name of state]. She had family there you know...and wanted to be close to them...Sara [pseudonym] came to live with me when she was around 11 or 12...I can't remember exactly...its been a long time. I was

living alone...didn't have a girlfriend or anything like that. So, it was nice, nice when she came to live with me.

George further discussed how Sara not having many friends worked to his advantage.

She did not have many friends and spent most of her time at home in the presence of her emotionally, physically, and sexually abusive father.

George: Sara wasn't very social...not a very social girl...didn't have many friends... actually, she couldn't make friends...she was always afraid of talking to new people. So, she spent a lot of time at home...home with me.

Terrell explained that "living in the same house" gave him access to his victim, a teenage girl. Living in the same house as his victim, allowed him to continue his illicit sexual relation with his victim for months before they were discovered by her mother and he was reported to the police. Terrell was charged with multiple counts of rape of a minor.

Terrell: ...we were living in the same house. Her [victim's] mama was renting from me...good deal, I gave her a good deal...I put a roof over their head because I felt bad for them, that is all...that was the only reason. The crack ho had no place to go. The nigga' she was with...well, he threw her ass out. She got behind on rent. That's how they ended up at my place. It wasn't an inconvenience...I had plenty of room. Plus, it was nice...for a minute there, it felt like I had a family.

Albert discussed how his wife's business gave him access to suitable targets. His wife, a retired gymnast, operated a small in-home gym and gave one-on-one gymnastic lessons to a small group of young girls.

Albert: They'd come to our house for lessons...some a couple of days a week, some more often. The lessons were normally anywhere from 30 to 60 minutes long. Some of them had been coming for years...the regular students. We had gotten to know them really well and had become real close with some of them. We don't have any kids of our own so it was nice...nice having kids around the house. They made it feel more like home.

Vulnerability. Another factor that increased the suitability of a potential target was vulnerability. In addition to accessibility, the offenders targeted victims with perceived or actual vulnerabilities that could be easily exploited. From the men's accounts, it became apparent that one of the reasons they selected their victims was due to the fact that they believed the victim could be easily controlled or manipulated because of his/her perceived or actual vulnerability. Tyler's victim was a suitable target because of his speech impairment; a vulnerability that Tyler exploited to the fullest extent:

Tyler: He couldn't speak...you know...he was speech impaired. He'd try to speak, but no one would be able to make out a single word. He was in like some speech therapy kind of classes, but they didn't seem to help too much. He was struggling a lot.

Tyler was convicted of multiple counts of child molestation for performing oral sex on his girlfriend's toddler son. Tyler took advantage of the child's physical vulnerabilities. His victim was speech impaired in addition to being developmentally delayed. Tyler knew the victim was especially vulnerable due to his inability to verbally communicate. Therefore, he found comfort in knowing that his actions would never come to light because of his victim's disability.

Chris discussed how he manipulated his victim into silence. He exploited the victim's friendship with his daughter in order to gain her compliance. When asked about his daughters' other friends, he explained that even though many of them were frequent visitors, they were different compared to Allison. They appeared to be more social and exuded confidence, whereas Allison was timid, insecure, and practically friendless other than her one and only best friend; Chris' daughter. He had threatened her that in addition to no one believing her, she would also lose her best friend.

Chris: She was too dependent on [daughter's name]. One time, I overheard my wife and [daughter] talk about Allison and how she didn't really have any other friends beside [daughter]...and how she's such a sweetheart, but can't seem to make friends. They were feeling so sorry for her. She was a sweet girl, I guess it was just hard for her to be social...I know some people are like that.

George knew that as the sole care provider of his young daughter, she did not have other avenues or sources of support. He was well aware of the fact that she was fully dependent on him. George also knew that Sara did not have any confidants. He exploited his role as the father and caregiver and continued to sexually assault and rape her for over two decades.

