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The Usual Suspects:

*Do Solvability Factors Predict Case Investigation Outcomes
for the Dublin, Ohio Division of Police*

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ABSTRACT

Solvability factors are a case screening mechanism used to predict case investigation outcomes. By identifying which cases are more likely to be solved, case clearances and investigative time efficiency could be improved. Solvability factors are those pieces of information that exist in a case that create leads to solve the case.

This research paper examines the use of solvability factors to predict case investigation outcomes for the Dublin, Ohio Division of Police. This research examined a random sample of 155 cases from the Dublin Division of Police that were assigned and investigated by detectives in 2002. The results of this research suggest that the higher the number of solvability factors or the higher the solvability score, the more likely a case was to be solved. The results of this research also support the belief that a named suspect is the most important solvability factor in predicting a case outcome.

Biographical Sketch

Mr. Tom Hirschy has been in law enforcement since 1988. He has served as a Police Lieutenant assigned as the Operations Bureau Commander for the Dublin Division of Police since 2003. Prior to this assignment, Mr. Hirschy was a Detective-Sergeant assigned as the Detective Section Commander for the Dublin Division of Police. Mr. Hirschy holds a Bachelor of Science degree in Criminal Justice from the University of Toledo and an Associate of Applied Science degree in Law Enforcement Technology. Mr. Hirschy will graduate from Tiffin University this summer with a Master's in Criminal Justice. Mr. Hirschy is a graduate of Ohio's Police Executive Leadership College and Northwestern University's School of Police Staff and Command.

INTRODUCTION AND LITERATURE REVIEW

According to the Federal Bureau of Investigation's Uniform Crime Report for 2001, law enforcement's national average clearance rate for Part I index crime was 20%. In other words, only one out of every five Part I crimes reported to law enforcement was solved. Part I crimes include: murder, forcible rape, robbery, aggravated assault, larceny, burglary, auto theft, and arson. The raw number of Part I index crime reported to law enforcement in 2001 was approximately 11.8 million (*Crime in the United States 2001, 2002*). These numbers do not reflect misdemeanor and other felony reported crimes which constitute another extremely large number of crimes. "There is considerable concern, primarily in the public arena, about serious violent crimes . . . , but little attention is paid to the ability of police to solve these crimes" (Mouzos and Muller, 2001).

Police detectives are generally expected to catch criminals and commonly that is the primary goal of criminal investigation. However, most detectives are burdened with trivial cases that have little chance of being solved (Sanders, 1977, p. 80). Due to the sheer volume of reported crime, not every criminal offense can be investigated by law enforcement. It would be unreasonable to expect that law enforcement could investigate and solve all crime. "In fact, with more and more crimes being committed every day, many police agencies find it difficult to provide even minimal investigative assistance to low priority crimes" (Urlacher and Duffy). According to Timothy Crowe in the *SHOCAP Implementation Guide* (1992), "The application of solvability factors reveals that somewhere between 65-85 percent of criminal complaints are not solvable. That is, there is little likelihood of the case being solved by a detective conducting an investigation." The chances of solving some reported crime is so slight that

investigating these crimes only serves to divert detectives from work on more solvable cases (Fyfe, Greene, Walsh, Wilson, and McLaren, 1997, p. 192). A more realistic approach would be to concentrate effort on those crimes which have at least some potential for solution (Gottlieb, Arenberg, & Singh, 1998, pp. 211-212). Many investigative managers and detectives use information from the preliminary investigation report of a crime to decide or predict whether a case is solvable and therefore assignable. "Law enforcement must constantly strive to balance its need for efficiency with the public's need for service" (Gottlieb et. al., p. 216).

This research paper will examine the use of preliminary investigation information, also known as solvability factors, to predict the outcome or likelihood that a criminal case investigation can be solved. The use of solvability factors to predict the outcomes of criminal case investigations is based upon the circumstances-result hypothesis. The circumstances-result hypothesis "... states that arrests are the result of circumstances beyond the control of police investigators and that those cases solved by detectives were already solved by information collected by patrol officers during preliminary investigations" (Eck, 1983, p. 142). This theory supports the belief that it is not the routine performance of investigative actions that solves crime, but rather the collection of specific information (i.e. solvability factors) that solves crime. Research has found that the characteristics of the criminal case generally determine overall investigative success or failure (Eck, 1979, p. 3). Certain pieces of information lead to the making of arrests in criminal investigations, not the specific investigative actions performed by detectives. In fact, one study indicated that only 3% of solved cases were solved by detectives exerting extraordinary effort (Gaines and Cordner, 1996, p. 242).

