Worksheet: Firearm Availability and Unintentional Firearm Deaths

Name: _____ Date: _____/_____/_____

1. How might the possibility that ". . . where there are more guns parents care less about their children's welfare. . . ." influence the inference one can reach from Dr. Miller's study?

2. Why did Dr. Miller ". . . control for state level of poverty, urbanization and regionalization"?

3. How does Dr. Miller address the possibility of the ecologic fallacy?

4. Should a death from Russian roulette be considered an unintentional firearm death or a suicide?

5. How are deaths due to air bags relevant to Dr. Miller's study?

6. Do you agree with Dr. Miller's conclusion that ". . . where there are more guns, more people are dying from unintentional gunshot injuries?"

Teacher's Cook's Index Sheet (Alphabetical Order)

	A	B	C
State	**"% of All *Suicides* Committed with a Firearm"**	**"% of All *Homicides* Committed with a Firearm"**	**Cook's Index (Column A + Column B)/2**
Alabama	78.0%	70.4%	74.2
Alaska	70.5%	61.3%	65.9
Arizona	67.3%	62.9%	65.1
Arkansas	76.4%	69.2%	72.8
California	52.6%	66.8%	59.7
Colorado	57.2%	56.4%	56.8
Connecticut	43.1%	63.7%	53.4
Delaware	48.4%	47.9%	48.2
D.C.	34.5%	72.4%	53.5
Florida	60.6%	66.0%	63.3
Georgia	75.2%	67.5%	71.4
Hawaii	29.3%	40.3%	34.8
Idaho	69.6%	59.8%	64.7
Illinois	45.6%	64.1%	54.9
Indiana	61.7%	68.3%	65.0
Iowa	54.5%	52.5%	53.5
Kansas	64.3%	64.8%	65.0
Kentucky	74.6%	69.9%	72.3
Louisiana	76.6%	74.5%	75.6
Maine	59.0%	52.4%	55.7
Maryland	55.1%	68.6%	61.9
Massachusetts	30.5%	46.8%	38.7
Michigan	55.8%	67.4%	61.6

continued

	A	B	C
State	"% of All *Suicides* Committed with a Firearm"	"% of All *Homicides* Committed with a Firearm"	Cook's Index (Column A + Column B)/2
Minnesota	49.9%	49.7%	49.8
Mississippi	34.7%	68.3%	51.5
Missouri	63.6%	68.4%	66.0
Montana	66.9%	58.4%	62.7
Nebraska	58.2%	59.0%	58.6
Nevada	67.3%	60.5%	63.9
New Hampshire	55.9%	48.5%	52.2
New Jersey	35.1%	48.6%	41.9
New Mexico	64.3%	54.6%	59.5
New York	37.5%	64.8%	51.2
North Carolina	71.4%	67.0%	69.2
North Dakota	58.4%	51.9%	55.2
Ohio	58.1%	63.0%	61.0
Oklahoma	69.9%	60.6%	65.3
Oregon	61.8%	55.0%	58.4
Pennsylvania	54.4%	60.7%	57.6
Rhode island	32.4%	47.9%	40.2
South Carolina	72.5%	65.3%	68.9
South Dakota	60.6%	35.4%	48.0
Tennessee	74.0%	69.8%	71.9
Texas	69.3%	68.6%	69.0
Utah	61.0%	51.7%	56.4
Vermont	65.7%	59.6%	62.7
Virginia	66.8%	68.4%	67.6
Washington	56.1%	55.8%	56.0
West Virginia	74.9%	68.8%	71.9
Wisconsin	52.7%	59.3%	56.0
Wyoming	74.1%	55.6%	64.9

Teacher's Cook Index Sheet (Rank Order)

	A	B	C
State	**"% of All *Suicides* Committed with a Firearm"**	**"% of All *Homicides* Committed with a Firearm"**	**Cook's Index (Column A + Column B)/2**
Louisiana	76.6%	74.5%	75.6
Alabama	78.0%	70.4%	74.2
Arkansas	76.4%	69.2%	72.8
Tennessee	74.0%	69.8%	71.9
West Virginia	74.9%	68.8%	71.9
Georgia	75.2%	67.5%	71.4
Kentucky	74.6%	69.9%	72.3
North Carolina	71.4%	67.0%	69.2
Texas	69.3%	68.6%	69.0
Missouri	63.6%	68.4%	66.0
South Carolina	72.5%	65.3%	68.9
Virginia	66.8%	68.4%	67.6
Alaska	70.5%	61.3%	65.9
Oklahoma	69.9%	60.6%	65.3
Arizona	67.3%	62.9%	65.1
Indiana	61.7%	68.3%	65.0
Kansas	64.3%	64.8%	65.0
Wyoming	74.1%	55.6%	64.9
Idaho	69.6%	59.8%	64.7
Nevada	67.3%	60.5%	63.9
Florida	60.6%	66.0%	63.3
Montana	66.9%	58.4%	62.7
Vermont	65.7%	59.6%	62.7

