



Review Article

Reasons for the Decrease in the Development of Suspects in Check Fraud Cases in Central Florida

Dena Marie Weiss, PhD*

American Public University System (APUS), Colorado State University-Global Campus

*Dr. Dena Marie Weiss is a criminal justice and forensics professor with over 25 years of experience in law enforcement. She began her career as a microanalyst and serologist with the Florida Department of Law Enforcement and remains active in local law enforcement as a crime scene investigator and fingerprint examiner. She has provided expert testimony for both the prosecution and defense in the state of Florida as well as the federal court system. Dr. Weiss has been teaching and developing criminal justice curriculum for 15 years.

Abstract

For hundreds of years, banking institutions have accepted original paper checks as a payment method for individuals as well as businesses. The establishment of the Check Clearing for the 21st Century Act (Check 21) created many changes in the way banks accept payment. One significant change is to create electronic check images of paper checks and afterwards destroy the check. Without the original piece of evidence to examine for forensic purposes, fraud investigators are struggling to solve check fraud cases. The study involved a qualitative approach to investigate fraud detection problems associated with the transition from paper checks to electronic deposits by the banking industry. A qualitative inquiry included in-depth interviews to analyze the perception of fraud investigators representing four law enforcement agencies as well as MIDFLORIDA Credit Union regarding the effect of the digitization of checks on fraud investigations. Qualitative data supported the theory that digitization of checks has had a negative impact on the development of suspects in check fraud cases. Future research recommendations include collection of data from additional geographical regions to evaluate the impact the legislation has had on development of suspects in check fraud cases.

Keywords: Check 21; Digital forensics, Remote deposit capture; Truncation

Introduction

In 1994, Bank of America launched a pilot program in Las Vegas, Nevada called the Thumbprint Signature Program to reduce check fraud [1]. The fraud reduction plan required bank tellers to collect

*Corresponding author: Dena Marie Weiss, American Public University System (APUS), Colorado State University-Global Campus, Tel: +1 8637123568; E-mail: Dena.Weiss@lakelandgov.net

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inked fingerprints on checks of non-account holders before cashing. The stratagem was successful and banks nationwide began following suit [1]. Law enforcement agencies improved the success rate of solving check fraud cases by applying inked thumbprint technology to forensic casework. Banks using the Thumbprint Signature Program average a 40 to 50% reduction in check fraud [2]. Prior to the Thumbprint Signature Program, forensic analysts attempted to identify criminals by processing fraudulent checks with a chemical called ninhydrin for the development of latent fingerprints. Ninhydrin reacts with the amino acids secreted from skin pores on the hands creating an outline of fingerprint ridge detail [3]. The fingerprint examiner compares the inked prints of any possible suspects identified during the criminal investigation. One of the drawbacks to ninhydrin processing is attempting to identify the developed latent prints. The creation of the Automated Fingerprint databases in the early 1980s improved the odds of identifying suspects involved in many categories of crime including fraudulent check crimes [4]. In 1999, the Federal Bureau of Investigation (FBI) developed a national database called the Integrated Automated Fingerprint Identification System (IAFIS) [5]. IAFIS is computer software consisting of finger and palm print records of arrested individuals referred to as the Criminal Master File (CMF), the Unsolved Latent File (ULF) containing unknown prints from crime scenes and the Civil Subject Index Master File (CSIMF) containing an "estimated 39.6 million civilian employee fingerprints" [6]. As of 2013, "there were over 75.9 million individuals contained in the Criminal Master File with over 23,029 local, state, tribal and federal law enforcement agencies electronically submitting data to IAFIS" ("Federal Bureau", 2013, para 2). At the local level each state maintains an AFIS database consisting of finger and palm print files from regional electronic fingerprint submissions. Biometric systems allow for the authentication of personal identity. Biometric authentication based on unique fingerprint characteristics have increased the success rate of identifying suspects based on their fingerprints in automated systems such as AFIS [7].

In 2004, the Check Clearing for the 21st Century Act (Check 21) was created by the banking industry and the Federal Reserve Board calling for the substitution of original paper checks for electronic images resulting in obliteration of the original document [8]. With the implementation of Check 21 law enforcement has no paper trail to follow thus no physical evidence resulting in limited opportunities to solve check fraud cases [9]. To investigate check fraud successfully based on fingerprint identification preservation of original documents is necessary for further processing in forensic laboratories. The banking industry has the responsibility to exercise business practices that safeguard customer privacy and security. In order to ensure best practices the use of available forensic technology is crucial to limit the thousands of unsolved check fraud cases in the United States yearly that in turn will result in higher arrest rates for fraud.

Materials and Methods

In-depth interviews of participants who are most concerned about crime (investigators) as well as the entity that is most concerned about profit (small businesses) provided usable data to develop correlations beneficial to the study [10]. Eight fraud investigators from two local

law enforcement agencies, nine fraud investigators from two federal law enforcement agencies and three fraud investigators representing MIDFLORIDA Credit Union in Central Florida participated through in-depth interviews. Data analysis combined interviews that revolved around the researcher as the primary instrument and the interpretive software Atlas.ti 7 to organize and interpret trends and themes occurring in the interviews. Qualitative analysis addressed two research questions:

Q1. What changes has the digitization of checks prompted in regards to the development of suspects in check fraud cases as perceived by Central Florida law enforcement agencies and private business leaders. Qualitative analysis also addressed research question 2

Q2. What security protocol changes do Central Florida law enforcement agencies and the business community perceive would assist in increasing the development of suspects in check fraud cases in the digital age?

The researcher relied on a digital voice recorder to interview participants rather than video recording because nonverbal cues and body language are not pertinent to the study. The interview process included written documentation as needed to capture thoughts the researcher may have had during the interview process regarding follow-up questions. Qualitative analysis in the form of inductive reasoning allowed the researcher to develop general conclusions from the interview process. Analysis of the interview data by the researcher resulted in conclusions based on an interpretation of how the study participants perceive the world around them.

