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Research Article

Pre-Registering Public Administration Studies: Avoiding the Poor Practice of a 'Best-Practice'

Paolo Belardinelli[†] and Xiaochun Zhu*

Abstract: Following other fields and disciplines, public administration scholars have recently embraced the practice of pre-registering experimental studies. Despite being cumbersome, such a 'best-practice' has the potential to contribute to the process of knowledge creation by: (i) forcing researchers to distinguish predictions, in which data are used to test the possibility that a hypothesis is wrong, from postdictions, in which propositions are used to explain what is observed in the data, and (ii) possibly mitigating publication bias. However, for these epistemic benefits to be observed, a few conditions need to hold, including: (i) registrations being submitted prior to data collection and analysis, (ii) published studies reflecting execution of pre-registered plans, and (iii) deviations from the original plans being transparently reported in published studies. We report findings from a systematic review of pre-registered experiments in public administration to show that, in most cases, these conditions do not hold. We conclude by discussing recommendations on how to make the best out of pre-registrations.

Keywords: Pre-registrations, experiments, public administration

Supplements: Available on Journal Website

Whether a science of public administration is at all possible has been the subject of reflection and debate among prominent social scientists (e.g., Dahl, 1947; Fukuyama, 2004; Hood, 2005; Meier, 2015; Simon, 1946; Wright, 2015). Despite differing opinions among scholars in this debate, several scientific practices have gained popularity within our community. Among the most recent is the adoption of pre-registrations, especially for experimental studies.

Pre-registration is the practice of documenting a research plan at the beginning of a study and storing that plan in a read-only public repository (OSF website, 2024), such as the Open Science Framework (OSF) Registry, the American Economic Association (AEA) RCT Registry, or the National Library of Medicine's Clinical Trials Registry.

By forcing researchers to disclose hypotheses and plan statistical analysis without knowledge of outcomes, pre-registration can contribute to increasing confidence in the reliability of research results. This is particularly important given the replicability crisis that has plagued the social sciences in the past decade (Baker, 2016; Christensen & Miguel, 2018; Pashler & Wagenmakers, 2012). Issues of p-hacking – referring to the practice of intentionally or unintentionally manipulating data or selectively reporting results to achieve statistical significance – have been shown to affect scientific publications and undermine the overall credibility of findings across social sciences (e.g., Brodeur et al., 2016; Cairo et al., 2020; Esarey & Wu, 2016; Friese & Frankenbach, 2020).

Existing evidence suggests that p-hacking may be less of a concern in our field, particularly for experimental findings (Vogel and Xu, 2021). This aligns with evidence from economics, which indicates that the severity of the issue depends significantly on the specific methods analyzed, though no method is entirely

†O'Neill School of Public and Environmental Affairs and Faculty Affiliate to the Ostrom Workshop, Indiana University Bloomington, *O'Neill School of Public and Environmental Affairs, Indiana University Bloomington
Address correspondence to Paolo Belardinelli at pbelard@iu.edu.

immune (Brodeur, Cook, & Heyes, 2020). Nevertheless, public administration scholars doing experimental work are increasingly adopting pre-registrations in their research process, recognizing its potential to enhance transparency in experimental research (e.g., Driscoll et al., 2023; Hopkins et al., 2023; Samahita & Lades, 2023). This is also evidenced by the growing number of pre-registered studies published in recent years. For example, in 2024 alone, 40 pre-registered studies were published in seven top public administration journals, compared to 1 pre-registered study published in the same journals in 2018. It is also becoming more common for journals in the field to require the disclosure of pre-registrations. The Journal of Behavioral Public Administration, for instance, encourages authors to pre-register their studies and disclose this information upon submission (JBPA website, 2024). Similarly, the Journal of Public Administration Research and Theory's guidelines promote transparency by asking authors to report whether their study was pre-registered and to provide access to pre-registration records (JPART website, 2024). These initiatives reflect a broader shift towards enhancing research transparency and rigor in public administration.

Systematic reviews of pre-registrations and comprehensive assessments of the outcomes of adopting this practice have been conducted across disciplines. Psychology has taken the lead (Strømland, 2019; van den Akker et al., 2024) in exploring the extent to which pre-registration may have helped address its own reproducibility crisis (Open Science Collaboration, 2015). Other disciplines followed suit, including economics – particularly experimental and development economics (e.g., Banerjee et al., 2020; Brodeur et al., 2024; Olken, 2015) – political science (e.g., Monogan, 2015), management (Toth et al., 2021), and sociology (Manago, 2023). These comprehensive assessments provide mixed evidence and arguments. Whereas pre-registration improves legitimacy of research and enhances its credibility (Manago, 2023), scholars note that this practice does not inherently improve the quality of published science. However, it can be effective when certain conditions are met, such as including pre-analysis plans (Brodeur et al., 2024) or power analyses (van den Akker et al., 2024). Whereas in certain disciplines, such as psychology, pre-registrations commonly include a pre-analysis plan, in others, such as economics, this is less common. This can undermine the value of pre-registrations, as researchers may retain flexibility in their analytical choices – while sometimes necessary, this can also introduce ambiguity regarding the distinction between exploratory and confirmatory analyses (Brodeur et al. 2024). As for power analysis, it can play a critical role in addressing the issue of underpowered studies (Bakker et al. 2020), by guiding researchers in determining appropriate sample sizes based on statistical principles.

