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# TOWARD EVIDENCE-BASED LEGAL DECISION-MAKING: INTEGRATING SYSTEMATIC REVIEW, META-ANALYSIS, AND NETWORK META-ANALYSIS IN LEGAL RESEARCH

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## ABSTRACT

*This paper proposes a methodological framework for integrating systematic review, meta-analysis, and network meta-analysis (NMA) into legal research to support evidence-based legal decision-making. Current doctrinal and empirical scholarship produces large volumes of heterogeneous findings but lacks coherent standards for comparing the effectiveness of legal interventions across jurisdictions. By reconceptualizing legal interventions as “treatment arms,” the framework adapts core features of evidence synthesis – standardized eligibility criteria, outcome measures, data extraction protocols, pairwise meta-analysis, and NMA for multi-intervention ranking – to the legal domain. Conceptual demonstrations from juvenile diversion and anti-corruption enforcement illustrate how comparative effectiveness can be quantified rather than inferred narratively. The framework increases transparency, reproducibility, and analytical rigor, but also faces challenges related to definitional variability, legal pluralism, and ethical risks of overgeneralization. The paper calls for legal-specific reporting standards (PRISMA-Law), interdisciplinary collaboration, and methodological training to establish a robust foundation for evidence-based law and policymaking.*

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**KEYWORDS:** evidence-based law, systematic review, meta-analysis, network meta-analysis, empirical legal research, comparative interventions, PRISMA-Law, legal methodology

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## 1 INTRODUCTION

The growing complexity, fragmentation, and diversity of legal scholarship and practice, combined with the complexity of comparing the effect of legal interventions across various jurisdictions, raises the question of how to synthesize and compare the increasing volumes of empirical data available. This research paper explores this pressing question by examining the potential of systematic reviews, meta-analyses, and network meta-analyses (NMAs) for legal research to support evidence-based legal decision-making.

The topic of this research lies on the interface between methodological innovation and legal scholarship. Doctrinal analysis used to be the traditional approach to legal research. Yet, given the proliferation of quantitative, comparative, and complex research topics, there is a rising demand for socio-legal research and empirical legal studies. However, the systematic integration of findings across studies remains a challenge in comparative analysis of the effect of different legal interventions. Systematic review, meta-analysis, and NMA help researchers to synthesize and map evidence from several empirical studies on the same topic. In addition, they provide an approach to systematically combine evidence from multiple studies in order to evaluate the comparative effectiveness of different legal interventions by ranking them according to a chosen variable. Thus, this paper attempts to address the following research question: How can systematic review, meta-analysis, and network meta-analysis be effectively integrated into legal research to enable the systematic comparison and synthesis of empirical findings on legal interventions across multiple jurisdictions? The aim of this research is to develop a comprehensive framework to adapt and integrate the methods of evidence synthesis to the systematic comparison of evidence across studies evaluating the effectiveness of legal interventions. Therefore, it attempts to overcome the absence of a comprehensive and standardized method to synthesize findings across studies, in order to provide evidence for effective regulatory designs, enforcement techniques, and policy interventions. Thus, the framework can inform policymakers and advocates of regulatory change by providing them with evidence that is not dependent on anecdote and belief, thus filling an identified research gap. By use of conceptual demonstrations, it shows how this method may be used in diverse areas of law to enhance the level of comparative evaluation of legal interventions.

This research adopts a five-step methodology,

including a comprehensive literature review on previous attempts at evidence synthesis in legal scholarship, with the goal of identifying the pros and cons, as well as the potential applicability of NMA for particular challenges in legal research. Thereafter, an epistemological model of legal interventions is developed as "treatment arms" of a network meta-analysis using the methodology of transitivity, consistency, and comparability as the starting point. In doing so, a methodological framework for evidence synthesis in legal research is constructed, which consists of: (1) a PICO-L-style framework adapted for legal research, (2) eligibility criteria for empirical and mixed-methods studies, (3) legal data extraction sheets, (4) pairwise meta-analysis for interventions with direct comparison, (5) NMA for comparative interventions and effectiveness ranking, and (6) PRISMA-Law for reporting. Examples from juvenile diversion by recidivism and anti-corruption enforcement are used to conceptually demonstrate the application of the developed framework to rank different types of legal interventions.

The current literature shows an increasing effort in incorporating evidence synthesis techniques in legal scholarship, such as the application of systematic review techniques on the effectiveness of the GDPR and empirical studies on legal consciousness. Furthermore, meta-analysis has been utilized in legal research, especially in empirical legal studies and social policy evaluation, such as the effectiveness of judges and their impact on judicial efficiency. While scholars and policy experts have urged for the uptake of quantitative evidence synthesis in legal research, the potential of network meta-analysis remains mostly untapped, possibly due to the inherent challenges, such as the heterogeneity between legal systems, variations in regulatory designs, and ethical challenges in aggregating study-level data in diverse legal environments. Methodologists, organizations, and scholars in other disciplines, such as the Campbell Collaboration and Leeuw, have advocated the adoption of systematic reviews and evidence syntheses in legal research to improve regulatory interventions, address complex problems, and assist policy analysis. Therefore, this research fills a gap by designing an analytical framework for the method of NMA to synthesize evidence in empirical and socio-legal studies.

