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## Chapter 13

### Desperately seeking certainty

#### Statistics, physical activity and critical inquiry

Michael Gard

Statistics are everywhere. We read them in advertisements for cosmetics ('get 40 per cent softer skin with brand X!'), breakfast cereals ('nine out of ten nutritionists recommend . . .') and motor cars ('28 per cent more leg room than its nearest competitor'). Politicians quote them ad nauseam, while keeping a close idea on the mountains of data provided by polling companies that purport to reveal the thoughts of the 'average person'. The media's coverage of sport is awash with numbers and graphs of every imaginable kind. And 'experts' and 'commentators' throw them about (and, often, at each other) in order to 'prove' that their version of the 'truth' is the truest. Statistics are also a serious business. Government policies are (we hope at least sometimes) formulated according to the 'weight of evidence' and, as is often the case in many spheres of life, numbers seem to be considered the 'heaviest' of all forms of evidence. We might even say that numbers speak louder than words.

Statistics are both trivial and profound: while they are often produced, quoted and repeated just to fill in space, at other times they can tell us extremely significant things about the societies in which we live. Statistics are both certain and uncertain: they can create the impression of being precise and 'on top' of one's subject matter, while at the same time raising other questions for which we have no answer. Statistics can be both true and untrue: although on the surface a statistic might be a statement of a very particular numerical fact, it might actually conceal or obscure other 'facts' which tell a very different or even opposite story. And statistics can be both deadly boring and endlessly fascinating: I have endured a number of torturous introductory courses in statistics and swore never to utter the words 't-test' ever again, only to find later in my career that the intellectual tools I gained from these courses have helped me to analyse issues from a variety of different perspectives and to remind me that I never 'know it all'.

Amidst all this, one point remains central: in western societies numbers and statistics are often associated with science and, by extension, the explanatory power and credibility that people often associate with science. Simply by attaching a statistic to a truth claim seems to increase the likelihood that the truth claim will be believed. This is not always a bad thing. But sometimes statistics cause us to stop thinking and, in particular, thinking critically. It is as if we sometimes look

at a graph or a statistic and see the end rather than the beginning of a story. This is not surprising since this is in part what statistics are designed to do, that is, to distil a lot of information down to a more easily digestible form and to provide answers. But what is lost in this distillation? What and who is hidden or excluded? And what are the dangers of not asking these questions?

By focusing on epidemiological data about people and physical activity, I want to suggest in this chapter that there is much to be gained from the study of statistics, both in terms of the development of students' critical thinking skills and in fostering what we might call a 'critical consciousness' about the societies in which students live, particularly the ways in which structural inequalities affect the health and physical activity of different social groups. In other words, I am making the argument that the development of a critical attitude towards statistics and information more generally should be a central goal of physical education. However, I want also to suggest that a 'critical attitude' is not simply the motivation and capacity to tell the difference between trustworthy and untrustworthy knowledge claims, but also entails an appreciation of the political nature of knowledge itself.

### Epidemiology and people

Epidemiology is the branch of social science that attempts to quantify the 'incidence and distribution of diseases and illness in human populations' (Abercrombie *et al.* 1994: 146). The production of statistics about people and their behaviour is central to the practice of epidemiology and these statistics play a crucial part in shaping health policy. A clear example of where this kind of research has been extremely useful is in the development of public health strategies designed to contain the spread of HIV/AIDS in Australia.

In the last thirty years or so a great deal of research interest has been devoted to the relationship between physical activity, body weight, medical health and, in particular, cardiovascular disease, and it is for this reason that the study of levels of physical activity has become a legitimate object of medical research. But despite the efforts of literally hundreds of researchers, epidemiological research into people's participation in physical activity and the knowledge it has produced have remained controversial, as has the exact role physical activity plays in the prevention of cardiovascular disease and other illnesses. This is an important point to keep in mind because in this area of knowledge at least, no amount of numbers and statistics have been able to secure certainty. In fact, a respectable argument could be made to the effect that the generation of more and more statistics has produced far more questions than answers.