George: She had nowhere else to go. It was either stay home or end up homeless or in a foster home...I'd tell her horrible, just horrible stories about kids who run away...she never tried. She was scared of everything. She was even scared of meeting new people. Like I'd ask her if she wants to go to the park or something and she'd always refuse. She didn't want to be around other kids if she didn't have to...she didn't want to be in a situation where she'd have to introduce herself or talk to people she didn't know.

From the beginning, George manipulated Sara into believing that she was less trustworthy compared to him. Therefore, even if she were to confide in anyone, no one would believe her.

George: I had ingrained in her head that no one would believe her if she ever told anybody. Like who would people believe, a little girl who has a reputation for lying or her father. This is something that stuck...I think this is why she didn't tell anyone anything until now. She's older now...not easy to control anymore. It was a lot easier when she was younger...things were simpler back then.

Albert, an opportunistic sex offender (i.e., *troller*), used a similar tactic in order to manipulate his victims into silence. His victims were pre-teen girls and students of his wife. Albert had molested the girls on multiple occasions.

Albert: They were so naïve. They all believed me. I didn't have to tell them much to convince them not to tell anyone. I just told them that it was our secret...a very special

secret that no one was supposed to find out...and if they ever told anyone, really bad things would start to happen like the police taking them away from their parents.

Victor was successful in continuing his sexual abuse of his oldest daughter by threatening to abuse the younger ones if she refused to comply with his demands. His oldest daughter, from a very young age, was very close with and protective of her younger sisters. Victor, their father, had managed to exploit this weakness to his own advantage. Further, the victim did not want to be the one responsible for breaking up the family unit especially since the family was going through a very difficult time due to Victor sustaining a physical injury.

Victor: if not her, her sisters...she knew that. She would've never wanted that for sisters. I would have never touched the younger ones, but it was enough to keep her in check.

Interviewer: Why did you stay away from the younger ones?

Victor: Jessica [victim's pseudonym] was 10 at the time. She understood things. It was easier to explain things to her. I knew she was smart...I knew she wouldn't involve her mother or anyone else. The other two were too young. They would've blabbered something to someone.

Jessica was a suitable target for Victor, because he could manipulate and control her. Through various threats and modes of manipulation, Victor had continued to molest her for about eight years. When Jessica turned eighteen, she left the house, escaped Victor, and exposed his sexual and emotional abuse she had endured for years.

Steve was serving time for involuntary deviant sexual intercourse because he had proceeded to have sexual intercourse with someone he knew was under the influence of alcohol and therefore unable to give consent. His account illustrates that Steve took advantage of his victim's vulnerable state even though he was aware that she was "shitfaced" drunk and therefore unable to accurately contemplate her actions and make an informed decision.

Steve: Well we were in my bedroom. I was looking for something...I can't remember what and I can't remember why she had followed me, but there she was laying on the bed...shitfaced [drunk]. We [other friends] all had a little too much to drink that night...I sat next to her asking her you know if she was okay. She was talking and telling me some story I guess...but none of it was making sense. She kept talking and I just kissed her. To this day, for the life of me, I don't know why I did that. I don't know why I kissed her...but, I did and she didn't pull back. Well, one thing led to another and before we knew it...we were, we were having sex.

Opportunity. In addition to accessibility and vulnerability of their victims, the offenders took advantage of available opportunities, made possible by their physical environment, to commit their sex crimes. Their physical environment and routine activities led to available opportunities for the commission of their sex crimes. The opportunities were also present due to the absence of capable guardianship. For many of the sex offenders in the study, that meant being alone with the victim (e.g., absence of capable guardianship) and usually in their own homes. As suggested by previous research, the familiarity and comfort of their own home rendered them a great degree of control over the situation and their targets.

For instance, Tyler explained how living alone and having to babysit the young boy gave him opportunities to sexually molest his victim on numerous occasions. Since he was living alone, he was not wary of anyone discovering him during the commission of his sex crime(s).

