Improving Results Reporting in RCT Registries

Jack Cavanagh [1] Sarah Kopper [1] Lars Vilhuber [2]

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[1] J-PAL Global/MIT

[2] Cornell University

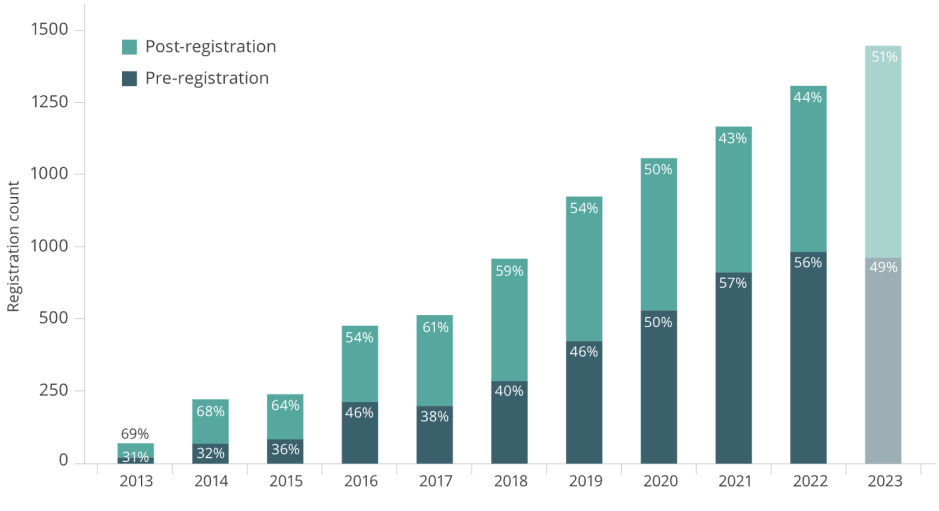
Motivation

Registries help solve two large problems in scientific knowledge-production:

- Can reduce “P-hacking” by allowing a place to pre-register intentions, designs, etc.
- Can reduce the “file-drawer” problem and publication bias by recording the existence of all studies in a universe, regardless of type of results

Motivation

Figure 1. New trials per year by registration status



Post-trial registry (PTR) completion

But in order to help combat the file-drawer problem, registrations need to be updated with **post-study information**, like links to the study's output (paper, report, data, etc.)

This has been a problem even in more established clinical registries (DeVito et al., 2020).

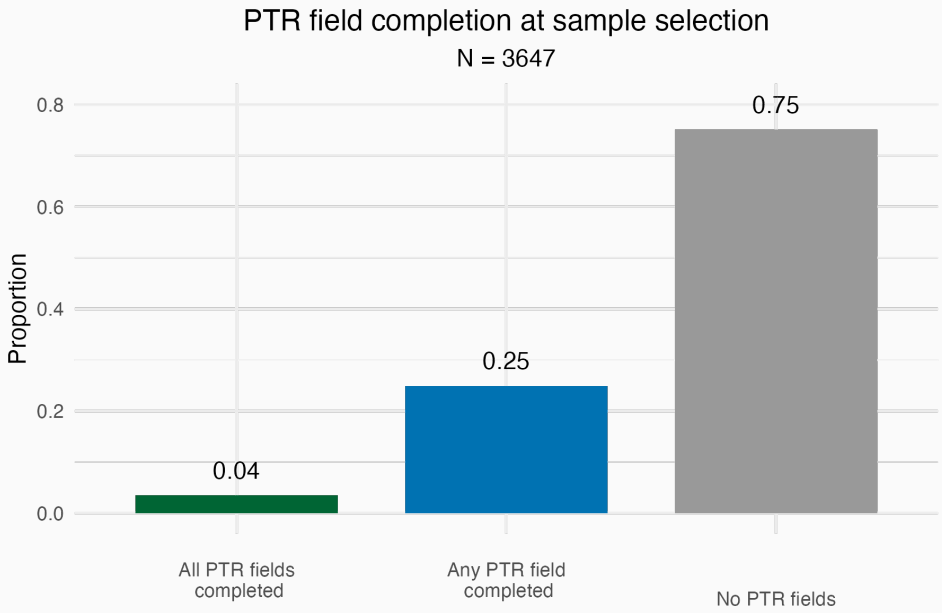
Post-trial registry (PTR) completion

But in order to help combat the file-drawer problem, registrations need to be updated with **post-study information**, like links to the study's output (paper, report, data, etc.)