What are solvability factors? If certain basic facts are known, (such as the suspect's name or nickname, suspect's vehicle information, a perpetrator's home or work location, the individual's associates, or a valuable piece of physical evidence) this can lead investigators on a clear path to resolve the case. These basic facts of a criminal offense are known as solvability factors (South Bend Police Department). Another explanation of solvability factors is that they are a research based assessment on the likelihood of a criminal case being solved based on key criteria. Examples of such criteria include: presence of an eyewitness or availability of suspect fingerprints (Ford; Osterburg and Ward, 1997, p. 521).

There are numerous forms, variations, and/or combinations of solvability factors used in law enforcement. According to the *National Survey of Police Policies and Practices Regarding the Criminal Investigation Process: Twenty-Five Years After Rand* (2001), approximately 50% of law enforcement agencies use solvability factors to screen cases and predict the investigative outcome. Of the law enforcement agencies who utilize solvability factors, 83% of those agencies apply case solvability factors to all types of cases even though empirical research identified their effectiveness in only two types of cases: burglary and robbery (Horvath, Messig, and Lee, 2001). "Studies have identified the solvability factors that best predict whether a case will be solved and the probability of case solution, given different amounts of evidence available following preliminary patrol investigation" (Cordner and Sheehan, 1999, p. 408).

The solvability factors identified in the research from the 1970s and 1980s were:

- Witnesses
- Suspect Information
- Vehicle Description
- Latent Prints
- Related Offenses
- Range of Time of Occurrence

(Eck, 1983, p. 137)

From this original list of solvability factors, other law enforcement agencies have implemented deviations and modifications to this list. For example:

Dublin, Ohio Division of Police (Dublin Division of Police Annual Report 2002, 2003)

- Was there a witness to the crime?
- Can a suspect be named?
- Can a suspect be located?
- Can a suspect be identified?
- Can the suspect vehicle be identified?
- Is the stolen property traceable?
- Is there significant Modus Operandi?
- Is there significant physical evidence present?
- Is there a significant reason to believe the crime may be solved?

Rochester, New York Police Department (Urlacher and Duffy)

- * Witnesses to the crime
- * Knowledge of the suspect's name
- * Knowledge of where the suspect can be located
- * Description of suspect
- * Identification of suspect
- * Property with traceable, identifiable characteristics, marks or numbers
- * Existence of a significant method of operation
- * Presence of significant physical evidence
- * Description of the suspect's vehicle
- * Positive results from a crime scene evidence search
- * Belief that crime may be solved with publicity and/or reasonable additional investigative effort
- * Possibility and/or opportunity for anyone, other than the suspect, to have committed the crime

Glendale, Arizona Police Department (Hill, 2002)

- Property Value
- Felony or Misdemeanor
- Suspect Information
- Witness
- Suspect Vehicle Information
- Physical Evidence
- Crime Report Time (Occurrence to Actual Report)

As one can see, the number, variations, and combinations of solvability factors is almost endless, but many have a foundation in the original solvability factor list.

The theory behind solvability factors is that where many or a significant number of solvability factors exist, the probability or predictability of solving a crime is high. Where none or fewer solvability factors exist, the probability or predictability of solving a crime is low (Gottlieb, et. al., p. 215). Solvability factors should be considered when deciding whether to investigate a crime because of their predictive nature. These factors are crucial to the resolving of criminal investigations (Bennett and Hess, 2001, p. 168). The development of “solvability factors” is considered one of the more important developments in modern policing (Fyfe, et. al., 1997, p. 192).

