



Is there an evidentiary basis for shaken baby syndrome? The conviction of Joby Rowe

Chris Brook

Departamento de Astrofísica, Universidad de La Laguna, La Laguna, Spain

ABSTRACT

A comprehensive review of the science pertaining to shaken baby syndrome (SBS), commissioned by the Swedish government and published in 2017, found 'insufficient', 'very low quality' scientific evidence for diagnosing Shaken Baby Syndrome on the basis of particular brain injuries. The review also found only 'limited', 'low quality' support for the notion that shaking causes the head injuries associated with SBS, let alone that it is the only possible cause. I review these findings and place them within the Australian judicial context by considering Joby Rowe's 2018 conviction for child homicide. Rowe's conviction was based solely on forensic evidence that openly and overtly lacked any scientific basis, with expert opinions based instead on confession studies. This case raises fundamental questions for forensic science in Australia, primarily: should forensic evidence be scientific? Or should it appeal to authority?

ARTICLE HISTORY

Received 12 April 2019

Accepted 28 May 2019

KEYWORDS

Validation; reliability; error; evidence-based forensics; rationality

Introduction

Shaken Baby Syndrome (SBS)¹ refers to a constellation of brain injuries that are believed² to result from forcefully shaking an infant. Most commonly, the 'triad' of subdural haematoma, retinal haemorrhages and encephalopathy, are associated with SBS³, although other related injuries have been associated with shaking: in this study I refer to 'SBS associated brain injuries'. Controversy over SBS and its diagnosis has raged over the past couple of decades, with hundreds of people convicted of shaking infants, many for murder⁴.

The controversy revolves around whether there is any scientific basis for associating such brain injuries with shaking. In 2017 an independent, systematic review¹ of the science pertaining to SBS, commissioned by the Swedish Government, concluded that there is 'insufficient scientific evidence on which to assess the diagnostic accuracy of the triad in identifying traumatic shaking (very low-quality evidence)' and that 'limited scientific evidence that the triad and therefore its components can be associated with traumatic shaking (low-quality evidence)'.

In this paper, I explore the current status of forensic SBS diagnosis and prosecution in Australia, through the lens of the conviction of Joby Rowe of child homicide. I first introduce the Joby Rowe case and the evidence presented. I then explain and critique

the reliance on confession evidence as a basis for SBS diagnosis, and the (lack of) error rates for such diagnosis. I conclude that convictions for SBS lack a sufficient evidentiary basis, and that the forensic and legal communities in Australia need to ask whether this is acceptable.

The case of Joby Rowe

In July of 2018, Joby Rowe was convicted of child homicide in the Supreme Court of Victoria,¹ found to have shaken to death his three month old daughter Alanah. This was the second trial for Rowe, after the jury failed to reach a verdict in the initial trial. Rowe steadfastly denied shaking Alanah, or physically abusing her in any way. No witness saw Rowe shake Alanah, who had no history of abuse or violence. There were no external injuries to Alanah,² such as broken bones or bruising. The evidence against Rowe was purely based on expert testimony relating Alanah's injuries to shaking.

The Crown's case was that Alanah's SBS associated brain injuries, including the 'triad', were 'reasonably explicable only from inflicted head trauma from rapid acceleration/ deceleration and rotational forces'.³ The notion that certain brain injuries can *only* occur through violent shaking is at the heart of the controversy over SBS. It creates a presumption that when a baby presents certain symptoms, the last person to have been looking after it must be guilty.

Three expert witnesses testified for the prosecution. Dr. Linda Iles, the director of forensic pathology at the Victorian Institute of Forensic Medicine, testified that Alanah's injuries were caused by 'mechanical head trauma ... due to shaking'⁴ and that there is no other cause that she could identify.⁵ Joanne Tully, Deputy Director of the Victorian Forensic Paediatric Medical Service (VFPMS) at the Royal Children's and Monash Children's Hospitals, stated that Alanah's injuries were 'a result of trauma that was most likely inflicted ... as a result of shaking or shaking with impact'.⁶ Dr. Lim Joon, an ophthalmologist who is senior specialist at the Royal Victorian Eye and Ear and Western Hospitals, testified that Alanah's injuries were 'suggestive of significant head trauma'.⁷

In sum, the prosecution asserted that the clinical findings were the 'smoking guns'⁸ of shaking that was 'violent',⁹ 'vigorous' and/or 'significantly in excess of normal handling', and that 'there is no other reasonable explanation for these injuries'.

