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Does Tort Deter? Inconclusive Empirical Evidence about the Effect of Liability in Preventing Harmful Behaviour

Benjamin van Rooij and Megan Brownlee

The tort system is a mouse with an other-worldly roar.

— Saks 1992: 1287

Abstract: This chapter assesses whether tort liability can have a deterrent effect and reduce risky and harmful behaviour. It discusses insights from key reviews of empirical work across regulatory domains. These reviews show that this body of empirical work, in all but one of the domains (corporate director liability towards shareholders) studied, does not find conclusive evidence that tort deters or that it does not deter. Studies do find some indication of negative side effects of tort regimes, such as lowering necessary services, enhancing unnecessary legal defensive practices and raising costs. The chapter concludes that common assumptions about the role that tort can play in compliance require a more solid empirical basis. The chapter presents directions for future tort and deterrence research with a focus on better understanding the causal processes through which liability rules may shape human and organizational conduct.

22.1 INTRODUCTION

In August 2019, a judge in Oklahoma ruled that Johnson and Johnson had breached a public nuisance law when it had intentionally downplayed the risks and overstated the benefits of prescription painkillers containing opioids. The drug company was ordered to pay the plaintiff, the state of Oklahoma, \$572 million in compensation. This massive award was well below the \$17 billion Oklahoma had claimed that Johnson and Johnson should have paid for addiction treatment, drug courts and other necessary services from the fallout of the opioid crisis that the state would otherwise have to bear. This was the first major ruling about liability in the aftermath of the opioid crisis. The case, with its massive claim about the immense amount of social harm directly attributable to major corporations, bears a resemblance to the cases against big tobacco companies in the late 1990s, which ended in the Tobacco Master Settlement Agreement where the tobacco companies agreed to pay a minimum of \$206 billion over the first twenty-five years of the agreement.

These are highly newsworthy cases. They attract attention because of the large awards. They offer the spectacle of the legal battle, with lawyers on both sides, with testimony,

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sometimes with juries and finally a verdict or a mass settlement. What gets lost in the reporting is whether these cases actually serve to reduce harm. These two cases are telling. Rather than focus on the verdicts here, we should have asked a different set of questions: Did the mass settlement in the tobacco cases scare other corporations away from misleading the public about how their products may cause harm and addiction? Did drug companies ever think of the dangers of liability when they pushed opioid prescription painkillers? In other words, did instituting a high liability help to prevent future harm, and not just compensate for harm in the past?

For economists, this is the core function of the tort liability system; such systems should exist only if they have utility in that they can reduce more harm than the tort system itself costs. As Judge Posner put it: 'If . . . the benefits in accident avoidance exceed the cost of prevention, society is better off if those costs are incurred and the accident averted [by adopting] precautions in order to avoid a greater cost in tort judgments' (Posner 1972: 33).

The key assumption here is that instituting a liability will somehow come to change future conduct, and often this is summarized in what we shall call *the tort deterrence thesis*, namely that tort can deter people and organizations from causing harm (cf. Landes and Posner 1987; Roisman, Judy and Stein 2004; Popper 2011). As Goldberg summarizes this idea: 'the most obvious function tort might play is to send a message to powerful actors that they must give due consideration to the well-being of others' (Goldberg 2010: 326).

Tort liability can be a major mechanism through which law can shape behaviour and measure compliance. Rather than changing behaviour through criminal law sanctions or regulatory law, tort law could provide a private law incentive to improve behaviour and reduce misconduct.

The question is whether tort liability in practice can achieve such an effect and whether it can improve behaviour. This chapter will discuss the empirical knowledge about the deterrent effect of tort. As such, it will explicitly not focus on the rich economic literature that models deterrent effects of tort and that discusses this in light of tort utility and debates about tort reform; rather, it will focus on what is known and still unclear about the empirical reality in which tort may influence human and organizational decision-making and prevent risk and harm.