This has been a problem even in more established clinical registries (DeVito et al., 2020).

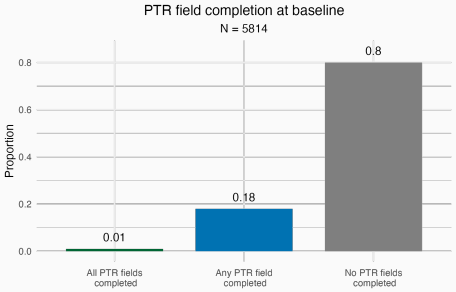
It hasn't been going so well.

PTR Rate – Sample Selection



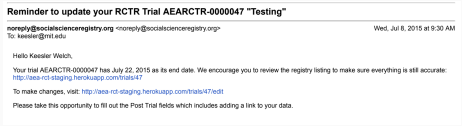
Two-pronged approach

- Part 1: Qualitative study of impediments to completion
- Part 2: A randomized trial of nudges based on results from the qualitative study



Background

AEA RCTR registrants currently get one reminder email after the recorded trial completion date.



Reminder to update your RCTR Trial AEARCTR-0000047 "Testing"

noreply@socialscienceregistry.org <noreply@socialscienceregistry.org> Wed, Jul 8, 2015 at 9:30 AM
To: keesler@mit.edu

Hello Keesler Welch,

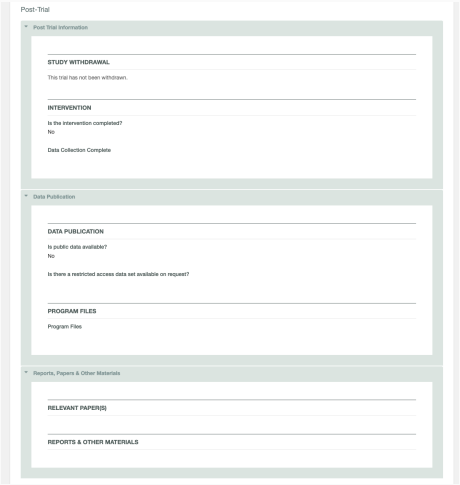
Your trial AEARCTR-0000047 has July 22, 2015 as its end date. We encourage you to review the registry listing to make sure everything is still accurate:
http://aea-rct-staging.herokuapp.com/trials/47

To make changes, visit: http://aea-rct-staging.herokuapp.com/trials/47/edit

Please take this opportunity to fill out the Post Trial fields which includes adding a link to your data.

Background

AEA RCTR registrants are asked to fill out 12 possible fields, including links to publications and data.



Part 1: Qualitative study

Qualitative study

We started with a qualitative study to understand what the constraints were:

- Sample of 63 registrants randomly chosen from trials registered before May, 2022 that were at least one year past the registered trial end date.
- Oversampled from trials with completed PTR fields
- Sampled PIs completed both a self-guided survey (N=63) and a semi-structured interview (N=48).
- The two jointly covered:
  - Experience with registration
  - The framing and frequency of messages aimed at increasing post-trial updates
  - Attitudes towards research transparency and trial registration
  - The perceived benefits of and hurdles to updated registrations
  - Open-ended feedback on the Registry

Findings – survey

From the survey we found:

- Low rates of PIs confident that they had seen the current Registry PTR reminder email (33.3%)
- A preference for pre-filled information and a reminder of fields yet to be completed as the most compelling nudges for a reminder email.
- Journal requirements and perceived benefits to others as the strongest incentives.
- Lack of reward from the field of economics and lack of time or staff to update the fields as the largest constraints.
- Perceived importance of transparent practices to them, but a large gap between that and how important they felt it was to the fields as a whole, similar to findings in Christensen et al. (2019).

