



Effectiveness of crime investigation methods

A literature review - Summary

Bram van Dijk, Maud Pluijm, Manja Abraham and Nynke Piepers

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Bram van Dijk
bvandijk@dsp-groep.nl

Maud Pluijm
mpluijm@dsp-groep.nl

Manja Abraham
mabraham@dsp-groep.nl

Nynke Piepers
npiepers@dsp-groep.nl

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Leading question and research questions

Commissioned by the Scientific Research and Documentation Centre (WODC), DSP-groep conducted a scoping review of literature related to the effectiveness of investigative methods used by the police. The leading question of this study is:

What does the scientific literature teach us about the effectiveness of various investigative activities, how is effectiveness measured, and what lessons can be drawn for Dutch police practice and policy?

Based on the leading question, we formulated the following research questions:

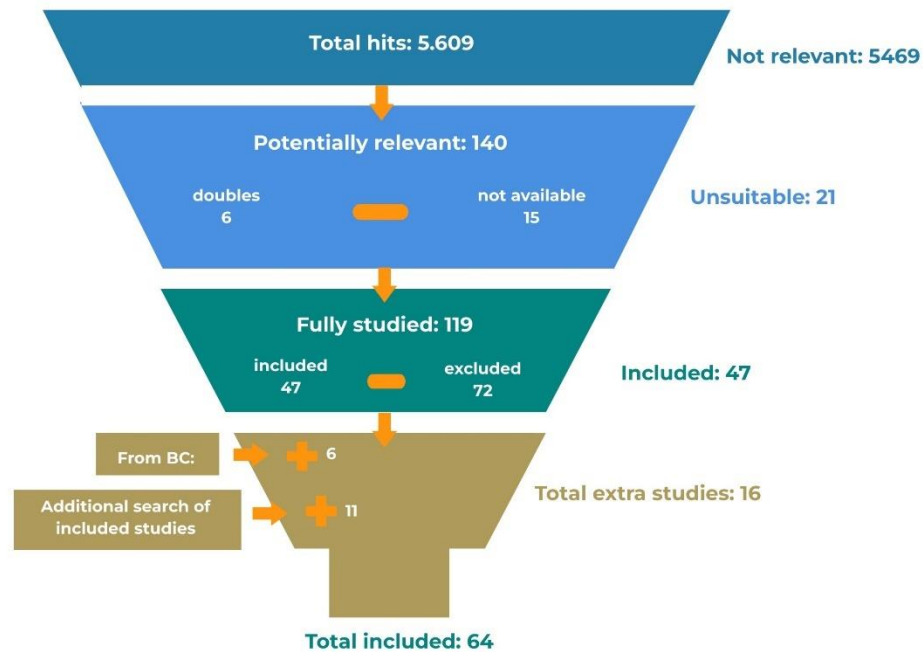
1. What does the literature teach us about the effectiveness of various police investigative activities, and how is this substantiated?
2. What lessons can we draw from these results for Dutch police practice and policy?
3. What leads for (empirical) follow-up research in Dutch police practice does answering the above questions offer?

Search strategy

The following criteria are used to determine which studies are included:

- ① **Effectiveness:** an outcome variable. We include all studies that describe something about the effectiveness of a method. Studies that do not make any statements about effectiveness are not included.
- ① **Type of studies:** we focus on meta-evaluations and effect studies. If a meta-analysis is available besides separate effect studies, we focus on the meta-analysis and leave out the individual effect studies. Individual studies are included if they say something about the applicability of methods in the Netherlands. We include empirical studies and studies by the WODC, Police and Science and research agencies. This is empirical research, broader than peer-reviewed. Theses and graduation projects are excluded.
- ① **Language:** Dutch and English.
- ① **Geographical origin:** studies from the Netherlands, Belgium and Anglo-Saxon countries. Studies from other countries will be included, provided they are available in English.
- ① **Year of publication:** studies are at most ten years old.
There has been a great deal of development in the field of crime prevention, as a result of which measures that were effective in the past may now be obsolete. In addition, the selected literature may refer to relevant older impact studies for specific potentially promising measures. We check these studies for relevant additional information.
- ① Primary databases are Google Scholar and Web of Science.
- ① If studies cannot be accessed through the available avenues, they are included..

The search process and its results are shown schematically below. It shows that we initially included 47 studies and added seventeen more after discussions with the guidance committee. Of these, six studies were added following suggestions from members of the guidance committee and eleven studies after an additional search of the already included studies.



Subdivision of studies

The following subdivision into seven main categories was made to organise the study results.

1. Classical investigation methods
2. Forensic investigation methods
3. Use of camera images
4. Digital investigation methods
5. Use of special investigative powers
6. International investigation
7. Financial investigation methods

Various types of methods are covered under each category. The distinction between the above categories is not entirely mutually exclusive. Thus, some categories overlap, and some methods fit within different categories. The special investigative powers category is not a category of investigative methods but a collection of several investigative methods using these specific powers.

