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Preprint

not peer reviewed

Prevention versus Risk Reduction or Mitigation: Why create unnecessary battles?

For correspondence:
stovitz@umn.edu

Ian Shrier¹, Franco M. Impellizzeri² and Steven D. Stovitz³

¹ Centre for Clinical Epidemiology, Lady Davis Institute, Jewish General Hospital, McGill University, Montreal Canada, ² School of Sport, Exercise and Rehabilitation, Faculty of Health, University of Technology Sydney, NSW, Australia, ³ Department of Family Medicine and Community Health, University of Minnesota, Minnesota, USA

Please cite as: Shrier, I., Impellizzeri FM, & Stovitz SD. (2023). Prevention versus Risk Reduction or Mitigation: Why create unnecessary battles? *SportRxiv*.

All authors have read and approved this version of the manuscript. This article was last modified on Jan 12, 2023.

ABSTRACT

Recently, some in the sports medicine community have argued that injury "prevention" is an inappropriate term when efforts fall short and not all injuries are prevented. Some reviewers are now insisting authors replace the term prevention with risk reduction or risk mitigation. We illustrate that because prevention is a causal concept, banning its use would also require banning the word "cause". Using definitions that are consistent with the broader medical community is necessary for communicating scientific information.

EDITORIAL

Several authors (eg. ¹⁻⁵) argue that injury prevention "implies stopping a specific event from occurring and that's not likely what these [injury prevention] programs do", ³ or that "prevention means no occurrence of injuries."⁵ These authors suggest replacing prevention with risk reduction, mitigation, or risk management. ^{3 5} Some reviewers now insist authors avoid the term prevention. (personal experiences managing submitted articles and ²)

We believe the sport research community should be consistent with the broader medical community where possible. This article explains the use of "prevention" in epidemiology. As shown below, if interventions cannot "prevent" injury, then interventions (e.g. exercise) cannot prevent most outcomes and can never prevent death.

Risk reduction *is* synonymous with prevention

We use vaccines to prevent polio as a familiar pedagogical example that mimics many medical interventions. The same principles apply to the more complex injury context.

Consider a randomized trial for an oral live vaccine to prevent polio. The vaccine is less than 100% effective⁶ and the live vaccine also causes some cases of polio. In epidemiology, we categorize each participant in the study population into one of four theoretical groups before the study begins depending on their "potential outcomes", i.e. whether they would get polio if they either received or did not receive the vaccine.⁷

1. No effect (Doomed): Participants with a compromised immune system who do not generate an effective immune response may contract polio with or without vaccine
2. No effect (Immune): Participants with an immune system that fights off the virus on its own will not contract polio with or without vaccine

3. Helpful effect (Preventive): Participants with an appropriate immune response will not contract polio with vaccine, but may contract polio without vaccine
4. Harmful effect (Causal): Participants with an immune system that is unable to fight off the small amount of live virus used will contract polio with vaccine, but may not contract polio without vaccine

We can see that “preventive” and “causal” both refer to the vaccine having an effect, i.e. causing a change in outcome. In epidemiology, we generally use the term preventive when the intervention results in benefit and the term cause when the intervention results in harm. In other words, prevention and causation are similar; the only difference is how we “code” the treatment and outcome. “The intervention prevents death” is equivalent to “The intervention causes increased survival”. If we cannot use the word “prevention”, then we cannot use the word “causal”. We also highlight that delaying the outcome (i.e. *preventing* the condition within a specified time interval) is *also* considered prevention. If some participants die at age 80 instead of age 50, we generally say that mortality was prevented for 30 years.

The context of injury prevention programs is similar. In a randomized trial examining exercise as an injury prevention program, some participants would be categorized as Doomed (injured with or without the intervention), some Immune (not injured with or without the intervention), some Preventive (no injury with the intervention but injury without the intervention), some Causal (injury with the intervention but no injury without the intervention). Although a little more complicated than the vaccine example, the guiding principles remain the same. The potential outcomes approach is consistent with the critics’ perspective in that we cannot prevent injury in every person. However, we also cannot reduce the risk in every person. Therefore, we do not see this as justification to replace prevention with “risk reduction”.

In clinical medicine and epidemiology, we cannot know if the vaccine was helpful or harmful (preventive/causal) for any individual participant (known as sharp causal effect) because each participant either receives the vaccine or not. Therefore, we generally use causal and preventive in the context of describing the *average causal effect* in the population. We would consider that an intervention has a causal/preventive effect if it changes the outcome in at least *some* of the population. More generally, different sources define prevention differently (Table 1) but all are consistent with the interpretation of preventing or delaying disease in at least some of the population.

Table 1. Some medical and epidemiological definitions of “prevention”

Source	Definitions
The Dictionary of Epidemiology ⁸	“[A]ctions that prevent disease occurrence. Actions aimed at eradicating, eliminating, or minimizing the impact of disease and disability, or if none of these is feasible, <i>retarding the progress of disease and disability.</i> ”
The National Cancer Institute ^a	“[A]ction taken to <i>decrease the chance</i> of getting a disease or condition.”
World Health Organization ⁹	“[A]pproaches and activities aimed at <i>reducing the likelihood</i> that a disease or disorder will affect an individual, interrupting or <i>slowing the progress</i> of the disorder or reducing disability”.
World Health Organization ⁹	“[S]pecific, population-based and individual-based interventions for primary and secondary (early detection) prevention, aiming to minimize the burden of diseases and associated risk factors.” In addition, tertiary prevention refers to reducing consequences once disease has been detected and quaternary prevention refers to preventing iatrogenic disease.

Emphases added by the authors to highlight key terms;

a, <https://www.cancer.gov/publications/dictionaries/cancer-terms/def/prevention>;

Some argue risk mitigation is the optimal term. Risk mitigation in epidemiology⁸ and other fields^{10 11} includes “Actions taken to avoid or minimize negative environmental, medical, or social impacts”.⁸ This is essentially a combination of primary and tertiary prevention,⁸ further confirming that risk mitigation is synonymous with an expanded definition of prevention.

In conclusion, using definitions that are consistent with the broader medical community is helpful for communicating scientific information. Prevention is a causal concept and the arguments against its use would also mean that we cannot say anything is a cause of injury. Risk reduction and risk mitigation are synonymous with different forms of prevention. We see no reason to prohibit the use of the term prevention.

Contributions

Contributed to conception and design: IS, FMI, SDS

Drafted and/or revised the article: IS, FMI, SDS

Approved the submitted version for publication IS, FMI, SDS

Acknowledgements

None

Funding information

This work was unfunded.

Data and Supplementary Material Accessibility

Not applicable

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- [2] lahti_johan. Reviewer wants me to stop using the term "injury prevention", and switch to injury management (maybe more rehab+prevention) or mitigation/reduction. *Reviewer wants me to stop using the term "injury prevention", and switch to injury management (maybe more rehab+prevention) or mitigation/reduction My bias is that reduction means*

- "hinder", not reduce to 0, but then again, I'm not a native speaker! :) So, please help by voting:: Twitter, 2020.
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