EHPS report

Methods in health psychology: how do we know what we really know?

Marijn de Bruin & Marie Johnston

University of Amsterdam & University of Aberdeen

Part of the charm of health psychology is the focus on direct applicability of our research results. There is also a risk in there, however, which is that our research can be focused more on obtaining applied results (e.g., the key determinants of achieving sufficient physical exercise within a particular population within a particular context) rather than contributing to a cumulative science through methodological and theoretical progress. Yet, the fact that our results might be applied immediately and influence behaviour of at-risk groups, prevention/health care workers, and policy makers, makes it even more important that the methods are sound and the conclusions valid. We need to take time to consolidate the methods we have established over the short life of our discipline and to identify the areas where we need to critique and improve our methods. We are therefore excited that EHPS has decided to run a **Methods in health psychology track**, starting in 2013 in beautiful Bordeaux.

In this article we want to discuss, first, an approach that we think could—if more widely adopted—contribute to a field with a richer, firmer set of research methods suitable for attacking the questions arising from both theory and practice; that generates conclusions that are valid; offers insights that are interesting and valuable for health psychology as a *science* rather than for the selective group of people working on the same health topic in a similar context; and that this is seen as an ongoing process where every investigation has the potential to contribute to better research methods and to advance theory while generating findings of practical use for promoting people's health and well-being. In other words, an approach that lets us find out what we *really* know. After that we discuss how this approach could translate to health psychology, and we end with suggestions of topics that could be covered in the new health psychology methods track.

In the Methods track, we expect to highlight and consolidate not only the key advances in commonly used research methods, but also to identify opportunities for (more rapid) progress that may not have been exploited to date due to researchers having paid more attention to applied outcomes than to the methodological and theoretical implications, i.e. the 'missed opportunities'. Reviews of 25 years of health psychology (Johnston, Weinman and Chater, 2011) and comments we have received suggest this is timely and that many health psychologists are in fact concerned about these issues. So we offer our reflections as a starting point for debate within our research community, which will hopefully translate into thought-provoking symposia in the newly established Methods track.

What approach produces rapid scientific progress?

As a young discipline, it has been important to demonstrate that we can make relevant contributions. For example, our work on developing an intervention to reduce disability following stroke has been implemented by the

Scottish Government (Johnston et al 2007), psychometric approaches are now part of the expected standards in the measurement of health outcomes (Bowling, 2001), and we are currently developing national guidelines and an implementation strategy for the delivery of 'current best practice' in HIV adherence care based on the results of meta-analyses (de Bruin et al, 2009; 2010). Without achieving this kind of base, health psychologists would not attract the funding to continue their work. However, the drive to produce results that are directly applicable can result in a confirming and narrow mind set, and can lead to repetitive work that does not present a relevant scientific or theoretical advance (e.g., the umpteenth observational cross-sectional study showing that the Theory of Planned Behavior (TPB) constructs explain a health behaviour). So what mind set could help us rise above these applicable outcomes?

In 1964, Platt published a paper in Science in which he reflected on fields where scientific progress was more rapid than in others. According to Platt, the usual explanations like "the tractability of the subject, or the quality of men drawn into it, of the size of the research contracts are important but inadequate". He suggested that in the most prolific fields there is a culture of applying 'Strong inference methods', of which the separate elements are no different from "the old-fashioned method of inductive inference that goes back to Francis Bacon" (Platt, 1964). What Platt refers to as Strong Inference is the systematic, formal and explicit application of the following steps following the initial proposition of an hypothesis, theory or explanation: (1) Formulate alternative explanations that could explain observed results; (2) Devise a crucial test (or several) that will exclude one or more of these explanations; (3) Carry out the research; and repeat this cycle by making sub hypotheses and sequential hypotheses to refine the options that remain. In this way an initial invention moves along the branches of a logical tree, with several options (i.e., hypotheses) at each fork that are then refuted, leaving one option open which is then pursued leading to the next fork, and so forth, until a particular conclusion has been reached. Platt observed that in the most productive fields Strong Inference was integrated in all thinking, publications, conference presentations, and so forth. So after one group published their results and conclusions, including possible alternative explanations and tests, other groups also pursued these ideas, confirmed or refuted the hypotheses, presented the alternative explanations and experiments for their findings, and so forth; progressing efficiently up the same logic tree.