By way of illustration, this chapter focuses on *Physical Activity Patterns of Australian Adults: Results of the 1999 National Physical Activity Survey* (Armstrong *et al.* 2000), a report produced by the Australian Institute of Health and Welfare (AIHW). I have chosen this document for two reasons. First, this large report presents statistics on a wide range of aspects of physical activity and

could make a useful object for study in schools. Second, one of the analytical strategies I will employ and advocate in this chapter is one in which different statistics are juxtaposed, a strategy the legitimacy of which relies on being able to compare 'apples with apples'. All of the statistics quoted in this chapter are derived from the same data set and therefore invite comparison.

The Armstrong *et al.* report contributes to the growing literature that claims that western populations are becoming more overweight and less physically active. For example, the report says that '(t)he average number of times each week people participated in walking, moderate and vigorous leisure-time physical activity declined between 1997 and 1999' (Armstrong *et al.* 2000: xiii) and suggests that levels of overweight and obesity in Australia may have risen slightly over the same short period. Indeed, there is much in the report that appears to conform to the general picture of Australian society, constantly repeated in the mass media, as increasingly lazy and gluttonous. While this is a view of Australia which has been accepted and endorsed by scientists, doctors and politicians alike, whether or not it is a helpful or accurate view is at least debatable.

To begin with, what are we to make of the report's claim that '88 per cent of people believe that their health could be improved by being generally more active' and that '92 per cent of people believe that health could be improved by participation in 30 minutes of moderate-intensity physical activity each day' (Armstrong *et al.* 2000: xiii)? This is an interesting statistic because a great deal of money has been spent on public education initiatives designed to inform people about the benefits of physical activity in the hope that they would result in people leading more active lives. On the one hand, then, these campaigns would seem to have been extremely successful since a vast majority of people appear to believe that there is a connection between physical activity and medical health. On the other hand, however, it raises doubts about the value of these campaigns if high levels of public awareness are not leading to high levels of physical activity. At this point some interesting questions present themselves. These are questions which students could be asked to consider: if knowledge about participation in physical activity does not necessarily lead to participation, what are the reasons for the apparent steady decline in physical activity levels? Is it, as we are often told, because we are generally lazy bunch, or is the answer more complicated?

A great deal of the concern about population levels of physical activity has been directed at girls and women. It is now something of a cliché that girls lose interest in sport and vigorous physical activity as they enter and move through adolescence, a situation physical educators have sought to remedy in a number of ways, such as by introducing different forms of physical activity into the curriculum (for example, aerobics and 'power-walking') and by reverting to single-sex physical education lessons. With this in mind, consider Table 13.1 (Table 6.1 in the report).

The general picture emerging from these figures, which relate to adults rather than children, is that women are more likely to participate in lower intensity forms of physical activity (such as walking) than men, while also participating

Table 13.1 Sessions of physical activity in the previous week by sex (per cent), 1999

Physical activity	Men	Women	Persons
Walking			
Nil	31.5	24.1	27.8
1-2	17.7	19.3	18.5
3-4	16.6	20.5	18.6
5 or more	34.2	36.0	35.1
Total	100.0	100.0	100.0
Moderate-intensity <sup>a</sup>			
Nil	67.2	75.6	71.4
1-2	22.0	14.9	18.4
3-4	6.1	5.2	5.7
5 or more	4.7	4.3	4.5
Total	100.0	100.0	100.0
Vigorous-intensity <sup>b</sup>			
Nil	59.1	65.4	62.3
1-2	19.1	19.0	19.1
3-4	10.6	9.2	9.9
5 or more	11.1	6.4	8.7
Total	100.0	100.0	100.0
Vigorous-intensity gardening/yardwork			
Nil	54.0	60.5	57.3
1-2	32.8	30.0	31.4
3-4	7.3	5.4	6.3
5 or more	5.9	4.1	5.0
Total	100.0	100.0	100.0

Source: Armstrong et al. 2000.

Notes

a Components may not add to totals due to rounding.

b Examples of moderate-intensity activities are gentle swimming, social tennis.

c Examples of vigorous-intensity activities are jogging, cycling, aerobics, competitive tennis.

in moderate and vigorous-intensity exercise less often than men. Do these figures confirm or dispute the idea that there is a problem with the amount of physical activity that females do? In other words, how should we interpret these statistics?