This chapter will assess leading reviews of this body of empirical work. It will show how in all but one domain (corporate director liability towards shareholders), the empirical studies do not offer conclusive evidence that tort deters or that it does not deter. Reviewed studies do find some indication of negative side effects of tort regimes, such as lowering necessary services, enhancing unnecessary legal defensive practices and raising costs. The paper concludes by considering what this means for compliance and for future research on tort and deterrence.

22.2 REVIEWED EMPIRICAL WORK: AN OVERVIEW

The present chapter focuses on empirical work on the deterrent effect of tort as discussed in English language review papers. Much of the English-language work that is reviewed focuses on the US jurisdiction, while there is also some work from other Western jurisdictions. The body of work found in the reviews is still fragmented, with reviews for different types of damages. Here the largest reviews cover medical malpractice liability. This body of work has been the most systematic, the most up to date, and also the best systematically reviewed (Mello and Brennan 2001; Agarwal, Gupta and Gupta 2019). Another large body of work for which we have reviews is about corporate director and officer liability in relation to liability insurance. And the third largest reviewed body of work assesses the effect of liability

in preventing car accident damages. This is a well-developed body of work that allows an insight into how insurance features in the deterrent effect of tort. There is only one review that assesses the deterrent effect across different domains of liability covering medical malpractice and car incidents, as well as product liability, workplace injuries and environmental damages, but unfortunately it is from 1992.

Most of the work the reviews cover uses larger sets of available data with indicators (or proxies) for damages, and with indicators for the tort liability system. Such studies use statistical analysis to find associations between trends in liability and trends in damages. Most of the studies that are reviewed look at how different forms of tort reform affect risky or harmful behaviour. These studies focus on reforms that lower liability, for instance through instituting caps on damages, allowing tortfeasors to have insurance for liability, or by instituting a no-fault insurance (where victims get paid through insurance and not through liability claims). If the tort deterrence thesis holds true, these reforms that lower liability would result in riskier behaviour and higher damages than jurisdictions with higher liability.

As such, most of these studies try to establish a rather linear relationship between a form of tort on the one hand and a form of risky behaviour on the other. When the law changes and lowers liability, these studies test whether it will result in the hypothesized increase in risky and damaging behaviour. However, it is also recognized that the relationship between tort and risky behaviour is not as clear-cut and that the process can be more differentiated (cf. Havinga 2012). A core issue in tort here is the mediating effect of liability insurance. Such insurance, as we just discussed, can on the one hand reduce liability and create moral hazard with those insured from liability engaging in riskier behaviour more frequently. However, when insurance exists, the insurance company gets a stake in the insured behaviour and may try to reduce risk through monitoring the insured client (Baker and Griffith 2010; Baker and Swedloff 2012; Boyer and Tennyson 2015). Amongst the reviews discussed here, one focuses on this issue and looks at shareholder liability insurance for corporate directors and officers and its effect on their risky decision-making. This body of work is different from some of the other work reviewed in that its data are not solely aggregate data (such as insurance coverage, share prices, management earnings and mergers and acquisitions decisions (see Boyer and Tennyson 2015)) but also include interviews with corporate risk managers and insurance professionals (i.e. Baker and Griffith 2010; Baker and Swedloff 2012).

Some studies covered in the reviews also assess the side effects of tort on regulated behaviour, or mediating influences on the effect of tort and risky behaviour. This has been most prominent in medical malpractice studies where a range of scholars have looked at how changes in tort law have affected the provision of care, specifically at whether stricter liability created lower availability of medical services that may lead to liability (for a review of earlier work see Mello 2006 and for recent work see Agarwal, Gupta and Gupta 2019). Reviewed studies have also looked at other side effects of liability such as the influence it has on the costs of insurance, administrative overheads, litigation rates, access to claims for victims and the amount of funds spent to reduce liability (for instance through so-called defensive medicine where doctors order unnecessary tests and referrals).

Table 22.1 below provides an overview of the review studies covered in this chapter.

