DOI	https://doi.org/10.1002/eqe.3983
Title	Evaluating the effectiveness of ground motion intensity measures through the lens of causal inference
	Background
Why this paper? How'd you find it?	I have prof. Burton's and prof. Baker's research under my radar because they align with my own research.
Study Objective	Figure out the most appropriate intensity measure to use in PBE by evaluating the extent to which it "causes" the EDPs.
Intended gaps to fill	Borrow the technique of Causal Inference from the social sciences and reap its benefits in the context of the study's objectives.
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Journal / Field	Earthquake Engng Struct Dyn.
Date	2023
Historical Context	Lots of different studies have attempted to rank different IMs and offer recommendations on what is most appropriate depending on the type of structure and EDP under consideration. None have applied Causal Inference to do so.
Relationship to SEMM	Earthquake Engineering
	Methods
Given:	A set of ground motions with known spectrum, M, and R, and the response of various structures subjected to the ground motions,
Find:	find the "best" IM, in the context of Causal Inference.
Experimental Design	Quantify the "treatment effect" associated with each IM (using a semi-parametric model & double machine learning), for each of the considered IMs, all EDPs of all stories of each structure, as well as the peak EDP of all stories.
Test Subjects	6 steel SMRF structures
	Results
Metric for comparison	The value of the "treatment effect"
Results	From a CI standpoint, the best IM depends on the height of the structure and the EDP under consideration. See the image on the right. The results sometimes differ from those of prior studies.
	Conclusions
Authors'	Using CI to rank IMs is better because it's more explainable and it's invariant to the number of ground motions used in the evaluation.
Yours	I'm confused as to whether CI is applicable to the particular setup. I am worried that the classical CI definitions are being stretched a bit. Can we really treat the "IM" as treatment and the "Magnitude/Distance" as confounders?

My summary of the results

Results for the peak EDP over the entire height

		Causal-Based	Efficiency-Based	Sufficiency-Based
1-story structure	PID	Sa(T1)	Sa(T1)	Inconclusive
	PFA	Sa(T1)	Sa(T1)	
>1 story (the bulk of cases)	PID	PGV	Sa(avg)*	
	PFA	PGA	PGV*	
Sensitive to #GM?		No (good)	Yes (bad)	Yes (bad)
Same result when looking at the full profile ?		Yes (good)	No (bad)	No (bad)

*Except for 5-story, where they are flipped.