Results

The purpose of the present research was to examine the reduction in the development of suspects in check fraud cases due to the digitization of checks. The study included an investigation into the fraud detection problems associated with the transition from paper checks to electronic deposits by the banking industry using mixed methods approach involving two concurrent strategies of inquiry. The qualitative data was analyzed using a process known as thematic analysis which is widely used in qualitative research [11]. Development of themes in the interview process included analysis by Atlas.ti software.

The purpose of thematic analysis was to identify themes from the qualitative data. The data accurately reflects the experiences of the participants and enables the researcher to achieve the objectives of the study. The specific process of thematic analysis used in this study involved analyzing the interview transcripts to provide a general overview of the research data. After importation of the transcripts into the Atlas.ti software each transcript underwent systematic examination extracting relevant material and allocating this to relevant codes.

In the qualitative analysis the researcher used a combination of a priori and inductive coding. Development of codes in the priori method took place in advance, in this case corresponding with the main questions asked during the participant interviews. Inductive coding involves developing codes based on the emerging research findings [12]. Extracts of research material allocated to codes ranged from just a few words to a whole paragraph or segment of an interview depending on how much material was necessary to convey the experience or viewpoint of the participant with regard to this theme.

Characteristics of the Sample

Table 1 presents background information on the demographic characteristics of participants in the qualitative research along with

Participant number	Identifier	Gender	Age	Race
1	FA1a	M	39	White/Hispanic
2	FA1b	F	47	White
3	FA1c	M	50	White
4	FA1d	F	51	White
5	FA1e	M	39	White
6	FA2a	M	59	White
7	FA2b	F	57	White
8	FA2c	M	35	White
9	FA2d	F	54	White
10	LA1a	M	59	White
11	LA1b	M	55	White
12	LA1c	F	41	White
13	LA1d	M	53	White
14	LA2a	M	46	White
15	LA2b	F	42	White
16	LA2c	F	43	White
17	LA2d	M	54	White
18	LBA	M	35	White
19	LBB	F	39	White
20	LBC	F	36	White

Table 1: Demographic characteristics of sample.

Participant number	Highest educational level	Employing organization	Years' experience of fraud investigation
1	Master degree	US Postal Service	8
2	Bachelor degree	US Postal Service	13
3	Bachelor degree	US Postal Service	2
4	Bachelor degree	US Postal Service	18
5	Bachelor degree	US Postal Service	10
6	Bachelor degree	Florida Dept. of Law Enforcement	20
7	Master degree	Florida Dept. of Law Enforcement	30
8	Bachelor degree	Florida Dept. of Law Enforcement	8
9	Bachelor degree	Florida Dept. of Law Enforcement	35
10	High school	Lakeland Police Department	24
11	Some college	Lakeland Police Department	8
12	Master degree	Lakeland Police Department	8
13	Master degree	Lakeland Police Department	15
14	Associate degree	Polk County Sheriff's Office	15
15	Bachelor degree	Polk County Sheriff's Office	14
16	Bachelor degree	Polk County Sheriff's Office	10
17	Associate degree	Polk County Sheriff's Office	18
18	Bachelor degree	MIDFLORIDA Credit Union	15
19	Associate degree	MIDFLORIDA Credit Union	12
20	Some college	MIDFLORIDA Credit Union	8

Table 2: Education and employment characteristics of sample.

the unique identifiers used in the verbatim quotations in this section. Table 2 represents participant's education and employment characteristics.

The overall sample of participants included a good balance of males and females with ages ranging from 35 to 59. All were white (one of mixed race). The majority of participants were highly educated with Masters, Bachelors or Associate degrees. Most of the participants were highly experienced in check fraud investigation (or fraud investigation in general) with an average of 15 years of experience. All but one had at least 8 years' experience of fraud investigation.

Atlas.ti software assisted in identifying six themes related to research question 2. These themes included; (Theme 1) check fraud knowledge and expertise; (Theme 2) current check fraud investigation processes; (Theme 3) availability of physical checks and forensic procedures; (Theme 4) working relationships with banks and other fraud investigators; (Theme 5) check fraud investigation processes and (Theme 6) the use of original and scanned checks in fraud investigation. Qualitative analysis revealed one theme identified relating to research question 2 as well as 3 sub-themes. Theme 7 was suggested changes to security protocols and included the following sub-themes (a) improved scanning technology and practice, (b) improved check handling processes and (c) other uses of technology.

Research question 1: What changes has the digitization of checks prompted in regards to the development of suspects in check fraud cases as perceived by Central Florida law enforcement agencies and private business leaders?

Theme 1: Check fraud knowledge and expertise

In order to provide further background information on the participants' knowledge of check fraud investigation and the forensic procedures involved, the question was posed whether participants had been specifically trained in fraud investigation and whether they were familiar with Check 21 and with the forensic procedures used in check fraud cases.

All 20 participants confirmed that they are familiar with the Check 21 Act at least in general terms. Nineteen of the participants just answered in the affirmative when asked this question, but one described the Act more fully as follows:

Check 21 Legislation is where banks no longer keep original checks. They create what they call an image replacement document or an IRD and what that does is act as a certified copy of the original document. That way the banks do not have to maintain the original checks that were negotiated at the time of the transaction (LA1a).

Similarly, all twenty of the participants indicated that they are familiar with the forensic procedures used in check fraud investigations. Some were initially hesitant about this but confirmed their familiarity with procedures such as fingerprint and handwriting analysis when the researcher clarified that the question only related to this general level of awareness, and not detailed specialist knowledge of the processes involved.

The fingerprints usually coming from the check you can tell who touched the check and link it to somebody who might have passed it. Um... any other kind of marks on the check, writing, pen, ink you know different things that would show a fraud had been committed or who last had the check or how the check was I guess processed (FA2b).