The body of work reviewed here does not represent all empirical work on tort but, rather, gives a picture of several larger bodies of work that have been reviewed separately in the past and that are now assessed together for the first time. As such, it covers work on medical malpractice, director liability towards shareholders and car accidents. For other areas of damages, reviews are less readily available and the reviews we have are older and less robust in

TABLE 22.1 *Review studies on the deterrent effect of tort*

Review studies	Type of damages	Type of review	# studies reviewed	Mediating or side effects
Agarwal, Gupta and Gupta 2019	Medical malpractice	Systematic	37	Supply of medical services
Kachalia and Mello 2011; Mello and Kachalia 2010	Medical malpractice	Systematic	64/201	Supply of medical services, insurance costs, overhead costs, costs of defensive medicine
Boyer and Tennyson 2015	Corporate misconduct and risk	Regular literature review	25	Liability insurance, premium levels, firm value
Engstrom 2011	Automobile accidents	Regular literature review	11	Effects on insurance premiums
Anderson, Heaton and Carroll 2010	Automobile accidents	Regular literature review	8	Costs, access to claims for victims, litigation rates
Deweese and Trebilcock 1992	Automobile accidents, medical malpractice, product damages, environmental damages, workplace injuries	Regular literature review (only partly empirical aggregate-level data studies)	20	Premium levels, defensive medicine, physician activity levels, innovation

terms of numbers and studies discussed. Most reviews focus on studies using aggregate data, and some older reviews also include less formal analysis of historical patterns of liability and damages. The present chapter does not cover studies using survey and laboratory methods (of which there have been a few).

22.3 EMPIRICAL EVIDENCE ABOUT THE DETERRENT EFFECT OF TORT

22.3.1 *Medical Malpractice*

In theory, liability for medical malpractice should have a deterrent effect and improve the quality of care for patients. If doctors become liable for damages their work causes patients, they may use a higher standard of care and work to reduce medical errors. At the same time, instituting such liability might have negative side effects, as it may reduce the willingness of doctors to work in high-risk practice areas (or in jurisdictions with higher liability) and it may increase the so-called defensive medicine (where care specialists provide services that are not strictly necessary but serve to reduce potential liability).

There are two major reviews of the deterrent and other effects of medical malpractice. The first, and most recent, is by Agarwal, Gupta and Gupta (2019). Their study reviewed thirty-seven previous empirical studies that were selected through a systemic method. These included studies that looked at the effects of caps on non-economic damages, and of caps on punitive damages.

Of these studies, eight papers evaluated the impact of caps of non-economic damages on a range of quality of care outcomes (Klick and Stratmann 2007; Currie and MacLeod 2008; Frakes 2012; Iizuka 2013; Avraham and Schanzenbach 2015; Frakes and Jena 2016; Bilimoria et al. 2017; Minami et al. 2017). Such studies look at whether when the potential amount of damages awarded is lowered, the quality of care given on a number of different issues (such as inpatient mortality, preventable delivery complications or certain kinds of other medical complications) is affected. As such, these studies provide an assessment of whether liability reduces risk, and thus about whether tort deters. If the deterrence thesis is correct, lower liability (through caps on damages) will result in lower quality of care.

Most studies did not find evidence that there was such a deterrent effect and that lowering the caps resulted in a lower level of care. Exceptions were Avraham and Schanzenbach (2015) who found that caps on non-economic damages were associated with a decrease in mortality for those aged forty-five to sixty-five but not for those older. Another exception was a study by Currie and MacLeod (2008), which found that caps of non-economic damages led to a decrease (6 per cent) in preventable labour complications. None of the other six studies found an association between caps on damages and care benefits across a wide range of patient safety indicators including those of acute care, inpatient mortality, avoidable hospitalizations, preventable delivery complications, medical errors related to birth or obstetric trauma, infant mortality and postoperative complications.

Seven studies reviewed by Agarwal, Gupta and Gupta (2019) (i.e. Kessler and McClellan 1996, 2002; Currie and MacLeod 2008; Sloan and Shadle 2009; Frakes 2012; Iizuka 2013; Frakes and Jena 2016) looked at whether the introduction of caps on punitive damages affected the quality of care. And as such, they looked at whether reducing the severity of expected punishment would lead to more damaging behaviour and thus a reduced deterrence.