Tyler: I lived alone...it would just be me and him [victim]...I wasn't worried about anyone finding out. I guess that's why I continued doing it you know. No one had keys to my apartment, not even my girlfriend [victim's mother]. She'd asked me a few times to give her a key, but I'd keep stalling her.

Victor explained how his physical injury and subsequent inability to work provided him a field of opportunities to be alone with his daughters, the oldest of whom he proceeded to sexually violate for about eight years.

Victor: After my injury, I wasn't able to work...I wanted to...to be able to provide for my family, but I couldn't. I couldn't stand, sit, or walk for long periods of time. I've gotten better, but I still can't...So, my wife, she had to find a job. She was a stay-at-home, but she had to find work. My SSI check wasn't enough to cover everything you know. We had a mortgage, a car payment, and bills and three girls to take care of. So, when I got a little better she went back to work...working full-time. The girls [5, 7, and 10-year-old at the time]...I was taking care of them after school. We couldn't afford daycare and I was home anyway...it was just easier that way.

Rich, having recently been convicted of rape, angrily described how his victim's willingness to go with him to his "place" made him believe that "she was up for it," and therefore, took it as an invitation and opportunity for them to have sex.

Rich: I thought she was up for it...she came up with me. I asked her only like a couple of times if she wanted to come up, and she didn't hesitate so we went up to my place. She was in a good mood...we were joking, laughing, just having a good time...well, at least I thought we were.

Albert took advantage of opportunities when they became available, as his wife would sometimes entrust him to supervise the students while she tended to a phone call or a chore around the house.

Albert: She'd walk out leaving us in the [gym]. I had to do it [fondling/molestation] quick you know...for a few minutes, I did it only for a few minutes. I never spent much time with the girls alone you know.

The sex offenders in the present study encountered their victims in the course of their routine activities. The majority of offenders in the study fit Rossmo's (1997) victim hunting typology of *trollers*. They were opportunistic sex offenders and were not involved in actively searching for suitable targets. Their routine activities exposed them to opportunities to be in the presence of suitable targets while capable guardianship was minimal to none. Their decision to target a potential victim was influenced by the victims' degree of accessibility and vulnerability as well as available opportunities for the commission of their sex crimes.

Conclusion

The present study makes significant contributions to sexual violence research and sex offenders' decision making and target selection processes. To date, the majority of target selection studies have focused on property crimes such as burglary (Bennett & Wright, 1984, Rengert & Wasilchick, 1985; Beauregard, Leclerc, & Lussier, 2012), robbery (Feeney, 1986; Petrosino & Brensilber, 2003), shoplifting (Carroll & Weaver, 1986), and auto-theft (Fleming, 1999). Although, property and sex offenders are two distinct groups of criminals, a number of empirical studies have established that they are both highly influenced by their physical environment (Deslauriers-Varin & Beauregard, 2010; Tewksbury, Mustaine, & Stengel, 2008). In the course of their routine activities, their social context exposes them to suitable targets in the absence of capable guardianship. The present study builds on existing research and concludes that sex offenders' routine activities play an imperative role in their decision making and target selection processes. Findings from face-to-face interviews with 22 incarcerated male sex offenders revealed that sex offenders are likely to encounter suitable targets in the course of their routine activities. The targets tend to be poorly guarded; thus, increasing opportunities for sex crimes and sexual victimization. The results of the study further suggest that three factors play a key role in sex offenders' decision to select a potential target/victim: accessibility, vulnerability, and opportunity. These elements are grounded in routine activities theory; further confirming that sex offenders' target selection is influenced by their physical environment as well as their routine activities.

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An Examination of Adult Deaths Caused by Prescription Opioid Use, in Combination with Other Drugs, and Associated Factors

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Abstract

With a flood of synthetic-opioid prescriptions being dispensed by legitimate pharmaceutical outlets, willingly matched by increasing availability from black-market outlets, it is no wonder accidental death by overdose is accelerating at an alarming pace. Our study examines three factors associated with deaths caused by prescription opioids in combination with other drugs in Fulton County, Georgia: biological sex, age, and racial background. We also explore trends that will hopefully illuminate the effectiveness of five strategies initiated by the Centers for Disease Control and Prevention in 2018 in combating this scourge. The findings show a statistically significant difference in adult deaths by biological sex, with men more likely to die from prescription opioids when taken with other drugs. Of the five strategies, two were probably not useful to the intended purpose, with a consensus on the other three strategies not yet apparent.