According to University of Cincinnati Criminal Justice Professor John Eck (2003), the research topic of solvability factors is a difficult research topic. Very little has been done on this topic since the 1970s and early 1980s. Bouffard (2000), supports Eck’s claim by indicating that relatively little research has been devoted to the study of the police investigative function. Other researchers have echoed similar conclusions, “Surprisingly, very little research has been conducted on the determinants of clearance rates for any type of crime ...” (Wellford and Cronin, 2000). “Although criminal

investigation is a fundamental mission of the police, there has been surprisingly little scientific inquiry in this area” (Horvath, et. al., 2001).

However, a limited body of research does exist that describes the nature of the investigative function (Greenwood, Chaiken, and Petersilia, 1977). Professor John Eck did perform research on the use of solvability factors in predicting the outcomes for burglary and robbery offenses (Eck, 1979, p. iii). While this research is quite dated, more recent surveys (Horvath, et. al., 2001) have suggested that these observations are still true today. Relatively little research has been done in using solvability factors to predict the outcomes for predatory crimes (Bouffard, 2000). What research that has been done since Eck’s earlier works has been focused on the specific crime of Homicide.

So how predictable are solvability factors when it comes to criminal investigation case outcomes? “One approach that various researchers have taken to investigate this issue is to do statistical analysis of incident variables to see how solved and unsolved crimes differ” (Wellford and Cronin, 2000). These types of studies have been conducted to validate the use of solvability factors as a means of predicting the outcomes of criminal investigations. Prior to the studies on solvability factors in the 1970s, 1980s, and 1990s, little was truly known. “Much of what is treated as canon by investigators is generally anecdotal information passed down by word-of-mouth” (Keppel and Weis, 1994). Information contained in a patrol officer’s preliminary investigation report could be used to predict, with a greater than 80% accuracy, whether or not a case could be solved (by arrest) as a result of a follow-up investigation (Greenberg, Elliott, Kraft, and Procter, 1975). According to another study conducted by the Police Executive Research Forum involving 26 law enforcement agencies, solvability factors applied to burglaries could

predict case investigation results within an 83 to 90 percent accuracy (Eck, 1979). A follow-up study conducted in 1983 with three law enforcement agencies showed an 80 to 85 percent predictive accuracy for case outcomes through the use of solvability factors (Eck, 1983, p. 139). In a study of four law enforcement agencies in Minnesota, solvability factors were applied to burglaries and robberies with a 90 percent accuracy rate for predicting case resolution (Johnson and Healy, 1978). In an article titled, “Working Smarter Versus Working Harder”, the author, Jared Clark, states that 7% more serious criminal offenders could be caught and prosecuted if an average of 30% of the solvability factors were known or present in a Part I criminal investigation (Clark, 2001).

Again, there has been little research into the use of solvability factors to predict criminal case investigation outcomes. In fact, most of the research on the valid use of solvability factors centers around their use for burglary and robbery offenses. However, basic criminal investigation strategies and tactics are similar for most types of crime. This research paper will examine the use of solvability factors as predictors of assigned criminal case investigation outcomes for the Dublin, Ohio Division of Police. The conclusions drawn from this study may be useful for other law enforcement agencies and their use of solvability factors for predicting case outcomes.

METHODOLOGY

Objectives

1. Review the literature on the use of solvability factors in predicting case outcomes.
2. Compare solvability factors with case investigative outcomes for the Dublin Division of Police.
3. Compare solvability scores with case investigation outcomes for the Dublin Division of Police.
4. Determine which solvability factor is the most predictive for solved cases.

Terminology

For the purposes of this research paper, a criminal case investigation assigned to a detective for investigative follow-up will be referred to as a “case”. A case is recorded as “solved” when it is cleared by arrest or unfounded. A case cleared by arrest is defined as a case where at least one offender was arrested, charged with the commission of an offense, or turned over to the court for prosecution. An unfounded case is defined as a case that has been determined through investigation to be false or not a criminal event (*Crime in the United States, 2001, 2002*).

For the purposes of this research paper, a case is recorded as “unsolved” when the case is cleared as inactive. An inactivated case is a case that has been investigated and there is insufficient evidence to charge an offender(s) and/or no further leads exist for continued investigation. All leads or investigative information in the case have been exhausted and no further follow-up is possible or necessary.