Again, just as with the studies of caps on economic damages, the studies of caps on punitive damages mostly do not find the hypothesized link between lower damages and lower patient care. Frakes and Jena (2016) report mixed findings, with a significant reduction in the rate of maternal trauma but no effects of the caps on punitive damages on 'mortality, avoidable hospitalizations, delivery complications, or cancer screening' (Agarwal, Gupta and Gupta 2019: 6). The rest of the studies showed 'no association with preventable complications of labour, APGAR scores, medical errors related to birth or obstetric trauma, mortality, or readmissions' (Agarwal, Gupta and Gupta 2019: 6).

Finally, six studies reviewed by Agarwal, Gupta and Gupta (2019) (i.e. Kessler and McClellan 1996, 2002; Konety et al. 2005; Klick and Stratmann 2007; Sloan and Shadle 2009; Yang et al. 2012) studied whether the introduction of caps on total damages would affect the quality of care. And again, the expected link between lower damages and lower care was not clearly found. Of these six studies, only Konety et al. (2005; 2006) found an effect, seeing a significant 13 per cent reduction in mortality probabilities among patients with bladder cancer, while the rest of the studies found no association.

Agarwal, Gupta and Gupta (2019) have also looked at the side effects of medical malpractice. Here they concluded that liability did have negative side effects and 'that caps on non-economic damages were associated with a decrease in defensive medicine, an increase in physician supply and decreases in health-care spending' (Agarwal, Gupta and Gupta 2019: 1). In other words, they found that when there is less liability, there is less chance that doctors will engage in unnecessary medical practices to reduce liability, meaning that there are more doctors willing to practise in such areas and that overall it lessens medical costs. The overall

conclusion here is thus that higher liability does not come with the expected benefits of higher patient care, but does come with the higher costs of having fewer doctors, and a higher cost in terms of performing more unnecessary tests and operations.

Kachalia and Mello have published two papers (Kachalia and Mello 2011; Mello and Kachalia 2010) reviewing empirical work about the effects of different types of tort reforms in the area of medical malpractice. Just like Agarwal, Gupta and Gupta (2019), they look both at the effects of liability on patient care (and thus on deterrence) and at several side effects, including physician supply and spending on defensive medicine. The work reviewed by Kachalia and Mello uses different types of tort reform to assess the effects of these medical malpractice liability systems. These include: setting caps on damages, putting limits on attorney fees, setting limits on the amounts that plaintiffs can get from defendants in relation to their overall fault in the case of joint liability (so-called joint and several liability reforms), eliminating double payment by defendants who could claim damages even if they have already been paid by other sources such as their health insurance (collateral-source rule reform), and introducing statutes of limitation. All tort reforms studied reduce the claims that plaintiffs can make and thus would in theory be expected to reduce deterrence and have a negative effect on the quality of care provided to patients.

However, similarly to Agarwal, Gupta and Gupta's (2019) review, Kachalia and Mello's (Kachalia and Mello 2011; Mello and Kachalia 2010) reviews report that there is no conclusive proof that these tort reforms have had an effect on the quality of care for patients. Table 22.2 contains a summary of their main findings about how different tort reforms have affected such quality of care. In contrast to Agarwal, Gupta and Gupta (2019), however, they do not find clearly that tort reform has side effects in terms of physician supply and defensive medical practices. As outlined in Table 22.2, they find mixed evidence that caps on damages lead to more physician supply and some evidence that they lead to less defensive practices, but they do not find this for all other tort reforms studied, including limits on attorney fees, joint and several liability reforms, and statutes of limitations.

