DISSENT

International comparisons: they do help and are essential for avoiding type III error

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In commenting on the report of child injury league tables issued by UNICEF,[1] Ramsay asked the rhetorical question: Do international comparison help?[2] Chalmers and Pless gave a conservative reply in the Editorial in *Injury Prevention*—"we certainly hope so".[3] Unlike Langley, I would like to give a more affirmative reply: I am convinced that international comparisons do help and are in fact essential for avoiding type III error, that is giving the right answer for the wrong question.[4]

The UNICEF report concerned two kinds of questions: why were there large variations in child injury mortality among countries that are part of the Organisation for Economic Cooperation and Development? And why did changes in child injury mortality differ from 1971–75 to 1991–95 among these countries? However, by using traditional, individual based epidemiological research methods to answer these questions, we run the risk of committing the type III error. Rose cautioned that we need to distinguish between two kinds of aetiological questions: the first asks about the "causes of cases" whereas the second asks about the "causes of incidence".[5 6]

Schwartz and Carpenter extended Rose's argument, illustrating it by using the causes of stroke.[7] The causes of interindividual variation in risk within a population (for example, diabetes, genetic vulnerability) may be distinct from the causes of differences in the disease rate over time (that is, global economic crisis) or between populations (that is, differences in social norms in response to economic crisis). All of these factors, in turn, are distinct from the cause of the disease itself—that is, damage to the brain caused by an interruption of the blood supply.

To highlight the importance of the foregoing distinction for injury prevention research, we have modified the example of Schwartz and Carpenter. We asked what factors might influence differences in the occurrence of injury in two countries (see fig 1). We assume two countries that are involved in increasing trade through globalization, and with different societal responses in terms of domestic policies and social investments. Country A adopts the approach of treating worker injury as an unpredictable and unpreventable event, and consequently encourages norms emphasizing individual responsibility. Increased economic competition, such as induced by the Multilateral Agreement on Investment (MAI), may lead to a reduction of safety standards[8] and less community advocacy in injury prevention. In contrast, the response of the second country (population B), whose emphasis is on treating injury as a preventable problem, may be to increase safety standards and to promote more community advocacy in injury prevention in the face of threats from MAI.

Taking an extreme example, in the first country, then, unsafe environments become ubiquitous (100%); in the second, they are eliminated (0%). The simplified example