An interesting side-effect of this approach of framing multiple alternative hypotheses for one's research findings is that people do not become too attached to a single hypothesis; in fact, researchers can take pride in formulating alternative hypotheses and clever experiments that can then be pursued and confirmed or refuted by others, thereby contributing to scientific progress beyond the results of their own experiments. There are more interesting ideas in this paper, but we would like to highlight this Strong Inference approach since we could probably use a bit of this ourselves.

What approach might produce more rapid progress in health psychology?

So how does this rationale translate to health psychology (Platt reflected on fields like molecular biology)? We think, first, that many of our applied studies permit us to ask more questions and pose more hypotheses that go beyond the applied questions, and thereby contribute to resolving ongoing theoretical or methodological debates. Second, after studying

these initial hypotheses (regardless of whether these are confirmed or not), we could generate alternative explanations for the results obtained and propose methods required to test these alternative hypotheses. These steps could be adopted in observational and intervention/experimental studies with diverse research designs and methods. By focusing our applied studies more on hypotheses of wider scientific interest, by generating alternative hypotheses, and through critiquing the methods we use, we may be able to reach conclusions that are relevant not only for the application, but which inform theoretical and methodological development in the field as a whole.

To give an example for observational studies, let's return to the example of the TPB (the umpteenth…). We can see that the results of such a study may be relevant for the applied context, but they can additionally test whether, for example, attitudes are more predictive of intention than subjective norms, which kind of attitudes and which kind of subjective norm is most relevant, or how subjective norms can best be measured; they may also allow simultaneous testing of different hypotheses about the intention-behaviour gap brought forward previously by others (e.g. explanations based on intention stability, planning ability, or self-regulatory skills; e.g. de Bruin et al., 2012; DiBonaventura & Chapmann, 2005; Sniehotta, Nagy, Scholz & Schwarzer, 2006), or studying the impact of past behaviour in the model (does it capture habit or does it mainly control for confounding?); or examine what is left of the theory when it is tested using a within- and between-subject repeated-measures model that captures change over time; or the difference in results when a subjective versus objective behavioural measure is being used as the dependent variable.

To give an illustration for intervention studies, consider the example of an intervention directed at increasing the uptake of an effective treatment. Whereas for that study the key outcome is whether it does indeed result in an improved uptake, one might also test theoretical or methodological hypotheses of wider interest, such as whether the delivery of particular behaviour change techniques indeed produce the intended change in determinants and behaviour, and if so for whom and under what conditions; evaluate the role of demand characteristics (McCambridge, de Bruin, & Witton, 2012) and other potential sources of bias; comparing different methods for assessing and controlling for variability in care provided to control groups; or comparing the feasibility and accuracy of different measures for assessing the quality of intervention delivery. If we identify the 'hot topics' in our field, and in our applied studies consistently pit hypotheses directed towards such theoretical and methodological questions against each other, as a field we could become much more efficient in understanding the processes involved and the conditions under which each of these hypotheses may hold.

So how is this linked with the starting point of this paper, namely a new EHPS conference track on research methods? We think that by putting more emphasis on methods, we will be able to ask the questions and present the evidence compatible with adopting a Strong Inference approach. Upon hearing an explanation for a result, we will have the opportunity to ask the question 'But what investigation could disprove your hypothesis?' (cf. Platt), and to reflect at a higher level on the scientific nature of our research (e.g. formulation of initial and alternative hypotheses beyond the applied question at hand) and on how our designs, measures and analytical/statistical models could be challenged. Our hypothesis (or hope) is that by

increasing the emphasis on improving our methods, we will encourage the research practices compatible with a Strong Inference approach, which could lead to an—if not exponential, than a substantial—increase in the advancement of our theory, the quality of research methods, and the impact of our research.

What methodological issues do we need to address?