Findings – free response

We asked two main long-form questions in the semi-structured survey:

- ”What do you see as the biggest benefit of updated trial registrations?”
- “What is the biggest hurdle to updating your trial registration?”

To analyze the responses we conducted three steps:

- We formed high-level categories from reading the responses
- We coded the responses into binary variables for if they referenced that category
- We assigned each response to a single category it was most similar to using continuous measures of the strength of that reference using embeddings from OpenAI’s `text-embedding-3-large` model.

Findings – free response

Group	Proportion coded	Proportion grouped
Benefits:		
Addressing publication bias and the file drawer problem	0.44	0.35
Supporting meta-analyses and evidence synthesis	0.21	0.04
Facilitating knowledge sharing and coordination among researchers	0.42	0.25
Enhancing reproducibility and replication efforts	0.54	0.12
Preventing P-hacking and ensuring pre-specified analysis	0.29	0.21
Serving as a commitment device and providing accountability for self	0.27	0.02

Findings – free response

Group	Proportion coded	Proportion grouped
Benefits:		
Hurdles:		
Time constraints and competing priorities	0.58	0.17
Lack of incentives or perceived benefits/redunadncy w/paper	0.58	0.48
Forgetting and need for reminders	0.35	0.12
Update process complexity and usability issues	0.4	0.04
Uncertainty about timing of updates	0.31	0.02
Coordination costs with co-authors	0.08	0.04
Uncertainty about what to put in updates	0.23	0.1
Concerns about making information public	0.08	0.02

Part 2: RCT

RCT – Design

Informed by the qualitative study we designed an RCT that sent one of the following nudges to all collaborators on in-sample registrations:

- A “control” email similar to the current PTR reminder
- A “salience” treatment that lists the PTR fields still needed to be filled in
- An “incentive” treatment that offered a slot in a lottery for trials with completely filled-in fields

Randomization was at the trial level, allowing for measurement of spillover and dosage effects.

Registered with PAP in Cavanagh et al. (2023).

RCT – Stratification and inclusion/exclusion criteria

We stratified randomization by a categorical variable with three values:

- Trials with no collaborator listed on any other trial (“single-trial PIs”)
- Trials where at least one collaborator was on at least one other trial, but no collaborators were on five or more other trials (“multi-trial PIs”)
- Trials where at least one collaborator was on at least five other trials (“many-trial PIs”).

The RCT sample consisted of all collaborators on all trials listed on the AEA RCT Registry with a registered trial end date at least one year post the sample extraction date (6 October 2023) and with at least some empty post-trial fields.

We excluded trials with collaborators who met either of the following “centrality”-related criteria:

- Be listed on >=20 registry entries
- Be a collaborator on trials with >=20 other collaborators

RCT – Intervention period

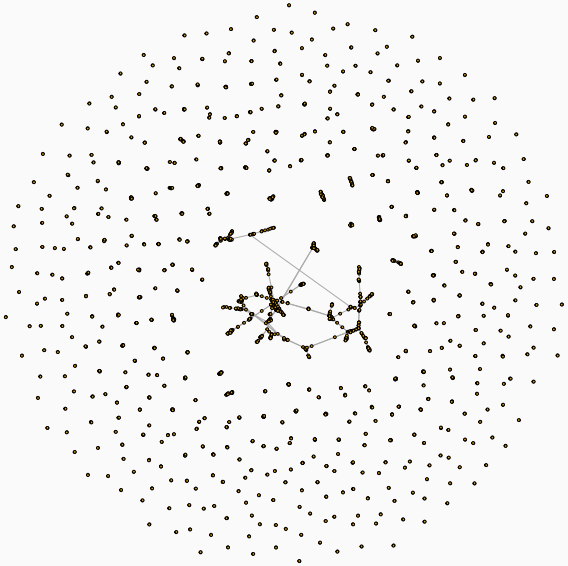
The intervention period lasted from October 11 2023 to January 25, 2024.

