Editor’s note: VOICES is a project of the journal to provide personal, historical, and scientific perspectives on the field of epidemiology, as seen through the eyes of the field’s most senior and accomplished practitioners. Readers are welcome to nominate candidates for the editors’ consideration.

A Conversation With Olli Miettinen

James A. Hanley

Olli Miettinen was born in Piikkio, Finland on 31 July 1936. He obtained his MD from the University of Helsinki and the MPH and PhD degrees from the University of Minnesota. He was Professor of Epidemiology and Biostatistics at Harvard School of Public Health from 1974 to 1986, and has been a Professor in the Department of Epidemiology, Biostatistics, and Occupational Health and in the Department of Medicine of the Faculty of Medicine at McGill University since 1985. He is the author of 3 textbooks and a veteran of extensive teaching internationally.

INTERVIEW

JH: As an epidemiologist today, you are somewhat exceptional in having a background in medicine. Why did your path to epidemiology begin with medicine?

OSM: Given my technological and mathematical bent, I began my academic studies in technological physics. But after a year, I realized that engineering would likely involve more administration than technology; and so, after another year of military service, I switched to medicine.

JH: What brought you into epidemiology?

OSM: As a medical student, I was drawn into research in a private hospital and foundation engaged in cardiological research. I got this strong impression that something is fundamentally wrong in this research. These researchers, while concerned to have statistics suitably entered into their papers, had no interest in what the statistics actually are and mean. There was just a concern that one enters them into any paper the way they appeared in the other papers one reads. The statisticians were in another institute; they got the data and produced the statistics to be somehow worked into the article. I thought that this divorce between the medical substance and statistics was inappropriate. After some consternation and contemplation, I elected to set out to learn the theory of medical research, notably that of quintessentially applied medical research. I was advised, then, to go and study epidemiology and biostatistics, which I did.

JH: What is your current view of that advice?

OSM: I take all of medical research, however “basic,” to be applied research—in the meaning that it is intended to advance the practice of medicine, clinical or community medicine. And as understanding of quintessentially applied epidemiological research arguably is a prerequisite for its clinical counterpart, I now think I was well advised to go and study epidemiological research.

JH: What is “basic” epidemiological research?

OSM: Research for the development of vaccines, for example.

JH: So, what about biostatistics in preparation for quintessentially applied epidemiological research?

This interview was conducted on 10 May 2011 at McGill University in Montreal, Quebec, Canada. Olli Miettinen has approved the transcript for publication. The unedited video of the 2-hour interview is available online at http://bcooltv.mcgill.ca/ListRecordings.aspx?CourseID=6485.

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Epidemiological research is about frequencies of phenomena of health. It thus is statistical research, and knowledge of relevant aspects of statistics consequently is a prerequisite for proper study of epidemiological research of the fully applied sort, just as, for example, broad and deep command of mathematics is a prerequisite to a career in physics. I learned more from my study of mathematical statistics than from biostatistics, in which I have my PhD.

JH: What are the biggest differences between the epidemiology that were practiced when you began your career and epidemiology today?

OSM: As for epidemiology in the meaning of the practice of community medicine, the principal difference that I am concerned with is that there increasingly is this idea that a citizen ought to take care of their own health in the interest of society, that community medicine increasingly encroaches on individual freedoms. In Nazi Germany, the citizen had the responsibility to take care of their health in the interest of the Reich, and we are in that situation increasingly today; it bothers me as a libertarian. As for epidemiological research, the volume has increased enormously but the question is: How much progress has there been? As you know, today the solution to almost anything, from the preventive point of view, is “diet and exercise.” But: what have we learned about diet and exercise in these 50 years? I’m afraid not very much. So, there has been substantial increase in research without a whole lot of progress in knowledge.

JH: Whom would you regard as the 2 or 3 most important epidemiologists during your lifetime?

OSM: I presume the question is about epidemiological researchers rather than practitioners of epidemiology, of community medicine. Perhaps it was that 1976 paper on case-referent studies, a citation classic as it is. The eminence of it, insofar as influence is concerned, has perhaps been principally because of the test-based interval estimate concept that I introduced there.

And by the way, confounding, the alternative to causation, can never be understood without the concept of study base. If you think of a case series coupled with a control group, the question is: What to you is a confounder? There is no answer to that question. The author of a textbook on case-control studies was in my office and I asked him: how did you define confounding in your textbook? There was a pause, and then, “I don’t remember.” I had the thought, quietly, that it’s difficult to remember something that makes no sense. Case-control study is an aberration that really should disappear. And there’s something fundamentally aberrant about the cohort study as well. In it, too, you should obtain the case series and a base series from the study base, etc.

The one and only theme in that 1976 paper should have been this: let’s move beyond the case-control study; let’s learn to always be students of rates, comparing the exposed with the unexposed in the study base and never cases with controls.