As the authors concede, '(t)he majority of the data in this report refer to leisure-time physical activity, which refers to an individual's discretionary time that is hygiene' (Armstrong et al. 2000: 12). As has often been the case in this kind of research, physical work done in the home is not considered worthy of inclusion in these statistics. But why should this be, particularly given that this kind of work has been, and remains, disproportionately 'women's work' in western societies? It is certainly true that people whose work in the home leaves them

with insufficient time and/or energy for any 'discretionary' leisure-time physical activity would be considered 'sedentary' by this report.

At least two possible explanations for this apparent anomaly present themselves. First, as a society we have tended to undervalue housework. In the 1970s, feminists argued that 'housewives' should be paid by their wage-earning spouse for doing housework, a suggestion that was greeted with horror by many people. Second, there is a tendency for the term 'physical activity' to be equated with terms like 'sport' and 'exercise'. So although our bodies respond in roughly the same ways to different forms of physical stress, regardless of whether we are playing a game of tennis or vacuuming the house, it seems that not all forms of physical activity are treated equally. For example, people who do regular vigorous exercise (such as aerobics or jogging) or play competitive sport are often described as leading 'healthy lifestyles', and it is no coincidence that health campaigns designed to encourage people to be more active usually focus on these forms of activity. By contrast, it is extremely difficult to imagine anyone advocating housework as a means to improve medical health, even though it may be just as strenuous as many forms of recreational physical activity.

The point of this is not to advocate that people do more housework, but to begin to ask questions about the epidemiological data that we are given. The above table purports to tell us something about how physically active Australians are. But does it? Is it possible that this table says more about the ways in which we have to come to define a term like 'physical activity', and particularly the way people tend to equate it with sport and vigorous exercise, activities which continue to attract more men than women. A similar set of questions could easily be asked about the physical work that some people do at work – how is it possible that a report entitled *Physical Activity Patterns of Australian Adults* makes no attempt to measure work-related physical activity?

An even more striking example of the way narrow definitions of 'physical activity' can produce highly debatable research results can be found in Wright's (1997) critique of fundamental motor skill testing in New South Wales schools. As she points out, the government-sponsored 'bench-marking' survey of the mid-1990s was designed to produce a snapshot of the motor skill levels of New South Wales' schoolchildren. The report of the survey, released with a good deal of media attention, claimed that the general motor skill proficiency of school children was 'poor' and that girls performed even more poorly than boys. The report advocated programmes to address this situation, particularly the 'problem' with girls. But Wright reminds us that the battery of tests chosen for the survey was strongly biased towards sports such as soccer, rugby and cricket. While punting a ball was considered a sufficiently 'fundamental' skill to be included in the battery, tests to directly measure balance and the ability to move in time with a beat were not. Why, for example, might basic gymnastics and dance skills such as skipping or doing a handstand or a chassé not be included in a battery of 'fundamental' tests? In short, who decides what is 'fundamental'? While wanting to avoid the murky territory of conspiracy theories, I think the most likely

explanation of this apparent bias towards traditionally male sports is to be found in the background of the researchers themselves. It has long been recognised that a background in competitive sports is the common denominator amongst many physical education and sports science teachers and researchers and it is probably not surprising that they tend to see activities that they enjoy doing as fundamental.

While this issue may seem relatively trivial, at its centre are significant questions about the information we receive on a daily basis as members of a globally connected and supposedly information-rich culture. In other words, an important part of making sense of information is the capacity to interrogate the motives and biases of the people generating the information in question. How might their motives and biases in intended or unintended ways shape their versions of 'the facts'? On the one hand, the issue of unintended bias has been one that has dogged the search for knowledge in all areas of scientific endeavour and is perhaps the single most important reason why so much research turns out to be of no long-term value. On the other hand, we live in an age of 'spin' in which the information and statistics we receive from governments, corporations and news outlets have been either massaged or deliberately invented for public consumption. Whenever students are presented with statistics that purport to prove something, we might profitably ask them to look into the circumstances and motivation of their production.