Each treatment consisted of up to four emails, with interventions stopping once any collaborator made a change to the trial

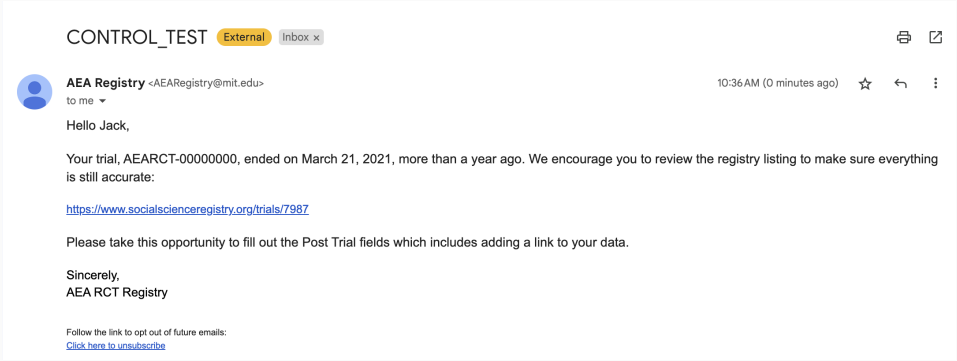
If no changes were made follow-up emails identical to the original one were sent roughly every four weeks from when the previous email was sent

Due to limits imposed by Qualtrics we split the trials into “connected” and “disconnected” groups based on whether any of the collaborators is in the “main registration network” after the imposition of the sample exlcusion restrictions.

RCT – Network



RCT – Control



CONTROL_TEST External Inbox ×

AEA Registry <AEARegistry@mit.edu> 10:36 AM (0 minutes ago)

to me

Hello Jack,

Your trial, AEARCT-00000000, ended on March 21, 2021, more than a year ago. We encourage you to review the registry listing to make sure everything is still accurate:

https://www.socialscienceregistry.org/trials/7987

Please take this opportunity to fill out the Post Trial fields which includes adding a link to your data.

Sincerely,
AEA RCT Registry

Follow the link to opt out of future emails:
Click here to unsubscribe

RCT – SALIENCE TREATMENT

Treatment_1_TEST
1 message

AEA Registry <AEARegistry@mit.edu> Fri, Aug 11, 2023 at 10:46 AM
Reply-To: AEA Registry <johncava@mit.edu>
To: jcavanagh@povertyactionlab.org

Dear Jack,

Your trial, AEARCT-00000000, ended on October 31, 2005, more than one year ago. We encourage you to review the registry listing, and in particular the post-trial fields, to make sure everything is up to date. Your completed registration helps other researchers both conduct their own research as well as find and cite your own. All of the collaborators on your trial are receiving this email.

As a reminder, your trial registration AEARCT-00000000 lacks data for the following post-trial fields:
- Intervention completion date
- Is data collection complete? (yes/no) If yes:
  - Data collection completion date
  - Final sample size (Number of clusters/unit of randomization)
  - Was attrition correlated with treatment status?
  -Final sample size (total number of observations)
  - Final sample size (or number of clusters) by treatment arm
- Is data available for public use? (If yes, the url)
- Are program files posted for public use? e.g. Stata .do files (If yes, the url)
- Is there a working paper or publication associated with this entry? (If yes, the abstract, citation, and url)
- Are there any reports or other materials associated with this entry? (If yes, the description, citation, and url)