Rather than approaching the inquiry through isolated segments, the discussion unfolds progressively. It begins by tracing how legal scholarship has evolved from textual interpretation to the systematic evaluation of real-world effects,

laying the groundwork for the need to adopt evidence-based methods. The narrative then turns to the core mechanisms of systematic review, meta-analysis, and network meta-analysis, examining not only how they operate in disciplines such as medicine and public health but also what must be adapted before they can function meaningfully in law. Building on that foundation, the central methodological framework is introduced, showing how legal interventions can be translated into comparable treatment arms and how multiple regulatory options can be ranked through multi-outcome evidence synthesis. A conceptual demonstration follows, using variations in pharmaceutical intellectual property regulation to illustrate how different legal designs can be compared on innovation, access, litigation burden, and related outcomes. The paper concludes by reflecting on both the benefits and the limits of applying evidence synthesis to legal research, and on the implications such an approach holds for policymaking, legal education, and the future of empirical legal scholarship.

## 2 METHOD

### 2.1 *Methodological Evolution in Legal Research*

The transition from doctrinal analysis to socio-legal and empirical research presents a diversification of methods. In contrast to the traditional focus on interpreting statutes, precedents, and legal principles, socio-legal and empirical approaches investigate the societal implications of the law. This movement to empirical methods suggests an increased awareness of the role of the law in society. However, along with this shift in methods, a clear conception of what high-quality legal research is remains contested. There is great variability in views among legal scholars on what good methodology is, and the lack of shared benchmarks for research quality has been identified as a significant problem by Langbroek et al. (2017).

The increase in methodological diversity has helped displace doctrinal analysis. New methods in legal research allow researchers to ask questions relating to compliance with the law, its legitimacy, and trust. Empirical, rather than textual methods, allow legal scholars to examine the social effects of rules, which would not be available through analyzing case law. Along with these new methods has come heterogeneity in the evaluation of rigor. Institutional or cultural factors affect standards, and quality evaluations have become increasingly contested, Langbroek et al. (2017).

Empirical legal researchers are influenced by the

social sciences, including behavioral studies, statistics, econometrics, and psychology. These scholars often ask questions regarding people and institutions and how they affect society, Langbroek et al. (2017). Empirical methods often make use of large datasets, and quantitative approaches enable scholars to generalize beyond specific cases. Legal scholars who utilize empirical methods provide critical analyses that often serve as compliments to traditional legal scholarship by taking into consideration the social context of the legal problem under investigation. However, differing views regarding methodological rigor have created rifts between faculties, with some programs encouraging quantitative approaches and others adopting a more traditional and doctrinally focused structure and culture. This disparity in programs has made it difficult to integrate empirical and quantitative methods throughout the field, which is concerning given the increasing importance of interdisciplinary legal research.

The application of systematic content analysis and systematic review methods has also broadened transparency and reproducibility of legal scholarship. Systematic content analysis and reviews have shown considerable benefit to researchers investigating laws and regulations. According to Salehijam (2018), "Content analysis provides a transparent, systematic, and replicable approach to coding and interpreting text documents" (p. 1). Systematic content analysis techniques have become increasingly adopted within areas of comparative constitutional law and in statutory interpretation. On the other hand, systematic reviews can summarize, aggregate, and compare findings from multiple countries, which also increases the rigor of comparative legal research. There is a need to provide researchers with appropriate training on methods to improve the application of content analysis and reviews. In regard to systematic methods, Salehijam (2018) suggests, "Lack of training may lead to application bias and ultimately render these methods unavailable for wider use in the field" (p. 8). Therefore, legal programs need to consider adopting more discipline-specific guidelines, because general frameworks for systematic methods may not reflect unique features of law and related legal materials.

Some inherent difficulties also exist in applying systematic methods in the legal field. Legal scholarship can be complex and abstract, making it difficult to measure legal phenomena. Operationalizing legal concepts is problematic, and often legal literature and research articles contain

heterogeneous language and concepts that can differ in meaning across legal fields. It is not clear whether using standardized methods will be beneficial for researching normative legal literature or that these methods will adequately capture legal issues. In contrast to the social sciences, normative questions are at the center of legal research. Salehijam (2018) recognizes that there is considerable danger in oversimplifying complex normative questions within legal studies, stating that these methods may limit the ability of legal researchers to adequately address complicated normative issues. Furthermore, the application of systematic content analysis and systematic reviews in law poses unique challenges and considerations. Despite the issues and challenges in adopting and developing systematic methods in law, there are also benefits. Researchers need to be aware of the various barriers in the application of systematic methods to the law, and there is a need to develop more refined guidelines that allow for the evaluation of systematic methods in the field of law.