Most times, the banks or the stores who are negotiating the checks will obtain a fingerprint which is placed on the check prior to the

transaction. We use that to send to our crime scene technicians for an evaluation what they do is they take the fingerprint, if it's quality and they run it through an AFIS system and it'll give them several possible suspects. From there it is determined who the actual person was that cashed the check (LA1a).

The next question related to specific training in check fraud investigation or general fraud investigation. Most reported that their training had consisted of both formal courses as well as on-the-job learning, but some had only experienced informal on-the-job training:

I have just taken the basic fraud investigation and on the job training (LA2a).

My training in check fraud investigation has been mostly through what I have learned through my fourteen years as a fraud investigator with the Lakeland Police Department (LA1a).

On the job experience. A lot that I have learned is from the detectives I have worked with just the years of experience (LBa).

Participants LA2b, LA2d and LBb are certified fraud investigators. Seven out of twenty participants have had specific training in check fraud investigations; nine reported that they had learned about check fraud as part of more general courses on fraud investigation:

Basically just general classes in fraud, nothing really specific (FA2c).

Overall fraud, money laundering, embezzlement, white-collar crimes, crimes against the elderly, mortgage fraud, yes (FA2).

I do not know if I have anything specifically related to check fraud, but I have taken classes related to criminal investigations, probably ten to fifteen classes (LA1c).

Four participants, three of whom were local law enforcement claimed they had only experienced on the job training and no specific check fraud cases. The one federal agency participant had only been working check fraud cases a couple of years.

Theme 2: Current check fraud investigation processes

The next series of questions related to the current check fraud investigation processes as experienced by the research participants. These questions intended to help reveal the ways in which the Check 21 Act is having an impact on the ability of investigators to solve check fraud cases. Questions included whether participants were familiar with forensic procedures used to analyze checks and if these procedures assist in solving check fraud. All participants in the study said there were familiar with forensic procedures. Several participants provided specific details.

Yes, I am stores who are negotiating the checks will obtain a fingerprint which is placed on the check prior to the transaction crime scene technicians run it through an AFIS system and it will give them several possible suspects. The check can also be processed for fingerprints and compared to fingerprints on file (LA1a).

Fingerprints usually coming from the check you can tell who touched the check and link it to somebody who might have passed it. Any other kind of marks on the check, writing, pen, ink would show a fraud was committed (FA2b).

I'm a very good advocate on paper trails video is great, but there's nothing in my personal opinion that basically seals the deal on an investigation like having fingerprints or DNA on paper (FA1a).

Nineteen of the twenty participants in the study agreed that forensic procedures assist in solving check fraud cases. Participants mentioned the technique of fingerprint analysis often.

When we get checks the latent fingerprint exams are the best (FA2c).

The participant who felt that forensic procedures do not assist in solving check fraud cases stated, it seems like when we send stuff to our lab the fingerprints do not seem to come back positive very often (FA1c).

Theme 3: Availability of physical checks and forensic procedure

The findings indicated that the participants do still have access to forensic procedures such as fingerprint analysis, either within their own organizations or by using the services of other organizations, and that they use these services whenever they have physical documents available for analysis. All twenty participants reported that it is becoming increasingly difficult for them to obtain the physical checks necessary for processing using forensic procedures. Eighteen out of twenty participants claimed they have difficulty getting their hands on original checks in a check fraud investigation. The remaining two participants said they have no problem obtaining original checks from mom and pop stores and convenience stores, only banks and grocery store chains (LA2b and FA2b).

They are (available) it is just becoming harder to find the paper (FA1a).

They are available if the documents are available, which unfortunately with the Check 21 Legislation, that is becoming more rare each and every day (FA1d).

Fingerprinting the checks and stuff like that has gone bye-bye with the new legislation. I think now mostly they depend on surveillance footage and the memory of tellers (LA1d).

The findings revealed that there is considerable variation in the participants' abilities to obtain original checks, depending on the origin of the cashed check. Five out of twenty participants reported that they rarely or never have the opportunity to work with original checks.

Any type of check fraud cases that I have worked; everything has been digitally recorded already and then sent to me in a regular paper copy (FA1b).

No, not any longer. They will scan it and give you a digital image of it, but you cannot get the original (LA1d).

Although all types of organizations must adhere to the Check 21 requirements for check truncation, the participants indicated that the specific processes used and the timescales for retention of checks vary between different institutions, as does the ease of obtaining them. Eleven out of twenty participants indicated that investigators have to act much more quickly to obtain original checks than they did before the implementation of Check 21. Two out of twenty participants noted that it is often easier to obtain original checks from smaller businesses rather than larger organizations (LA2b and FA2b) three out of twenty participants commented that it is easier to obtain checks from credit unions, since these institutions retain checks for longer (LA1a, LA2a, and LBa). A variety of responses were received but the overall theme was that obtaining checks for investigations is not as easy as in years past due to Check 21 legislation.

You have to move faster, because once they digitalize the checks they destroy that evidence they're not required to retain it. You can still get them from the smaller banks, but like I said you have to move faster. A lot of businesses once they deposit the check on a major bank, it goes to like a centralized collection back house as you would say. And after maybe seven or eight days the check is destroyed it's easier if you work with credit unions, because they're smaller institutions and Check 21 applies to them but they have an option of retaining the

paper if they want to but it's still you know the clock is ticking from the moment the fraudulent action happened or the crime occurred to the time when you might still have access to the physical evidence (FA1a).

It depends on the business or the institution and how long they keep the original item. Some of them may only keep them for thirty days. Some may keep them for ninety days. Some may keep them for six months (LBb).

I can get them from a business, like a local mom and pop store if they are a victim of a crime and some just say, "Here, take them." Some would say, "We want a subpoena, to cover ourselves." Mom and pop stores sometimes keep their own checks (FA2b).

If it is a convenience store many of the times we can, but if it is a major retailer or a grocery store we do not (LA2b).