Click here to update your post-trial fields

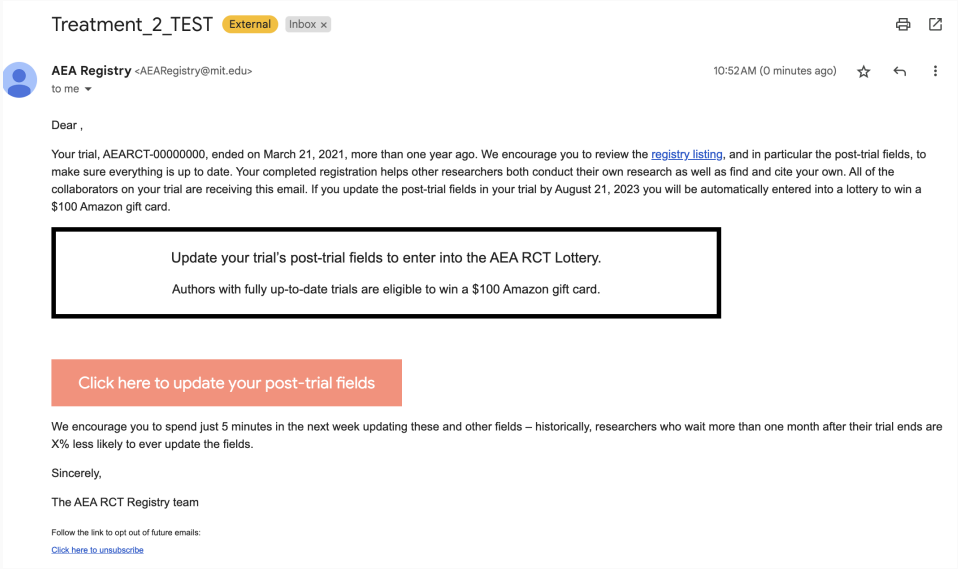
We encourage you to spend just 5 minutes in the next week updating these and other fields – historically, researchers who wait more than one month after their trial ends are X% less likely to ever update the fields.

Sincerely,

The AEA RCT Registry team

Follow the link to opt out of future emails:
Click here to unsubscribe

RCT – LOTTERY TREATMENT



Treatment_2_TEST External Inbox ×

AEA Registry <AEARegistry@mit.edu> 10:52 AM (0 minutes ago)
to me

Dear ,

Your trial, AEARCT-00000000, ended on March 21, 2021, more than one year ago. We encourage you to review the registry listing, and in particular the post-trial fields, to make sure everything is up to date. Your completed registration helps other researchers both conduct their own research as well as find and cite your own. All of the collaborators on your trial are receiving this email. If you update the post-trial fields in your trial by August 21, 2023 you will be automatically entered into a lottery to win a $100 Amazon gift card.

Update your trial's post-trial fields to enter into the AEA RCT Lottery.

Authors with fully up-to-date trials are eligible to win a $100 Amazon gift card.

Click here to update your post-trial fields

We encourage you to spend just 5 minutes in the next week updating these and other fields – historically, researchers who wait more than one month after their trial ends are X% less likely to ever update the fields.

Sincerely,

The AEA RCT Registry team

Follow the link to opt out of future emails:
Click here to unsubscribe

RCT – Outcomes

First-stage outcomes:

- *Email opened*: binary variable that takes 1 if the treatment (or control) email is opened, and 0 otherwise. Measured at the collaborator level.
- *Page visited*: binary variable that takes 1 if the collaborator visited the post-trial page, and 0 otherwise. Measured at the collaborator level.

Main outcomes: The extent to which the post-trial fields are filled in, measured by complete dummy and proportions for two indices (as well as proportion of all fields):

- *F1*: Full index of all PTR fields except for “Reports & Other Materials”
- *F2*: Smaller index of key PTR fields, including information on study completion and links to paper and data.

Main specification:

$$y_i = \beta_0 + \beta_1 T1_i + \beta_2 T2_i + \beta_3 C_i + \beta_4 ST1_i + \beta_5 ST2_i + \beta_6 numpi_i + X_i\beta + \varepsilon_i \qquad (1)$$

Primary hypotheses:

- *Hypothesis 1*: $\beta_1 + \beta_4 > 0$ - increasing salience of missing information increases the likelihood registration of trial *i* will be updated.
- *Hypothesis 2*: $\beta_2 + \beta_5 > 0$ - providing incentives in the form of a lottery increases the likelihood trial *i* will be updated.
- *Hypothesis 3*: $\beta_2 + \beta_5 > \beta_1 + \beta_4$- adding lottery incentives has a greater effect than increasing salience of missing information.