Evidence-based policymaking has made a push in fields such as social welfare, healthcare, and education. A core concept of evidence-based policy is “what works” to intervene effectively and efficiently to solve social, environmental, or other challenges. The Campbell Collaboration has systematically reviewed interventions for crime and justice since 2001 and, in 2012, expanded to incorporate interventions for social welfare policies, De Marchi *et al.* (2014). Many of the efforts to apply evidence-based practices have emerged out of a desire to see more accountability for the criminal justice system, crime prevention efforts, and broader social justice policies and programs. While it is important to apply evidence-based approaches to policy and interventions, the translation of interventions to the legal field from fields such as healthcare and education is not always seamless. Legal interventions often vary with legal diversity and context; legal enforcement is complex; and ethical considerations of the use and aggregation of data affect policy formulation. For evidence-based legal interventions and policies, De Marchi *et al.* (2014) suggest it is critical to “design appropriate evaluation plans to deal with diversity and address ethical challenges that are context specific” (p. 8).

Empirical legal scholars have begun contributing to an evidence-based law. Researchers use large datasets and quantitative methods such as meta-analyses, data mining, simulations, and natural language programming to empirically evaluate legal rules and institutions. The use of large datasets opens the door for many opportunities for data mining of

legal rules and institutions. In addition, meta-analytic methods help researchers compare the effectiveness of differing legal strategies, policies, or institutions across different countries, jurisdictions, states, agencies, or court systems. For example, studies have been done to investigate judges’ performance by examining their decision-making outcomes and other behaviors. These are a few examples of opportunities that empirical methods, in particular meta-analytic methods, have presented the legal field, and there are more to come, Rachlinski (2011). These empirical techniques can help translate ideological views to measurable outcomes and promote evidence-based law that is testable, falsifiable, and verifiable by other scientists. Nonetheless, there have been some challenges and weaknesses of empirical research in the legal field, for instance operationalizing and isolating concepts within legal rules or institutions. Also, finding consistent measurements for outcomes and operationalizing legal concepts are barriers to advancing evidence-based law. Rachlinski (2011) encourages researchers to pursue such standards or a unified methodological framework in their studies. He says, “Empirical legal scholars must find ways to standardize the outcomes they observe, standardize the variables they measure, and develop better operational constructs of the aspects of legal systems to which they seek to relate outcomes” (Rachlinski, 2011, p. 659). As empirical legal studies continue to develop and adapt these techniques, there is an ever-growing need for such standardized methodological approaches to contribute to the further development of this burgeoning realm of scholarship.

A further application of evidence synthesis that is used to inform and implement more equitable justice practices and policies comes from the “evidence-based guideline approach.” Barendrecht *et al.* (2023) recommend gathering experiences of practitioners within a specific domain in the justice system in order to construct a list of questions or tasks that practitioners or users may have to deal with, for example a particular court case. To answer these questions, they then suggest gathering practitioner experiences on how to address the questions. Evidence-based guidelines synthesize information on possible justice approaches and strategies, and it also requires combining these strategies and techniques with the context and implementation data. The authors also note that billions of people on a global scale lack access to basic justice needs. Barendrecht *et al.* (2023) suggest that there needs to be a shift from only applying evidence synthesis for single cases to large-scale applications that

encompass multiple cases, scenarios, and contexts of various stakeholder experiences. In order to do this, there is an increased need for data and large-scale approaches and applications, as well as additional efforts to empower those in need of and impacted by justice systems.

Gaps between research production and use occur in legal research and policy. Legal scholarship is often considered to be irrelevant for policymaking decisions. This is partially due to how the cultural and organizational structures of research and politics impact the transmission of information. Bogenschneider and Corbett (2010) suggest that there are three factors that explain research and policy use, including culture (both political and organizational), communication, and structure (particularly research and resource infrastructures). Cultural factors often have varying values within political fields. Politicians are often interested in achieving certain goals rather than applying research data. Cultural differences can impede both research utilization and uptake. Communication problems exist in the realm of research. Because scholars write journal articles using complex jargon and intricate writing styles, they tend to write these journals for themselves or other scholars rather than communicating it to politicians and professionals. In the realm of research utilization, this is problematic, as there is often lack of sufficient resources that would translate or implement research to policymakers or professionals. Structural barriers that hamper the dissemination of research relate to the ability of institutions to gather, manage, and share information. This suggests that there needs to be a structured method that connects and links research to policymakers or stakeholders.

To address the gap between evidence production and use, Bogenschneider and Corbett (2010) suggest several strategies to improve communication between researchers and policymakers. For instance, it is important to include policymakers at the beginning stages of the research project, and providing evidence summaries to policymakers as well as creating a policy toolkit also strengthens communication of the importance and relevance of the evidence generated. In terms of improving infrastructure (structural) barriers, there should be systems and structures available to promote the use of research. They state, "Institutions on the policy and research ends must change to make it easier to gather, share, synthesize, and ultimately apply research. Policies that change research reward structures so that academics are rewarded for time spent on translating, connecting, and engaging

research consumers will improve utilization" (p. 44).