Five out of twenty participants noted that the times they are most likely to succeed in obtaining original checks for forensic analysis occur when a bank teller or a merchant becomes suspicious and holds back the check for investigation.

For one reason or another, those checks were held aside and we were able to get physical evidence from those checks. Or in an instance where somebody stole mail that contained checks and then went and deposited those checks into their own ATM machine and the bank management cleared the ATM and saw that those checks obviously didn't belong and held them aside for law enforcement (FA1b).

They smell a rat, or whatever and they figure out it's fraud of course then they get law enforcement involved and we're able to retrieve the check, because it hasn't been processed yet (FA2a).

Theme 4: Working relationships with banks and other fraud investigators

All twenty interviews indicated very good working relationships between the organizations involved in check fraud investigation. The twenty research participants reported having good or excellent working relationships with banks and two of them described ways in which these relationships were mutually beneficial to the parties.

Most banks, probably, I would say probably ninety-eight percent of the banks. There was a couple of banks that refused to help or assist (LA1d).

With most of the banks, we have an excellent relationship. If their bank loss prevention people come to us with a case, we will work the case from start to finish and it builds a relationship with the banks and with their asset protection people (LA1a).

However, two out of twenty reported that some banks are easier than others to work with on check fraud investigations, especially those that have a better understanding of the processes involved. One participant highlighted the ways that non-co-operation from some banks often weakens their ability to effectively solve a fraud case.

We find that financial institutions, who hire prior law enforcement to work as fraud investigators or corporate security, who have actually worked fraud investigations, who understand the processes that law enforcement goes through and the needs of law enforcement and the processes of the criminal justice system tend to be more law enforcement friendly and they also understand that once the financial institution has become a victim, that they are in a position where they can provide information to us more freely and more freely without subpoenas and court orders and a lot of the other "red tape" documents,

versus the financial institutions who have people who don't have that type of background (FA1d).

Some banks work well that is very few the other banks it's just impossible to get any information from and we know they're hitting every bank and we'll only get information from one or two banks. So, we know that we are only getting a percentage of the loss and we know that they hit every bank, but we are only getting a few banks. So, we know that the other banks just are not cooperating (FA2c).

The researcher asked participants about the quality of their relationships with other fraud investigators at federal state and local level. All twenty participants reported strong and effective inter-organizational relationships and conveyed an overall sense of good co-ordination between agencies which the researcher perceives as contributing to the success of investigations. One participant indicated a stronger relationship with federal agencies than with local Law enforcement Agencies (LA2b). The interview data indicated that the best working relationships exist due to informal interaction between employees, especially those with a similar specialist background in law enforcement, whether these are working for financial or other law enforcement institutions.

Yes, I've made some really good relationships, I think that the locals and the state law enforcement agents have a wealth of knowledge and have a lot of experience and Federal Agents can learn a lot from them (FA1a).

If a lot of your investigators are retired law enforcement, then there is an understanding that you guys can work together. You know what needs to be done and then of course get the subpoenas etc., what you need to get the information (FA1c).

Absolutely, you know if we didn't we wouldn't get our job done, when they work one check a lot of times they are the same suspect I'm looking at in my bigger case, because of our relationship we finally do make the connection (FA2a).

At the Lakeland Police Department we have a very good working relationship with both state and federal, we work very closely with Florida Department of Law Enforcement and with the United States Postal Services regarding the check fraud cases (LA1a).

We have a fantastic working relationship with all our federal entities here (LA2b).

One participant made the point that although working relationships between agencies appear good the effectiveness of the relationship suffers due to incompatible information technology systems which make it difficult to share data.

Oh yes, the locals and everybody's willing to work together, especially the locals, federal, state, we all pretty much work together. The only thing is our systems do not generally talk to each other and that is the biggest problem (FA2c).

Just two Lakeland Police Department participants mentioned problems in their relationships with other organizations, causing problems with check fraud investigations.

It's hard to get anything from the Fed's, like for instance if you're working like over the last ten years probably one of the increases you'll see is fraudulent tax refunds or government assisted checks fraudulently, but you can't get them to help you. They do not or they will not disclose any of that information. I have never been successful trying to get a government agency to help me with an investigation on the check (LA1d).

Over my career, I would say that I had better luck with federal agencies than local agencies as far as Secret Service and Postal Inspectors stand out (LA2c).

Theme 5: Check fraud investigation processes

The researcher asked participants asked about the typical length of time between the actual occurrence of an incidence of check fraud and the start of the investigation; how many check fraud investigations they typically work on annually, and the percentage of these cases typically solved, in terms of identifying the individual responsible. The intention of the researcher was to shed further light on the check fraud investigation process post Check 21.

The participants' responses relating to the typical length of time between a check fraud cases occurring and the start of their investigation largely reflected their different roles and organizations. For example, some of the Lakeland Police Department, Polk County Sheriff's Office and MIDFLORIDA Credit Union representatives reported the fraud victim sometimes contacts them almost immediately or a financial institution when they realize fraudulent activity has occurred. However, more typically reporting can take around a month since the victim only discovers the fraudulent activity when they receive their monthly bank statement.

If not that day within a week, if they recognized it as a fraudulent check it would be reported immediately but if, it was something that the victim did not pick up on until down the road it may be a week or so or a month (LA1c).

It depends, I mean some people are right on top of it and they will let you know immediately, they are checking their accounts. Other people are not so diligent and it may take them until they get their statement. So, it might be twenty, thirty days later. But for the most part, I think it is pretty quick. People keep an eye on their money with online banking these days (LBA).

The time frame can range from immediately being notified that yeah, there was a mail theft and there were checks inside the mail that were ready to go out to various vendors to then finding out a month later "I saw my statement and you know Big Charlie's Barbeque and I didn't make it payable to Big Charlie's Barbeque, it was going to Duke Energy in North Carolina and how did that happen?" and so it all depends (FA1b).