Secondary hypotheses:

- *Hypothesis 4*: $\beta_6 > 0$ - there is a dosage effect, where the likelihood of a trial being updated following an email nudge is increasing in the number of researchers listed on the trial.
- *Hypothesis 5*: $\beta_1 > 0$ and $\beta_2 > 0$ - receiving any nudge about trial *i* increases the likelihood of trial *i* being updated.
- *Hypothesis 6*: $\beta_3 > 0, \beta_4 > 0$ and $\beta_5 > 0$ (spillovers) - increasing salience about updating registrations in general increases the likelihood that researchers will update trial *i*.
- *Hypothesis 7*: $\beta_1 > \beta_4$ and $\beta_2 > \beta_5$ - the direct effect of receiving a nudge about trial *i* is greater than the spillover effects of receiving nudges about other trials

Because no “pure” control group, interested in whether intervention period as a whole increased PTR rates.

Created a panel of Registrations in our sample from the time that we started posting monthly drops of the Registry metadata on the AEA Registry Dataverse (January 2020) to six months after the intervention period ended (July 2024).

We use this panel to estimate event study effects:

$$y_{it} = \sum_{j=-9}^{6} \gamma_j D_{i,t+j} + \alpha_i + \delta_t + \beta X_{it} + \epsilon_{it} \quad (2)$$

RCT – HTE & MHT

We estimate Heterogenous treatment effects for the following variables:

- *Pre-specified:* whether the trial contained any PIs that were collaborators on other trials. Anticipating lack of power, we pre-specified pooling the two strata that contain these "multiple PIs" (those on >1 registration, i.e. "multi-trial PIs" and those on > 5, i.e. "many-trial PIs")
- *Exploratory:*
  - Whether the trial contains one of the respondents from our qualitative study as a collaborator
  - Whether the trial is above median length
  - Whether the trial had any PTR fields filled at baseline
  - Whether the trial was pre-registered.

We control for the FWER-rate within three groups: main hypotheses, secondary hypotheses, and pre-specified HTE (List et al. (2019))

First stage results

Outcome	N	Cont. mean	T1	T2	Num. of trials	T1-T2
Opened email	5934	0.670	0.017	-0.003	0.002	0.020
		[0.470]	(0.016)	(0.016)	(0.002)	(0.016)
Visited page	5934	0.104	0.011	-0.016*	-0.003***	0.027***
		[0.305]	(0.010)	(0.009)	(0.001)	(0.010)

Main results

Outcome	N	Cont. Mean	T1	T2	S_cont	S_T1	S_T2	Num_PI	T1-T2
Index of fields (F2)	4481	0.076	0.004	-0.013	-0.006**	0.000	0.001	-0.005	0.017*
		[0.193]	(0.009)	(0.009)	(0.002)	(0.002)	(0.002)	(0.005)	(0.009)
All completed (F2)	4481	0.001	0.011**	0.008	0.000	0.000	-0.002*	-0.002	0.003
		[0.036]	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)	(0.002)	(0.006)
Index of fields (F1)	4481	0.076	0.011	-0.008	-0.006**	0.000	0.001	-0.011*	0.019*
		[0.194]	(0.010)	(0.009)	(0.002)	(0.003)	(0.003)	(0.006)	(0.010)
All completed (F1)	4481	0.000	0.010*	0.007	-0.001	-0.000	-0.001	0.001	0.003
		[0.000]	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)	(0.003)	(0.006)
Index of fields (all)	4481	0.016	0.001	-0.002	-0.001**	-0.000	0.000	-0.001	0.003**
		[0.043]	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)