Nonetheless, one of the main values of pre-registration is that it makes the distinction between prediction and postdiction transparent (Nosek et al. 2018). Researchers commit to a predefined empirical strategy to test specific hypotheses. They can still amend their plans or conduct unplanned analyses, though any deviations should be transparently reported and justified, ensuring clarity for the reader.

We perform the first comprehensive assessment of the adoption of pre-registration in public administration. We report results from a systematic review of pre-registered public administration experiments to show how such a 'best-practice' has been imported from other research communities to ours. Our findings reveal a considerable increase in pre-registration practices, with pre-registrations rising from 1 study in 2018 to 40 in 2024. While pre-registration is becoming more common, the findings also demonstrate discrepancies between pre-registered plans and final publications, particularly in hypotheses, research design, and analysis plans, pointing to ongoing challenges in adherence to pre-registered protocols and transparency in reporting deviations from original plans.

In what follows, we first present the advantages and disadvantages of pre-registrations and explain the standards that need to be met for pre-registration to be considered as a best practice for advancing knowledge. Next, we discuss the methodological choices made to conduct our systematic review, followed by the results. In presenting our findings, we avoid explicitly referencing examples of pre-registered studies that failed to meet certain standards, as it is not our intent to blame anyone or point out specific deficiencies. We acknowledge that it takes time for a community to fully understand and internalize a new practice, and we ourselves have made some of the reported mistakes when pre-registering. We conclude this article by identifying several recommendations aimed at encouraging our community to move beyond cosmetic compliance and improve the implementation of this practice in our field.

The Value of Pre-Registrations

Much of what social scientists do relates to generating and testing hypotheses. Inductive approaches to research focus their efforts on the former, using specific empirical observations to formulate general theoretical relationships that effectively explain why those observations occurred. Deductive approaches, by contrast, start from general theoretical relationships and test them against specific empirical observations to confront the possibility that the theorized relationship may be wrong. Both approaches coexist in public administration studies (Raadschelders, 1999; Ospina et al., 2018) and social sciences in general. These two approaches have received much scrutiny from epistemologists and methodologists and have been labeled in different ways, for example, confirmatory vs. exploratory research (Kuhn, 1970; Wagenmakers et al., 2012) or context of justification vs. context of discovery (Hoyningen-Huene, 1987). Nosek and colleagues (2018) explicitly refer to these two approaches to research by making a general distinction between prediction and postdiction.

Both prediction and postdiction can contribute to advancing knowledge in much the same way as deductive and inductive approaches. Prediction allows us to assess how effective current models are in explaining real phenomena. Postdiction is important for considering and discovering unexplored relationships. However, to make the most of both, it is essential not to conflate one with the other. 'Presenting postdictions as predictions can increase the attractiveness and publishability of findings by falsely reducing uncertainty' (Nosek et al., 2018, p. 2600).

Predicted findings are considered more robust than exploratory findings because they stem from hypotheses established before data collection and are therefore more likely to reflect underlying general rules that can be replicated. In contrast, exploratory findings arise from post hoc analyses without predefined hypotheses and are more susceptible to multiple hypothesis testing, which increases the likelihood of false positives. When researchers test multiple relationships within a dataset, the chance of detecting a statistically significant effect by random chance rises. Predicted findings, based on prior theory and confirmed through pre-registered analyses, are more likely to capture true effects and improve reproducibility (Wagenmakers et al., 2012). This distinction highlights the importance of rigorous research practices, such as pre-registration, in maintaining the integrity of scientific findings (Nosek et al., 2018).

The practice of analyzing datasets to identify statistically significant relationships, which can include p-hacking, is not inherently problematic. Data exploration and postdiction are valuable. However, the practice becomes concerning when it is not transparently reported and is instead presented as if the findings arose from a predictive hypothesis-testing exercise. Together with publication bias, this bad practice has undermined the credibility of reported results across all social sciences, though to varying degrees (e.g., Brodeur et al., 2016; Cairo et al., 2020; Esarey & Wu, 2016; Friese & Frankenbach, 2020). For example, these issues became evident in psychology through large-scale replication studies, such as the Open Science Collaboration (2015) project, which found that only a fraction of psychological studies could be replicated. Psychology has therefore led the way in adopting pre-registration (Stevens, 2017; Strømland, 2019). In economics, pre-registration gained significant traction after the publication of several seminal articles revealing the 'star wars' phenomenon in economics journals (Brodeur et al., 2016), referring to the use of eye-catching symbols, like stars or asterisks, to signal statistically significant findings and highlighting the risks of over-representing significant results (Olken, 2015; Arpinon & Espinosa, 2023). A similar trend occurred in political science (Monogan, 2015), though the debate here involves critical voices, expressing concerns that it may stifle creativity and iterative discovery (McDermott, 2022).