In contrast, the FDLE institution representatives and some of the USPS representatives indicated that they are often only involved later in the process when another organization refers a case to them this can take weeks, months or sometimes even more than a year.

That can be anywhere from 14 to 30 days because we are usually, we are usually notified days after it happens. And then by the time the credit union or the bank gathers all the documents it might take a while (FA1a).

Probably within six to eight months would be a start time, time that people would actually complain it would get through the system and you would start your investigation from there (FA1c).

It usually takes months. I have a case now it's international and the victims came from the Dominican Republic and they were trying to solve the case themselves for the first almost year and a half. It happened in 2011 and they did not bring the case to me until like December 2013. So, that is part of the problem because the clock still runs. The date of the occurrence was 2011. Two years have already passed, or more (FA2b).

It may take several months before it comes to FDLE (FA2d).

These timescales are likely to have implications for the ability of investigators to obtain original checks for use in forensic analysis since a long delay in starting an investigation may mean the destruction of the original check in accordance with the Check 21 legislation.

To provide an indication of the overall effectiveness of current check fraud investigation processes the researcher asked participants how many such cases they typically work on each year and of these, the number of cases solved by identifying the perpetrator of the crime. The responses varied widely between the participants reflecting their different organizations and roles.

On the one hand, seven of the nine participants representing the USPS and FDLE reported working on just a small number of large cases per year typically between two and five. These involved high value, federal or international crime cases with multiple suspects and incidents and sometimes ran into more than one year. However, seven participants reported quite a high percentage of these cases were usually solved anywhere between 60% and 100%. Explanations for this high percentage involved the criteria that a significant amount of evidence must exist before accepting the case.

I would say about three or four but the difference being is because these are our Federal cases the thresholds are higher, we have a pretty good resolution rate right now, I would say up in the 95% (FA1a).

I have two cases, but they are huge cases. They are multi-million dollar cases, international cases with multiple suspects (FA1d).

We kind of pick and choose our cases. So when a case comes to me and I actually look at it, I do the preliminary work on it and I go to my supervisor and I talk him into me opening that case, I'm pretty sure that I'm going to solve that case (FA2a).

Our cases are long term. Sometimes they are one, two, three, four plus years (FA2b).

On the other hand, the local law enforcement agency investigators and fraud investigators from MIDFLORIDA Credit Union tended to work on individual check fraud cases, typically ranging from around 50 to several hundred cases annually. Perhaps unsurprisingly, the typical percentage of solved cases reported by these participants was somewhat lower ranging from around 30% to 60%, but with the annual figure varying significantly depending on the type of cases involved and being quite difficult to estimate. Three of the respondents specifically stated that it is much easier for them to solve check fraud cases when the original checks are available to them.

It can be anywhere from fifty to a hundred to more, It could be anywhere between thirty and sixty percent our solvability goes up when we are able to get the original documents (LA1a).

Probably a hundred to a hundred and fifty, I would say probably thirty-five to forty percent if we had the original check? I... it certainly increases the solvability factor when we had the check, May be even higher (LA1c).

I would say may be twenty to forty per month (LA2b), I do not have a percentage, I am sorry. I can tell you more would have been without Check 21 (LA2b).

Theme 6: Use of original and scanned checks in fraud investigation

Nineteen participants expressed very strong support for forensic procedures using original checks, and agreed that these were important in helping them to solve check fraud cases.

I've had experience in cases where the majority of them never go to trial because not only do we have the video but we actually have forensic evidence that states that you know their fingerprints or their DNA was on the paper. Some of our best investigations have been investigations involving physical evidence recovered such as deposit slips, withdrawal slips, actual checks. The video is great, but there's nothing in my personal opinion that basically seals a deal on an investigation like having fingerprints or DNA on a paper (FA1a).

When we get checks, the latent fingerprint exams are pretty much the best (FA2c).

It does give a lot of strength to a case that's presented for prosecution because I think that nowadays if you don't have the physical evidence or the video, there's just too many types of cases like this that come through, so if you can actually link a particular person to that instrument it's absolutely helpful without a doubt and prosecutors want that more and more (FA1b).

Our solvability goes up when we are able to get the original documents. Again, because of the procedures that we are able to follow with turning them over to the lab for forensic examinations and for processing (LA1a).

Just one participant stressed that even when they were able to use forensic procedures, these did not always help in solving the case. One USPS representative even said that they "very rarely" helped (FA1c).

When we send stuff to our lab, the fingerprints do not seem to come back positive very often (FA1c).

The check was analyzed by the Pinellas County Sheriff's Office through FDLE and unfortunately, no prints of value were found, because it was handled so many times (FA1b).

Sixteen of the twenty participants highlighted the difficulties in working only with scanned images of checks and the way that this can adversely affect their ability to identify the perpetrator. The researcher noted in particular that as well as the loss of fingerprints, the scanning process does not effectively reproduce the unique identifying features included on paper checks such as watermarks.

I have not had one come back positively identified. I mean, you can see the fingerprint on there, that does not mean a lab can tell you whose prints they are; once the originals get destroyed obviously, there is a lot of evidence that gets destroyed with the original check (FA1e).

A lot of the examiners cannot make a determination about the author of the check without the original check. So, Check 21 and you can understand it is a paper reduction rule, if you will, but for our purposes it sure does hamper us (FA2a).

In the scan image, you cannot really tell if it is a counterfeit item or not, because there are actually features in the paper, and that is what the Check 21 has not caught up to. There are features in the paper, security features, watermarks, magnetic ink embedments that tell these scanners and tell the tellers "hey this is a good check" or at least it has the security features. Once that check is scanned, there is no way of telling that (FA1a).

With the Check 21 Legislation, it has really hindered our ability to investigate some of these check fraud cases. When the original check is scanned it pixelates the fingerprint, making it unable for the technician to come up with a positive identification on that check. Again and without the original document we are not able to process that check; for fingerings of somebody who may have handled the check (LA1a).