Another way in which we might interrogate epidemiological statistics is to place two different sets of statistics side by side. With the above statistics about physical activity in mind, let us look Table 13.2 (Table 5.4 in the report) which presents data on the body mass index (BMI) of respondents to the survey.

What are we to make of these figures which suggest that approximately 51 per cent of Australian men are overweight or obese compared with approximately 37 per cent of women, particularly in the light of the previous figures we saw which suggested females do less vigorous physical activity than men and 'exercise' less often than men? Before making a comment about this, it is important to remember that this BMI table refers to self-reported figures. In wanting to survey as many people as possible the researchers had to rely on respondents correctly reporting their own height and weight, the two measurements required to calculate a person's BMI. This raises the tricky question of whether either men or women are more likely to overestimate or underestimate their weight or height, in short, can these figures be trusted. In fact, this is a problem for all epidemiological and survey-based research, not just the current example. Therefore, before making judgements about the numbers presented, we (including students) could ask what reasons people might have for providing deliberately or inadvertently misleading answers. Although important, in the current example this is not a simple question to answer, although it is worth pointing out that these figures fairly closely match the results of 'first-hand' research into the levels of overweight and obesity in Australia and other western countries (Australian Bureau of Statistics 1995; Flegal 1999).

Table 13.2 BMI categories of survey respondents by age, sex, education level (per cent), 1999

	Underweight	Healthy weight	Overweight	Obese
Sex				
Men	1.7	46.9	39.5	11.9
Women	4.2	59.0	24.0	12.7
Persons	3.0	52.9	31.8	12.3
Age group (years)				
18-29	7.5	65.9	19.8	6.8
30-44	1.9	53.1	32.9	12.2
45-59	0.8	46.0	36.9	16.3
60-75	1.5	42.8	40.5	15.2
Education level				
Less than 12 years	2.5	46.9	35.5	15.2
HSC or equivalent	3.7	55.6	28.1	12.7
Tertiary	2.9	57.7	31.8	7.7

Source: Armstrong et al. 2000.

Notes  
HSC, Higher School Certificate.

It is also worth remembering that while it is generally believed that women, on average, carry more body fat than men, no allowance is made for this in the calculation of BMI in this or most other studies. In other words, men and women are deemed overweight (BMI equal to or greater than 25.0 and less than 30.0) and obese (BMI greater than 30.0) using the same standards. Certainly if different (that is, higher) cut-off points were used to classify women as either overweight or obese then the difference between men and women would be even larger!

Questions of reliability aside, this table should force us to stop and think about the relationship between body weight and physical activity. Why is it that women as a group seem to be doing less physical 'exercise' than men while remaining considerably less prone to overweight and obesity? Of course, a number of potential answers to this question are possible. I would argue, however, that simply by posing this question, students are forced to ask other questions and to seek out other pieces of information. For example, do women eat less or differently to men? If so, why? Asking these questions may, in turn, open up other debates about the disproportionate cultural pressure on western women to be thin despite the fact that they already appear to be much thinner than men. Certainly there exists a large body of research which suggests that western women and girls are much more likely to be worried about their weight and/or to be dieting than men and boys (for example, see Christler 1996; O'Dea and Abraham 1999).

But there are more fundamental questions to be asked here. Given the apparently large gap between the levels of male and female obesity, is it defensible that most media and scientific comment on the issue seems to suggest that we are in the

middle of a generalised obesity epidemic, one that is affecting everyone everywhere? In other words, if overweight and obesity are seen as a general problem, rather than one that affects some sections of the population more than others, is it possible that we might misdiagnose the problem and end up proposing solutions to problems which do not exist? The scientific and physical education literature is full of suggestions for making girls more active. Is the attention paid to girls and physical activity justified?

Perhaps an even more important dimension to discussions about physical activity, body weight and health is one that is often obscured amongst the general hysteria about the 'obesity epidemic', that of social class. What is apparent from the previous table is that people with less than 12 years of education were approximately twice as likely to be obese than people with a tertiary qualification? This difference becomes all the more significant when you consider that while the health risks of being merely overweight remain controversial, obesity and morbid (or extreme) obesity appear to be unequivocally bad for your health.