The main value of pre-registration lies in forcing researchers to make the distinction between prediction and postdiction transparent. Researchers who pre-register their empirical inquiries commit to a plan involving a specific empirical strategy to test pre-determined hypotheses through certain statistical analyses. Beforehand, predictions are clear. Nothing then prevents researchers from making amendments to the original research plan or considering unplanned analyses. Therefore, the goal of pre-registration is not to limit exploration (McDermott, 2022). Nonetheless, those amendments and deviations from the original plan should be transparently reported and justified, allowing the reader to clearly distinguish between prediction and postdiction.

The transparent reporting of this distinction has several benefits, the main one being the enhancement of the credibility of findings against the risk of undesirable practices, which can be more or less intentional, ranging from motivated reasoning to selective reporting to fishing for results (Monogan, 2015; Nosek et al., 2018). In the words of Nosek and colleagues, 'it is underappreciated that the presence of "hypothesis testing" in the name of null hypothesis significance testing is consequential for constraining its appropriate use to testing predictions' (2018, p. 2601). Failing to distinguish between prediction and postdiction can therefore reduce the significance of 'significant' findings, as some positive results are observed by chance when testing multiple relationships. Pre-commitment to a specific analysis plan will increase the credibility of findings and make p-values more meaningful. As such, pre-registrations can contribute to reducing publication bias (Monogan, 2015), which is the disproportionate publication of significant results compared to null findings, that has been often observed in public administration research syntheses (e.g., Battaglio et al., 2019; Cantarelli et al., 2016; DellaVigna & Linos, 2022).

Nevertheless, this positive outcome is threatened when a high number of hypotheses are pre-registered, raising concerns about multiple hypothesis testing and increasing the probability of Type I errors. In such cases, corrections such as Bonferroni or Scheffé multiple comparison tests must be applied. This highlights that pre-registration is not a panacea and comes with its own challenges. Beyond the need to balance the number of pre-registered hypotheses with the validity of the results, pre-registration also requires considerable effort and time, both for researchers and for reviewers, who must assess pre-registration plans in addition to submitted articles. In a study on researchers' perspectives on pre-registrations, Sarafoglou and colleagues (2022) found that researchers are not always convinced that this investment of energy and time is worthwhile. Moreover, pre-registrations have the potential to limit creativity and discourage exploration of data (Toth et al., 2021).

Regardless of potential challenges, pre-registrations can certainly make a positive contribution to the process of knowledge creation in public administration. However, for these epistemic benefits to be realized, researchers engaging in this practice must meet three conditions. First, they must submit registrations prior to data collection and analysis, so that predictions are made explicit before any observation of the data occurs and can thus be rightly distinguished from postdictions. Second, submitted studies should reflect the execution of pre-registered analysis plans. Third, any deviations from the original plans should be transparently reported. This ensures that readers can easily understand which findings result from prediction and which from postdiction.

We perform a systematic review of pre-registered public administration studies aimed at verifying to what extent these two conditions hold in our field. In the next two sections, we describe methods of and findings from the systematic review. Next, we discuss these findings, as well as additional challenges for our field that go beyond individual researchers' practices and involve commitment from reviewers and editors.

Methods

The scope of our systematic review is to trace the trend of pre-registrations in experimental public administration, explore advantages and disadvantages of pre-registrations, and identify discrepancies between pre-registered plan and published papers, and, based on these, set a research agenda. Following recent practices, we performed our systematic review in accordance with the PRISMA protocol (Liberati et al., 2009). The checklist is reported in Table A1 of the Appendix.

Experiments have become increasingly popular in public administration as a method for testing causal relationships and generating rigorous evidence, as demonstrated in studies such as James et al. (2017). This growing trend in the field is strongly associated with the rise of Behavioral Public Administration (see Grimmelikhuijsen et al., 2017; Battaglio et al., 2019; Bertelli & Riccucci, 2022; Bhanot & Linos, 2020; Tummers, 2020), and makes experimental studies particularly relevant for examining the effectiveness and challenges of pre-registration practices. Comprehensive assessments of pre-registrations in other disciplines have also focused exclusively on experiments (e.g., Brodeur et al., 2024; Olken 2015).