The evidentiary basis of shaken baby syndrome

However, these opinions are not based on science. Indeed, the expert witnesses conceded this. Dr Iles testified in the first trial that the presumption that the Alanah's injuries imply that she was shaken, does not have a 'sufficient scientifically robust evidence base'.¹⁰ Dr Joon stated that there is no 'irrefutable evidence because we can never produce that evidence'.¹¹ As Dr. Iles pointed out, the problem is that you 'can't conduct ... controlled experiments ... with actual human children'.¹²

Rather than robust science, the opinions were based on confession studies. Confession studies^{5,6} draw conclusions from the fact that some people accused of shaking an infant on the basis of the SBS associated brain injuries have confessed. Dr Iles testified that the notion that 'shaking can cause this spectrum of injuries', is

'based on confession evidence',¹³ 'fundamentally ... we're looking at confessional evidence'.¹⁴ Dr. Tully stated that 'you rely on the confession',¹⁵ 'the confessional data, and there's three good confessional studies, does suggest that forcefully shaking a baby can do this'.¹⁶

Dr. Tully added another reason for believing in SBS was that 'amongst physicians who work in paediatrics and this field' there was 'very, very general agreement that this is a valid diagnosis'.¹⁷ Dr Joon also invokes this 'consensus'.¹⁸ However, having a consensus, no matter how large or how distinguished the proponents, does not provide a scientific basis. As the point of this article is exploring the scientific basis of SBS, I now explore the confession evidence base.

Confession studies as the basis for SBS

In the absence of experiments of shaking babies, several studies^{5,6} have documented confessions to shaking in cases where SBS associated brain injuries have been present in infants. As is clear in the expert testimony in Joby Rowe's trial, 'the case for shaking as a mechanism of injury now rests largely on confessions'.⁷ The Swedish review found that confession studies provide 'low quality' support for the notion that shaking causes the head injuries associated with SBS. Objections⁸ were made that some confession studies⁹⁻¹¹ were not included in the Swedish review. However the Swedish researchers responded that the supposedly unexplored studies 'were actually assessed'¹² when making their findings.

What can confession studies prove?

The first problem with confession evidence is that 'even if the confession evidence were taken to imply guilt, this might help support the proposition that shaking an infant can cause brain bleeding and swelling, but it does nothing to prove that the triad of symptoms has *always* resulted from assault'.^{7,13} This issue on its own makes the conviction of Joby Rowe hugely concerning. However, the problems of confession studies run deeper.

The circularity of confession evidence

One of the main criticisms of medical (non-confession) evidence for SBS is circularity⁷. Circular reasoning follows this logical form: a) when SBS associated brain injuries are present, then shaking has occurred, b) such injuries are found in an infant, and no other explanation is found, c) therefore the baby has been shaken. To answer whether proposition a) is true, it is circular to point to cases where shaken baby is diagnosed on the assumption that a) is true. Circular reasoning applies to cases that rely on classifications based on assuming a), and to convictions for shaking when the conviction was based on medical opinion that assumed a)⁷. Researchers have argued¹⁴ that to continue to apply circular reasoning in SBS is not only unscientific, it is scientific misconduct.

Even confession evidence risks being circular when 'the alleged abusers will likely be told not just by the doctors, police and prosecutor but often by their own attorneys and even their own families, that the medical evidence is conclusive and the hope for acquittal is slim to nonexistent'.¹⁷

Consider cases where the accused, under interrogation, admits to shaking. Now consider other cases where the accused, under interrogation, provides a different explanation, for example that the baby was choking. Indeed, when Joby Rowe was interrogated, he claimed that Alanah choked, either on the formula he fed her from a bottle, or on her vomit. The defense proffered choking as a possible alternative explanation for Alanah's injuries. Rowe's responses regarding choking made during interrogation are, *a priori*, equally as reliable as the accused who has said they shook an infant. In fact, Rowe's responses could be considered *more reliable* than those reported in current confession studies because we *know* they were made during an 'information gathering' type of interrogation, which are known to be more reliable¹⁵ than other interrogation methods. At face value, if responses during interrogations are taken as providing causes of SBS, then choking^{16,17} is equally as well supported in terms of this type of evidence. The only difference in the 'shaking' vs 'choking' responses is that the shaking responses conforms to proposition a).