Introduction

This study examined the overdose rate and related factors associated with deaths caused by prescription opioids, often in combination with other drugs, in Fulton County, Georgia. This study documents the changes in opioid deaths across associated demographics, and identifies substances commonly associated with those deaths. Additionally, we will discuss the measures taken in 2018 by the Centers for Disease Control and Prevention (CDC) aimed at reducing opioid abuse.

The choice of using Fulton County as the primary focus for this research is to be viewed as a follow-up from a previous study by Hager and Batchelder (2020). Fulton County is the largest and most populous county in Georgia, and has the greatest sample size. Additionally, data from the Georgia Department of Public Health's Online Analytical Statistical Information System (OASIS), shows Fulton County accounted for 10.6 % of opioid deaths in 2017, 11.8% in 2018, and 10.2% during the timeframe of the study. Those proportions highlight the urgency to address this crisis in what is clearly one of the most problematic populations in the United States.

Literature Review

Prescription opioids have given rise to a crisis nationwide; more than 11.5 million Americans over the age of 11 report misusing opioids (U.S. HHS, 2021). Between July 2016 and September 2017, visits to emergency rooms for opioid overdoses rose 30% nationwide, with large metropolitan areas seeing the greatest increase (CDC, 2018). From January to June of 2019, 85% of the drug overdoses in 24 states and the District of Columbia could be attributed to illicitly manufactured fentanyl, heroin, cocaine, or methamphetamine, either alone or in combination (CDC, 2020). Deaths from drug overdose nationwide increased from 47,000 in

2015 to 107,000 in 2022 (Ahmad et al., 2022). Of the 70,000 drug overdoses in the United States, 47,000 (67%) of them were attributable to prescription or illicit opioids.

At the national level, opioid deaths are at a crisis proportion; in Georgia, the problem is even more challenging. The CDC (2019) found that in 2018, Georgia medical providers wrote 63 opioid prescriptions for every 100 persons in the population. Sixty percent of drug overdose deaths in Georgia involved opioids for a total of 866 fatalities (National Institute on Drug Abuse, 2020). Comparing Georgia's prescription rate (63%) to the national prescription rate (51%) punctuates the persistent need to address this scourge. Therefore, in 2018, the CDC developed a new response to the crisis.

CDC Actions (2017-present)

Carroll et al. (2018) identified 10 evidence-based strategies viewed as being effective in reducing opioid overdoses in the United States. The evidence-based strategies included Naloxone distribution, medication-assisted treatment, academic detailing, eliminating prior-authorization requirements for medications that address opioid-use disorder, screening for fentanyl in routine clinical toxicology testing, the 911 Good Samaritan Law, Naloxone distribution in treatment centers and criminal justice settings, medication-assisted treatment in criminal justice settings and upon release, initiating Buprenorphine-based medication-assisted treatment in emergency departments, and syringe services programs.

Additionally, the CDC launched its first ever social media campaign, called *Rx Awareness*, targeting opioid overdose prevention. The campaign on social media was evidence-driven and provided true stories of people who suffered from opioid use and abuse. The target population was adults aged 25 to 54 who took opioids at least once for medical or recreational use. The CDC's two primary goals for the social media campaign was to 1) increase awareness

of the dangerousness and addictiveness of opioids, and 2) to reduce the number of individuals who use opioids, either recreationally or for pain management. The CDC had successfully used testimonials about other sensitive health behaviors on social media and chose the same approach for this campaign.