Operationalisation of effect

We distinguished between two types of studies: effect studies and process studies.

1. **Effect studies** use quantitative or qualitative information to make statements about the degree of effectiveness of a method or, in some cases, a combination of methods.
2. **Process studies** are studies in which, with qualitative or quantitative information, statements are made on how the process should be filled in to make a method effective or increase its effectiveness.

The effect studies are then subdivided according to how the concept of effectiveness is operationalised:

- ③ The investigation method leads to **new insights or (management) information**.
- ③ The investigation method leads to **results that can be used in the criminal procedure**; it concerns, in particular, identifying or apprehending a suspect and obtaining evidence.
- ③ The investigation method leads to **solving a case**, usually operationalised through the conviction of offenders or expressed in the resolution rate.
- ③ Other.

Expert meeting and expert interviews

Based on the included studies, a memorandum was prepared and presented to eleven experts in the field of detection methods. The interviews and expert meeting focused on the following objectives:

- ③ To check whether experts recognise the results of the review and on which parts they have additions.
- ③ What recommendations can be made regarding further research and utilisation of the results.

Conclusions effect of investigative methods

For each category, we indicate what our review has broadly revealed and where gaps in knowledge exist about the effect of relevant detection methods.

Classical investigation methods

Interrogation techniques

The six studies provide a clear picture of the conditions contributing to interrogation effectiveness. Here, effectiveness is operationalised as the probability of obtaining a reliable statement. The studies are all but one of recent date, but none are Dutch.

Tracking of individuals

The five studies show that various forms of tracking individuals (deployment of students in cold cases, investigative reporting through traditional media and deployment of social media) make a meaningful contribution to the investigation process. Four of the five studies are more than seven years old and do not provide insight into recent results of tracking individuals through social media.

Social network analysis

All three studies show that this method contributes to the information position of the police, including on crucial persons within networks. To what extent this contributes to the arrest and prosecution of suspects was not investigated in these studies.

Other classic methods

Two studies show that using profilers and reconstructing scenarios with new analytical tools in a cold case leads to valuable new information in the investigation process. The third study shows that routine police work (such as speed checks) contributed to the investigation process of terrorism suspects in the US.

Forensic investigation methods

Forensic evidence in general

A total of twelve studies were classified in this category. A feature of these studies is that they focus on the effectiveness of various forms of forensic investigation. These studies show a positive relationship between forensic evidence and the solve rate. But the studies in question do not provide an unambiguous picture of the relationship between forensic evidence and the probability of conviction of suspects. The non-uniform picture is probably partly because these studies need to distinguish between various forms of trace evidence and how effectiveness is operationalised.

Interestingly for police practice is that a Dutch process study found that the influence of trace evidence results appears to be stronger when shared after initial scenario formation than when provided earlier. This positive influence also carries the risk that detectives may be more inclined to look for corroborating evidence.

DNA testing

The eleven studies' results show that DNA testing plays an important role in the different stages of the criminal process. The positive correlations found are significant in all but one of the studies. It was noted in the expert meeting that other techniques are often quicker than DNA testing, so it is essential to speed up DNA testing to make it more useful. Fast mobile DNA techniques are likely to reduce turnaround time significantly (see De Roo & De Poot, 2022).

Other forensic investigation methods

The four studies relate to very different investigation methods, and the concept of effectiveness is operationalised differently. The two process studies provide insight into how the efficiency of trace investigations is stimulated. One study concerns additional training for detectives on how to collect DNA evidence. The other (Dutch) study shows that using forensic assistants makes crime scene investigations more efficient. A third also Dutch study shows that palm prints are used with some regularity by judges in substantiating their verdicts. The fourth study concerns a review that considers the effectiveness of many different forms of forensic investigation (fingerprints, toxicological samples, genital smears, nails, clothing, crime scene photography and special methods for vice cases). The results are very specific and detail-oriented, making a general statement about these investigation methods impossible.

Use of camera images

Camera surveillance

The seven Anglo-Saxon studies paint a positive picture of the effectiveness of camera surveillance, using identification, arrest, prosecution of suspects and resolution rates as indicators of effectiveness. Some studies on camera surveillance have been conducted in the Netherlands, but they do not address the effectiveness of camera surveillance.

ANPR cameras

Two WODC studies (one in 2020 and one in 2021) have been conducted in the Netherlands on ANPR legislation. Based on section 126jj WvS, it is possible to register and store licence plate data of passing vehicles for 28 days using designated cameras. These studies show that section 126jj WvS has not often come up in criminal cases. When ANPR does come up, this investigation method appears to lead to management information or bringing suspects into focus.