JH: Which of your contributions to the field would you most like to be remembered for?

OSM: The books that I’ve been working on for the last 2½ years. Two of them just came out, one on so-called clinical epidemiology and evidence-based medicine, the other a counterpart of A Dictionary of Epidemiology of the I.E.A. Right now, I’m working on an introductory text on epidemiological research, expecting to have it completed by the end of retrospective time, my answer would unhesitatingly have been Edward Jenner and Robert Koch. But in the period actually in question, a reasonable view, I think, would be the troika of Franz Müller, Richard Doll, and Ernst Wynder. Müller, in his medical thesis in 1939, gave very elegant and compelling evidence for what already was very strongly suspected in Germany: that smoking quite substantially increases the risk of lung cancer. Doll and Wynder, in turn, had a major role in retarding the recognition of this major health-hazard, in the UK and US, respectively.

JH: Which do you think has been your most influential paper?

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I might add that this has also been my most underappreciated article, for it should have made the case-control study obsolete; but, it didn’t. In that paper, I said as a novelty that the so-called control group in these studies should be understood to be a sample of the study base, the referent of the study result. You don’t compare your case series with your base series; you get numerator information from one and denominator information from the other, and you get to quasi-rates and thereby to rate ratios, without any rare-disease assumption.

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of this year. Next year, I may still produce an introductory text on clinical research, which has been my preoccupation in addition to epidemiological research. These books represent a synopsis of the understandings that I have come to, through concentrated efforts over 5 decades, as for what ultimately matters, namely the elementary. There are no advanced topics any one of them. They are elementary, even if in many ways innovative.

**JH:** I’m impressed by how you devote the first part of your dictionary to the prerequisite concepts for epidemiological research, namely medicine, science at large, and statistics. Might you comment?

**OSM:** A student of epidemiological research needs to learn, for example, that as a matter of medicine, disease is but one genre of ill health; that, as a matter of science, studies in the practice of epidemiology—sample surveys for community diagnosis, say—are not research; and that many concepts of statistics, such as “data analysis,” are malformed as matters of mere statistics, even.

**JH:** You are, first and foremost, a developer and teacher of the theory of epidemiological research. What, in your view, makes for a good teacher of epidemiological research?

**OSM:** Teachers of epidemiological research are being evaluated in respect to their effectiveness in getting their messages across. But to me, a good teacher is one who has good messages, one who really understands epidemiological research.

**JH:** What is your assessment of yourself as a teacher?

**OSM:** I feel I should recall all my students in the last 4 decades. I’ve been as naive as teaching in separate courses “study design” and “data analysis,” echoing the unjustifiable distinction between so-called epidemiologists and so-called biostatisticians concerned with epidemiological research.

**JH:** How should epidemiologists choose their research topics?

**OSM:** The beginning of all wisdom in epidemiological research, in my view, is that it should not be driven by investigator interest. Society pays for the research, and it does not pay for the researchers to indulge in their hobbies. Society wishes to have worthy results from the research toward public health. Therefore, one should be concerned with what is worth studying from the societal point of view and at the same time feasible to meaningfully study. This is a matter of the study’s propitious object design.

**JH:** What have been your major interests outside your epidemiologic activities?

**OSM:** For one, I have, all along, had a major interest in something closely related to my efforts to ever better understand epidemiological research; and this has been, as I’ve already let on, my interest in ever better understanding what I term meta-epidemiological clinical research.

For another, I have maintained quite a catholic interest in the history of ideas, intellectual and technological, and religious ones too. In the history of intellectual ideas, my interest has principally been in those of philosophy and science, but cultural ideas in a broader sense also.

One book I just recently read is *The Beginning of Infinity* (2011) by David Deutsch, the physicist and engineer in quantum computing who also is a notable polymath with central concern for progress in human societies. Unsurprisingly, he also is an aficionado of another venerable tome, *The Ascent of Man* (1973) by the earlier polymath—mathematician, poet, inventor, playwright, and author of many other books too—Jacob Bronowski. I’ve been an admirer of his for almost 4 decades already. Along the same lines, I last week read, with much interest, Niall Ferguson’s *Civilization: The West and the Rest.*

**JH:** What’s been epidemiology’s most important contribution to society?

**OSM:** Oh well, there should be no question: the ascent of man over communicable disease; communicable disease control. This is the only feature of medicine that Ferguson brings up, although he does not use the word “epidemiology.” Nor do academic epidemiologists now define epidemiology in reference to practice of community medicine. In my introductory book, upcoming, I illustrate the misunderstanding in this by the public health agency of the city of Ottawa, with how evident it is from the language in their reports that they’re practicing epidemiology for the population of the city of Ottawa. But, we academics have lost sight of what epidemiological research supposedly serves, namely epidemiology in the meaning of such practice of community medicine.