A non-circular argument that could favour interrogation responses of shaking over responses of choking requires some independent (non-confession based) evidentiary basis. However, such a basis has not been found. Added to this, choking has been proposed in medical literature as a cause of SBS related injuries¹⁷. Proponents of SBS dismiss the interrogation responses that refer to choking as not having a sufficient evidentiary basis, which simply gives choking the same (non-confession) evidentiary status as shaking.

Thus, claims that 'whiplash/shaking has been repeatedly reaffirmed by confessions of perpetrators'¹⁸ is a circular argument that assumes a). Using the same logic, one could just as legitimately conclude that choking has been reaffirmed as a cause of SBS associated brain injuries by responses of perpetrators such as Joby Rowe.

The issue of false confessions

Confession studies also carry 'the risk of false confessions'^{1,7,19} with important implications. There is extremely strong evidence, in the form of DNA²⁰, that false confessions occur. One can therefore expect that, *even if shaking does not cause the SBS associated brain injuries, some people accused of shaking their babies will falsely confess*. And that is all that is found in confession studies^{5,6,9-11}: *some people confessed*. It thus remains logically possible that shaking did not cause the brain injuries in *any* of the confession cases. That may be considered an extreme position but it is logically sound. By contrast, an assumption that all or even most SBS associated brain injuries *must have been* caused by shaking does not logically follow from the fact that confessions were made in some cases.

Sound confession studies require a thorough investigation of the nature of the confessions, taking regard of factors that contribute to false confessions. I outline some specific issues that need to be addressed if one wants to rely on confession evidence for SBS:

Rates of confessions

Around 12% of wrongly convicted people exonerated by DNA evidence falsely confessed²¹ to crimes that they did not commit. However, overall rates of false confession are hard to constrain. In one study of police detectives, interrogators estimated that around 5% of innocent suspects provide a partial or complete confession²², whilst

a study of Icelandic youths found that 12% of those who had been interrogated by police reported that they had falsely confessed²³. Laboratory based studies indicate the rate of false confession rates could be significantly higher again, in certain circumstances²⁴.

By comparison, 'confessions are uncommon'⁵ in SBS cases, although no systematic study has been made to explore confession rates for people who are accused of shaking an infant. This makes it extremely difficult to assess the value of current confession studies. To understand the degree to which false confessions are responsible for the reported SBS confessions, one would need to make a detailed analysis of the *rates* of confessions to SBS compared to rates of confessions to other crimes. Do confession rates accord with what is expected purely from false confession rates?

Causation vs correlation

Another issue is raised by claims that SBS associated brain injuries are common²⁵, whilst confessions are uncommon. It is logically possible that there are some cases in which the confessor did shake an infant, but the shaking was not the *cause* of the infant's injuries. Confession studies are confronted with the causation/correlation conundrum, which they have not addressed.

Validity: the quality of confession evidence depends on interrogation methods

The confessions in the published studies all involved interrogations^{5,6,9,10,11,26}. Yet none of the studies made analysis of the quality of the confessions in terms of how they were attained. Indeed, one confession study states that 'analysis of the investigative techniques involved in eliciting the admissions is beyond the scope of this article'²⁶. This is despite the growing and detailed body of empirical evidence concerning the reliability of confession evidence. 'The body of research on the causes of false confessions ... is well established and widely accepted within the field of psychology.'¹⁹ It is critical to scrutinize the confession evidence for SBS within the context of this research²⁷ and in terms of how the interrogations occurred.

Three key errors during interrogation have been identified that increase the likelihood of a false confession; the misclassification error; the coercion error; and the contamination error.²⁰ I outline these errors and show why each of them may occur in SBS cases:

The misclassification error occurs when the interrogator wrongly believes that the accused is guilty, for example based on demeanour. In SBS cases, the interrogator invariably believes that the accused is guilty based on medical opinion. So the belief in guilt of the interrogator is systematically strong.

The coercion error occurs when the interrogator subjects the accused to an accusatorial interrogation. Research²⁸⁻³⁰ has shown that interrogators who presume guilt ask more incriminating questions, conduct more coercive interrogations, and try harder to get the suspect to confess. In shaken baby cases, the interrogators have a belief in guilt based on medical opinion.