### 3 RESULTS AND DISCUSSION

#### 3.1 Foundations of Evidence Synthesis Methods

Systematic reviews follow a clear and replicable method for synthesizing different studies, which is useful in identifying research gaps on complex legal systems. Systematic reviews are suitable for summarizing the body of evidence about regulatory effect, such as effects of the GDPR across different jurisdictions (Sucharew & Macaluso, 2019). Pre-defined eligibility criteria and systematic selection can minimize bias in evidence interpretation and results. However, legal research is often mixed between texts and empirical studies, so further methodological innovation in the application of systematic reviews is needed.

By accommodating heterogeneous study designs, scoping reviews are capable of mapping and summarizing existing evidence about the topic, which is useful when a knowledge base consists of both empirical and doctrinal studies (Sucharew & Macaluso, 2019). However, their broad inclusion can lead to difficulty in identifying standard outcomes and may lead to more fragmented conclusions than in systematic reviews with narrow focuses.

In comparison with evidence in medicine, more heterogeneity exists in the types of legal texts and empirical studies, and thus methodological heterogeneity becomes a serious issue. With varying approaches to data extraction and lack of harmonized definitions of legal interventions and outcomes, the interpretability of findings is compromised (Salehijam, 2018). Therefore, researchers need to formulate rigorous strategies for selecting studies and aggregating data, or systematic reviews could fail to offer clear guidance in legal areas.

An evidence map can be used to present the links between interventions and outcomes in a visually clear manner, which may be useful for policymakers to explore the impact of the regulatory scheme in specific contexts (Sucharew & Macaluso, 2019). It can facilitate researchers and policymakers in assessing the strengths and weaknesses of regulatory interventions, thereby identifying areas for further research and regulatory reform. Yet, interpreting the maps might be difficult with inconsistent legal terminologies, the diversity of interventions across jurisdictions, and various barriers to access to implementation.

Challenges of applying systematic reviews in legal areas include differences in definitions of key terminologies, various jurisdictional contexts, and

rapid legislative changes. More methodological training and collaboration are needed to minimize the inconsistencies (Salehijam, 2018).

Meta-analysis enables combining quantitative evidence across different studies, leading to more precise estimations of effects of interventions in answering unresolved questions in legal intervention effect. For example, empirical data that test whether reforms in the courts of law have a significant impact on access to justice and procedural fairness, or whether the effectiveness of free legal aid depends on funding resources, can be examined with meta-analysis (Elbaek et al., 2021; Moullaali et al., 2022).

Meta-analysis provides a standardized approach for the comparison of outcomes across jurisdictions or context through pooling outcome data such as compliance rates or recidivism. With the ability to summarize disparate empirical literature, meta-analysis provides generalizable findings which may enhance the knowledge on regulation in a certain area of legal study (Sucharew & Macaluso, 2019). For instance, resources such as social capital, psychological well-being, as well as monetary resources are negatively associated with unethical economic behaviors (Elbaek et al., 2021). However, when the findings are taken out of the context, differences across nations in legal practice may make the meta-analysis results less applicable.

With regard to legal intervention-effect studies, many sources of heterogeneity in methodology or legal context could influence the interpretation of the effects. The reliability and generalizability of meta-analytic findings are thus compromised if between-study heterogeneity is not addressed. Strict selection of studies is required in this method to minimize bias and maintain the consistency of outcome measures (Moullaali et al., 2022). A series of sensitivity analyses is also needed to confirm the robustness of the synthesized results. It is also necessary to transparently explain the similarities and differences of legal settings across countries to integrate the evidence for meta-analysis and interpret the results.

Besides summarizing the literature, meta-analysis also plays a role in synthesizing small and modest effects in the empirical literature. For example, a recent meta-analysis has been able to show that short-term school interventions have a small effect of significantly reducing anxiety (Caldwell et al., 2019). Likewise, an appropriate use of meta-analysis may show the impact of restorative justice practices or digital platforms on conflict resolution. By following a well-developed methodology and transparently presenting the evidence, meta-analysis enables a better understanding of regulatory effects of

practices with modest results.

The effectiveness of meta-analysis rests on several methodological assumptions. While minimizing selection, measurement, and attribution biases within primary studies of an individual meta-analysis is crucial to producing reliable synthesized estimates (Moullaali et al., 2022), the generalizability and robustness of meta-analysis results depend on how well these assumptions hold across primary studies included in the meta-analysis (Mills et al., 2012). When methodological biases in the included studies are moderate or severe, or if the data available for a given comparison are relatively sparse, meta-analytic findings may be biased or unreliable. Even when heterogeneity is adequately accounted for, selective reporting, the selective inclusion of outcomes and statistical tests, and poor operationalization of legal concepts, meta-analysis could not provide conclusive findings about intervention effectiveness.