The over-representation of people from lower socio-economic bands within the ranks of the overweight and obese has been a consistent research finding both in Australia and other western countries (Paxton *et al.* 1994; Centre for Weight and Health 2001; Vescio *et al.* 2001; Wardle *et al.* 2002). In Table 13.3 (Table 6.7 in the report), the percentage of Australians achieving 'sufficient', 'insufficient' or no exercise each is estimated.

Table 13.3 Percentage of people achieving 'sufficient' time and sessions during the previous week by sex, age group and education level, 1999

	Sedentary	Insufficient	Sufficient <sup>a</sup>
Sex			
Men	14.6	38.3	47.1
Women	14.7	41.9	43.4
Persons	14.6	40.2	45.2
Age group (years)			
18-29	6.3	37.5	56.3
30-44	16.9	41.9	41.2
45-59	18.2	41.6	40.2
60-75	17.9	38.5	43.6
Education			
Less than 12 years	19.5	41.9	38.6
HSC or equivalent	12.5	40.5	47.0
Tertiary	10.9	36.8	52.3

Source: Armstrong *et al.* 2000.

Notes

HSC, Higher School Certificate.

<sup>a</sup> Sufficient time and sessions is defined as 150 min (using the sum of walking, moderate activity and vigorous activity (weighted by two)) and five sessions of activity per week.

It is interesting to note that in this table the difference between males and females that we saw in the first table has virtually disappeared. Having combined all the different kinds of (discretionary) 'exercise' that people do, both high and low intensity, this table seems to conclude that women are almost as likely as men to get 'sufficient' physical activity for good health each week. This is a straightforward example of a 'problem', in this case the amount of physical activity females do, appearing or disappearing depending on the manner in which the statistics are grouped and presented. However, it is interesting to note that the summary of the report claims somewhat mysteriously that '(w)omen were 20 per cent less likely to achieve 'sufficient' physical activity compared with men' (Armstrong *et al.* 2000: xiv).

In this table the differences in people deemed to be doing 'sufficient' physical activity appear to be more pronounced with respect to age and level of education, generally accepted as an indicator of financial affluence. Once again, we might challenge students to interpret these figures. According to the table, the percentage of people with less than 12 years of education who are sedentary (19.5 per cent) is higher than the percentage of 60-75 year olds who are sedentary (17.9 per cent). This is also the case if we look at the percentage of people who do 'insufficient' physical activity (41.9 versus 38.5 per cent, respectively). I am also struck by the approximately 14 per cent difference between people with less than 12 years of education who do 'sufficient' physical activity (38.6 per cent) and those with a tertiary level education (52.3 per cent).

Of course, there is clearly scope for students to ask critical questions about how the authors of the report arrived at their definition of 'sufficient' physical activity. But if we accept this definition, consideration of these disparities across social class has the potential to open up a wide range of topics for further research and critical reflection. To begin, we might ask questions about the structural reasons for this difference. Is the expense of recreational physical activity (such as the fees for sports clubs and dance classes, the cost of sporting equipment, gym memberships) a barrier to participation for some people? Or could it, as some have suggested, have something to do with the physical environments and conditions in which the poor live, such as high density housing and a lack of open green areas? Of particular interest are what we might call cultural reasons for this difference, and it is here that we see some similarities to the situation with smoking. Although federal and state governments in Australia have substantially increased the cost of cigarettes over recent decades, smoking remains relatively popular amongst poorer people. And while anti-smoking campaigns have proven effective in getting middle-class people to quit, they appear to have been less successful the lower we go down the socio-economic scale. Are we witnessing a similar phenomenon when it comes to recreational or 'discretionary' physical activity? Has physical activity become a luxury? Has a slim body become a marker of socio-economic affluence, similar to fast cars and expensive clothes?