One example of accusatorial interrogation is the Reid technique that 'provides both negative and positive incentives – on one hand, confronting the suspect with accusations of guilt, without opportunity for denial, assertions that may be bolstered by true or

false presentations of incriminating evidence; on the other hand, offering sympathy and moral justification, minimizing the crime and leading suspects to see confession as an expedient means of “escape.”³¹

In how many of the confessions to SBS was the accused confronted with accusations of guilt that were bolstered by medical evidence? We do not know, as none of the studies recorded this information. The opportunity to ‘minimize’ also comes naturally in SBS cases, which affords suggestions such as ‘We all get frustrated when the baby cries’, ‘maybe you just shook it harder than you meant to’. In one case from an Australian study of confessions, the accused said that he often bounced the infant on his knee after feeding, causing her head to move ‘up and down and back and forth.’^{17,9} This was taken as a confession to shaking the baby. Was the accused simply looking for the closest thing to shaking that he could think of, given that he had been assured that the baby must have been shaken? We do not know as this was not explored in the study.

When combined, the tactics of maximizing the confrontation by refuting suspects denials, and minimizing the appearance of moral culpability, exploit the human decision-making tendency to over-value immediate rewards and punishments relative to future consequences³². The degree to which such tactics were used in the SBS confession studies is not known.

How many confessions of SBS occurred during the more reliable¹⁵ ‘information-gathering’ interview techniques rather than the less reliable ‘accusatorial style’ interrogations? Again, this is not noted in any of the studies.

Even in cases where ‘information-gathering interview techniques are used, a belief of the interrogator that shaking has occurred can influence the suspect, similar to the way that police officers can indicate suspects in a police line-up³³. Confession based studies would ideally involve interrogators who are not aware of the suspicions of doctors pertaining to the baby having been shaken.

Finally, *the contamination error* occurs when interrogators supply facts of the crime to the accused. In the case of SBS, the fact to be determined is whether the infant was shaken. It is not clear in any confessions to SBS that the notion of shaking was first mentioned by the suspect, rather than by an interrogator or doctor.

Due to the lack of consideration of these errors, it is not possible to assess existing confession studies, except to say that they were made in the absence of an appropriate level of consideration of research into interrogation methods and false confessions. As a result of these omissions, current confession studies are not fit for purpose, if their purpose is to provide an evidentiary basis for SBS.

Reliability: error rates in diagnosis

Beyond confession studies is the issue of error rates. The 2009 National Research Council report³⁴ into the state of forensic science highlighted concerns regarding forensic fields that ‘lacked well-defined systems for determining error rates’.²¹ What are the error rates for diagnosing SBS by reference to particular brain injuries? How accurate are Drs. Iles and Tully at diagnosing SBS by reference to the nature of an infant’s brain injuries? Are the rates low enough to dispel reasonable doubt in a case that totally relies on such testimony? There is no way to know, as there is no system in place for assessing error rates of diagnosing SBS, and never has been.

Conclusions

The conclusions are clear and unambiguous: the diagnoses of SBS by reference to associated brain injuries is not supported by science, whilst confession studies do not provide an evidentiary basis for guilt beyond reasonable doubt in the absence of corroborating evidence. Yet Joby Rowe was convicted purely on expert opinion evidence, experts who *conceded* the lack of a scientific basis for SBS, and based their opinions on confession studies, even though they had no expertise in interrogations or confessions.

Does it matter that there is no scientific basis for SBS? This goes to the heart of how Australian forensic science wants to define itself, and how the legal system wants to engage science. Should forensic ‘science’ be required to actually have a scientific basis? Should scientific ‘reliability’ be explicitly required within the Australian legal system?^{35,36} Or should it simply follow a model of appealing to authority, allowing well qualified forensic experts to provide opinions that lack sufficient evidentiary basis?

Notes

1. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490.
2. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490, Sentencing p3 note 15.
3. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490, Sentencing p3 note 16.
4. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490 at p485.
5. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490 at p493.
6. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490 at p662.
7. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490 at p662.
8. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490 at p819.
9. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490 at p859.
10. The Queen v Rowe, Joby. L Lasry JA [2017] VSC at p422.
11. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490 at p583–584.
12. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490 at p499.
13. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490 a p690.
14. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490 a p689.
15. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490 a p688.
16. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490 a p485; see also p500, p512.
17. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490 a p688.
18. The Queen v Rowe, Joby. T Forrest JA. [2018] VSC 490 a p583–584.
19. Brief for American Psychological Association as Amicus Curiae Supporting Appellant, People v. Rivera, 962 N.E.2d 53 (Ill. App. Ct. 2011) (No. 2–09 – 1060).
20. Leo. R. & Drizin, S. The three errors: pathways to false confession and wrongful conviction, University of San Francisco Law Research Paper No. 2012–04.
21. See President’s Council of Advisors on Science and Technology. Forensic science in criminal courts: ensuring scientific validity of feature-comparison methods. Washington, DC: Executive Office of the President of the United States; 2016 (PCAST) at p4.