Network meta-analysis (NMA) offers a comprehensive approach for estimating comparative effectiveness. Unlike traditional meta-analysis, NMA considers all existing evidence, both direct (i.e., the outcomes of studies that make head-to-head comparisons between interventions) and indirect (i.e., the outcomes of studies that compare both interventions to a common comparator), to identify the most effective and cost-effective option (Ahn & Kang, 2021). This enables researchers to derive estimates of comparative effectiveness even between interventions that have never been directly compared with one another (Mills et al., 2012). NMA also offers an advantage over multiple, pairwise meta-analyses of two interventions by simultaneously comparing several treatment arms and providing a relative ranking of intervention options (Ahn & Kang, 2021). These methods may be applied to compare different policy options concerning regulatory effects.

NMA may be appropriate when a high degree of heterogeneity of interventions or population exists, or when there are multiple types of interventions for the same type of problems. For instance, NMA can be used to compare the effectiveness of different interventions to tackle corruption on the grounds of lowering recidivism (Ahn & Kang, 2021). The strength of NMA relies on the assumptions of transitivity, similarity, and consistency, but these assumptions are challenged when applying NMA on evidence of legal studies. The assumptions imply that different legal studies may have different levels of internal and external validity.

One important trade-off in comparison with

traditional meta-analysis is the relative complexity of NMA in terms of data collection and interpretation of findings. These can be quite technically demanding; advanced statistical models are required for data synthesis, and the interpretation of outcomes and rankings generated by NMA methods is highly complex. To conduct NMA well may require interdisciplinary collaborations from scholars in multiple fields such as statisticians, sociologists, psychologists, economists, etc. (Mills et al., 2012).

When translating methods of evidence synthesis to the legal field, the lack of methodological homogeneity raises methodological and reporting standards issues. To achieve rigorous NMA research, a legal-specific adaptation of the PRISMA statement, with attention to its methodological elements, needs to be developed. A cross-national evaluation of guideline application in other fields illustrates widely varied adherence. Many methodological characteristics are included in the published reports in countries such as the U.S., Australia, Canada, and New Zealand, and very few reports include a comparative cost-benefit analysis and the evaluation of the quality of evidence and the consistency of interventions across study populations (Laws et al., 2019). Guidelines for applying the evidence synthesis method in law research should address issues such as: pluralistic legal systems with complex governance, diverse doctrinal and empirical traditions, and different degrees of regulation.

Eligibility thresholds for study inclusion and standards for data extraction should be adapted for the legal field (Laws et al., 2019). Methods for study selection and reporting, with the aim of transparency and reproducibility in study selection and coding strategies, should also be followed when translating evidence synthesis methods.

The PRISMA-Law is a potentially new extension that is specifically geared to the legal context, and the purpose of PRISMA-Law is to maximize transparency, replicability, accessibility, and contextual sensitivity of research. As one example, an overview by Laws et al. (2019) presents a framework for this.

To ensure the evidence synthesis process delivers reliable, useful findings, legal scholars must address methodological weaknesses and biases within studies, and across studies of synthesized evidence. These biases and weaknesses could arise from selective reporting, poor standardization of legal terminology, or unclear conceptualization of constructs. Legal scholars need to take actions and employ relevant and adequate research methods in order to address the aforementioned problems of

legal science in conducting reviews and making legal claims. In addition, careful examination of heterogeneity across the primary legal studies to ascertain potential biases, and the utilization of established sensitivity analyses, such as funnel plots, subgroup analysis, and robust variance estimates, for assessing potential effects of biases or for minimizing heterogeneity are recommended in an NMA context (Mills et al., 2012). Finally, it is essential to involve stakeholders in the formulation and interpretation of the research process in the evidence synthesis approach and place an appropriate emphasis on contextualization when discussing the interpretation and implications of results, as well as in formulating the guidelines (Mills et al., 2012).

Factors to consider for the effective translation of evidence synthesis methods may include economic considerations. For example, additional fees, or logistic reasons, or social attitudes and cultural beliefs may become barriers to intervention compliance, even when the intervention is nominally free (Sacks et al., 2022). Equity-focused approaches in legal research, which can draw lessons from the barriers to engagement, should ensure access and applicability for various groups in practice.

Using a variety of evidence synthesis methods, systematic reviews, meta-analysis, and network meta-analysis allows the legal field to move forward from the reliance on narratives to using quantitative studies in comparative analysis. This increases the rigor and the potential real-world application of legal studies (Caldwell et al., 2019; Mills et al., 2012).

### ***3.2 Epistemological and Methodological Framework***

The concept of reconceptualizing legal interventions as “treatment arms” enables an adaptation of evidence synthesis methods used in fields such as public health to legal research. This approach permits comparison of legal interventions by conceptualizing these as equivalent to treatment arms of studies on the treatment of diseases or other conditions. In other words, one might evaluate regulatory schemes, enforcement, or diversion programs across legal systems to determine which have better, or less bad, outcomes, such as compliance with regulatory standards. Poirier et al. (2022) demonstrate how one can operationalize this framework to quantitatively compare interventions such as, for example, the impact of two regulatory schemes on compliance. It is important to note that by operationalizing legal interventions, such as standards for tobacco regulation, as treatment arms, it is possible to reduce different interventions across

legal systems to a common metric that would not be amenable to synthesis without such an operationalization. The main downside of this type of methodological adaptation is the need to be cognizant of jurisdictional variations that could influence the treatment arm effects. Further, as these methods move to higher levels, such as network meta-analysis and more complex methods, it may be difficult to maintain internal and external validity with the risk of significant dilution of variation in legal practices between legal systems.