TABLE 22.2 *Summary of key findings on medical liability, deterrence and side effects*

Type of tort reform	Core findings	Implications for deterrence	Side effects
Caps on damages	'Evidence on quality of care too limited to draw conclusions' ¹	No conclusive evidence	Mixed findings on physician supply, reduction of some defensive practices
Limits on attorney fees	'Effect on quality of care not studied'	No evidence	No effect on physician supply, limited evidence of no effect on defensive practices
Joint and several liability reform	'Evidence on quality of care too limited to draw conclusions'	No conclusive evidence	No effect on physician supply, mixed findings on defensive practices
Statutes of limitations and repose	'Evidence on quality of care too limited to draw conclusions''	No conclusive evidence	No conclusive evidence on physician supply and defensive medicine

Source: Drawn from Kachalia and Mello 2011: 1568.

¹ Quotes in this table are all from Kachalia and Mello 2011: 1568.

In sum, the studies of medical malpractice do not find conclusive evidence for the deterrent effect of tort, as they do not find that reducing liability also leads to lowering of patient care and safety, as the tort deterrence thesis would expect. And they provide some indication that medical malpractice liability can have negative side effects in limiting the supply of doctors in higher liability jurisdictions and areas of work, enhancing defensive medicine practice and increasing overall costs of health care.

22.3.2 *Liability of Corporate Directors and Officers towards Shareholders*

If directors and officers make decisions that damage the interest of their corporation, they can face liability towards the corporate shareholders. In some jurisdictions, such directors and officers can buy insurance to reduce their liability towards shareholders. There has been a large body of empirical work about how such insurance will affect risky corporate decision-making. If the tort deterrence thesis holds true, the more directors and officers purchase insurance, the less liability they will face and the more likely it is that they will engage in risky corporate decision-making. There is an additional hypothesis at play here as well, namely the insurer monitoring hypothesis, where insurers have a stake in monitoring the risky behaviour of their clients and can thus counter the moral hazard that their insurance creates. Here we shall review this body of work through a recent paper by Boyer and Tennyson (2015).

Their review discusses seven studies that find ‘significant moral hazard effects’ in corporations whose directors and officers have purchased liability insurance. One study by Chalmers, Dann and Harford (2002) looks at seventy-two initial public offering (IPO) firms that went public between 1992 and 1996, and finds, for instance, that there is a negative relationship between the three-year post-IPO stock price performance and the insurance coverage in relation to the IPO. From this they deduce that managers in cases where there is insurance are more likely to act opportunistically by taking the companies public when they are overvalued (Chalmers, Dann and Harford 2002: 609). Another study discussed in the review finds that firms are more likely to overpay for firms they acquire when their directors have liability insurance (Lin, Officer and Zou 2011). And several studies found that firms with liability insurance for directors and officers were more likely to engage in restatements of earnings (DuCharme, Malatesta and Sefcik 2004; Boyer and Hanon 2009; Cao and Narayanamoorthy 2011; Gillan and Panasian 2015; Kim 2015).

As such, this body of work finds that when there is more insurance for directors and officers to protect them from lawsuits from shareholders, they will be more likely to engage in risky behaviour for the corporation. In other words, when they face less liability, corporate executives will take more risk-prone decisions. In sum, this body of work finds that, in contrast to the research about medical malpractice, there is support for the tort deterrence thesis in that lower liability can result in riskier and potentially more damaging behaviour.

Reviewing another six studies, Boyer and Tennyson (2015) did not find that such moral hazard is mitigated by the insurance companies. As such, their research finds that although the premiums do seem to respond to the risk of directors getting sued by shareholders, it is not clear that such higher premiums reduce risky corporate decisions by directors or officers (Core 2000; Boyer and Stern 2012). In-depth qualitative work by Baker and Griffith (2007, 2010) further concludes that insurers who provide corporate executives with insurance against shareholder liability do not monitor corporate behaviour.

22.3.3 *Liability for Car Accidents*

A third, larger body of work on tort and deterrence is about car accidents. Here, again, the tort deterrence thesis would hold that where there is a higher liability for automotive accidents, risky driving will decrease and there should be fewer such accidents. Several jurisdictions have adopted so-called no-fault insurance systems, where victims have a direct right to partial compensation for their damages through insurance. In these systems, drivers causing accidents are no longer liable for the damages (Engstrom 2011:304). Thus, when jurisdictions adopt such no-fault insurance systems, they provide an ideal natural experimental setting in which to study the deterrent effect of tort. Under the tort deterrence thesis, we would expect there to be riskier behaviour when there is less liability, and thus with no-fault insurance systems we would expect more accidents.