Due to the variety of case clearance standards, there are two other case clearance types that will be mentioned, but not examined: cases cleared by exceptional means and

cases administratively closed. In both of these case clearances, some degree of criminal investigation was performed, but due to a number of different reasons outside the control of the investigator, these cases were neither solved nor unsolved. These investigations were halted and because of their investigative status, no discernible research information can be derived.

The solvability factors that were analyzed in this research are listed in Table 1.

Table 1. Solvability Factors & Weighted Solvability Scores for the Dublin Division of Police

Factor	Non-Weighted Value	Weighted Value
Was there a witness to the crime?	1	3
Can a suspect be named?	1	5
Can a suspect be located?	1	2
Can a suspect be identified?	1	2
Can the suspect vehicle be identified?	1	2
Is the stolen property traceable?	1	1
Is there a significant M.O. present?	1	1
Is there significant physical evidence present?	1	1
Total	8	*17

Table 2. Case Outcomes for Random Sample of Cases for the Dublin Division of Police

Outcomes	Number	Percentage
Cleared by Arrest	46	29.7%
Unfounded	7	4.5%
Inactive	34	21.9%
Cleared by Exceptional Means	36	23.2%
Administratively Closed	32	20.6%
Total	155	100%

Data Sources

The examination of solvability factors/scores in cases and their associated case clearance outcomes were derived from two major sources:

- A standardized data collection form was created and utilized to collect the necessary data (solvability factors) from the initial criminal offense reports from a random selection of 155 cases between January 1, 2002 and December 31, 2002.
- The Dublin (Ohio) Division of Police HTE Crimes (computerized) record management system (case outcomes).

Standardized Data Collection Form

A Dublin Police intern was trained and utilized on the data collection method for this research. A random sample of 155 cases was obtained from the Dublin Division of Police HTE Crimes record management system. The 155 cases were sampled from January 1st, 2002 through December 31st, 2002. The sample included case investigations conducted by six different detectives. The Dublin Police intern physically checked the original criminal offense report on each case and completed a standardized data collection form for each case. The information from the standardized data collection form was forwarded to this researcher who then transferred the information into an Excel spreadsheet for descriptive statistical analysis.

The Dublin (Ohio) Division of Police HTE Crimes Record Management System

A report from the Dublin Division of Police HTE Crimes record management system was generated to create a random sample of cases for this research. This report produced 155 qualified cases to be used. In order to be qualified, the case had to meet the following criteria: 1) each original offense report had to have a completed list of solvability factors, 2) each case must have been assigned to a Dublin Police detective for further investigation, 3) each case had to have been assigned and completed between January 1, 2002 and December 31, 2002, and 4) each case had to have a definite case clearance outcome. A check of the Dublin HTE Crimes record management system was performed on each of the 155 randomly sampled cases. Each case clearance outcome was recorded from THE on a computerized report. This outcome was compared with the standardized data collection form in order to perform quality control and ensure data collection accuracy.

RESULTS

Solvability Factors per Case

Table 3. Average Raw Number of Solvability Factors per Case

Case Outcomes	Mean (Average) Raw Number	Standard Deviation	Median	Mode	Range
Cleared by Arrest	4.1	2.4	4	4	0 to 8
Unfounded	5.3	1.6	5	4	4 to 8
Inactivated	2.1	2.1	1.5	0	0 to 8
Cleared by Exceptional Means	3.3	2.5	3	5	0 to 8
Administratively Closed	3.4	1.9	3	3	0 to 8
Total Overall Case	3.4	2.4	4	4	0 to 8

Based on the random sample of 155 cases, those cases that were solved (cleared by arrest or unfounded) had a higher mean (average) number of solvability factors in their initial criminal offense reports. The average number of solvability factors in cases cleared by arrest was 4.1. The average number of solvability factors in unfounded cases was 5.3. The average number of solvability factors in cases that were unsolved (inactivated) was 2.1.

In applying Chebyshev's theorem, "... 75% of scores in a distribution fall between scores that are two standard deviations above and below the mean" (Lurigio, Dantzker, Seng, & Sinacore, 1997, p. 79). Applying Chebyshev's theorem to this research indicated that 75% of all cases cleared by arrest ranged between 0 and 8.9 solvability factors. Cases that were unfounded ranged between 2.1 and 8.5. Cases that were unsolved or inactivated ranged between 0 and 6.3.