continued

	A	B	C
State	"% of All *Suicides* Committed with a Firearm"	"% of All *Homicides* Committed with a Firearm"	Cook's Index (Column A + Column B)/2
Maryland	55.1%	68.6%	61.9
Michigan	55.8%	67.4%	61.6
Ohio	58.1%	63.0%	61.0
California	52.6%	66.8%	59.7
New Mexico	64.3%	54.6%	59.5
Colorado	57.2%	56.4%	56.8
Nebraska	58.2%	59.0%	58.6
Oregon	61.8%	55.0%	58.4
Pennsylvania	54.4%	60.7%	57.6
Utah	61.0%	51.7%	56.4
Washington	56.1%	55.8%	56.0
Wisconsin	52.7%	59.3%	56.0
Maine	59.0%	52.4%	55.7
North Dakota	58.4%	51.9%	55.2
Illinois	45.6%	64.1%	54.9
D.C.	34.5%	72.4%	53.5
Iowa	54.5%	52.5%	53.5
Connecticut	43.1%	63.7%	53.4
Mississippi	34.7%	68.3%	51.5
New Hampshire	55.9%	48.5%	52.2
New York	37.5%	64.8%	51.2
Minnesota	49.9%	49.7%	49.8
Delaware	48.4%	47.9%	48.2
South Dakota	60.6%	35.4%	48.0
New Jersey	35.1%	48.6%	41.9
Rhode island	32.4%	47.9%	40.2
Massachusetts	30.5%	46.8%	38.7
Hawaii	29.3%	40.3%	34.8

Article: "Firearm Availability and Unintentional Firearm Deaths"

This excerpt is adapted from the Discussion section of Matthew Miller, Deborah Azrael, and David Hemenway's "Firearm Availability and Unintentional Firearm Deaths," published in the journal *Accident Analysis and Prevention*, Volume 33, Issue 4, July 2001, pages 477–484.

4. Discussion

This study examines the relationship between firearm availability and unintentional firearm deaths in the US. It was found that children and adults, men and women, and members of all racial groups were significantly more likely to die from unintentional firearm injuries if they lived in states with more rather than fewer guns. The relationship between guns and unintentional firearm death remained statistically significant even after controlling for state level poverty, urbanization and regional location. This study appears to be the first national study to examine and document this relationship and while the statistically significant association itself is not surprising, the magnitude of the effect across all strata was not expected.

No data could be found to suggest that where there are more guns parents care less about their children's welfare or take fewer precautions with their own safety. Yet, unintentional firearm deaths are an order of magnitude greater in high-gun compared to low-gun states, both for children and for adults. The more than 10-fold increased risk of unintentional firearm deaths among children in the four states with the highest gun levels compared to the four states with the lowest gun levels is not readily accounted for by any identifiable variable other than guns. The analyses that control for state level poverty, urbanization, and regional location still find a relative risk that is over 10 times higher among states with many guns compared to states with few guns.

Stratified analyses comparing only southern states to one another (and non-southern states to other non-southern states) produce qualitatively similar and statistically significant associations between firearm availability and unintentional firearm deaths. In fact, although the unintentional firearm death rate is higher in southern than in non-southern states, once firearm availability is factored into pooled analyses, this regional gradient ceases to remain significant.

One reason that studies of gun availability and lethal violence have been confined to geographically limited areas within the US is that current firearm surveillance does not include direct measures of gun ownership at the state level. Yet the household gun ownership rate may not be the measure of exposure most appropriate to the analysis. Like Cook's Index, survey estimates of

household gun ownership only crudely measure exposure to firearms, indicating nothing about the number of guns per household, the type or caliber of the guns, storage practices, or gun carrying. In addition, surveys typically under-represent poor people (e.g. households without telephones) and it appears that women living in two-adult households with guns often do not know that there is a gun in their home. It is also not clear whether individuals would normally report guns obtained illegally. Some factors (e.g. storage practices) may have a substantially greater influence on unintentional firearm death rates among children than among adults. The extent to which Cook's Index captures some of these factors better (or less well) than do survey based estimates of household gun ownership rates is unknown. Nevertheless, household gun ownership levels and the measure of Cook's Index are highly correlated (correlation coefficients of 0.86 for regional household gun ownership and 0.96 for handgun ownership levels), suggesting that they are providing information about similar constructs.