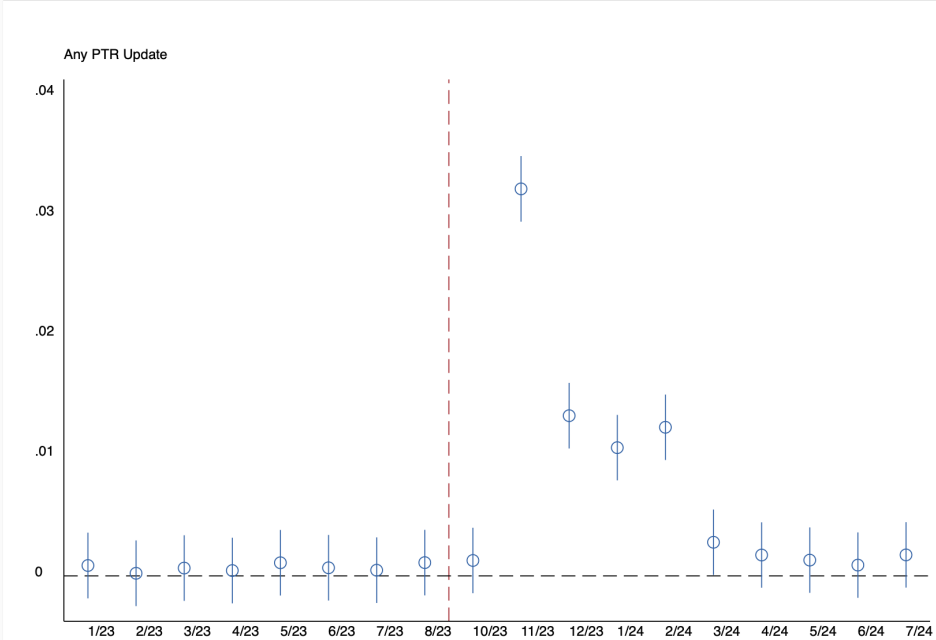
Main Hypotheses

Outcome	N	Cont. Mean	H1	H2	H3
Index of fields (F2)	4481	0.076	0.004	-0.012	-0.016**
		[0.193]	(0.009)	(0.008)	(0.008)
All completed (F2)	4481	0.001	0.011**	0.006	-0.005
		[0.036]	(0.005)	(0.005)	(0.005)
Index of fields (F1)	4481	0.076	0.011	-0.007	-0.018**
		[0.194]	(0.009)	(0.009)	(0.008)
All completed (F1)	4481	0.000	0.010*	0.005	-0.004
		[0.000]	(0.005)	(0.004)	(0.005)
Index of fields (all)	4481	0.016	0.001	-0.002	-0.003**
		[0.043]	(0.002)	(0.002)	(0.001)
FWER-adjusted p-values			{0.738}	{0.576}	{0.533}

Secondary Hypotheses

Outcome	N	Cont. Mean	H4	H5a	H5b	H6a	H6b	H6c	H7a	H7b
Index of fields (F2)	4481	0.076	-0.005	0.004	-0.013	-0.006**	0.000	0.001	0.004	-0.014
		[0.193]	(0.005)	(0.009)	(0.009)	(0.002)	(0.002)	(0.002)	(0.011)	(0.010)
All completed (F2)	4481	0.001	-0.002	0.011**	0.008	0.000	0.000	-0.002*	0.011*	0.010*
		[0.036]	(0.002)	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)	(0.006)	(0.006)
Index of fields (F1)	4481	0.076	-0.011*	0.011	-0.008	-0.006**	0.000	0.001	0.010	-0.009
		[0.194]	(0.006)	(0.010)	(0.009)	(0.002)	(0.003)	(0.003)	(0.012)	(0.011)
All completed (F1)	4481	0.000	0.001	0.010*	0.007	-0.001	-0.000	-0.001	0.010*	0.008
		[0.000]	(0.003)	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)	(0.006)	(0.006)
Index of fields (all)	4481	0.016	-0.001	0.001	-0.002	-0.001**	-0.000	0.000	0.002	-0.002
		[0.043]	(0.001)	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
FWER-adjusted p-values			{1}		{0.861}		{1}			{0.922}

Event study results



Conclusion

Conclusion

The current lack of registration updating is a major barrier towards standardized reporting in the social sciences.

Qualitative findings suggest that constraints are more **mechanical** (time, incentives) than norm/values-based.

Nudges helped increase reporting some, but likely larger changes in **incentives** are required for more full reporting.

References I

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