The median is defined as the middle value in an array or distribution of values. Applying the median to this research indicated that cases cleared by arrest had median of 4 solvability factors. The median for unfounded cases was 5. The median for unsolved (inactivated) cases was 1.5. The use of the median is another measure of central tendency that will allow for a more complete representation of the array or distribution.

The mode is defined as the most frequently occurring value in an array or distribution of values. Applying the mode to this research indicated that cases cleared by arrest had a mode of 4 solvability factors. The mode for unfounded cases was also 4. The mode for unsolved (inactive) cases was 0. Again, the use of the mode is another measure of central tendency that will allow for a more complete representation of the array or distribution.

Thus, in the 155 cases that were randomly sampled and analyzed, cases with an initial higher number of solvability factors in their original criminal offense reports appeared more likely to be solved (cleared by arrest or unfounded). In turn, cases with a lower number of solvability factors in their initial criminal offense reports appeared less likely to be solved and were more apt to be inactivated. The higher the number of solvability factors, the more likely a case was to be solved.

Weighted Solvability Score per Case

Table 4. Average Weighted Solvability Factor Score per Case

Case Outcomes	Mean (Average) Weighted Solvability Score	Standard Deviation	Median	Mode	Range
Cleared by Arrest	9.8	5.7	12	12	0 to 17
Unfounded	13.1	2.1	12	12	11 to 17
Inactivated	5.4	5.2	3.5	0	0 to 17
Cleared by Exceptional Means	7.4	5.7	7	0	0 to 17
Administratively Closed	8.5	4.4	9	10	0 to 17
Total Overall Case	8.1	5.6	10	0	0 to 17

Based on the random sample of 155 cases, those cases that were solved (cleared by arrest or unfounded) had a higher mean (average) weighted solvability score in their original criminal offense reports than cases that were unsolved (inactivated). The average weighted solvability score for a case cleared by arrest was 9.8. The average weighted solvability score for an unfounded case was 13.1. The average weighted solvability score for a case that was unsolved (inactivated) was 5.4.

In applying Chebyshev's theorem to this research indicated that 75% of all cases cleared by arrest ranged between 0 and 17 points for a solvability score. Cases that were unfounded ranged between 8.9 and 17. Cases that were unsolved or inactivated ranged between 0 and 15.8.

Applying the median to this research indicated that cases cleared by arrest had a median solvability score of 12. The median solvability score for unfounded cases was 12. The median solvability score for unsolved (inactivated) cases was 3.5. The use of

the median is another measure of central tendency that will allow for a more complete representation of the array or distribution.

Applying the mode to this research indicated that cases cleared by arrest had a mode solvability score of 12. The mode solvability score for unfounded cases was also 12. The mode solvability score for unsolved (inactive) cases was 0. Again, the use of the mode is another measure of central tendency that will allow for a more complete representation of the array or distribution.

Thus, in the 155 cases that were randomly sampled and analyzed, cases with a higher weighted solvability score in their original criminal offense report appeared more likely to be solved (cleared by arrest or unfounded). In turn, cases with an initial lower weighted solvability score appeared less likely to be solved and were more apt to be inactivated. The higher the solvability score, the more likely a case was to be solved.

Most Predictive Solvability Factor

Table 5. Raw Number of Solvability Factors per Assigned Case

Solvability Factors	Arrest	Unfounded	Inactive	Exceptional	Administrative
Witness	29	7	10	19	17
Suspect Named	33	7	15	17	21
Suspect Located	29	6	12	15	19
Suspect Identified	30	6	12	20	17
Suspect Vehicle	13	1	5	6	7
Traceable Property	15	3	9	6	8
Modus Operandi	18	4	5	17	13
Physical Evidence	21	3	5	19	8
Total Cases	46	7	34	36	32

Table 6. Percentage of Raw Number Solvability Factors per Assigned Criminal Case Investigation