A range of scholars have taken this opportunity and looked at how no-fault liability has affected car accidents. Such studies have also looked at potential side effects.

Two very similar papers, one by Engstrom (2011) and one by Anderson, Heaton and Carroll (2010), have reviewed this body of work: Engstrom reviewed ten studies, both about the USA as well as about Quebec and New Zealand, and Anderson and colleagues reviewed nine studies, all in the USA.

The reviews both found that the scientific findings were split. Six of the studies reviewed (Landes 1982; McEwin 1989; Devlin 1992; Sloan, Reilly and Schenzler 1994; Cummins, Phillips and Weiss 2001; Cohen and Dehejia 2004) found that with the no-fault insurance, and thus the reduction of driver liability, there were more fatal accidents (ranging from 2 per cent to 15 per cent). However, five of the studies reviewed did not find any effect of no-fault insurance on fatal accidents (Kochanowski and Young 1985; Zador and Lund 1986; Loughran 2001; Derrig et al. 2002; Heaton and Helland 2008).

In sum, both reviews conclude that the evidence is mixed and that there is no clear conclusion. As Anderson, Heaton and Carroll (2010: 82) conclude: '[A]lthough there are some theoretical reasons that no-fault coverage may raise costs by inducing less careful driving, the empirical evidence is mixed.' The study examining the broadest range of accident types (Heaton and Helland 2008) finds 'no evidence of an effect of no-fault on accident rates' (Anderson, Heaton and Carroll 2010: 82). Or, as Engstrom (2011: 333) puts it, '[a]ll told, roughly half of the studies published thus far claim that no-fault coverage increases fatal accidents, while the other half find no effect, and the notion that no-fault reduces fatalities has been seemingly put to rest. The proposition that no-fault may be associated with a greater number of accidents thus lingers.'

The reviews have also looked at side effects of the no-fault regimes. Anderson, Heaton and Carroll (2010), for instance, find that the no-fault regimes have led to higher insurance premiums, but this cannot be explained by a higher rate of claims per accident in jurisdictions with the no-fault rule. They also report that claimants in no-fault systems do get a higher percentage of their economic losses and get paid faster (Anderson, Heaton and Carroll 2010). Engstrom (2011: 337) concludes that the adoption of no-fault insurance systems is associated with higher premiums and overall costs than an ordinary liability system, and that between 2000 and 2004 the gap in premium levels between the two systems grew.

22.3.4 *Other Forms of Tort*

To understand whether tort deters in other domains, a cross-sectional review is important. Dewees and Trebilcock (1992) compared findings from nineteen studies about the deterrent

TABLE 22.3 *Summary of key findings in Dewees and Trebilcock's 1992 review*

Type of damages	Number of studies	Findings on deterrence	Findings on side effects
Automobile accidents	7	Mixed and inconclusive	None studied
Medical malpractice	2	Studies are fragmented and findings are inconclusive	Indications of more defensive medicine and reduction in physician services
Product damages	2	Mixed findings. No useful conclusions can be drawn from available aggregate data	Inconclusive findings on negative effects on innovation and development of socially desirable products
Environmental damages	4	No conclusive evidence of deterrence	Tort action may have given rise to legislative or regulatory action
Worker damages	5	Contradictory findings and limited sound empirical evidence	None studied

effect of tort across five different areas of tort: automobile accidents, medical malpractice, product damages, environmental damages and worker damages. The studies they reviewed were not all purely empirical studies with aggregate data but also included sources that sketched the history of both tort rules and the development of damages that were used to support ideas about causality between the two without testing this through statistical analysis. Table 22.3 presents an overview of their key findings.