The following themes related to research question number 2 of the study and resulted in one theme and three sub-themes.

Research question 2: What security protocol changes do Central Florida law enforcement agencies and the business community perceive would assist in increasing the development of suspects in check fraud cases in the digital age?

Theme 7: Suggested changes to security protocols

In the final phase of their interviews, the researcher asked participants to suggest measures for improving the effectiveness of check fraud investigation in the post Check 21 era. The researcher received a wide variety of suggestions, which fell broadly into three categories, as discussed under the following sub-themes. The first sub-theme was improved scanning technology and practice. Sixteen of participants stressed the need for improved quality of scanned check images. They noted that a lot of information potentially important in check fraud investigation is being lost due to the poor scanning technology or techniques currently used by banks.

When we get copies of the checks that we need, when they are subpoenaed we get them now in CD form and a lot of times the quality goes and goes every time it is copied. We have trouble with our checks when we get copies from the bank. Even though they are certified for court our analyst a lot of times have to manually enter them in the computer to do their charts instead of scanning them, because they can't be read properly (FA2b).

Just as much money as they spend hiring and training the front line folks which are the tellers, they should spend that same amount of money for the proper equipment to get a good sharp image as well as have somebody that's trained to operate that machine that can - when they accept a scan of an image, yes, that's exactly what's on this original document (FA1b).

Clearer copies would help a lot of times we will get copies of checks they have been minimized. Some of them will be minimized and you cannot read the information correctly or the copy is poor because it has been scanned incorrectly or it is just a poor scanning device so a good clear copy of the check, front and back (LA2d).

I think there probably should be a good quality scan. There should be a baseline. I know that even if you scan or use a copier, it has got to be a certain DPI to be legal (LBa).

Three of the participants explained that in check fraud cases, especially those involving multiple individuals, various handwritten notes and codes are often added to the checks as they pass hands, for example so that those involved in the process can earn their commission. Similarly, when checks pass through the banking system, equipment embeds codes and identifiers on the checks that can be helpful to fraud investigators. The problem is that the current standard of scanning technology is not effectively reproducing these codes and marks, and they are sometimes being lost altogether if they are on the reverse side of checks.

There is a lot of data on the backs of checks, all of these little routing numbers and different things that are keyed in that actually shows you the entire travel between the savings bank and then the Fed member and then again if it's going into an account, every single time a different bank touches it, there's another number and that also helps like the date that it was accepted or it went through or it cleared (FA1b).

If you are tracking organized crime groups that are putting different symbols on it, so and so is giving me a 100.00 check, I am going

to get 5.00 from that 100.00 check. I am going to make sure that the check casher, once he cashes it knows that it went through my hands so I can get my 5.00. That is what I mean (FA1b).

Some banks will do just the front of the check thinking' that is good enough without the signature, without the backside with the signature on it, and we would need front and back (LA2d).

Five of the twenty participants stressed that the need is not just for improved scanning technology used, but for better maintenance of this technology so that it works effectively, and more competent operators who take good care to reproduce accurate images of the checks. The machines get dirty; you get so many checks that run through them. The cameras, the readers, those all get dirty. They have to be cleaned regularly. If somebody is not cleaning them, you know, you get lines through the checks, you get you know, the checks may scan upside down, they may scan sideways, they may cut off (LBb).

There are times when whoever is scanning it does not make sure that the image completely captured everything that is on that check (FA1b).

The second and third sub-themes involved improved check handling processes and suggestions for improving check fraud security related to the check handling processes of both banks and merchants. Many of the participants expressed the view that improvements in the handling of checks, such as better identification or verification procedures, would have a major positive impact on reducing check fraud. Several participants suggested keeping checks longer before destruction. Another suggestion was the adherence of institutions to specific guidelines about the timescales for check truncation.

Participant LA2 noted that a big part of the check fraud problem is that major retailers are accepting checks but using very few security safeguards, and that these merchants need to improve their procedures.

If the merchant would be a little bit more diligent on the identification they collected at the time the check was passed. Whether it is a fingerprint and, you know, a decent fingerprint. A clear photocopy of the ID would help. I know that is not always convenient for them to do, but that would definitely assist (LA2d).

Five of the participants stated the need for more or improved training for all individuals responsible for handling checks, including retail and other customer-facing staff as well as bank tellers. Their comments indicated that this training must include for example, awareness raising about fraud techniques such as fake IDs and smudging of fingerprints.

I think more of it's probably more education to the merchants on what to look for in way of IDs to see if they are fake, because a lot of the IDs from a layman's standpoint, they look real but if they had more training they'd realize they're not real identifications that they're looking at (FA1c).

The problem with the security measures that are in place now, some people would suggest, 'hey, are you making' sure you check your ID's?' Well, they have these ID's that are tremendously well made fake ID's. So how do you cure that when you're looking' at it, and you do not have the training the person that is takin' that check do not have any training to identify anything on those identifications (LA1b).

Sometimes, you know, people smudge the print. So, I think if they would train the tellers properly to be able to see if they're trying' to

fudge on that fingerprint, or that thumbprint, that would definitely help (LA1d).

Four of the participants argued that there is now too much emphasis in banking on customer service and speed and that this is one of the main factors leading to an increase in fraud. They emphasized a need to slow down banking processes in order to introduce better safeguards such as checking that funds are in the relevant account before a cashing checks and verifying the identity of customers.

We need to get away from making things so easy and customer friendly, we need to rather take a step back away from that. You know, we need to put those little buffers in there. We need to verify information, so much is done now electronically. The banks don't know who their customers are now even with you know all of the provisions with the Patriot Act and all of these measures that are supposed to be there to protect the customer, to know your customer etc., You factor in the Check 21, you know, there needs to be that step of verification ... We need to go ahead and put those little extra security layers in and you know so what if there is a day or two delay. We need to start holding those funds the way it used to be. You know a couple of day hold before funds are released (FA1d).