Solvability Factors	Arrest	Unfounded	Inactive	Exceptional	Administrative
Witness	63%	100%	29.4%	52.8%	53.1%
Suspect Named	71.7%	100%	44.1%	47.2%	65.6%
Suspect Located	63%	85.8%	35.3%	41.7%	59.4%
Suspect Identified	65.2%	85.8%	35.3%	55.6%	53.1%
Suspect Vehicle	28.3%	14.3%	14.7%	16.7%	21.9%
Traceable Property	32.6%	42.9%	26.5%	16.7%	25%
Modus Operandi	39.1%	57.1%	14.7%	47.2%	40.6%
Physical Evidence	45.7%	42.9%	14.7%	52.8%	25%
Total Cases	46	7	34	36	32

Based on the random sample of 155 cases, for cases that were considered solved (cleared by arrest or unfounded); the solvability factor most likely to predict this successful outcome was the name of a suspect. An analysis of solved cases showed that over 75% of these cases contained a named suspect (71.7% for cases cleared by arrest and 100% in unfounded cases). An analysis of unsolved cases showed that the named suspect solvability factor existed in only 44% of those inactivated cases.

Other solvability factors that were considered likely predict that a case would be solved (cleared by arrest or unfounded) was: presence of a witness (68%), suspect can be identified (68%), and suspect can be located (66%).

DISCUSSION

Solvability Factors

So what does any of this mean? The results of this research indicate that the presence of solvability factors in an initial criminal offense report appeared to be able to predict case outcomes to a certain degree and be used as a case screening model. The higher the number of solvability factors present in a case, the more likely the case was to be solved. This statement was supported by the higher mean (average), median, and mode number of solvability factors in solved cases compared to unsolved cases (See Table 3).

Solvability Scores

The results of this research appeared to indicate that the presence of solvability scores in a case can predict case outcomes to a certain degree and can be used as a case screening model. This concept is similar to the presence of solvability factors. However, the difference here is that solvability factors in this instance were weighted based on previous research as to their significance in predicting the successful outcome of a case. In other words, the presence of some solvability factors was more important than others in predicting successful case outcomes. The solvability factors that were more predictive were weighted more than the less predictive solvability factors. This concept supports the ideology that the higher the weighted solvability score in a case, the more likely the case was to be solved. This statement was supported by the higher mean (average), median, and mode weighted solvability score in solved cases compared to unsolved cases

(See Table 4). Thus, whether solvability factors or solvability scores were utilized, the higher the score or number present, the more likely the case was to be solved.

The Most Predictive Solvability Factor: Can a suspect be named?

According to the analysis conducted in this research paper, a named suspect appeared to be the most important and most predictive solvability factor in cases that were solved. This concept appeared to be supported by the data analyzed in Tables 5 and 6. Prior research indicated that cases were solved as a result of specific suspect information provided by victims or witnesses (Gaines and Cordner, 1996, p. 242). According to *The Criminal Investigation Process Volume I: Summary and Policy Implications*, “The single most important determinant of whether or not a case will be solved is the information the victim supplies to the immediately responding patrol officer. If information that uniquely identifies the perpetrator is not presented at the time the crime is reported, the perpetrator, by and large, will not be subsequently identified” (Greenwood and Petersilia, 1975, p. vii).

For example, in solved cases, a named suspect was present in 71.7% of cases cleared by arrest and in 100% of unfounded cases. A named suspect was present in only 44.1% of unsolved cases. These numbers in and of themselves suggest that cases that possessed a named suspect were more likely to be solved than cases that did not have a named suspect. Thus, the presence of a named suspect solvability factor in a case would more likely lead to the solution of a case.

Overall, of the 155 random sampled cases, a named suspect was present in 60% of all cases (93 of 155). Of all cases that contained a named suspect solvability factor (93),

43% (40) of those cases were solved. However, it should be noted that cases cleared by exceptional means or administratively closed comprised 41% of those cases with a named suspect. In these cases, the case outcome was undetermined for a number of reasons outside the direct control of the detective. Unsolved or inactivated cases comprised 16% of those cases with a named suspect. Therefore, it appeared that the named suspect solvability factor was an important and predictive in the outcome of case.