One of the concerns identified by physicians was the lack of training in prescribing opioids. So, the CDC (2022a) issued recommendations for prescribing opioids for chronic pain in the United States. The overarching goal of those recommendations was to improve communication between the patient and physician about the benefits and risks of opioid therapy. Despite the presence of the evidence-based strategies, since its publication in 2018, over 70% of the approximate 71,000 drug overdose deaths in 2019 involved an opioid. Of that total, approximately 73% of all opioid overdose deaths involved synthetic opioids (CDC, 2020). Therefore, this study addresses the need to ameliorate the scourge by shedding a light on factors that are associated with opioid deaths among a specific population in Georgia.

The Present Study

Hager and Batchelder (2020) examined opioid-related deaths in conjunction with alcohol, marijuana, methamphetamine, or cocaine occurring from 2014 to 2016 in Georgia. That study explored commonly researched factors including age, race/ethnicity, and sex. Although that study found no significant differences in opioid deaths among persons of differing racial background, numerous other studies found differences between African Americans and Caucasians to be statistically significant on a variety of measures. For example, Hoopsick et al. (2021) examined national trends in opioid overdose mortality among middle-aged adults using data from the CDC's epidemiologic database, grouped by race/ethnicity (and biological sex). Using adults aged 45-64 involved with heroin, natural and semisynthetic opioids, and synthetic

opioids, the authors found that Caucasian adults had the highest rates per 100,000 population for natural and semisynthetic overdose mortality, whereas African American adults accounted for the highest rates of heroin and synthetic opioid deaths. The greatest increase in mortality rates were among African Americans for synthetic opioid and heroin overdoses, and men were found to have the highest mortality rates in comparison to women in all drug categories (Hoopsick et al, 2021). These authors identified gaps in the research involving racial background, and the current study expands this knowledge-base by including all adults (18+ years-old) and incorporating polysubstance use (opioids + methamphetamine, cocaine, marijuana, and/or alcohol).

Another appeal to fill missing data-points came from Lippold and Ali (2020), who characterized trends in opioid-related overdose deaths among metropolitan and non-metropolitan areas in the United States over the past two decades, again using data grouped by race. Caucasians in non-metropolitan areas showed the greatest annual increase in rates with 13.6%, whereas a 12.3% increase was found in medium-small metropolitan areas. African Americans in medium-small metropolitan areas had the smallest increase of 11.3% per year. To address what they considered a lack of attention to causality among African Americans, Stephens-Watkins (2020) identified the possible causes of the opioid-related overdose deaths for the past ten years, to include structural and cultural considerations that may influence future research, practice, and policy. African Americans in metropolitan areas experienced the largest percentage increase from 2015 to 2017 in drug overdose deaths compared to other ethnicities (103%), and from synthetic opioids the increase was 361% (Stephens-Watkins, 2020). The study discussed the impact of polysubstance-use, meaning the mixing of opioids with illicit drugs and other classes of prescription drugs, and deaths of African Americans. The explanation provided by African

Americans who used drugs stated that the mixing of drugs helped with “coming down” or getting a “better high” (Stephens-Watkins, 2020). They also found that mixing of opioids with heroin and cocaine produced the most deaths among African Americans when compared to other races.

The Stephens-Watkins (2020) study expressed the need for more research on polysubstance use in opioid deaths among racial categories, and Furr-Holden et al. (2021) responded by examining historic differences in rates of opioid-related overdose deaths over time between African Americans and Caucasians. While from 2009 to 2012 African Americans had no statistically significant rate of change, from 2012 to 2018, African Americans had a sharp and statistically significant increase for opioid-related overdose deaths. And, among Caucasians during the three time-periods studied (1999 to 2006, 2006 to 2013, and 2013 to 2016), there were statistically significant periods of opioid-related overdose deaths. But, from 2013 to 2022, the average annual percentage rate was significantly higher for African Americans compared to Caucasians. The results of the study suggest that opioid-related overdoses for African Americans is outpacing Caucasians (Furr-Holden et al., 2020).