We conducted our search using the strategy outlined in a recent systematic review of public administration experiments by Belle and Belardinelli (2024). This strategy involved searching for primary studies written in English using Scopus. The search strategy was designed to ensure comprehensive coverage

of the field and included a range of experimental terms such as 'experiment,' 'RCT,' 'randomized,' 'randomized control trial,' 'randomized controlled trial,' 'conjoint,' 'DCE,' and 'DCEs.' The focus was deliberately narrowed to scholarly articles published after the year 2017 to capture the most recent trends and developments in the field, and the search was confined to a selected group of esteemed journals within the public administration domain, namely, 'American Review of Public Administration,' 'Governance,' 'Journal of Public Administration Research and Theory,' 'Public Management Review,' 'Public Administration,' 'Public Administration Review,' and the 'Review of Public Personnel Administration.' As explained in Belle and Belardinelli (2024), the rationale behind this choice was to select public administration journals ranked among the top 20 in two international rankings, namely the Scimago Journal Ranking of Public Administration (2023) and the Google Scholar ranking for the category of Public Policy and Administration (2023). The algorithm adopted is the following:

> *TITLE-ABS (experiment OR experiments OR rct OR randomized OR "randomized control trial" OR "randomized controlled trial" OR conjoint OR dce OR dces) AND PUBYEAR > 2017 AND (LIMIT-TO (EXACTSRCTITLE , "Public Administration Review") OR LIMIT-TO (EXACTSRCTITLE , "Journal Of Public Administration Research And Theory") OR LIMIT-TO (EXACTSRCTITLE , "Public Management Review") OR LIMIT-TO (EXACTSRCTITLE , "Public Administration") OR LIMIT-TO (EXACTSRCTITLE , "Governance") OR LIMIT-TO (EXACTSRCTITLE , "Review Of Public Personnel Administration") OR LIMIT-TO (EXACTSRCTITLE , "American Review Of Public Administration"))*

To complement the strategy by Belle and Belardinelli (2024), we included the Journal of Behavioral Public Administration (JBPA), as it is particularly relevant to our focus on pre-registered experiments. JBPA's emphasis on behavioral approaches within public administration aligns well with our goal of exploring the pre-registration trends in experimental research. Additionally, JBPA directly encourages authors to pre-register their studies and disclose this information upon submission. Since JBPA is not indexed in Scopus yet, we manually reviewed every article published in JBPA from 2018, when it was firstly released, to 2024 to identify those that were pre-registered.

By selecting these journals, we ensure that our review covers the most rigorous and impactful studies in the field. The most recent update of this search covers until the end of December 2024. Performing the specified search query in Scopus resulted in the identification of 370 primary studies, each with titles or abstracts featuring terms associated with experimental methods. We added to this group the 60 articles published in JBPA between 2018 and 2024. After reviewing the 430 studies, we identified 100 pre-registered studies. For six pre-registered studies, we could not access the pre-registration, either because the link did not work or because it was not provided in the published article. We contacted the corresponding authors of these publications and asked to provide pre-registration, that we received in five cases. As a result, 113 pre-registered experiments from 99 published studies are included in our analysis. The complete list of references to these experiments is included in the Appendix.

The authors, title, publication year and the journal or source title were recorded for each pre-registered study. Whether pre-registrations occurred before data collection and platforms where studies were pre-registered, such as the Open Science Framework (OSF), were noted. The coding process involved a detailed comparison between the hypotheses listed in the pre-registration plans and those reported in the published articles. This comparison extended to several aspects, including the number and content of hypotheses, research design, outcome variables, sample size, and the analysis plan. Such an approach facilitated an in-depth evaluation of the consistency between planned and executed research methodologies and outcomes. The review also assessed whether any power analysis was performed in the pre-registrations and whether additional analyses, not initially pre-registered, were conducted and reported in the published articles. Furthermore, we recorded whether the findings reported in the published article were statistically significant or not.

Finally, the coding process scrutinized whether differences between the pre-registered plans and the published outcomes were explicitly acknowledged and explained by the authors. This aspect is crucial for maintaining transparency and integrity in research reporting. Links to the pre-registration documents were collected for each study, allowing for further verification and detailed examination of the pre-registered protocols.

Results

We present our findings by first providing a descriptive analysis of our articles. Next, we report how our findings speak to each of the three conditions identified for pre-registrations to make a valuable contribution to the PA scientific community.

Figure 1 reports the number of pre-registered experiments published in our selection of eight top public administration journals from 2018 to 2024. In 2018, only one published experiment was pre-registered, but the increasing trend took the number of pre-registered experiments up to 23 and 40 in 2023 and 2024, respectively.