Case Screening Model

In 2002, 1,614 criminal offense reports were filed with the Dublin Division of Police. With the exception of major violent crimes (i.e. robbery, sexual assault, etc.), telephone harassment, and case linkages, case assignment was determined by using a minimum solvability factor score. Each of the solvability factors listed on the back of the Dublin criminal offense report had a weighted value (see Table 1) to create an overall solvability score. Based on the weighted solvability score, a case assignment determination was made. A minimum solvability score of 4 points was required for a case to be assigned for further investigative follow-up. As a result, 342 cases were assigned for investigative follow-up in 2002. This represents a 21% assignment rate for cases. In other words, 79% of all criminal offense reports filed with the Dublin Division of Police were not assigned for further investigative follow-up due to a lack of solvability factors/score (*Dublin Division of Police 2002 Annual Report, 2003*). This appeared to be consistent with Timothy Crowe's statement in the *SHOCAP Implementation Guide* (1992), "The application of solvability factors reveals that somewhere between 65-85 percent of criminal complaints are not solvable. That is, there is little likelihood of the

case being solved by a detective conducting an investigation.” Other studies have supported the belief that case investigation is limited as a viable response to perhaps no more than 30 percent of all cases (Crowe, 1992).

Problems and Issues

The use of solvability factors and solvability scores are not without faults. This data could be inaccurate or misleading depending on which factors were present per case and/or how the solvability factors/scores were analyzed. Overall, of the 155 random sampled cases, a named suspect was present in 60% of all cases (93 of 155). Of all cases that contained a named suspect solvability factor (93), only 43% (40) of those cases were solved. In other words, only 43% of the 60% of cases were solved. Therefore, it would appear that this solvability factor was a prominent factor in case outcomes, but not always the determining factor.

In addition, the presence of other solvability factors was not always significant or predictive in the outcome of a case. For example, the identification of a suspect vehicle was present in 28.3% of cases cleared by arrest and 14.3% of unfounded cases. Therefore, the majority of cases that were solved did not possess this solvability factor. In fact, the following solvability factors were present in less than 50% of solved cases and present in less than 50% of unsolved cases as well: identified suspect vehicle, traceable stolen property, significant M.O., and the presence of significant physical evidence (See Table 5). In specific cases, these solvability factors appeared to play a role in the case outcome, but overall it appeared that these solvability factors did not play a prominent role in predicting case outcomes. Of course, the same problems and issues

that applied to solvability factors also applied to solvability scores since they are based on the same basic concept.

Prior research conducted on the use of solvability factors/scores to predict case outcomes is limited. As mentioned in the introduction and literature review, most research conducted on the use of solvability factors/scores to predict case outcomes, was conducted in the 1970s and 1980s. Most of the research was conducted using investigative data from larger urban law enforcement agencies. The data utilized was almost exclusively oriented toward the crimes of burglary and robbery which constitute a small portion of overall reported crime. No further significant research has been conducted to expand the idea of using solvability factors/scores to predict case outcomes.

Implications and Improvements

The use of solvability factors/scores appears to be the most rational method for screening, assigning, and predicting cases. The use of preliminary investigation information has been a concept utilized by the Rochester (NY) Police Department since the late 1960s and early 1970s (Bloch and Bell, 1976, p. 38). Prior to the establishment of this method, cases were assigned based on one of three major methods: 1) all cases were assigned (which wasted a lot of investigative time), 2) only major cases were assigned (which ignored a lot of workable cases based solely on their classification or priority), and 3) cases were assigned on the subjectivity of the case reviewer (which was based solely on the reviewer's judgment, training, and/or experience). These prior methods were insufficient in establishing an efficient and effective means for screening

and assigning cases. The use of solvability factors/scores, although not fool proof, still has research validity and empirical value for screening and assigning cases.

However, are we using the right solvability factors for screening and assigning cases? If the cases that are solved lack certain solvability factors, can the presence of these factors really be predictive and of value? For example, in general, is the presence of a significant Modus Operandi (M.O.) really going to predict the outcome of a case? Who decides what a significant M.O. really is? How is the officer to know or identify a significant M.O.? How much evidence is necessary to have significant physical evidence? The decisions made by patrol officers are usually made by officers who lack investigative experience and formal investigative training.