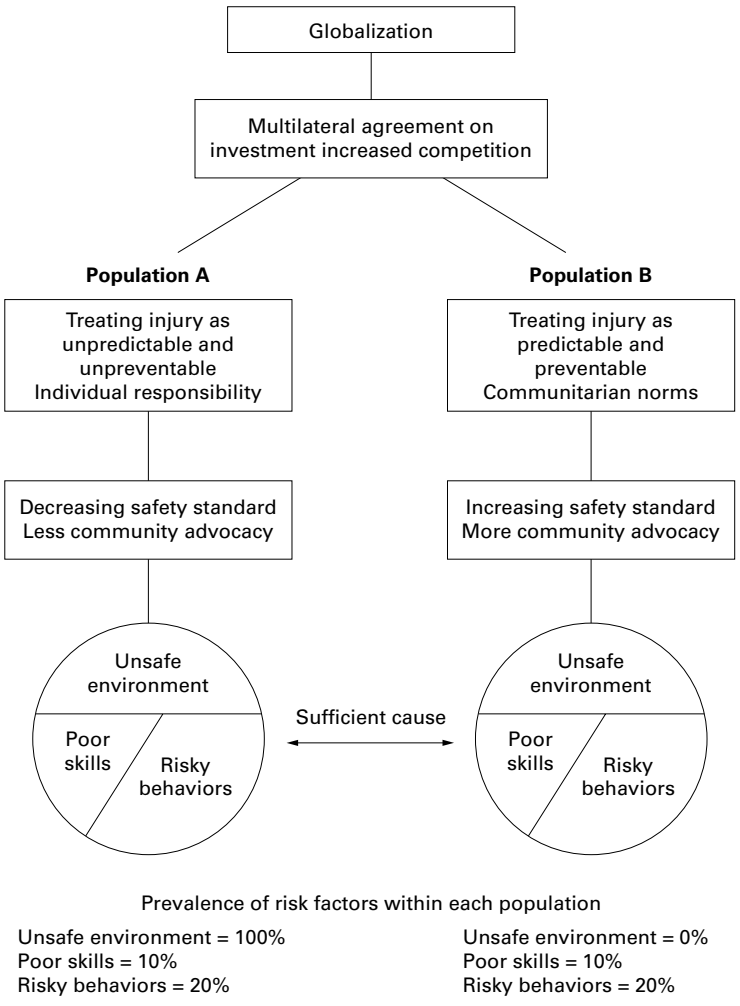

Figure 1 Population differences in the prevalence and patterning of risk factors for injury, based in part on Schwartz and Carpenter's model.[7]

further assumes that the two countries are *identical* in terms of the prevalence and pattern of all other sufficient causes of injury.

For investigators studying people within population A, risky behaviors or poor skills would be potential risk factors for injury. Unsafe environments would not be detectable as a risk factor in this population because they are ubiquitous. As every one is exposed, it is not possible to differentiate people in this population on the basis of their exposure to this factor. In other words, we have correctly identified the causes of "cases", but missed the causes of "incidence". Unsafe environment is clearly a cause of injury in population A, but it is not a cause of interindividual variation; that is, it does not explain why one person in this population suffers an injury while another does not. By contrast, within population B, an unsafe environment would not be a cause of injury, because no one is exposed to it.

Population A would also have a much higher incidence of injury than population B. The cause of this rate difference is not due to differences in the prevalence of the risk factors identified within population A (that is, poor skill and risky behavior) because they are present in the same proportions and in the same patterns in the two populations. Rather, the rate difference between the two populations is due to differences in the societal approaches to injury prevention that led to differences in exposure to unsafe environments. There has also been a change in the incidence of injury in population A over time, owing to the declining safety standards wrought by pressure from globalization.

If injury prevention researchers continue to examine the distribution of injury only *within* a population, this will only yield answers about causes that can be distinguished among these individuals. This approach will fail to detect causes that are either widespread or relatively invariant within any population under study, whether these are inherently group characteristics or derive from interactions among individuals. Indeed, this may be one of the reasons why some risk factors identified by traditional case-control and cohort studies do not appear to be effective in intervention studies.[9]

What are the consequences of type III error in injury prevention research? As suggested by Schwartz and Carpenter, the consequences depend on the relationship between the causes of the differences among individuals within a population and the causes of the rate differences (between populations or time periods) in their contribution to the current incidence in the population.[7] We believe that injury prevention researches are more likely to run the risk of type III error because many of the factors related to the incidence of injury are contextual.[10] International comparisons could provide useful insights for avoiding type III error.

The ability to make valid comparisons among countries should lead not only to recognition of important differences but also to a better understanding of successful preventive measures.[11] None the less, international comparisons of injury remain a relatively neglected area of research. One reason is because most researchers seem more interested in identifying individual level risk factors—the dominant paradigm in epidemiology.[12] A second reason is that most researchers do not receive international perspectives in their training. A third reason is that valid and comparable data for cross national comparisons are so hard to obtain.

The International Collaborative Effort on Injury Statistics has done much to improve the international comparability and quality of injury data. Nevertheless, the effort is still some distance from the ultimate goal to provide the data needed for understanding the causes of injury and the most effective means of prevention.[13] The UNICEF report was an important attempt to explain cross country and cross time period variations in injury. Even so, most of the speculations were based on studies within individual countries. Only in figure 9 do we see a cross national comparison of when and what national legislation was enacted. However, even these comparisons were questioned by Chalmers and Pless, who pointed out that none of the laws in Germany differed substantially from measures taken in other, less successful countries.[3] Clearly, further accurate and insightful data are needed on societal-level characteristics for making international comparisons and for avoiding type III error in injury prevention research.

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