Outcome definitions for compliance, recidivism, success of settlements, or public confidence in legal institutions should be clear and agreed upon across research studies. Without outcome definitions and clearly articulated scales for measuring such outcomes, comparisons of the relative effectiveness of interventions are difficult to perform in evidence syntheses. Poirier et al. (2022) highlight the necessity of consistently defined outcomes across research studies for evidence synthesis methods. Legal systems often have different scales of success that are not comparable. For instance, success rates can be perceived and reported in different ways between regulatory and penal systems. Success of settlements is also an important legal outcome but can be different from one type of intervention to another. All such issues need to be overcome by identifying common measurement instruments for success or failure in outcomes of interest. It is vital for scholars in this field to avoid imposing artificial outcome definitions, but to find a way to measure legal outcome variables that are useful and reliable in each legal system. This will facilitate interjurisdictional comparison, while still considering the peculiarities of legal systems and the variety of ways that legal variables are defined and measured.

Operationalizing legal interventions as treatment arms is important for meta-analyses and network meta-analyses, where the goal is to synthesize research from a range of jurisdictions and to draw inferences across legal systems about the impact of legal interventions. In order to properly aggregate the findings of several research studies, it is essential that interventions and methods of measuring variables are defined comparably across jurisdictions. Poirier et al. (2022) state that many of the differences between studies in law are due to differing definitions of legal interventions. The legal intervention of interest needs to be clearly defined to ensure it is equivalent to the treatment arms across studies; for example, in studies of mechanisms to prevent and reduce corruption. Corruption can be defined in different ways depending on intervention

type and political goals of corruption reduction in the jurisdiction being evaluated. Similarly, a system can address corruption in either a preventative or punitive manner. These differences must be noted and either incorporated in an analysis or avoided as study parameters. Similar issues arise in studies of compliance with environmental and product safety laws. This necessitates that legal intervention definitions are clearly defined and, when possible, standardized. If such clarity can be achieved, interventions in one system can be treated as a specific set of treatment arms that are analogous to interventions in other legal systems. This allows a standard experimental or other research study design framework to be used and results from studies across systems can be pooled, enabling standard analyses and estimates of variation and effectiveness. Poirier et al. (2022) describe these concerns and offer solutions for legal studies of interventions such as interventions for tobacco control. This operationalization of legal interventions in systematic reviews will become more important as evidence synthesis progresses in this field. The development of well-defined study design standards can minimize these methodological issues and maximize the value of this approach for synthesis. But there remains considerable work for legal researchers to apply this approach.

The concept of operationalization is highlighted in the examples previously mentioned. In those examples, outcomes, such as levels of recidivism or success rates for settlements, are tied to a system. This provides data across such systems based on common conceptualizations of legal interventions as systems of multiple legal actions. Poirier et al. (2022) point out that operationalization allows one to quantitatively evaluate interventions and derive inferences to guide effective law policy. However, this approach requires special caution to recognize the important role of context in influencing how various legal interventions function. An assessment of the actual effect of legal interventions must consider factors outside the legal realm. For example, recidivism can depend on social services programs in the community, as well as intervention approaches, and not only on the severity of sanctions for breach of intervention rules. The impact of corruption-prevention mechanisms may depend on the degree of citizen participation in governance and institutional trust in a particular system. Further, an intervention will affect compliance differently depending on the perceived legitimacy and acceptance of that law within a system. Therefore, it is critical to add sensitivity checks on system

characteristics that can influence intervention outcomes. For example, it would be important to compare the effect of anti-corruption interventions across legal systems where there is high versus low institutional trust, and assess the effectiveness of compliance standards for product safety in systems with high versus low citizen participation in implementation.

Operationalization of legal interventions opens the door for cross-disciplinary evidence-based assessment. This benefits both the legal system and evidence-based health approaches. Poirier et al. (2022) advocate that by developing standard assessment protocols, legal researchers can make law amenable to more powerful health synthesis and other social and economic research. This creates several synergies for the legal field. For example, statistics and economics are disciplines that have strong traditions in the quantitative evaluation of legal variables and are very useful for measuring heterogeneity. Moreover, other fields such as social science have a long history of impact assessment, and are adept at understanding the practical and applied side of legal intervention evaluations. But while this type of collaboration is a great step, it brings challenges. The ontological bases of public health and law, for example, are different. Public health researchers are generally positivists who often apply quasi-experimental designs that are highly generalizable. Law has a different ontological basis in its focus on the normative nature of human interaction. In general, the goals of legal research and methodology are oriented toward explanation and legal interpretation within the legal system. For example, while economists make assumptions about rationality in market contexts, those contexts can include market manipulation and asymmetries of information. In law, there are laws against manipulating markets. The application of the positivist methodological toolkit to the legal system can distort aspects of legal phenomena.