Figure 1. Pre-Registrations in Public Administration Journals Over Time

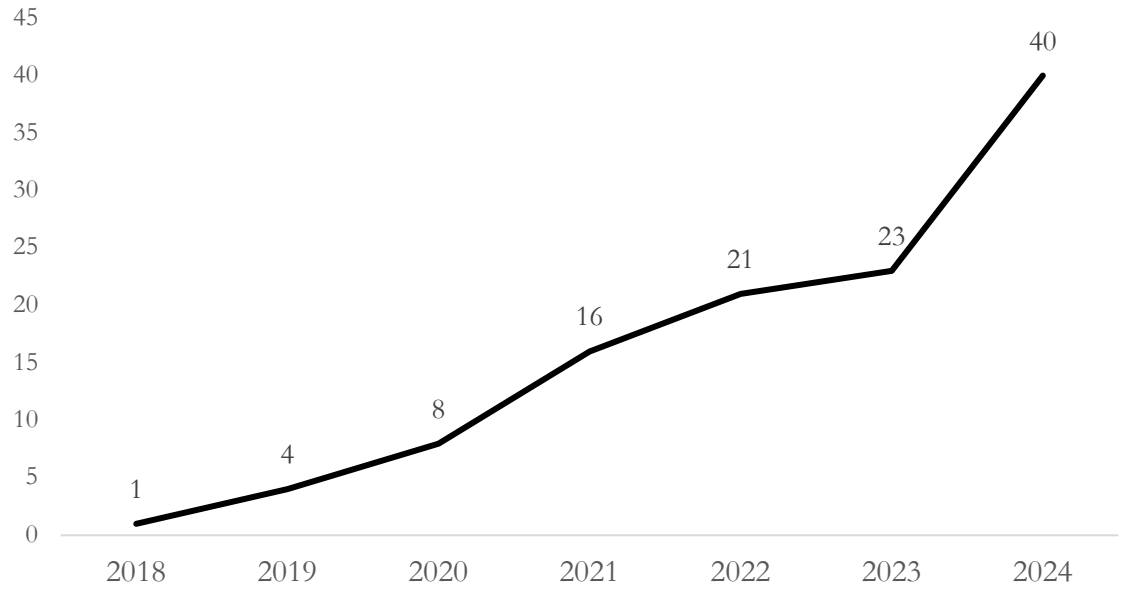


Table 1 provides a breakdown of the distribution of pre-registered studies, by journal in which the experiment was published. Among the journals, Public Administration Review leads with 22 experiments (about 19%), followed closely by the Journal of Public Administration Research and Theory and Public Management Review with 19 experiments (about 17%). These three journals account for more than half of the pre-registered studies, indicating their prominence in publishing research that adheres to pre-registration practices. Other significant contributors include the Journal of Behavioral Public Administration and Public Administration (18 experiments each, about 16%). Pre-registrations are less frequent for experiments published in Governance (8 experiments, about 7%), the Review of Public Personnel Administration (6 experiments each, about 5%), and the American Review of Public Administration (3 experiment, about 3%), due also to the lower number of experiments published in these journals. The pre-registration rate of published experiments ranges from about 18% for ARPA to about 36% for JBPA. These are also the journals where the ratio between the number of experiments and the number of published articles is the lowest (about 5%) and the highest (about 41%), respectively.

Table 1. Distribution of Pre-Registered Experiments, by Journal

	# published articles	*# published experiments*	*# experiments / # articles (%)*	*# pre-registered experiments*	*# pre-registered exp. / # experiments (%)*	*% of experiments included in the review*
PAR	814	83	10%	22	27%	19%
JPART	306	64	21%	19	30%	17%
PMR	866	65	8%	19	29%	17%
JBPA	121	50	41%	18	36%	16%
PA	505	73	14%	18	25%	16%
Gov	407	28	7%	8	29%	7%
ROPPA	255	23	9%	6	26%	5%
ARPA	367	17	5%	3	18%	3%

In terms of platforms, the Open Science Framework (OSF) is the most widely used platform, hosting 76 pre-registrations (about 67%) included in our sample. The OSF is highly regarded and easily accessible for researchers looking to pre-register their studies, and it has become the go-to platform for many scholars across fields. ASPREDICTED and EGAP are the second most popular platform, each used by 12 studies (about 11%). It should be noted that, as of October 15, 2023, EGAP is not accepting any pre-registration (EGAP website, 2023) and is now hosted by the OSF. The American Economic Association RCT Registry (AEA) follows with 11 pre-registrations (about 10%), and Harvard Dataverse accounts for 1 study. Finally, we were unable to associate any platform with 1 pre-registration. While journals typically do not mandate a specific pre-registration platform, our analysis reveals that some platforms are more popular than others among scholars.