There are numerous methodological challenges in the field of health psychology. We invite you to propose your ideas and symposia for the methods track for the 2013 conference and for subsequent conferences. In order to illustrate the breadth of topics we might consider, the

Table 1. *Possible methodological questions that could be central to a symposium*

Process of research	Methodological topics	Possible methodological questions
Background	Systematic reviews	What are the basic standards for a systematic review? When is meta-analysis appropriate?
	Feasibility & acceptability of interventions & research studies	How should feasibility and acceptability be assessed? e.g. how should quantitative and qualitative methods be used and integrated?
	Piloting methods	What pilot work is necessary before trialling an intervention? – e.g. for power calculations
	Existing data sets	How can we use existing data sets to investigate new research questions, without collecting new data?
Research question	Confirmation or testing mindset	How can we move from 'confirmatory' research questions to scientific 'testing' questions? How can one test competing hypotheses?
	Questions about methods, theory and/or application	Does the test of the intervention also allow test of theory, e.g. in process evaluation or in (fractional) factorial designs? Or to develop better methods of reporting intervention content e.g. using BCTs?
	Replication	When is a replication study needed?
Research design	Choice of research design	Have we approached the research question in the right way? Are there better research designs to answer the question?
	Cross-sectional studies	When are cross-sectional designs appropriate?
	RCTs	How many control groups are necessary? How can one characterize the active ingredients of a control group? How can one test theories or hypotheses within an RCT design? What sources of bias need to be controlled?
	N of 1 studies and within person studies	What can these research designs contribute? How do they complement between person studies?
	Qualitative and mixed method studies	What are the basic standards required for different types of studies using qualitative data? How can qualitative and quantitative data be integrated?
Participants	Who?	When is it appropriate to include e.g. students, clinical populations? How can one ensure representative populations?
	How many?	How does one justify the number of participants included? Are CONSORT methods of reporting adequate?

Process of research	Methodological topics	Possible methodological questions
Measures	Selection	How do we choose an appropriate measure: one which measures the intended construct? What evidence of validity is required before using a measure? When is it appropriate to use validated tests with norms and when should new measures be developed?
	Methods of measurement	What are the biases associated with subjective and objective measures? Are there systematic differences in the results of self-report, observational and automatic measures? When is it appropriate to have real-time (EMA) or retrospective assessments? How should physiological and clinical measures be used?
	Psychometrics	What are minimum reporting standards? Is internal consistency enough?
	Timing	When should measures be taken? How does one decide on the appropriate follow-up period?
Interventions	Reporting intervention content	How can we improve methods of reporting intervention content? How far does the BCT approach get in doing this? How far does the Intervention Mapping approach get in doing this?
	Reporting intervention delivery	What is the minimum set of information required to report the methods of delivery of an intervention? How do we ascertain whether the intervention was delivered a) by someone trained and competent (competence) and b) as reported (fidelity, adherence)?
	Clarifying distinction of intervention from control conditions	What is the minimum set of information needed to distinguish the key differences between the intervention and control groups?
Analysis	EMA data	How should real-time data be analysed to control for time-series effects? How do real-time data relate to retrospective reports?
	Longitudinal data	How can we use more advanced methods for handling longitudinal data?
	Prediction of change	How is change measured? How should one control for past behaviour?
	Large data sets	Are there improved methods of handling and analysing large data sets, especially those from large existing data sets?
Interpretation	Inference from findings	What *can* we infer from our results with some certainty? What are alternative explanations for our findings?
	Causality	What are the minimum findings necessary to either confirm or test a causal hypothesis?
	Prevalence of a problem	What evidence is required to assert that there is a problem which needs to be addressed by health psychology intervention e.g. prevalence, comparison with norms?
	Bias	What biases need to be considered in interpreting findings?
	Identifying strengths	Can we agree on what makes a study 'strong'?
	Identifying limitations	Can we agree on what makes a particular study 'weak'?
	Conclusions	Should conclusions refer to all three of theory, methods and application?

table identifies potential methodological topics and questions as they may occur throughout the process of research reported in a typical journal article or research grant application. Topics for future methods symposia might be derived from these or other topics—but no doubt you will have ideas that are more original than ours. We hope that with this paper, a yearly symposium on Methods in health psychology of which an overview will be presented in this Bulletin, and the Methodology track, we will see an increased rigor and impact of our discipline.

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Marijn de Bruin

m.debruin@uva.nl

Marie Johnston

m.johnston@abdn.ac.uk