Methods such as systematic content analysis and systematic reviews allow transparent and rigorous ways to find and synthesize what is known about legal interventions. Salehijam (2018) states that the utilization of predetermined data extraction sheets and categorization provides reproducibility and reduces the chance of bias. Systematic content analysis provides an in-depth and well-organized analysis of legal texts, from statutes and cases to written laws. By identifying common trends among multiple legal documents, trends can be traced. But challenges with this particular method must be noted. For example, the differences in legal language

and interpretations make it important to develop a good balance between specificity of coding categories and flexibility in the application of coding categories in differing contexts.

Systematic reviews allow a synthesis of a body of complex knowledge on legal topics, drawing on resources from a variety of legal- and related academic and practice arenas (doctrinal analysis, social science literature, or legal practice and policy). Salehijam (2018) points out that without clear protocols on the scope and nature of data selection and synthesis, it may be possible to misrepresent a very intricate and complex system. Thus, it is important to develop well-defined and justified protocols in order to avoid misinterpretation of complicated, real-world legal environments. For example, regulatory frameworks could be synthesized from studies of different countries and would need to reflect legal and cultural differences of each context.

In addition, inconsistencies of terminology and diversity of methodologies that exist in empirical studies within a synthesized body of research may hinder accurate syntheses in law and could ultimately compromise overall reliability. It is therefore extremely crucial that protocols are designed and followed that specifically state how to select studies for inclusion in the review, how to abstract and combine the studies, and how to synthesize all of this information together. Further, it may be necessary to train legal researchers in methodological techniques for proper protocol adherence and to prevent a too-rigid simplification of complexities in legal areas.

The argument between methodological quality in legal research has existed for some time, and deals specifically with differences between accepting and rejecting empirical evidence. Langbroek et al. (2017) describe differing attitudes within legal scholars concerning empirical methods: the majority of legal scholars want to continue without the integration of empirical science and its corresponding methodology, whereas a minority is not against the idea of this collaboration. The systematic methodology requires transparency, replicability, and consistency, thus differing substantially from traditional doctrinal methodologies. So the integration of empirical methods poses a challenge as legal scholars must now deal with two very diverse perspectives. Langbroek et al. (2017) call for the use of hybrid methods to allow the strengths of each methodology, with a clear and agreed-upon understanding of the differences. An important aspect for achieving increased methodological

quality is encouraging active and critical reflection within the legal profession regarding methodological choices, in order to promote the discussion concerning methodological quality, which in turn will advance the evolution of well-considered quality standards. This allows and accommodates the existing methodological pluralism and maintains quality.

The complexity of epistemological and methodological standards of legal research may make it difficult to apply methods borrowed from other domains for synthesis of legal evidence. Poirier *et al.* (2022) and Salehijam (2018) caution against inadequate assessment and description of how national context can have a significant impact on the implementation of particular approaches to law and on legal outcomes. This is because most legal concepts and the nature of the law itself are defined quite differently across legal systems. These differences influence many aspects of empirical legal studies, from variable definitions to methods used in evaluations. To effectively deal with these issues, one must specify detailed study selection methods, as well as how to harmonize different concept definitions. Both actions can ensure that any synthesis accurately reflects how particular concepts are handled across diverse jurisdictions and avoid misleading interpretations. Legal interventions need to be explicitly described with details on how they are implemented, by whom, where, and in what context. The methods for how evidence is assembled should be transparent in regard to why studies were selected or excluded, how they were interpreted, and how these differences are accounted for during any statistical synthesis. It is also important to remember that not all differences are detrimental. For example, differences in measurement approaches across studies may allow researchers to account for cultural and conceptual diversity. To achieve all of these elements of rigor, one must explicitly state the level of knowledge one synthesizes and the limitations one finds. It may be necessary to consider how well the researchers were situated within that system and how they took that context into account during the synthesis. Adding qualitative findings with contextual detail for interpretation is critical, as this will help reveal the strengths and weaknesses of synthesized evidence for a particular context of legal systems. Legal studies also need to provide detail regarding data availability and how all the methodological nuances were reconciled so that all the processes for finding and synthesizing results are verifiable. Ultimately, what evidence synthesis in the legal field may entail includes accommodating

jurisdictional variation in methods or measurement, recognizing definitional ambiguity when aggregating evidence across different fields, accommodating variations in culture and cultural assumptions, integrating contextual or system level factors as moderators and effect modifiers in evidence syntheses, reconciling or addressing methodological issues by integrating study design attributes and methods into analytical and presentation approaches, dealing with methodological issues as part of protocols for abstracting legal evidence and providing methodological annotation on how they are addressed in reports, and dealing with the ethical considerations that arise when synthesizing literature from a wide variety of settings.