The current study expands on Lippold and Ali’s research on racial background, and also incorporates age and sex. Furthermore, the current study expands upon the breadth of literature by addressing opioid overdose deaths in conjunction with other drugs. The geography of the current study included the metropolitan and non-metropolitan areas of Fulton County, GA.

Methodology

The data are from Fulton County, Georgia, which experienced a population increase of 16% between 2010 and 2020, and now has over a million residents. The sample data were obtained from the Fulton County Medical Examiner’s Office producing a dataset of N = 298 cases (decedents). The dataset was reduced by excluding those persons who died from non-

prescription drug overdose, leaving persons who either died from prescription-only overdose, or poly-substance overdose. The final dataset contained $N = 224$ cases from 2017 to 2019.

Sample

The subjects in this study included 167 males and 57 females. The subjects were grouped dichotomously by those who died by ingesting prescription opioid medication alone ($n = 71$), or those who died from “poly-substance” use, defined as prescription opioid plus one or more of the following: marijuana, methamphetamine, alcohol, or cocaine ($n = 153$). Of the 224 subjects, 147 were Caucasian (65%), 70 were African American (31%), and the remaining seven decedents were Asian (3) and Latino (4). The subjects ranged from 19 to 87 years-of-age, with a mean age of 40; the median-age was 37.

Variables

The dependent variable was nominal, and subjects were grouped according to death type: death by prescription only or polysubstance. The three independent variables were race, age, and biological sex. The subjects comprised four different racial background groupings (Caucasian, African American, Asian, and Latino), but since the latter two categories were under-represented, (1% and 2% respectively), the variable “Race of Decedent” was recoded, grouping Caucasian and Non-Caucasian decedents dichotomously. Age of decedent was also dichotomized by those under age 37, and those 37 or above, because 37 was the median for these subjects.

Results

The first factor examined in the study among the two types of death was biological sex. The data revealed that the difference in subjects who died from polysubstance use among males and females was statistically significant $\chi^2_{(1, N = 224)} = 3.826$, $p = .05$. Deaths among women was

less likely to be caused by the use of additional substances when taking prescription drugs (57%), whereas male fatalities were typified by a pattern of using a combination of drugs when taking prescriptions (72%).

The second factor examined in the study was racial background. No significant differences were found in the dependent variable, prescription only or polysubstance, among the two categories $\chi^2_{(1,N=224)} = 0.181$, $p = .671$. Although the data-set was grouped dichotomously between Caucasians and non-Caucasians, the overwhelming number of non-Caucasians were actually African American. The difference in overdose deaths among Caucasians using polysubstance (67.3%) was not statistically different than members of ethnic minority groups using polysubstance (70.1%).

The final factor examined in the study was age. The data revealed that subjects age 36 and below, were not significantly more likely to die from overdose using polysubstance in conjunction with prescription medication $\chi^2_{(1,N=224)} = .010$, $p = .919$. Younger decedent-deaths investigated in this study were not more likely to be caused by the use of additional substances (68.0%) in comparison to those using prescription medication alone (68.6%).

Discussion

The purpose of this study was to re-examine commonly researched factors associated with opioid-related deaths from 2017 to 2019 in Fulton County, Georgia, and to gage the efficacy of some of the efforts to curb them. Of the five areas identified, the impact on opioid deaths of the first two areas can be loosely measured by examining the current data. The first of those areas, conducting surveillance and research to track public health outbreaks and develop more targeted interventions, appear to be ineffective. Whatever successes the CDC's response had on prescription tracking opioid abuse, it appears to have minimally impacted a reduction in

overall opioid-related deaths, especially those involving polysubstance use. O'Donnell et al. (2020) found that, although drug overdose deaths decreased from 2017 to 2018, they have been increasing since 2019 driven by opioid and stimulant-involved combination. And, from January to June 2019, 83.8% of the drug overdose deaths were attributed to illicitly manufactured fentanyl, cocaine, heroin, or methamphetamine either alone or in combination. Compton et al. (2020) made a similar claim of nonmedical opioid users ingesting other drugs, and that polysubstance use led to increased morbidity and mortality.