Condition 1: Registrations should be submitted prior to data collection and analysis

As we discuss in this study, one of the key factors contributing to the success of pre-registrations in advancing knowledge is that they must be submitted prior to data collection and analysis. Of the 113 pre-registrations in our sample, 97 (about 86%) meet this standard (see table 2). However, based on the information we gathered, this is not true in 12 cases (about 11%). Notably, in three of these 12 cases, the authors explicitly stated that they did not perform any analysis of the already collected data before submitting the pre-registration. Additionally, we were unable to determine the timing of pre-registration for four studies (about 4%).

Condition 2: Published studies should reflect the execution of pre-registered plans

The second key condition is that published studies should reflect pre-registered plans. Before looking at possible differences between pre-registrations and publications, it is worth noting that pre-registrations may vary in terms of their content, particularly with respect to hypotheses and analysis plans.

As for hypotheses, the vast majority of pre-registration plans include them (96, about 85%). Of the 17 pre-registered experiments that did not include hypotheses, four can be considered exploratory in nature, as is clearly evident from the published studies. One is a replication of another experiment with explicit hypotheses, making repetition unnecessary, and the remaining 12 include hypotheses in the published paper. There may be valid reasons for presenting a non-pre-registered hypothesis-testing exercise as such. For example, before data collection, authors may have received feedback on the pre-registration plan at a workshop or conference and decided to test specific hypotheses accordingly. However, this process should be made transparent in the published study, which is not the case in 11 out of the 12 studies mentioned. Transparency ensures that readers have all the necessary information to interpret the findings accurately. The

risk is presenting postdictions as if they were predictions, potentially undermining the effectiveness of pre-registrations in advancing knowledge.

Among the 96 studies including hypotheses in their pre-registered plans, many exhibit differences between the pre-registered and final published hypotheses, either in terms of number or content. More specifically, 50 experiments (about 44%) showed differences in the number of hypotheses, with the final publication either adding or omitting hypotheses compared to what was originally pre-registered. When not transparently reported, the addition of hypotheses can be linked to p-hacking, while omission is linked to selective reporting. Both practices risk leading to post-data analysis exercises aimed at fitting the narrative to the data, ultimately reinforcing publication bias.

Additionally, we observed changes in the content of hypotheses in 48 cases (about 42%), meaning the wording of the hypotheses was altered between pre-registration and publication. It is worth noting that minor language differences are not included in these numbers, as long as the hypotheses remained substantially the same, without altering the direction of the hypothesized relationship or the variables considered – specifically, moderators, mediators, or outcomes.

We find that public administration pre-registrations are generally good at reporting sample information. Almost all the studies included this information (112, about 99%), with differences between the pre-registered sample and the actual sample used in six cases (about 5%). However, it should be noted that only 33 articles included power analysis in the pre-registration (about 29%). All but seven pre-registered experiment (about 99%) provided detailed information about the design. Seven differences (about 6%) were detected, mostly related to dropping one manipulation from the description in the published article.

In 23 studies (20%), the outcomes reported in the final publication differed from those originally pre-registered. These changes included alterations to primary or secondary outcomes, or the addition of new outcomes not initially planned. As with hypotheses, when not transparently reported, both modifying and adding outcomes come with the risk of fitting the narrative to the data, ultimately confounding predictions with postdictions. In terms of statistical analysis, 102 pre-registered experiments (about 90%) included an analysis plan in their pre-registration. However, 23 studies (about 20%) conducted analyses that differed from their original plans, either by replacing pre-registered statistical tests with others or by adding additional tests that were not pre-registered.

Condition 3: Deviations from the original plans should be transparently reported in the published studies

In total, 73 pre-registered experiments (about 65%) reported at least one difference between the pre-registration plan and the published study across our dimensions of interest, indicating that changes during the research process are common. While there are several valid reasons for these changes, they should be reported explicitly in the published studies, which, unfortunately, happens in less than half of the cases (32, about 44% of those studies including some deviations from original pre-registrations). This lack of transparency prevents consumers of research from easily differentiating predictions from postdictions. Improved reporting may help readers understand the rationale behind deviations from original plans. Results on main elements of pre-registered public administration studies and their deviations from original plans are summarized in table 2.