Case studies provide many examples of the challenges of evidence synthesis for legal areas and the solutions that were used. The case study of nonconsensual sexting identified many limitations that pose difficulties to systematic evidence synthesis in this area (Krieger, 2016). Several definitional variations of sexting were discovered throughout law, psychology, and education databases. It is important to keep these differences in mind in order to avoid providing confusing or misleading policy suggestions based on conclusions of the synthesized evidence. Due to many misleading claims within the extant literature of nonconsensual sexting, protocol-based identification of varying sexting definitions and outcomes is essential for effective evidence synthesis in this domain. In response to these definitional challenges, Krieger (2016) provides steps to facilitate accurate and well-constructed protocols to ensure effective systematic evidence synthesis for research areas that have a diversity of concepts or outcomes. Krieger (2016) also provides steps to aid in synthesizing data of research designs from varying fields of research, accounting for the complexity that occurs when integrating data across domains of empirical law, culture, ethics, law interpretation, and culture integration and cultural assumptions.

#### 4 CONCLUSION

The overall objective of this work was to address the methodological challenges in legal research by systematically adapting and applying evidence synthesis methods (systematic reviews, meta-analysis, network meta-analysis) in law in order to provide evidence that they can increase rigor, comparability, and impact in comparative legal studies. I conclude that it is feasible to synthesize and compare legal interventions. The main findings show that empirical and systematic methods, such as

systematic reviews, meta-analysis, and network meta-analysis, when carefully adapted to the law, are feasible methods to identify research gaps, collect evidence, and allow comparisons of legal interventions across countries or jurisdictions. For transparency and reproducibility in synthesizing legal evidence, standardization of components (e.g., eligibility criteria, outcome definitions) is essential. Moreover, it is important to standardize reporting by developing adapted legal reporting standards (e.g., adapted PRISMA, MOOSE, etc.). In addition, it is necessary to consider the plurality and diversity of the law; thus, more discipline-specific protocols and customized methodological trainings are necessary, along with more collaborative team work to conduct systematic synthesis of legal evidence.

In this respect, these findings support the call for improved rigor, transparency, and reproducibility by methodologists and international organizations in legal research. In other words, it demonstrates the call to close the gap between doctrinal and empirical and systematic research, and to improve evidence and impact in law and policy reform. It also addresses the calls to use empirical and systematic methods, such as systematic reviews, in research of law, justice, and regulation. This research also contributes to addressing the need to standardize research of law and justice to promote more transparency and better quality of scientific evidence.

Based on reflection in this work, evidence synthesis methodologies have limitations when applied to law. It is hard to measure, compare, and aggregate evidence from the different legal domains in countries and jurisdictions. The heterogeneity across the law is the key element for these obstacles, such as different law traditions, enforcement, or interpretation of legal terms, which affects the process of evidence synthesis. Moreover, the data may be too diversified for quantitative aggregation. This is a great challenge and might threaten the robustness and rigor of any attempt to synthesize the evidence in law. Regarding the ethical considerations, the complexity, aggregation, and comparison of the law is challenging. Overgeneralization of national interventions and the potential risks of negative impact for a vulnerable nation and misinterpretation of the complex law of each country also need to be assessed. Regarding the feasibility issues, more empirical studies are necessary to test this methodology in the legal field. As

methodological pluralism is still present, there is a limitation regarding training in evidence synthesis approaches for legal scholars, as well as the existing resistance to them among the legal field. Thus, it is essential to bridge the methodological gaps in law to improve the use of evidence synthesis methods in research.

With regards to future direction, more empirical research should be conducted in law to refine and validate the modified framework in different legal disciplines or countries and to better develop the tools to synthesize, aggregate, and report data (e.g., evidence map, etc.) and to deal with legal complexity. Further methodological research and development in evidence synthesis methods for the legal domain need to be pursued, and more collaboration among methodologists, statisticians, law professionals, policy makers, practitioners, and legal scientists needs to be established. It is necessary to conduct methodological training programs in law in order to fill the research gaps in the field and address research challenges and practical challenges and promote collaboration in the academic sector, legal profession, and policy-making sectors. The development of legal-specific protocols, guidelines, and tools in evidence synthesis is a must for the legal field. Engagement from other researchers, the legal and policymaking sectors, and stakeholders should be conducted at a large scale in order to embed this method to promote evidence-based practice of legal policymaking.

To conclude, our intellectual curiosity to systematically combine evidence synthesis methodologies and legal methodologies has enabled me to grasp an in-depth understanding of the complexities inherent in research designs within the social science, the diversity among the epistemological orientations and philosophies in the field, and the complex characteristics and limitations of this discipline. Thus, through this process, I acknowledge that the strength of interdisciplinary collaboration is the richness and adaptability to learn and borrow methodological aspects from other disciplines to improve the rigor of legal research. It also enables scholars and stakeholders to appreciate and to use and borrow methods from other disciplines for legal scholarship. By adopting and adapting methods from other disciplines to advance the understanding and practice of the law and lawmaking, one can enhance its rigor, transparency, and usefulness.

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