The banks at this point they have the Availability of Funds Act, where if they bring a \$2,000.00 check that bank has to give them a percentage of the check, and I know it's inconvenient, but I think if a person comes in with a check that bank has the ability to say because it takes two or three days for it to process through. If they just held those checks for a day or so until they can verify the funds, it would stop a lot of the fraud (FA2a).

More training on their part to understand that is okay not to cash a check. You know, I get customer service and all, but you know, sometimes you have to say no (LA2c.)

In this context, one of the USPS representatives identified the Funds Ability Act as a legislative barrier to reducing check fraud. This participant discussed a form of fraud involving remote deposits of original checks as well as deposit of the check at the Post Office for refund. Unlike banks, the Federal Reserve must make the funds available immediately due to the provisions of the Act. The participant suggested the legislation undergo modification to include a waiting period for verification of the fund availability.

I am very, very concerned about remote deposits. We're actually investigating cases in this agency where people are buying postal money orders, blank money orders they're taking an image of it remotely depositing into their account and then they're going back into the post office and saying "hey I want to cancel this money order, because I don't have a need for it", so they get their money back. But because of the truncated system that allows a remote deposit the image of the document gets presented to the Federal Reserve and Federal paper is different than bank paper; once it goes to Federal Reserve the Federal Reserve pays first, then they investigate if there's any issues with the check. I think there has to be safety measures in the sense of maybe the Funds Ability act needs to be enhanced to give a waiting period (FA1a).

The fourth sub-theme related to research question 2 was other uses of technology. Three of the participants emphasized that there is a need for other technology based security or fraud investigation measures and tools in the digital era (FA1a, FA1d and LbC). Two participants (LA1c and LA2a) mentioned the use of video as being very important for identifying the perpetrators of check fraud crimes

particularly in the absence of forensic evidence as well as the possibility of a digital scanner that could capture a fingerprint image for printing onto the digital check.

I think video is the biggest thing. I mean, if you're not going to have a physical check where I can get a fingerprint from or if you're not going to have something that will record a fingerprint or something that'll do other identification other than just showing somebody your ID, video and a fingerprinting system it would just connect the two. It can even be a digital fingerprint, you know, a fingerprint scanner or something' like that can be printed onto the digital check (LA2a).

Two of the MIDFLORIDA Credit Union representatives identified a need for the improved use of information technology for the purpose of analytics to identify potential fraud cases, and for better sharing of information between financial institutions to improve the effectiveness of check fraud investigations.

I think it is going to be software that looks for you know maybe suspicious activity or anomalies in activity, spikes in deposits or balances. So, really internal software running against your core database. If somebody, their six month balance is \$300.00, and all of a sudden they're ... making' large deposits and pulling' out money that could be a potential fraud case (LBa).

I think that the ability for institutions to share information on check fraud would help you know, we have some capabilities, but check fraud is not allowable through that to share information. I think more of a cross institutional analysis between institutions that use the same vendors for fraud software would help. I think the ability to you know have better knowledge of the people that are in crime rings and be able to not open accounts for them would assist because normally they go institution, to institution, to institution (LBb).

One of these MIDFLORIDA Credit Union representatives also argued that better technology would speed up check processing times so that banks can immediately obtain the information needed to identify a fraudulent transaction.

You come in with a check today; I take it from you that must mean it is a good check. But they do not understand that it has to go off to another financial institute, which still will only take two to three days before the check comes back no good and that is with the Check 21. Check 21 was supposed to speed up the clearing of these checks and in theory bring down the check fraud, but they are still getting that two to three days in-between. So, I think if there was a real time I'd bring in this Wells Fargo check to MIDFLORIDA, I put it in my account, MIDFLORIDA can zap it off immediately and debit that account while the person's still standing there, that would be big. Yeah, that would be the biggest thing but right now that technology is not available (LBa).

Finally, one participant expressed the hope that technological change will gradually make checks and therefore check fraud obsolete and expressed the view that this is the longer-term objective of the banking industry.

I think the ultimate goal; everybody needs to get rid of checks. That is my vision that checks someday will not be around with all the technology, the phones, your electronic means. So, I think that is kind of the way they are going. They are trying to phase them out (LBa).

Discussion

Qualitative data provides a different method of evaluating the impact digitization of checks has had on the development of suspects in

check fraud cases. Individuals involved in the day to day investigations of check fraud were interviewed to determine what changes Check 21 legislation has had on the development of suspects in check fraud cases as well as what security protocol changes they feel would assist in increasing check fraud arrests. The interview transcripts were imported into Atlas.ti software to highlight themes among the participants. Seven themes and three sub-themes were identified regarding the impact of Check 21 legislation on check fraud investigations.

Nineteen of the participants indicated a need to retain original checks in order to process the documents using forensic techniques. All twenty participants reported that it is difficult to obtain the original checks in fraud investigations and in some instances impossible depending on the businesses involved. The amount of time it takes investigators to actually receive the actual fraud report also may have an impact on check fraud investigations. Even though some banks may keep originals for up to 30 days, study participants indicated they often do not begin an investigation for weeks maybe months. Sixteen individuals interviewed expressed that scanned images of checks are of low quality hindering the ability to decipher the identifying characteristics of checks. The percentage of check fraud cases actually solved was low for local law enforcement agencies with an average of 30% to 60% and often depended on whether the original checks could be obtained. Federal agencies solvability average was higher according to participants because they can choose whether to accept a case and usually do not take the case unless the evidence is compelling.