**JH:** What is your assessment of the current state of health of epidemiology, then?

**OSM:** If epidemiology means practice of community medicine, then I give one answer; if it is seen to be research, then it’s another answer. I have no major problem with today’s practices of epidemiology other than what I mentioned earlier, namely that we have gone too close to the Nazi-type society, which dictates how individuals are to conduct themselves in respect to health issues.
In research, too, the public is what we ultimately are supposed to serve, and we supposedly conduct research in order that the public ever better knows how to preserve and promote their health. Now people’s first order of concern in this is their diet, and they are bewildered by the conflicting and ever-changing ideas that come from epidemiological research. We really ought to tidy up things around epidemiological research, notably as for what comes to public attention. One of the remedies in my view would be that there be no press releases, from universities or from journals, regarding original studies. Only a review may deserve public attention. The self-promotion of universities and journals is a great disservice to the public and to the researchers themselves.

JH: What about risks and opportunities in epidemiological research?

OSM: I don’t think of risks, although I worry about young people who set out to do case-control studies for the rest of time without any real sense of what to study and how to study it, producing papers without making contributions.

As for future opportunities, I feel they are plentiful, in the meta-epidemiological clinical research in particular. I am mainly thinking about the development of the knowledge base for clinical medicine, appropriate in form for expert systems, diagnostic probability functions first off. There’s a way of getting that information from clinical experts, as I explain in the book on clinical epidemiology. So, I would be thrilled to be a beginning researcher today, focused on these efforts. One can see great productivity down the pike, very securely.

JH: Do you have any predictions about what the future might hold for our field?

OSM: I actually have quite a strong sense of that. Epidemiology has been in the service of, and subservient to, public health all along, and it will continue to be in this role. But public health has undergone a profound change in recent decades, without “public-healthers” always noticing this. By the advent of national health insurance, clinical medicine became a concern in public health. So, now public health is principally, by far, about clinical medicine. A Minister of Health is now mainly preoccupied with clinical medicine, with its unsustainably increasing societal cost; and, whereas politicians and economists have been trying to find solutions to this huge problem, epidemiologists will have to get on with this principal challenge in modern public health.

JH: What are the roles?

OSM: The first role, I think, would concern the ills of healthcare, clinical healthcare overwhelmingly, of wasteful proceedings there—diagnosing these and bringing them to the attention of the relevant decision makers concerned to free the system from waste. This is not science, but it is very important public health work, in modern public health.

The other thing then is the one that I just mentioned, namely that epidemiologists should be in the front line of making clinical practice expert systems-driven. It takes epidemiologists to work with clinicians to produce those systems and to thus help bring genuine professionalism to the practice of clinical medicine. You know very well that, from the epidemiological point of view, the lead idea in this direction has been that of Archie Cochrane, namely that if practitioners knew what treatments work best, they would more commonly use the most effective treatments. The National Health Service of UK would thereby be more efficient. And so, his solution was cultivation of randomized trials on treatments. I start from the same problem, but I say that if doctors knew what their most illustrious colleagues in a given situation typically think and do, they would think and do likewise; and again, waste would be reduced and costs would thereby come down, while quality would improve. So, I am suggesting a role different from that envisioned by Cochrane, a larger role, something whose results are more quickly and less expensively attainable.

JH: What is the most important piece of advice you would give to a beginning epidemiologist?

OSM: I am very sanguine about the idea that someone suitably programmed, so to speak, will have a very good career in the sense of the societal yield, for one, and personal sense of accomplishment, for another. As I study the history of ideas, there is nothing like the Enlightenment, how it changed thinking and was the platform for progress in science and consequently in societies at large. So, it is good to recall what the maxim of Enlightenment was, as perpetuated by Immanuel Kant, for example. It was sapere aude, meaning “dare to reason,” or “dare to think for yourself.” Be an independent agent rather than merely a perpetrator of the past, which was the idea before Enlightenment. That would be the beginning.

But then there is this other thing, which I think is worth mentioning. My original interest was, as you know, in cardiology research, and I had a long-term cardiology appointment in Boston. I also was already a consultant to Paul Hugenholtz, the pioneering professor of cardiology in Erasmus University, in the 1960s. On his office wall, I read, “Make no small plans. They have no magic to stir men’s blood.” For any real accomplishment, a certain ambitiousness has to be there, in the arts, in sports, and in science too. If you don’t have ambition and confidence in your ability to achieve results, then you don’t really belong. You have to have the daring to dream big dreams and then the necessary tenacity etc. to successfully pursue the goals. But given this orientation, the future for today’s young epidemiologists is very bright, whether looked at from the outside, the societal point of view, or from the inside, as for career satisfaction.
JH: On that inspirational note, I want to thank you on behalf of the readers and viewers of this interview.

OSM: Thank you for all the insightful questions and for the opportunity to respond to them.

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