Otzi's Adventures

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Ethical Issues Raised by Conclusions

The largest ethical issue that our conclusions face is generalizability. We present findings, such as using supplemental oxygen increases the odds of a climber summiting. But, all our findings implicitly apply to the types of people who go on expeditions in the 8 Himalayan mountains of interest and are not applicable to the general population. This type of extreme mountaineering is not a standard activity, and thus our conclusions suffer greatly from selection bias. Expeditions require extended planning periods, specialized equipment, participants to leave home for a significant amount of time, and large amounts of money. Climbers must be relatively healthy, train, and ultimately have strong enough interest to endure the treacherous conditions found on the mountains. Additionally, the Nepalese Ministry has a regulatory process for granting expedition permits and implements standards for who is allowed to even attempt a climb. Additionally, these findings would not generalize to other high peaks throughout the world or even the other peaks in the Himalayas, despite having a similar population of avid climbers.

In situations such as this, the impetus is on the researchers to conservatively frame their findings to avoid misinterpretation. All conclusions must be presented with the caveat that they are applicable to the types of people who would and who could seriously consider a Himalayan expedition. Otherwise, we would risk the average 16-year old thinking that they have a great chance of summiting Everest, as our survival plot shows that the under 18 cohort summits about 80% of the time. And, in this case misinterpreting one's ability to climb or factors that might aid on in a climb could lead to serious injury or death.

All of our analyses also suffer from omitted variable bias. By omitting key predictor variables, we could be publishing conclusions that are misleading. For instance, when we analyze the effect of summit time on death, we find that those that summit later in the day are more likely to die. But, we lack data on major weather events, earthquakes, avalanches, and crowding on routes. In reality those that summit later could be doing so because of a weather window or because they had to wait in line, and their mortality is less a reflection of the time of day and more a reflection of these missing factors. We also are making the assumption that summiting is the optimal or "good" outcome for all climbers. Our conclusions ignore the fact that some climbers might only be trekking with another goal in mind (i.e. scientist needing to set up an experiment at X meters). In our analyses, we deem these trips to be failures, despite the fact that a climber might have done exactly what they set out to achieve.

Lastly, there is a level of ethical ambiguity in the experimental design of our power analysis. We avoid the clearly unethical experiment of requiring one group of expeditions to use supplemental oxygen and prohibiting another group of expeditions from every using oxygen. We know that many climbers need oxygen to survive the climb. So, preventing access to oxygen undoubtedly poses harm and is an unethical condition for a RCT. Instead, we require one group to use oxygen and make oxygen optionally for the second group. However, making oxygen option means that climbers must be provided adequate information about the benefits of oxygen in order to make informed decisions. We then run into an interesting issue: oxygen deprivation results in cognitive impairment. If a climber on one of our optional expeditions is trying to make that decision while already experiencing diminished cognition, we cannot confidently say the climber is making an appropriate choice. We would need to ensure that non-impaired climbers on the expedition could make the decision about whether to use oxygen to avoid morally questionable situations.