There were many similarities in study participant's suggestions on how to improve technology involved in truncating checks. Suggestions included improved resolution of scanning equipment used to capture the images of the original check as well as routine maintenance and cleaning of these instruments. Other suggestions included more diligence by merchants in examining photo identification and requiring a fingerprint on the check for identification purposes. Higher training standards for both bank personnel as well as local business cashiers were also proposed to include fingerprint training in order to collect an identifiable fingerprint on a check. Improved software technology to detect check fraud was also discussed that would allow banks to share information regarding accounts and red flag those with suspicious activity. Lastly, many study participants claimed the entire check processing procedure needed to be slowed down. Care should be taken to check to make sure funds are available as they did in the past and go back to putting a 2 to 3 day hold on large checks. There were a couple of limitations to the study. Cooperation from local businesses was constrained due to claims by these businesses that information regarding check fraud activity was proprietary information. The researcher requested in excess of 20 Central Florida businesses to participate in the study but all but one declined. The one business that agreed to interviews for the qualitative portion of the study was limited in the number of fraud investigators with experience in check fraud. The interview process had few limitations once the participants agreed to the study perimeters. All study participants felt comfortable answering the questions posed and proved knowledgeable in the area of check fraud.

Conclusion

Most themes that were identified in the analysis of interview transcripts aligned with the belief that the destruction of original checks hinders the ability of fraud investigators to investigate the case thoroughly. The majority of the participants indicated that forensic techniques played an important role in attempting to develop a suspect.

Techniques such as fingerprint and DNA analysis were named as methods available to investigators if they are able to obtain the original check. However, most participants reported that it is difficult to obtain the check evidence in fraud investigations and in some instances impossible depending on the businesses involved. Even in instances where a business may keep original checks for a short time period, the slow process of victims reporting the crime and investigators being assigned the check fraud case result in too long of a delay. By the time the investigator makes contact with the business regarding the original check, the document evidence has been destroyed.

A large number of participants also commented that scanned images of checks are of low quality impeding the ability to decrypt the identifying characteristics of checks. These characteristics may include security codes imbedded in the paper, watermarks as well as magnetic ink. Scanned image resolution is so poor in some cases that the actual handwriting is illegible. Some participants reported that in some cases only the front or back of the check was scanned also limiting information needed for the investigation.

Study participants all agreed that there were security protocol changes that could be enacted to assist in increasing the development of suspects in check fraud cases in the wake of Check 21 legislation.

Suggestions included a universal standard for resolution of scanners used to capture the images of the original check before destruction. Also mentioned was the routine maintenance and cleaning of scanners to ensure clearer scans. Other suggestions addressed training standards for both bank personnel as well as local business cashiers. Paying close attention to signatures, checking for identification, and making sure a fingerprint that is not smeared is placed on the front of the check were just a few of the suggestions. Study participants also seem to think that in the near future improved software technology to detect check fraud would allow banks to share information regarding accounts and red flag those with suspicious activity. Some individuals interviewed felt that the check processing procedure moves too fast and that care should be taken to check to make sure funds are available. Suggestions were even made to go back to putting a 2 to 3 day hold on large checks.

All of the previous points lead the researcher to conclude that there is information indicating the enactment of Check 21 legislation has had a negative effect on the ability for law enforcement to solve check fraud cases. Literature available on check fraud investigations is limited but does reflect little communication between law enforcement and bank security regarding electronic check fraud investigations. The literature provides several examples of court cases involving the destruction of evidence and the resulting effect on due process. The researcher's study has provided themes to support claims made in the literature that more cooperation is needed between businesses and law enforcement to identify and solve problems that have arisen from Check 21 legislation. Increased hold times for original checks as suggested in the literature should be considered. Security measures must be tightened to identify check fraud when the original check cannot be obtained by law enforcement. As stated by [13], "In many ways, check fraud is easier to commit today than ever before; automated check processing systems have rendered physical review of checks a thing of the past" (p. 2209).

Check fraud is easier today than ever before due to automated systems, check scans and availability of check production equipment to consumers [13]. The Federal Reserve Board does not regulate how long a bank has to retain an original check after truncation leaving

law enforcement frustrated by the lack of consistency in protocol for check destruction [14]. The actual process of scanning checks is suggested by the literature as inept. Banks are not using instrumentation with a high enough resolution to preserve the security features such as watermarks and background patterns located on an original check [15]. When a fingerprint has been placed on a check during the check cashing transaction, analysis of the fingerprint is often impossible due to poor scan quality. Poor resolution of inked fingerprints deposited on checks results in lack of level 2 and 3 characteristics being distinguished and therefore no chance of entering a print for possible identification into the AFIS database [16]. In addition, not having access to the original check also prohibits any possibility of processing a fraudulent check for possible latent prints left on the paper during the suspect's handling of the evidence.

Check 21 legislation has mandated the scanning of checks and therefore has resulted in diminishing the ability to preserve security features embedded in checks. Advances in cybercrime result in vulnerability of the electronic banking. Because of this, it is crucial that the banking industry take certain steps to improve scanning protocol of check documents. Improved training of bank personnel will assist in reducing duplication of check deposit transactions. Duplication issues arise when a bank creates a digital image of the check for deposit and unintentionally delivers the paper check for deposit to the payee bank branch as well resulting in inaccurate customer withdrawals [17]. Creating protocol for check scanning procedures is crucial to the preservation of security features on original checks. Existing literature recommends that documents be scanned at 300-400 dpi and grayscale used rather than black and white [18]. Bank personnel must scan both sides of a check as well as pay closer attention to the placing of the check in the scanner to avoid issues that arise due to folding of checks causing creases.

Study results as well as existing literature recommend businesses take certain steps to avoid fraudulent activity as soon as a cashier receives the check. These steps include (a) having the individual cashing the check leave an inked thumbprint on the original check; (b) checking photo identification and comparing signatures and (c) having working video surveillance to capture an image of the individual cashing a check. If the resolution of bank scanners meets the recommended requirements, possible identification of a reproduced inked fingerprint on a check scan is possible using the AFIS. Despite the geographic limitations of the study the findings should be viewed as a positive contribution to the limited data on Check 21 legislation and destruction of original checks.

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