Disclosure statement

No potential conflict of interest was reported by the author.

References

1. Lynøe N, Elinder G, Hallberg B, Roseen M, Sundgren P, Eriksson A. Insufficient evidence for 'shaken baby syndrome' – a systematic review. *Acta Paediatr.* 2017;106:1021–1027. doi:10.1111/apa.13760.
2. Narang SK, Estrada C, Greenberg S, Lindberg D. Acceptance of shaken baby syndrome and abusive head trauma as medical diagnoses. *J Pediatr.* 2016;177:273–278. doi:10.1016/j.jpeds.2016.06.036.
3. Guthkelch AN. Infantile subdural haematoma and its relationship to whiplash injuries. *BMJ.* 1971;2:430–431. doi:10.1136/bmj.2.5759.430.
4. Tuerkheimer D. Flawed convictions: 'shaken baby syndrome' and the inertia of injustice. Oxford University Press; 2014.
5. Adamsbaum C, Grabar S, Mejean N, Rey-Salmon C. Abusive head trauma: judicial admissions highlight violent and repetitive shaking. *Pediatrics.* 2010;126:546–555. doi:10.1542/peds.2009-3647.
6. Vinchon M, de Foort-Dhellemmens S, Desurmont M, Delestret I. Confessed abuse versus witnessed accidents in infants: comparison of clinical, radiological, and ophthalmological data in corroborated cases. *Childs Nerv Syst.* 2010;26:637–645. doi:10.1007/s00381-009-1048-7.
7. Findley K, Barnes PD, Moran DA, Squier W. Shaken baby syndrome, abusive head trauma, and actual innocence: getting it right. *Hous J Health L Pol'y.* 2012;12(2):258.
8. Saunders D, Raissaki M, Servaes S, Adamsbaum C, Choudhary AK, Moreno JA, van Rijn RR, Offiah AC. Throwing the baby out with the bath water — response to the Swedish agency for health technology assessment and assessment of social services (SBU) report on traumatic shaking. *Pediatr Radiol.* 2017;47:1386–1389. doi:10.1007/s00247-017-3932-8.
9. Biron D, Shelton D. Perpetrator accounts in infant abusive head trauma brought about by a shaking event. *Child Abuse Negl.* 2005;29:1347–1358. doi:10.1016/j.chiabu.2005.05.003.
10. Leestma J. Case analysis of brain-injured admittedly shaken infants: 54 cases, 1969–2001. *Am J Forensic Med Pathol.* 2005;26:199–212. doi:10.1097/01.paf.0000164228.79784.5a.
11. Adamsbaum C, Grabar S, Mejean N, Rey-Salmon C. Abusive head trauma: juridical admissions highlight violent and repetitive shaking. *Pediatrics.* 2008;126:546–555. doi:10.1542/peds.2009-3647.
12. Lynøe N, Rosén M, Elinder G, Hallberg B, Sundgren P, Eriksson A. Pouring out the dirty bathwater without throwing away either the baby or its parents: commentary to Saunders et al. *Pediatr Radiol.* 2018;48:284–286. doi:10.1007/s00247-017-4003-x.
13. Luttner SE. Shaken baby syndrome: inadequate logic, unvalidated theory, insufficient science; 2014.
14. Lynøe N, Elinder G, Hallberg B, Rosén M, Sundgren P, Eriksson A. Is accepting circular reasoning in shaken baby studies bad science or misconduct? *Acta Paediatr.* 2017;106(9):1445–1446. doi:10.1111/apa.13947.
15. Vrij A, Hope L, Fisher RP. Eliciting reliable information in investigative interviews. *Policy Insights Behav Brain Sci.* 2014;1(1):129–136. doi:10.1177/2372732214548592.
16. Barnes PD, Galaznik J, Gardner H, Shuman M. Infant acute life-threatening event– dysphagic choking versus nonaccidental injury. *Semin Pediatr Neurol.* 2010;17(1):7–11. doi:10.1016/j.spen.2010.01.005.
17. Ros de San Pedro J, Martínez-Lage JF, Puche A, Pérez-Espejo MA. "Benign" shaken baby syndrome. Case report. *Neurocirugía.* 2006;17(4):348–350. doi:10.1016/S1130-1473(06)70339-6.
18. Choudhary AK, Servaes S, Slovis TL, Palusci VJ, Hedlund GL, Narang SK, Moreno JA, Dias MS, Christian CW, Nelson MD, et al. Consensus statement on abusive head trauma in infants and young children. *Pediatr Radiol.* 2018;48:1048–1065. doi:10.1007/s00247-018-4149-1.
19. Leestma J. "Shaken baby syndrome": do confessions by alleged perpetrators validate the concept? *J Am Physicians Surgeons.* Spring 2006;11(1):14–16.
20. Garrett B. The substance of false confessions. *Stanford Law Rev.* April 2010;62(4):1051–1118.