There certainly exists some anecdotal evidence that particular forms of physical activity, such as sport, play a much bigger part in the lives of middle-class families

than it does for working-class people. And there has been a great deal of comment over the last 20 years about the connections between what has been called 'the fitness industry' (aerobics, private and corporate gyms and health clubs) and middle-class society. So, as well as thinking about the kinds of practical reasons why 'discretionary' physical activity might be more available to people with more money, students might also ask what physical activity means to different people. For example, is it possible that one of the ways in which poorer people differentiate themselves from richer people is to reject the middle class apparent preoccupation with body weight and physical fitness?

One way of answering this question would be to analyse the ways in which (conventionally) desirable bodies and 'healthy lifestyles' are constantly linked with affluence, 'stylish' urban living and the consumption of expensive fitness paraphernalia, such as shoes, lycra outfits and leisure wear. On a more straightforward level, students can also be encouraged to look around at the world they inhabit. Where do they see 'fat' bodies? Where do they never see 'fat' bodies? I recall vividly a conversation I once had with a scientist who was trying to convince me that Australian society in general was becoming grossly overweight and that there was a particular problem with children. I replied that I spent a great deal of time in schools and rarely saw an obese child. Certainly, I argued, I found it impossible to accept her assertion that between 20 and 30 per cent of Australian children were either overweight or obese. The scientist replied, 'If you want to see obese children you just need to go down to your local shopping centre on a pension day, Thursday!' She paused for a moment and then changed the subject.

### Desperately seeking certainty

It should be clear by now that the end point of the techniques I have just described may be somewhat disorientating and unsettling. By asking critical questions about the ways in which epidemiological data are compiled, by juxtaposing different sets of findings, and by moving beyond generalisations about 'society as a whole', there exists the obvious risk of a kind of intellectual vertigo where certainty about any knowledge claim becomes illusive. If all these old 'truths' about physical activity (such as claims that we are all getting fatter and lazier or that there is a bigger problem with females than there is with males) are rendered suspect, what is the truth? If not this, then what?

One answer to this concern would be to argue that moments of discomfort are a prerequisite for learning to occur. In this way, the teacher's role can be thought of as moving students from positions of certainty to uncertainty and then, perhaps, facilitating the formulation of answers and conclusions which students arrive at themselves. And as I have suggested above, one of the ways students might do this would be to look around them: look at the people they know, the culture they consume and the meanings people attach to things like body weight, physical activity and health. In my experience, the statistic that women are considerably less likely to be overweight or obese than men never fails to arouse the curiosity

and even anger of at least some (particularly female) students, precisely because it contradicts their assumptions about who does and/or who should worry about their weight.

There is more at stake here, however, for both teachers and students. Perhaps my single most lasting memory of my own school teaching career, as well as watching practising and experienced physical/health education teachers in secondary schools, is that of students being asked to copy down lists: lists of the benefits of exercise, lists of the benefits of a 'healthy' or 'balanced' lifestyle, lists of the dangers of unsafe sex, alcohol, tobacco and other drugs, and lists of good food and bad food. There is perhaps no other school subject area that is so certain that it has the answers to what constitutes a 'good' or 'healthy' life than physical education. This certainty is so strong that it seems to lull us into believing that 'the facts' about exercise and health are so self-evident and compelling, that our job is simply to give students 'the facts'. Why spend time debating and researching 'the facts' when we already know what the truth is? And yet, unbeknownst to many, physical education's knowledge base is constantly shifting: for example, the idea that it is possible to be fat (in fact very fat) and fit and healthier than much skinnier people is currently quietly displacing old assumptions about the unavoidable perils of being overweight (for example, see Brodrey *et al.* 2000).

In a similar vein, reports such as the one discussed in this chapter make no attempt to explain why physical activity and obesity appear to be linked to socio-economic class. This is perhaps not surprising since the researchers do not appear to have collected any data that could shed light on this association. The reasons for this relationship between physical activity, obesity and social class and the reasons that it is scarcely ever addressed in popular discussion about overweight and obesity are legitimate and important areas of critical inquiry for both teachers and students. The answers to these questions may not be so straightforward, but they do point towards classrooms where the copying of lists is no longer an option.

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