The importance of sound theory to guide research and program selection

Additional reading for What to look for in research

Introduction

Schools want to know the programs they select as part of their bullying prevention approach will work. Investigating the research evidence and ‘hard data’ for a program is part of making an appropriate selection.

However, the data that is presented in research is not sufficient alone to claim that a program is effective. There are many steps between finding some ‘promising’ data and making a claim that a program causes a change to occur. This is where schools can be alert to the underlying theory guiding the research and the program.

Coincidental correlations

To illustrate the pitfalls of simply relying on the patterns shown in two sets of data that suggest two measures are related, Harvard University’s Tyler Vigen created a website called Spurious Correlations. The site provides humorous examples of the ‘spurious’ links that can be suggested by combining random sets of data together without any theory or logic about the relationship between the information.

Vigen mined various data sets until he found data that matched and then represented them in a single graph to show the dangers of seeing patterns in data without a sound theory about why and how the two sets of data are related. If we look at the pattern of data shown in any of the graphs, the two lines suggests the two measures might be related. But when you consider the logic or think about how these things could be related, it is obvious there is no link between the two behaviours. Graph 1 could suggest Vigen has found a relationship between chicken consumption and crude oil imports, which makes no sense at all.

Likewise, it would be spurious to suggest that awarding more computer science doctorates will help arcade businesses be more profitable (as might be suggested in Graph 2).
The key message from Spurious Correlations is just because two sets of findings match each other (even closely) it does not mean that one causes the other or even that there is a relationship between the two. The appearance of a relationship in these graphs has been created by Vigen selecting the time periods or types of data collected. In these cases, the relationship is purely coincidental. A few more examples from Vigen’s site show that spurious relationships are easy to find.
Real but non-causal relationships

Another possible problem in interpreting patterns in data about program effectiveness is when there is a real, but non-causal relationship. This type of relationship is seen commonly in research into human behaviour as people’s choices and actions tend to have complex motivations rather than simple or single causes.

A classic ‘cautionary tale’ is that in summer in New York, ice cream sales and murder rates rise. The two are correlated (the pattern of data shows a common pattern), but it is obvious that increasing ice cream sales do not actually cause the rise in the murder rate. Thinking about the logic behind these two sets of data suggests that there might be a third variable - like hot weather - that causes both.

Another example is that doctors noticed that people taking a vitamin supplement seemed less likely to get heart disease. Some suggested a causal relationship - that taking vitamins lowered the risk of heart disease. With further examination and developing a plausible theory about the possible causal relationships that could be at play, research eventually determined that people who were taking the supplement were more likely to come from higher socio-economic groups, with healthier diet and exercise habits. It is these other factors that caused the lowering lowered the risk of heart disease.

The importance of sound theory

A sound theory of why the change occurs is a considerable protection against both coincidental findings (spurious links between chicken and crude oil) and real, but non-causal relationships (missing a common cause for both the change in heart disease and vitamin taking.)

Inferring a causal relationship where one does not exist can lead to ineffectual policy and practice. Missing the third common cause in the example above could have led to a medical practice of prescribing vitamins to prevent heart disease, possibly leading to an increase in death rates. Research into bullying prevention programs needs to be designed to avoid these pitfalls and to be able to make valid claims that a program is effective.

The starting point for any research into bullying is a sound theory, which includes logic that encompasses what bullying is, how it can be changed, and consequently how the change can validly be measured, as well as the number of participants and time period necessary to show the change. Logic represents the researcher’s ideas about why the change measured in their study did (or did not) occur. So, research does not try to find a relationship, it looks for a logical causal mechanism which can be tested.

The underlying theory about bullying informs how to conduct the research, what questions to ask and what to measure. Research to determine if a program ‘works’ (efficacy research) is not a matter of observing what might happen in a study; it must involve specific questions to answer (hypotheses) and
some planned measurements. Researchers ask themselves ‘how can I test my theory that this program ‘x’ will make a specific change ‘y’ happen?’ and ‘how can I demonstrate’ that it is the program ‘x’ that is actually causing the change?’. They then design their methodology based on their answers. The logic represents a researcher’s ideas, based on previous research, about the causal mechanism that their research will investigate.

Not having a sound theory or clear logic could mean leaping into expensive and time-consuming efforts with no idea why they might succeed. Being aware of the theory of change that underpins a bullying prevention approach makes it possible to determine why it works, which informs future work. Just as importantly, an overt theory makes it possible to learn and make productive suggestions and changes if something does not work.

In the absence of clear logic about how change happens, even the best research methods can yield misleading interpretation of findings. If no theory informs how the results are interpreted, Spurious Correlations site shows that just about any sort of answer can be generated.

Implementing a bullying prevention program that claims to cause changes in student behaviour, without ensuring it the claims are based on robust research underpinned by a sound theory and a clear logic about why and how the program leads to the change, can mean a waste of time and energy by schools. In the worst case, it can cause negative outcomes for students.

What schools can do

So, if research suggests that program ‘x’ causes ‘y’ (for example, a relationships program leads to a reduction in student bullying, or personal stories from adults about overcoming bullying lead to a change students’ behaviour to be more empathetic) readers need to look for:

A clear description (concept) of what bullying is (this should be what was measured)

A statement of the underlying theory of how bullying can be changed and therefore how the research has shown this program is the cause of the change to participants’ behaviour (this is the logic about the nature of the causal relationship)

Measurement in the research that is suitable to demonstrate the change predicted by the theory.

Most researchers are cautious about the claims they make about what they have found. However, media and some commercial organisations may not observe the same caution. If you see articles, media or promotional materials citing research and claiming that ‘Research says that bullying program x reduces bullying in students’, the questions above are a useful guide to determine if the claim is valid.

If you see research claims that a bullying program will make a big change in your school, ask yourself: just HOW does the program lead to changed behaviour, have the researchers overtly explained the program logic, does that logic make sense to me, is it compatible with what we know more generally about why people change their behaviour (e.g. what we know about motivation, learning theory, engagement, social pressure, child development, etc.), and finally, have the researchers made a claim about what caused the change without actually having any measurements to support that claim.

References

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