**Initial Email to Mr. Ross**

**Subject: Question about your article: The Relationship Between Gun Ownership and Firearm Homicide Rates in the United States, 1981–2010**

Hello Mr. Ross,

After reading your article *The Relationship Between Gun Ownership and Firearm Homicide Rates in the United States, 1981–2010*, published in the *AM J Public Health* Journal, my partner and I are interested in your ideas on gun ownership as a starting point for our own independent research project. What really stood out to us was how you analyzed the incident rate ratios for specific predictors. My name is Aryan Deorah and my partner’s name is Chris Goodhart. We are juniors at the Loudoun County Academy of Science (AOS), a magnet high school dedicated to math, science, and, most importantly, research. As a part of our research project, we plan to create a machine learning regression model to predict the effects of different gun laws on different types of gun violence. Specifically, we hope that our inputs will be stringency scores for the gun laws in a given municipality or state, and our outputs will be the predicted gun violence death rates for different types of gun violence: suicides, homicides, and accidents. In order to get our project started, we were hoping that you could answer some specific questions regarding your research.

Would you be available for a meeting via google hangouts or skype to discuss our project? Please let us know if you are available. You can reach us through our emails at chrisgoodhart817@gmail.com andaryandeorah@gmail.com.

Thank you so much for your time,

Aryan Deorah and Chris Goodhart

**Mr. Ross’ Response**

Hi Aryan and Chris,

That’s a very interesting project you are proposing. I’m happy to answer questions to help you get started. Please send me a list of your questions and we’ll find a time to have a call/hangout.

Regards,

Craig S. Ross, PhD, MBA

Research Assistant Professor

Epidemiology Department

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**Our Questions for Mr. Ross**

Hello Mr. Ross,

Thank you very much for responding to us very quickly. Here is a list of questions we had regarding the article:

* What confounding factors do you think need to be controlled in order to determine causation between firearm ownership and homicide rates, or is there a different way to determine causation?
* When filling in holes in the data, why did you choose to use linear extrapolations or interpolations? Are there different methods that could work better?
* Do you think that, if you were to go back and repeat the study, you could use the “strictness” of gun laws and restrictions in each state as a predictor? What kind of result would you expect?
* In the limitations you mentioned how unlikely is it that a putative confounder correlated with gun ownership and gun homicide rates but not any other predictor variables. How do you think the “strictness” of gun laws would relate to the other predictors, and could this variable (or something similar) be the confounding variable?

We would love to be able to schedule a skype or google hangouts with you and we will get back to you about potential times and dates.

Thank you so much for your time,

Aryan Deorah and Chris Goodhart

**Mr. Ross’ Response to Our Questions**

Hi Aryan and Chris,

I am happy to have a phone call to clarify these responses further, but here are a my initial thoughts regarding your questions.

1. What confounding factors do you think need to be controlled in order to determine causation between firearm ownership and homicide rates, or is there a different way to determine causation?

RESPONSE

(A) The article you are referencing contained the most exhaustive list of confounders that had been published to date. As we point out in the limitations, it is not possible to assure that all possible confounding bias has been controlled in the analysis. However, in order for confounding bias to explain away the association, it would have to be strongly associated with both firearm ownership and firearm homicides and not strongly associated with any variable which we controlled in the analysis. We could not identify any such variables.

(B) You will be estimating associations with your study design and models. As epidemiologists, we are trained to resist implying that our analyses determine causation. You can take care to control many elements which are necessary for a causal relationship with your study design – elements such as temporality, confounding, selection bias and measurement bias. However, even taking care to control these elements is not sufficient to determine causation.

2. When filling in holes in the data, why did you choose to use linear extrapolations or interpolations? Are there different methods that could work better?

RESPONSE

Since these data likely follow relatively stable trends, a simple linear interpolation was adequate. However, there are other methods. The most commonly used method to address missing data is Multiple Imputation.

3. Do you think that, if you were to go back and repeat the study, you could use the “strictness” of gun laws and restrictions in each state as a predictor? What kind of result would you expect?

RESPONSE

That is an excellent question. I think you would find stronger associations depending on the ‘strictness’ of the policy. I have attached a recent paper which ranks gun laws and examines associations. I also include this link to a useful website that analyses gun policies:

<https://www.gunpolicy.org/firearms/citation/quotes/8271>

4. In the limitations you mentioned how unlikely is it that a putative confounder correlated with gun ownership and gun homicide rates but not any other predictor variables. How do you think the “strictness” of gun laws would relate to the other predictors, and could this variable (or something similar) be the confounding variable?

RESPONSE

I think this could very well explain part of the association between firearm ownership and firearm homicide. As you can imagine, stricter firearm access policies would be associated with lower rates of firearm ownership and with lower firearm homicide. I think this is a valuable line of inquiry as attested by the attached study.

I have some time available on 10/19 between 9AM and 11AM. Please let me know if that time works for you.

Regards,

Craig Ross

Craig S. Ross, PhD, MBA

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