Cook's Index increases roughly 2-fold from states with the lowest to the highest indices. This corresponds to a 3–4-fold increase in household firearm ownership levels, based on the Cook's Index on household ownership levels reported (1) for the nine US census regions (using levels reported in the General Social Surveys (GSS) and (2) for a convenience sample of 21 US states in the 1990s (using data from the Behavior Risk Factor Surveys). The 7–8-fold increases in the incidence of unintentional deaths among states with the highest compared to states with the lowest Cook's Index suggests that there are other factors associated with reported gun ownership levels (e.g. the number of guns per household) that may help explain the greater than additive effect on firearm accidents. Unfortunately, individual level data that would help provide answers to these questions are not systematically collected in the US.

Drawing causal inferences from group data to individual behaviors is generally referred to as the "ecological fallacy." For example, although the poverty rate in a given state with a high unintentional gun death rate may be very high, that does not prove that the actual individuals in this state who are dying from guns are disproportionately poor. On the other hand, if a person dies from gunfire, that particular individual did come in contact with a bullet. The ecological fallacy, therefore, is not likely to be a major problem for investigations into the relationship between unintentional firearm deaths and gun availability. Nor is the problem of reverse causation (households are not obtaining firearms in response to an intrinsically high risk of accidental gunshot injury or because the rates of such injuries are high in their community).

All firearm related deaths are classified in one of six mutually exclusive categories, based on the imputed intent of the people involved and the circumstances surrounding the death: accidental death, suicide, homicide, homicide due to legal intervention, death undetermined whether accidentally or purposely inflicted, and death due to war operations. Although the definition used by the NCHS is standardized, in practice the coding of deaths draws heavily upon the cause of death determined by the medical examiner or coroner who filled out the death certificate. It is known that coding practices for equivocal cases can vary across medical examiners and coroners. For example, some might code a death from Russian Roulette as an unintentional firearm death

whereas others might code it as a suicide. Although misclassification in this data set has been reported for suicides, there is no reason to expect that the degree of misclassification of unintentional deaths is related to a state's gun level and, as such, should not bias the results. Deaths from firearms of undetermined intention and from war activities are excluded from analyses. It is worth noting that among children 0–4 years of age there are no firearm suicides to misclassify as unintentional firearm deaths, yet the risk ratio is greatest for this age group.

The findings are robust. Analyses are not driven by either the largest states or the states most extreme in gun levels. Statistically significant and qualitatively consistent results were produced whether the data analyzed were the 50 United States, the 40 largest or the 40 smallest states, the 40 states least extreme in their gun levels (i.e. excluding the five states with the highest and the lowest Cook's Index), or when the most extreme outlier (Alaska) was excluded from analysis.

Control variables in the analyses were all in the expected direction. Consistent with others, it was found that overall unintentional firearm death rates were inversely related to urbanization, and in simple correlations, positively associated with poverty. Among African Americans, however, the inverse association between unintentional firearm deaths and urbanization did not reach significance, probably due to the high risk of unintentional firearm death among African American urban youth.

Omitted variables are always a concern in statistical analysis. The analyses may not account for some reasons that states with higher gun levels have higher unintentional firearm death rates. Although we included various state-level confounders, such as poverty, urbanization, and southern location, these represent only a small number of the characteristics likely to affect unintentional firearm deaths (e.g. firearm storage). It is not clear, however, whether accounting for these unobserved characteristics would revise the magnitude of observed association upward or downward.

Between 1979 and 1997, over 29,000 people died from unintentional firearm injuries, 4,600 of whom were children under 15 years of age. If the crude firearm death rate for Arkansas, Mississippi, Alabama and Louisiana pertained to the entire 50 United States, over 11,000 children under 15 years of age would have died over this same 19 year period—over 10,000 more children than would have died if the US had the firearm death rate of Massachusetts, Rhode Island, New Jersey and Hawaii. Overall, more than 76,000 Americans would have died over this period if the US had the unintentional firearm death rate of the high-gun states, while under 10,000 would have died if the low-gun state's death rate pertained.

The US has more guns and more unintentional gun injuries than any other industrialized nation. Approximately 50 people each day are unintentionally shot in America and every other day a child under 15 years of age dies from unintended gunfire. As a society we generally try to respond if the children are in danger. When it became apparent that air bags (which, like guns, are purchased for protection) killed six children per year over the past decade, these fatalities

caused intense media attention and manufacturer and governmental responses to address the problem. The galvanizing effect of these air bag deaths appears in sharp contrast to the slow regulatory and manufacturing response to the loss of well over a hundred children each year due to unintended gunfire.

Fortunately, many policies are readily available to reduce this injury problem. Although formal firearm training does not appear to improve safe storage practices, other approaches that do not rely on changing behavior but rather on changing the environment offer promise, such as modifying firearms and ammunition to render them less lethal and manufacturing child-proof guns, personalized guns and guns with magazine safeties. There are many potential costs and benefits from having a heavily armed society. This article examined one possible cost—an increase in unintentional gunshot death. The findings suggest that for men and women, African Americans and Whites, and for all age groups, where there are more guns, more people are dying from unintentional gunshot injuries.