As we can see from this summary, just like the work on medical malpractice and automobile accidents, and in contrast to the work on director liability towards shareholders, other fields of tort do not yield conclusive evidence that tort deters and reduces the harms it seeks to reduce. This is the case for product liability tort regimes, for environmental torts and for worker damage compensation torts. And although this body of work is not of the same size and quality as the work reviewed in medical malpractice and automobile accidents, it does show that older findings in other fields do not clearly show either that tort does deter or that it does not.

22.4 DISCUSSION AND CONCLUSION

Across the seven domains of tort reviewed here, in six there is no conclusive evidence that changes in tort systems have a clear effect on risk-taking and damaging behaviour. The exception is corporate director and officer liability towards shareholders, where empirical studies do find clearly that when liability is reduced because of insurance, executives will make riskier and more damaging decisions. For other domains, the body of empirical work does not show clear evidence that higher tort liability creates more deterrence and lowers risk, or that lower tort liability creates less deterrence and heightens risk. As the evidence is mixed and inconclusive, neither can we say that the literature proves that tort deters or that it does not deter. The best we can conclude right now, based on this body of work, is that we do not know.

The work discussed here is limited. Each review discussed here is limited by its own focus, its own selection of studies and also the year it was developed. This means that we get a fairly

good picture of medical malpractice tort studies up to 2019, corporate director liability up to 2015 and automobile accidents up to 2011 or so, but for other forms of tort the reviews we have are old and also cover a rather limited body of work. The focus in these reviews is also mostly on aggregate studies that compare outcomes in terms of damages before and after changes in or between tort law systems. And most of these studies have looked empirically at what will happen when liability is lowered, but not at what will happen when liability increases.

For compliance generally, this body of work shows that we cannot clearly say that adopting a liability regime will enable an effective legal influence on human and organizational conduct. The findings from these reviews are an important warning that what is often taken for granted about the impact of law on behaviour, whether it is that higher punishment reduces crime (cf. Nagin and Pepper 2012; Nagin 2012, 2013; Simpson et al. 2014; Schell-Busey et al. 2016) or, as discussed here, that higher liability reduces risky behaviour, may not be empirical fact. It shows the importance of developing more and better empirical work and taking such work seriously in how we design and discuss legal systems and rules that seek to alter behaviour.

Part of the problem is that the existing body of work reviewed here has tried to assess the effects in a sort of direct cause and effect manner. As such, it has focused on the type of liability on the one hand and the type of behaviour on the other. In reality, there will be a complex causal set of processes that combine the two. And it is exactly that chain that is vital to understand to come up with meaningful data about how existing liability systems may become more effective and less costly in improving behaviour.

Another problem is that the existing work has not really tried to assess why sometimes (as in the case of shareholder liability) tort is effective, and in other cases such an effect is not clearly found. When it is unclear whether tort works to deter, we should try to understand how tort actually can deter and what conditions are at play in effectuating tort deterrence, and also what costs such deterrence may bring.

Here, there is much to learn from other areas of compliance studies, as also discussed in this handbook. A first lesson from other compliance work is that there are two key aspects of deterrence that are relevant for affecting behaviour: the certainty of punishment and the severity of punishment (Beccaria 1764; Bentham 1789; Becker 1968). Such certainty of punishment consists of the chances that offending behaviour will be detected and the probability that, upon detection, action will be undertaken that will result in such punishment (Nagin 2013). The study of criminal punishment has found that the certainty of punishment matters more than its severity (Nagin 2013). Scholars have found that punishment starts to deter only when there is a certain threshold level of certainty, ranging between 25 per cent and 40 per cent depending on the type of crime (Brown 1978; Chamlin 1991). As such, research on tort and deterrence should come to look more closely at what the certainty of getting sued, losing in litigation and ultimately having to pay damages, legal fees and other fees is, and of course how people perceive such certainty.