The second area was building state, local, and tribal capacity by equipping communities with the necessary resources to prevent opioid-related overdoses and deaths. Amplifying findings on polysubstance use including opioids, Cicero et al. (2020) examined data from a national sample of 15,741 persons entering treatment for opioid use disorder. The data included “last month’s” co-use of prescription or illicit opioids in combination with any one of 12 non-opioid psychoactive drugs. The data show an increase in illicit opioid use, from 44.8% in 2011 to over 70% in 2018, of past-month use of at least one non-opioid drug in over 90% of the participants. Although the finding for the earliest years of the study (2014-2017) is not directly relevant to the CDC’s five areas, surely the increase in 2018 speaks to a weakness in building resources, with an 85% increase of methamphetamine. To further understand the implications of using methamphetamine with opioids, Cano and Huang (2020) examined the increase in overdose deaths by state. The study showed a significant increase in psychostimulant-involved overdose deaths, especially in states heavily affected by the opioid crisis.

The remaining three measures to decrease opioid deaths may well show promise in the coming years, but all three will need time reveal their effectiveness. To be sure, supporting providers and developing provider education and resources is always a sound policy. The same

can be said for supporting public safety organizations, particularly law enforcement / public health partnerships. Lastly, measuring opioid avoidance attributable to risk-education measures will need to be explored further as well. As previous research indicated, the role of polysubstance abuse related to opioid deaths needs to be further explored by the CDC. An area of exploration could include the development of a more comprehensive Prescription Drug Monitoring Program (PDMP). Relevant to future research in Georgia, the Georgia Department of Health has agreements with North Dakota, Massachusetts, Alabama, and South Carolina for the purpose of sharing and disseminating information entered into the PDMP. However, this mutual agreement with those states does not prevent an individual from “doctor-shopping” and obtaining prescriptions in neighboring states such as Tennessee, North Carolina, or Florida, all of which have no agreement to share and disseminate information in the PDMP.

Another point of optimism, which may suggest a potentially hopeful outcome for all five measures, comes from a recently released (CDC, 2022b) communication indicating U.S. overdose deaths in 2021 increased only half as much as in 2020, but still up 15%. Still, the numbers remain a cause for concern: the new data show overdose deaths involving opioids increased from an estimated 70,029 in 2020 to 80,816 in 2021.

Due to the continuing issue related to opioid deaths in conjunction with another drug, the authors recommend the CDC to update the database with measures that specifically target outcomes attributable to education efforts and law-enforcement partnerships. The updated response should include a nationwide agreement assuring access and sharing of information in PDMP. It should also include a mandate for prescribing physicians to incorporate a standardized interview to assess polysubstance use or abuse. Thirdly, it should address societal changes

related to pharmaceutical grade and illicitly manufactured opioids entering the United States from outside countries.

Summary and Conclusions

The current study revealed statistically significant results after examining adult deaths caused by prescription opioid use, in combination with other drugs, with respect to one of the three factors examined. The data revealed the difference in subjects who died from prescription opioid and polysubstance among males and females was statistically significant, although race and age were not statistically significant factors.

Opioid-related deaths including polysubstance use continues to be an issue as indicated from the examination of data from 2014-2016 from the previous study by Hager and Batchelder (2020) and the data from 2017-2019 from the current study. Research by O'Donnell (2020), Compton et al. (2020), Cicero et al. (2020), and Cano and Huang (2020) substantiated the extent of polysubstance use influencing opioid-related deaths. This despite governmental efforts to stem the opioid death-count. Until there is an appropriate response to this crisis, the authors believe the opioid-related deaths involving polysubstance use will continue to trend upwards. Therefore, we highly recommend future research on specific these afore mentioned CDC measures, to include a quantifiable statistical analysis concerning the CDC recommendations.

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