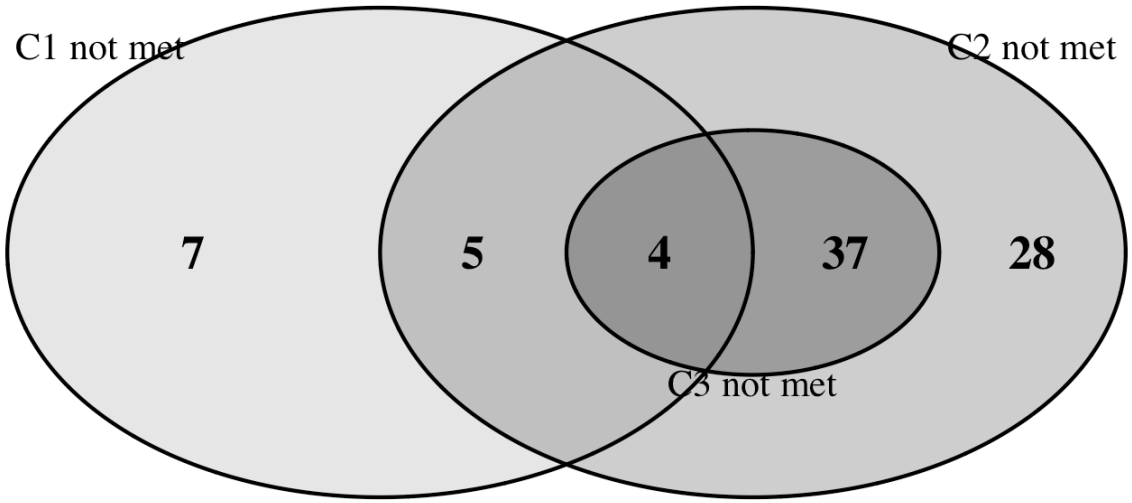
Table 2: Pre-Registration Practices in Public Administration

Descriptives (*N = 113*)		113	
		N	%
Registration prior to data collection			
	Yes	97	86%
	No	12	11%
	n/a	4	4%
Hypotheses			
	Included in the PAP*	96	85%
	Differences in number of HPs	50	44%
	Differences in content of HPs	48	42%
Sample			
	Included in PAP	112	99%
	Power analysis in PAP	33	29%
	Differences in sample size/sampling strategy	6	5%
Design			
	Included in PAP	112	99%
	Differences in design	7	6%
Outcomes			
	Included in PAP	112	99%
	Differences in outcomes	23	20%
Analysis plan			
	Included in PAP	102	90%
	Differences in analyses	23	20%
IN SUM			
	Some difference	**73**	**65%**
	Differences made explicit	**32**	**44%**

* Thirteen studies have hypotheses in the published paper, but not in the pre-analysis plan

Figure 2 visualizes how pre-registered experiments included in our review deviate from the three requirements outlined above. A small number of studies (four, about 4%) fail to meet all of the three conditions. The largest subgroup of experiments relates to those failing to meet conditions 2 and 3 (41, about 36%), i.e., deviating from original plans while not transparently reporting deviations. On the positive side though, it is worth noting that 32 experiments (about 28%) satisfy all three conditions. Therefore, they are not included in the diagram.

Figure 2. Venn Diagram Showing Distribution of Experiments by Unsatisfied Conditions



Discussion and Conclusion

We conducted a systematic review of pre-registered experiments to analyze trends and practices in pre-registration within public administration research. Our review reveals an increasing adoption of pre-registrations in public administration research over time – a 'best practice' that is becoming an integral part of the research culture in our field, as evidenced by the support of journals actively promoting pre-registration.

For pre-registrations to be effective in advancing knowledge and improving the research process by clearly distinguishing predictions from postdictions, three conditions must be met: (i) registrations should be submitted prior to data collection and analysis, (ii) published studies should reflect pre-registered analysis plans, and (iii) any deviations from the original plans should be transparently reported. Through our systematic review, we tested whether these conditions were met in public administration pre-registered experiments. The results are somewhat concerning. On the one hand, a significant proportion of studies – though a minority – either delay 'pre'-registration or fail to provide clear information on when registration occurred. Post-registrations are pointless, and the fact that about one-fifth of the experiments cannot be clearly identified as 'pre'-registrations suggests that the response of our community to external pressure – stemming from the popularity of pre-registrations in other disciplines – has, to some extent, led to buffering internal practices from outside scrutiny (Pfeffer & Salancik, 1978; Thompson, 1967). In other words, what is supposed to be a best practice for advancing knowledge has been implemented in our field as an adaptive symbol to increase legitimacy in the eyes of other disciplines, similarly to what has been observed in other disciplines (e.g., Manago, 2023).

The discrepancies revealed by our systematic review between pre-registered plans and final publications, particularly regarding hypotheses and outcomes, reinforce this idea – especially given the significant proportion of studies that did not transparently report these changes in the published articles.

A particularly negative interpretation of our results is that pre-registrations, as a symbolic tool to increase the credibility and legitimacy of studies, can be used to boost the chances of publishing null results, regardless of their substantial effect on the quality of knowledge produced. Regarding this point, only a small group of 15 studies (about 13%) reported significant findings only, while the majority reported either a mix of

significant and non-significant findings (83 out of 113, about 73%) or only non-significant findings (15 out of 113, about 13%). This result contrasts with other systematic reviews in our field, which commonly find a majority of studies reporting significant findings only, even within the behavioral public administration area (e.g., Battaglio et al. 2019). It also contrasts with systematic reviews in other fields showing that pre-registered studies did not have a lower proportion of positive results, compared to non-pre-registered studies (e.g., van den Akker et al., 2024).

