Guns, Suicide, and Homicide: Individual-Level Versus Population-Level Studies

In a systematic review published in this issue, Anglemyer and colleagues (1) found that access to firearms is associated with the risk for completed suicide (odds ratio, 3.2) and being the victim of homicide (odds ratio, 1.9). These results are consistent with those of previous literature reviews (2, 3). The lack of recent research on these issues is telling: The current review found no relevant study published after 2005. However, I believe that this review provides too conservative an estimate of the relationship among guns and suicide and homicide at a societal level.

The evidence that a gun in the home increases the risk for suicide is overwhelming, even stronger than Anglemyer and colleagues’ robust findings. They examined only individual-level studies, stating, “[W]e decided not to include population-level data because we were concerned about ecological bias; for example, gun ownership data on a population level may not reflect the persons who actually commit suicide, so no true link between gun ownership and harms outcomes can be made.” Different disciplines use different research methods. The National Research Council (4) team that critiqued the scientific knowledge about firearms gave little weight to evidence from case-control studies, possibly because the team included few public health experts. Anglemyer and colleagues display an opposite and potentially equally misleading bias by excluding population-level evidence.

Everyone who studies epidemiology learns about the ecological fallacy, but too few seem to learn when it is and is not a serious problem. I believe that the ecological problem is minimal when guns in the home and suicide are examined. Why? Because we know that most guns used in suicides are guns obtained from the home that are used by someone living there. Suicide perpetrators almost never use a gun belonging to another family. We also know that the gunshot wound caused the death in these cases.

The evidence from many population-based studies of guns and suicide is as strong as that from individual-level studies. Across U.S. cities, states, and regions, higher levels of household gun ownership are associated with higher rates of firearm-related and overall suicide. There is no association between gun ownership levels and suicide by means other than guns. These studies have controlled for such factors as rates of urbanization, poverty, education, alcohol use, unemployment, divorce, depression, suicidal ideation, and suicide attempts. The association holds for men, women, adolescents, and all adult age groups (5). The effect of a gun in the home is not only significant but important. Indeed, differences in suicide rates among the states are better explained by household gun ownership levels than by levels of mental health problems, suicidal ideation, or suicide attempts (6). Studies also show that adults in households with firearms are no more depressed or suicidal than those in households without firearms (7), yet they are far more likely to die of suicide.

The few U.S. ecological studies that did not find a significant relationship between guns and suicide used poor proxies for gun ownership. The only individual-level study (8) in Anglemyer and colleagues’ review that did not show a statistically significant association was from New Zealand, where gun safety laws are stronger than those in the United States (for example, guns in the home must be locked up), and was underpowered—only 20 firearm-related suicides were included among the cases. The risk for suicide was 40% greater in homes where persons owned a gun, a result that is significant at the 10% level but not at the 5% level.

The evidence that Anglemyer and colleagues summarized about the relationship between guns and homicide is not nearly as strong as that between guns and suicide, perhaps largely because the authors focused exclusively on individual-level studies of victims. Most victims of firearm-related suicide shoot themselves with a gun from their own home. In contrast, victims of firearm-related homicide are, by definition, shot by someone else and most perpetrators do not use a gun from the victim’s home. Only in domestic homicides does the perpetrator often kill the victim with a household firearm, and in these instances a man typically shoots his female partner; relatively few male homicide victims are shot by their partners. Not surprisingly, the evidence on the relationship between homicide and household firearms is strongest for female victims. Studies of battered women—not included in Anglemyer and colleagues’ review—confirm the strength of this relationship (9).

Why having a gun in the home would substantially increase the risk for being murdered by a person who is not a family member is uncertain, and Anglemyer and colleagues do not provide an explanation. Although there is little evidence that having a gun reduces the risk for homicide victimization (10), there is not yet compelling evidence that having a gun substantially increases the risk for homicide victimization for most men. What does put men at substantially increased risk for homicide victimization is other men having access to guns.

I suggest that future analysis of the association between guns and homicide should not be through individual-level studies of victims but through individual-level studies of perpetrators or ecological, population-based studies. Such studies that have been done provide evidence that more guns in the community substantially increase the risk for homicide victimization (3).
Anglemyer and colleagues aptly summarize the evidence that, for most families, bringing a gun into the home substantially increases the risk for suicide for all family members and the risk for women being murdered in the home (11). Evidence not included in their review also indicates that a gun in the home increases the risk for homicide victimization for others in society. This increased risk may be due to someone in the family shooting others (for example, the Sandy Hook Elementary School shooting) or the gun being stolen and used by criminals. Obtaining a firearm not only endangers those living in the home but also imposes substantial costs on the community.

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