The presence of current solvability factors/scores does appear to have some value in predicting case outcomes. For example, Dublin Police use a minimum solvability score of 4 points as the value needed for a case to be assigned for further investigation. In 2002, solvability scores screened out approximately 79% of all filed criminal offense reports with the Dublin Division of Police. Of the 155 randomly sampled cases, cases that went unsolved (inactivated) had a lower mean (average), median, and mode weighted solvability factor score than cases that were solved. Based on the information from this research and previous research conducted on solvability scores as a predictive case screening mechanism, it appeared that the Dublin Police were properly employing solvability scores as a predictive case screening and assignment method.

To make the best use of solvability factors/scores in predicting case outcomes, the proper information must first be collected. Police officers must collect as much information as possible during the preliminary or first stages of a criminal investigation.

“The difference between solvable and unsolvable cases is in large part, but not entirely, determined by the quality of patrol officers’ work” (Eck, 1996, p. 174). This is often a training and/or experience issue. Police agencies must devote time and resources for basic criminal investigation training for patrol officers.

Continued and future research would prove valuable for the application of solvability factors/scores as a mechanism for predicting case outcomes. Further research is necessary to identify and refine which solvability factors are most useful. Should property value play a role? Should the extent of a loss or injury be evaluated? What is the role of time in predicting successful case outcomes? Should officers’ opinions or beliefs play a part in determining case assignment? These factors and more should be examined to determine the most predictive and best use of solvability factors in the criminal investigation process.

SUMMARY AND CONCLUSION

Only one in every five reported crimes are ever solved. Due to the sheer volume of reported crime, not every case can be investigated. In fact, it would be irresponsible and unreasonable for law enforcement to even try to investigate all crime. Criminal investigation is a viable alternative for only a small percentage of reported crime. So how can law enforcement identify those crimes that have the greatest chance for solution through investigation? The answer is solvability factors.

Solvability factors are valuable pieces of case information (i.e. suspect name, physical evidence, etc.) that can lead to the arrest of an offender(s). Solvability factors

can be used to predict case outcomes. Solvability factors can be used to screen offenses and determine which cases should be assigned for further follow-up. Prior research on the use solvability factors to predict case outcomes is limited.

In this research paper, a random sample of 155 cases assigned to detectives was examined. The solvability factors completed on the initial criminal offense reports were compared with the final case investigation outcomes. The primary objective of this research was to determine whether solvability factors could predict case investigation outcomes. Other objectives of this research were whether solvability scores could predict case investigation outcomes and which specific solvability factor was the most predictive for solving cases.

By using a variety of descriptive statistical analysis techniques, the data gathered for this research was analyzed and evaluated. The results of this analysis concluded that the existence of solvability factors can predict case outcomes. The major measures of central tendency were utilized (mean, median, and mode) to provide a more complete representation of the randomly sampled distribution. Cases with an initial higher number of solvability factors and/or solvability scores in their original criminal offense reports appeared more likely to be solved (cleared by arrest or unfounded). Cases with a lower number of solvability factors and/or solvability scores in their initial criminal offense reports appeared less likely to be solved and were more apt to be inactivated by detectives. See Tables 3 and 4.

The analysis of individual solvability factors indicated that a named suspect was the most important solvability factor and most likely to predict a case outcome. In this research's random sample of cases, the named suspect solvability factor was present in

75% of all solved cases. In an evaluation of all cases containing a named suspect solvability factor, 43% of solved cases had a named suspect solvability factor and 16% of unsolved cases had a named suspect solvability factor. Thus, cases that were solved were more likely to have a named suspect solvability factor than cases that were not solved.

The results of this research are limited. The data gathered was based on a random sample from Dublin Police over a one year period in 2002. However, based on this research, the Dublin Division of Police appeared to be properly using solvability factors to predict case outcomes for case screening and case assignment. This research supported the circumstances result hypothesis that stated information collected by initial responding police officers is the most valuable for solving cases. Criminal investigation is an information intensive activity and by collecting the right kind of information, crimes can be solved. This is the theory behind the use of solvability factors. Further research is recommended to identify and refine which solvability factors are most useful.

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