Digital investigation methods

For this category, only two studies were found that are also of little relevance. One of the studies concerns Chinese research, which results are poorly "translatable" to the Dutch situation. The other study shows that the application of OSINT (Open Source Intelligence) gives a picture of the (Australian) drugs market, but it was not determined whether this information was used in the investigation.

Experts give the following explanations for the small number of studies found. Firstly, developments in digital investigation methods are moving much faster than research can keep up with. Moreover, research into, for example, OSINT conducted by the Dutch police is not always allowed to be made public.

Experts further note that cryptocurrency cracking has contributed to evidence in recent cases and that the digital tracing methods are leading to significant changes in the investigation. For instance, using OSINT, clues about the location of suspects are obtained considerably quicker, and digital traces can also capture activities and the order in which they took place. This contrasts forensic methods (see Henseler & De Poot, 2020).

Use of special investigative powers

Of the six studies found, five were conducted in the Netherlands. Four of those studies (all four are five or fewer years old) show that special investigative authorisation methods (systematic intelligence gathering, pseudo-buying/service, infiltration, recording of confidential information and the phone tap) play an important role in the investigation, especially in terms of strengthening intelligence, gathering evidence against a suspect and convicting suspects. One study from the US also paints a positive picture: using informants in several terrorism cases leads to relevant intelligence.

The evaluation of the Terrorist Crimes Investigation Act (the 5th Dutch study) using the "clues" criterion shows limited results. Only one of the fifteen investigations resulted in prosecution.

International investigation

Two Dutch studies were found. A review of the PNR law was conducted in 2021. This law requires airlines to provide passenger data from every flight departing or arriving in the Netherlands to the Passenger Information Unit (PI-NL). This study shows there has yet to be a ruling in which passenger data under the PNR Act has been used as evidence. The second study (from 2014) shows that the introduction of the International Crimes Act in 2002 boosted the investigation of international crimes and led to several successful prosecutions: in seven out of nine cases, the perpetrators were irrevocably convicted.

Financial investigative methods

The three studies found are all five years or older. The evaluation of the Dutch anti-money laundering policy shows that the policy meets the following three (of seven) criteria: 1. competent authorities make adequate use of 'financial intelligence', 2. money laundering offences and activities are investigated, and offenders are prosecuted and subjected to effective, proportionate and dissuasive sanctions, and 3. criminal money and instrumentalities for criminal purposes are seized.

An Anglo-Saxon literature review on asset recovery found no studies on the effectiveness of this method of investigation. The third (also Anglo-Saxon) study shows that financial investigation plays a decisive role in criminal investigations. This method has been used in most cases to identify the crime or/and to build up information or evidence.

Relevance for Dutch police practice and policy

An overall picture of available knowledge of investigation methods

Based on the previous conclusions, we note that a lot of knowledge is available on the effectiveness of classical investigation methods in particular (and within that category interrogation and tracking individuals), forensic methods (and within that category studies on forensic evidence in a general sense and on DNA), camera surveillance and the application of special investigative powers. Almost all studies show that these investigative methods contribute to the investigation process. In these studies, the nature and impact of that contribution range from the reliability of the results of interrogation and providing management information for the (further) investigation to providing evidence in the conviction of offenders. That is not to say that further research would not be desirable for these methods. For some of these methods, it is helpful to check whether certain insights derived from Anglo-Saxon research, in particular, are also applied in Dutch police practice. It is also useful to investigate the possibilities of making the process following these methods more efficient and effective.

Less research has been found on the other investigation methods; thus, less knowledge has been obtained about their effectiveness.

Limitations

A number of limitations emerge from the review and expert responses to its findings:

- ③ The inclusion criteria resulted in certain publications not being included, specifically studies with a legal rather than an empirical angle. An example is the publication "Essentials in cybercrime" (Van der Wagen, Oerlemans and Weulen Kranenbarg, 2021).
- ③ Not all research conducted on investigative methods is public. This implies that relevant findings have been left out of this review.
- ③ Part of the relevant knowledge about the effectiveness of investigative methods resides in the minds of police officers, especially detectives. The "tapping" of this knowledge is found only once in the studies included in our review.
- ③ Not all studies in this review apply to the Dutch context, such as the study on the effectiveness of the National Integrated Ballistics Imaging Network (NIBIN) in the US or the study on the role of data from mobile phones in China.
- ③ Some detection methods (especially digital investigative methods, including OSINT) develop rapidly; research does not keep up with these developments. As a consequence, the results of the investigations are no longer or less useful for police practice and policy.
- ③ For long-term investigation, for example, into the confiscation of assets and goods from offenders, it isn't easy to visualise the effect because it requires a long duration of investigations and, related to that, often considerable investigation capacity.
- ③ Several experts point out gaps in the registration manner throughout the criminal justice chain. This hinders reliable research into the effectiveness of investigation methods, including financial investigation.