It is not our intent to blame individual authors for these results. On the contrary, the authors of the pre-registered experiments included in our review should be praised for being among the first to adopt this best practice, which has the potential to improve the knowledge created in our community. Additionally, a significant proportion of studies successfully meet the two necessary conditions for pre-registrations to be effective. Our goal is simply to highlight a few implementation gaps in pre-registrations so that authors adopting this practice in the future will pay closer attention to meeting the conditions that make pre-registrations useful.

It should be noted that there are several reasons why differences between pre-registered plans and published studies may arise, and not all of them can be attributed to the authors. For example, published studies may differ from their pre-registered versions due to the influence of reviewers and editors during the peer-review process (e.g., Baekgaard et al., 2023). Furthermore, pre-registered studies may be presented at workshops and conferences, where authors might receive suggestions to modify parts of the theoretical framework or empirical strategy. Since these practices are part of the research process, our community should reflect on how to balance them with the need for published studies to align with the initial pre-registered plans.

At the individual level, authors play a critical role by adhering as closely as possible to their original research designs, hypotheses, and analysis strategies, making modifications only when strictly necessary and ensuring that any changes are transparently documented and justified in their final publications. A simple way for authors to enhance transparency in published studies is to report each relevant event that led them to deviate from the original plan. At the same time, reviewers and editors, when suggesting changes that affect the study's design, analysis, or outcomes, should encourage authors to clearly report and justify these changes, ensuring that the final published work remains transparent and accountable to its pre-registered intentions. By fostering a collaborative approach that values both the rigor of peer review and the principles of pre-registration, the field can better achieve the intended benefits of pre-registration. It is worth noting again that several studies in our sample successfully reported deviations. This was commonly done through endnotes (e.g., Flink & Xu, 2023; Schiff et al., 2023; Döring, 2022; Fischer, 2022) or in a separate appendix (e.g., De Fine Licht et al., 2022).

At the community level, workshops and conference panels dedicated to pre-registrations would allow feedback to be provided before data are collected and analyzed. Most pre-registration platforms allow researchers to modify their pre-registrations throughout the process. Changes to pre-registration plans should be reported on the platform to reflect legitimate modifications of predictions that are not conflated with postdictions. This was effectively done in a few cases from our review (e.g., Zhang & Wang, 2023). In this regard, it is worth mentioning Alexandra Freeman's Octopus program, a free repository for hypotheses, data, code, and methods, designed to be the primary research record, where research is published in smaller units (Octopus website, 2024). Additionally, publishing definitive pre-registrations may be another effective way to maximize the benefits of this practice. This could be done in traditional academic journals, where editors could give authors the option to submit a pre-registration plan before data are collected, allowing for the pre-acceptance of an article without the findings, as is already practiced by the journal Cortex (Chambers, 2013; Monogan, 2015). Alternatively, ad-hoc journals could be launched specifically to publish pre-registrations.

The adaptive nature of public sector interventions poses a particular challenge to pre-registration. Public administration research often deals with complex, evolving policy contexts that require flexibility in research design and data collection. Pre-registration's structured approach can limit the ability to adjust to unexpected developments, which is often necessary to capture real-world complexities. However, the success of pre-registration in fields like psychology (van den Akker et al., 2024) and economics (e.g., Banerjee et al., 2020; Brodeur et al., 2024) offers important insights. In these disciplines, pre-registration is most effective when

combined with comprehensive PAPs. PAPs help constrain researcher discretion and enhances the transparency of analyses. The experience in psychology and economics suggests that pre-registration's benefits are maximized when researchers commit to a thorough pre-analysis plan that limits analytical flexibility while still allowing for justified deviations when warranted.

To conclude, the three conditions analyzed in this study are essential for pre-registration to contribute effectively to scientific practice, but they are not sufficient on their own. Several additional aspects should be considered. For example, pre-registration has been argued to indirectly improve the quality of individual studies by shifting the focus from merely obtaining statistically significant results to encouraging researchers to carefully assess theoretical hypotheses and methods before observing the data (van't Veer & Giner-Sorolla, 2016; Sarafoglou et al., 2022). Our systematic review did not address whether this is the case. As previously mentioned, pre-registration may also create incentives to register a high number of hypotheses, introducing new challenges. Not directly addressing these challenges is a limitation of our review. Another limitation stems from our selection of journals, which may not be representative of the field and could overlook the fact that pre-registration may be even more necessary in other journals.

The value of our study is showing that pre-registrations can enhance knowledge-building by promoting transparency and reducing bias, but their current use in public administration to some extent may add complexity and cost without delivering the intended benefits. Addressing the issues highlighted above will help pre-registrations improve public administration research quality and credibility.

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