21. West E, Meterko V. Innocence project: DNA exonerations, 1989–2014; Review of data and findings from the first 25 years. *Albany Law Rev.* 2016;79:717–795.
22. Kassin SM, Leo RA, Meissner CA, Richman KD, Colwell LH, Leach A-M, La Fon D. Police interviewing and interrogation: a self-report survey of police practices and beliefs. *Law Hum Behav.* 2007;31:381–400. doi:10.1007/s10979-006-9073-5.
23. Gudjonsson GH, Sigurdsson JF, Sigfusdottir ID, Young S. False confessions to police and their relationship with conduct disorder, ADHD, and life adversity. *Pers Individ Dif.* 2012;52:696–701. doi:10.1016/j.paid.2011.12.025.
24. Stewart J, Woody W, Pukos S. The prevalence of false confessions in experimental laboratory simulations: a meta-analysis. *Behav Sci Law.* 2018;36:12–31. doi:10.1002/bsl.v36.1.
25. Liley W, Stephens A, Kaltner M, Larkins S, Franklin RC, Tsey K, Stewart R, Stewart S. Infant abusive head trauma: incidence, outcomes and awareness. *Aust Fam Physician.* 2012;41(10):823.
26. Starling S, Patel S, Burke B, Sirotnak A, Stronks S, Rosquist P. Analysis of perpetrator admissions to inflicted traumatic brain injury in children. *Arch Pediatr Adolesc Med.* 2004;158(5):457. doi:10.1001/archpedi.158.10.962.
27. Kassin SM, Drizin SA, Grisso T, Gudjonsson GH, Leo RA, Redlich AD. Police-induced confessions: risk factors and recommendations. *Law Hum Behav.* 2010;34:3–38. doi:10.1007/s10979-009-9188-6.
28. Kassin SM, Goldstein CC, Savitsky K. Behavioral confirmation in the interrogation room: on the dangers of presuming guilt. *Law Hum Behav.* 2003;27:187–203. doi:10.1023/A:1022599230598.
29. Hill C, Memon A, McGeorge P. The role of confirmation bias in suspect interviews: A systematic evaluation. *Legal Criminol Psych.* 2008;13:357–371. doi:10.1348/135532507X238682.
30. Narchet FM, Meissner CA, Russano MB. Modeling the influence of investigator bias on the elicitation of true and false confessions. *Law Hum Behav.* 2011;35:452–465. doi:10.1007/s10979-010-9257-x.
31. Kassin SM. False confessions. *WIREs Cogn Sci.* 2017;8:e1439. doi:10.1002/wcs.1439
32. Madon S, Guyll M, Scherr KC, Greathouse S, Wells GL. Temporal discounting: the differential effect of proximal and distal consequences on confession decisions. *Law Hum Behav.* 2012;36:13–20. doi:10.1037/h0093962.
33. Rodriguez DN, Berry MA. Eyewitness science and the call for double-blind lineup administration. *J Criminol.* 2013;2013:1–10. Article ID 530523. doi:10.1155/2013/530523.
34. National Research Council. Strengthening forensic science in the United States: a path forward. Washington DC: The National Academies Press; 2009. p. 178–179.
35. Edmond G. Specialised knowledge, the exclusionary discretions and reliability: reassessing incriminating expert opinion evidence. *Univ N S W Law J.* 2008;31(1):1–55.
36. Edmond G. The admissibility of forensic science and medicine evidence under the uniform evidence law. *Crim Law J.* 2014;38:136.