One study, using a laboratory experiment where students playing a public goods game could claim damages when harmed by other players, assessed the certainty and severity of liability (Eisenberg and Engel 2014). The experiment manipulated the height of such damages as well as the probability that such claims could be made. They found that 'a damages rule analogous to the most common measure of damages in contract and tort litigation, the harm to the aggrieved party, is insufficient to deter serious deterioration in co-operation over time' (Eisenberg and Engel 2014: 331). Only when the probability was high

enough or when a very high liability (treble the normal rate) was introduced did such liability have a positive effect on co-operation. In other words, better insight into the relative weight that certainty and severity of liability play in shaping behaviour is crucial to designing systems with more effective forms of tort.

Once we focus on the certainty of liability as a core aspect of tort liability, the crucial issue is what the chances are that victims of damages will sue and how likely it is that they will be successful in such litigation. For medical malpractice it is striking, for instance, that victims of negligent medical errors are very rarely (in only 2–3 per cent of cases) likely to file a claim, and when they do so only 50 per cent will be awarded money, and in a quarter of the cases there is no connection between the merit of the claim and the outcome (Kachalia and Mello 2011: 1564–5). Here the empirical study of the effects of tort on behaviour can draw on the well-developed body of socio-legal scholarship on access to justice and the chances of success in litigation (Galanter 1974; Cappelletti and Garth 1978; Curran 1978; Felstiner, Abel and Sarat 1980–1; Genn and Beinart 1999; Talesh 2012).

Further understanding of how tort may influence behaviour starts with recognizing that people develop a subjective view of the law and how it is enforced. Chapter 32 in this volume shows how low the level of legal knowledge and understanding often is, both for laypersons and for professionals. Here, interestingly, one study found a surprising link between liability and legal knowledge, as it showed that doctors in Texas were much more afraid of legal liability and engaged much more in defensive medicine than doctors in Denmark, yet the doctors in Texas also had far worse knowledge of the law than their Danish colleagues (Van McCrary and Swanson 1999). If people do not know exactly when they are going to be liable and what for, how can such liability come to shape their behaviour? A key question in the study of tort and deterrence should thus be about the legal knowledge of potential tortfeasors.

Deterrence scholarship from other fields, notably criminology and regulatory studies, has also found that people have subjective views on how the law is enforced. This body of work has shown that people are not at all aware of the exact chances of getting caught and punished or what punishment they should then expect (Gunningham, Thornton and Kagan 2005; Apel 2013; Van Rooij 2016). Thus, potential offenders often do not see punishment as it exists in reality. This means that deterrence must be studied from the subjective perspective of the potential offender, as it is this perception that will shape how they see the punishment and thus whether it deters them from offending (Decker, Wright and Logie 1993; Nagin 2013; Van Rooij 2016). We have also learned from these studies that the severity of punishment is relative: what may be severe for some may not be for others.

This means that to understand how tort may deter risky and damaging behaviour, we must first understand the subjective view of those whose behaviour the liability system addresses. To do so requires adopting methods beyond aggregate studies testing the effects of different liability regimes, that is, studies that get into the minds of potential tortfeasors. To get a subjective understanding of the law and its enforcement requires using surveys, focus groups or other forms of interviewing. An example of a simple survey analysis of tort was a survey that presented 700 first-year law students with a series of vignettes, and asked respondents to rate the likelihood of their participation in tortious behaviour under differing legal conditions of criminal and tort liability (Cardi, Penfield and Yoon 2012). But to truly get to the pertinent issues here, surveys should develop instruments to test legal knowledge (without shaping it), and similarly test views on the certainty and severity of liability, and they should do so amongst subjects whose tortious behaviour really matters.

Once such subjective views about the legal rules of liability and the way they are enforced and invoked are clear, the final part of the research on tort liability should be about how these views then play a role in how people engage in or refrain from risky and harmful behaviour. This may well be the hardest part to capture in empirical research. One approach might be to use laboratory experiments where such behaviour can be directly observed and where influences on the decision-making can be tightly controlled (e.g. Eisenberg and Engel 2014). The next step will be to take these sorts of studies from the students in the laboratory to doctors in hospitals, directors in boardrooms and drivers in their cars.

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