Follow-up research

Possible topics for research

- ③ Insights on the effectiveness of interrogation techniques come exclusively from Anglo-Saxon research; to what extent investigators in the Netherlands use these insights has yet to be discovered.
- ③ There is no recent insight into the effectiveness of tracking individuals through social media in the Netherlands; this also applies to information from individuals that come to the police through other channels (telephone reports, hearing of witnesses). Since many crimes are solved with the help of information from individuals, see Baardewijk, J., van den Brink, G., & Van Os, P. (2009), it is advisable to (re)investigate this.
- ③ In forensic evidence and DNA research, much research is available demonstrating the effectiveness of these investigation methods. Therefore, it is particularly interesting to conduct research into the extent to which innovations in this broad field are successful. For example, it would be useful to commission research into the extent to which further development of mobile DNA techniques is realised and to what result this leads.

- ③ The effectiveness of using camera images for investigative purposes has only been demonstrated in our review by Anglo-Saxon research. Given the investments in camera surveillance, it is also advisable to commission research into this in the Netherlands.
- ③ Regarding the use of ANPR cameras in the Netherlands, it would be useful to carry out repeat studies of previous WODC studies in a few years to determine whether more use is being made of this method and its effect.
- ③ The effectiveness of digital investigation methods is still a virtually untapped research area, while these methods have now become commonplace. In the P & W call 2022, cybercrime is the central theme. It is important to assess the extent to which this generates research proposals related to the effectiveness of digital investigation methods and to determine what other research in this area is desirable.
- ③ Little research has been found on the effectiveness of international detection. It is a broad field that can include investigating severe international crimes such as genocide, war crimes and crimes against humanity. Such investigations generally take a long time, and the results only become public once completed. However, it may be possible to investigate the lessons learned from finalised investigations.
- ③ Little (current) research has been found on financial investigation methods. However, this year, outside the research period, two recent studies were published by the Court of Audit on the effectiveness of investigations aimed at confiscating criminal assets and money laundering, respectively. According to experts, a lot of innovation is also possible in financial investigation methods, including in the field of cryptocurrency, and it is recommended to focus research on this.
- ③ The recent study "Slimme(re) opsporing" by Ira Helsloot and colleagues (2022) concludes, among other things, "The focus on investigation effectiveness as the only measure of investigation quality leaves out of consideration an important assessment aspect of investigation, namely the efficiency of the investigating process." Following this conclusion, it is important to include research on the effectiveness of investigative methods when investigating how to increase the efficiency and quality of the investigation process.

Research design, methods and techniques

- ③ Assess the extent to which investigation results can be better recorded in the registries of chain partners, thus providing more insight into the effectiveness of investigation methods.
- ③ Use (more) information sources that are not or rarely used. Examples include court decisions published on rechtspraak.nl and, specifically for the effectiveness of financial investigation, CJIB data can be used to determine whether collection results (how much of the imposed amount is collected) are improved.
- ③ Certain methods, e.g., financial investigation methods, require a long duration; long-term research is recommended to be able to visualise effects.

Organisational leads

- ③ This scoping review is an initial research launched by the Ministry of Safety and Justice as part of the Knowledge Agenda drawn up by DGP and V. It is recommended that the results of this scoping review are taken into account when setting out further research within the framework of this Knowledge Agenda, particularly concerning the choice of topics for research.
- ③ When choosing topics for new research into investigation methods, use insights from ongoing research in which no publications have yet become public. For example, there are long-term projects funded with EU money in the detection field for which no scientific publications are (yet) available. An example is the ANITA project (www.anita-project.eu) which deals with technological innovations relevant to criminal investigation.
- ③ Ensure greater police involvement in investigation research, for example, embedded research, where researchers and police officers form a research team.
- ③ Suppose a study, especially from police investigators, cannot be made (fully) public. In that case, it is important to consider how we can share essential lessons in other ways, for example, by summarising the results of the investigation in such a way that they can be made public.

DSP-groep BV
Van Diemenstraat 410
1013 CR Amsterdam
+31 (0)20 625 75 37

dsp@dsp-groep.nl
KvK 33176766
www.dsp-groep.nl

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Dienstverlening

Onze inzet is vooral gericht op het ondersteunen van opdrachtgevers bij het aanpakken van complexe beleidsvraagstukken binnen de samenleving. We richten ons daarbij met name op de sociale, ruimtelijke of bestuurlijke kanten van zo'n vraagstuk. In dit kader kunnen we bijvoorbeeld een onderzoek doen, een registratie- of monitorsysteem ontwikkelen, een advies uitbrengen, een beleidsvisie voorbereiden, een plan toetsen of (tijdelijk) het management van een project of organisatie voeren.

Expertise

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