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Introduction

Evidence has a key underlying role in the practice of educational psychology in defining ‘change’, one of the central themes of this volume. The success of the Educational and School Psychologist as an agent of change across the core functions of consultation, assessment, intervention, training and practitioner research (Birch, Frederickson, & Miller, 2015; Boyle, 2011; Dunsmuir & Kratochwill, 2013) hinges upon an understanding of the nature of ‘evidence’ and how it informs practice.

In this chapter, we will consider the nature of evidence and its relationship to professional practice. Educational and School Psychologists not only generate evidence themselves about underlying processes, outcomes, and the acceptability, feasibility and impact of the implementation of interventions, but are also ‘consumers’ of research findings (Frederickson, 2002) as they engage with the literature to determine the best available evidence for practice.

In the first part of the chapter, we focus upon the role of evidence in relation to research and assessment. We consider what ‘counts’ as evidence and explore the relationship between evidence and practice, ‘evidence-based practice’, in relation to hierarchies of evidence (Sackett, Strauss, Richardson, Rosenberg, & Haynes, 2000; Scottish Intercollegiate Guidelines Network, 2015) and typologies of evidence (Boyle & Fisher, 2007; Petticrew & Roberts, 2003). We also consider the reliability and validity of both quantitative and qualitative data.

In the second part of the chapter, we re-visit evidence-based practice to consider the impact of the gap between research and practice upon the implementation of interventions.

We consider evidence-based interventions and their potential for improving the practice both of Educational and School Psychologists and teachers, and conclude with a discussion of the role of Implementation Science supporting evidence-based practice in educational and school psychology.

We shall now turn to consider the nature of evidence.

The nature of evidence

What counts as ‘evidence’ depends upon a number of factors:

- *Epistemological stance*

Crotty (1998) provides an account of how epistemology informs theory and in turn methodology, research methods and evidence. Those with a scientific, positivist epistemological stance may be more persuaded by nomothetic approaches, fixed designs designed to ‘control out’ the effects of context (Robson, 2011) which utilise hypothesis-testing and quantitative data favouring evidence from the outcomes from controlled, group design methodologies, such as randomised controlled trials (RCT) or quasi-experimental designs (Slavin, 2002). In contrast, those with a post-positivist, interpretative stance may be persuaded by idiographic approaches utilising flexible designs (Robson, 2011) yielding qualitative data which focused on the lived-in experience and the understandings and attributions of clients and stakeholders (Gergen, 1985). On the other hand, those with a critical realist epistemological stance may be persuaded by mixed-method approaches to evidence, where value is perceived in the triangulation of both quantitative data from rigorous study designs to inform an understanding of effectiveness (Robson, 2011) and qualitative data from interviews, questionnaires and focus groups to inform an understanding of acceptability, feasibility and impact (Fixsen, Blase, Naoom, & Wallace, 2009) and of the effects of

context (Pawson & Tilley, 1997). By gathering evidence from more than one standpoint, a mixed methods approach allows both data triangulation and methodological triangulation (within-methods and between- or across-methods) which provides checks on reliability and concurrent validity (Robson, 2011, p. 158)

- *The research or assessment questions to be answered*

Boyle and Fisher (2007) and Petticrew and Roberts (2003) provide examples of specific research and assessment questions that may require different types of evidence. For example, an efficacy study investigating outcomes under optimal, controlled conditions with a need for high levels of internal validity to determine causal relationships may be conducted using an RCT, whereas an effectiveness study of implementation in a real-world setting with a need for high levels of external validity may be conducted using a quasi-experimental design (Boyle & Hannah, 2008; Robson, 2011). However, effectiveness studies often fail to achieve the same levels of outcome as efficacy studies. By way of example, Boyle, McCartney, O'Hare, and Forbes (2009) reported an efficacy study using an RCT design of the effects of different modes of delivery of school-based language intervention which had positive outcomes which were not replicated when the programme was implemented in a subsequent related effectiveness cohort study involving only existing staff in the participating schools (McCartney, Boyle, Ellis, Bannatyne, & Turnbull, 2011). Further, academic psychologists may have differing interests and different research questions from professional psychologists (Dunsmuir & Kratochwill, 2013, p. 65), focusing perhaps upon theory rather than outcomes. In some cases, this may mean that academic research reports may not have sufficient details of the effects of process variables to allow Educational and School Psychologists to determine 'What... works,

for whom, in what circumstances, in what respects and why?’ (Pawson, Greenhalgh, Harvey, & Walshe, 2005).

- *The evidence available*

Ideally, evidence relating to process, outcomes and context should be available for primary data collection in the case of both research and assessment. The level of access that Educational and School Psychologists have to the research literature to determine best evidence from the existing studies is also relevant here.

- *Stakeholders views*

The views of stakeholders such as pupils, parents, schools and other establishments, training providers, local and national government will also have an impact upon what evidence is relevant (Dunsmuir & Kratochwill, 2013).

- *Beliefs, values & knowledge*

As Hattie, Rogers, and Swaminathan (2014, p. 203) note: ‘‘Evidence’’ is not neutral’. Beliefs, values and knowledge base of the Educational and School Psychologist, what Sen (2004) refers to as ‘positional parameters’, can impact upon what is held to count as evidence and how it is interpreted (Nevo & Slonim-Nevo, 2011).

The relation between evidence and practice

The use of research evidence to support professional decision-making, ‘evidence-based practice’, has gained traction since its origins in medicine in the 1990s with the aim of ‘integrating individual clinical expertise with the best external evidence from systematic research’ (Sackett, Rosenberg, Muir Gray, Haynes, & Scott Richardson, 1996, p. 71) to increase both effectiveness and accountability. More recently, the American Psychological Association Task Force on Evidence-Based Practice, added an important rider which includes

the importance of context, including the culture, values and preferences of participants: “Evidence-Based Practice in Psychology (EBPP) is the integration of the best available research with clinical expertise in the context of patient characteristics, culture and preferences” (APA Presidential Task Force on Evidence-Based Practice, 2006, p. 273).

There has been debate about how appropriate the term ‘evidence-based practice’ (EBP) may be for those working in education and other helping professions such as social work (Rubin, 2007). More inclusive terms such as ‘evidence-informed practice’, ‘evidence-influenced practice’, and ‘evidence-aware practice’ have been proposed as a result which incorporate more interpretative approaches to clinical judgement (Gulliford, 2015; Hammersley, 2001; Nevo & Slonim-Nevo, 2011).

‘Hierarchy of Evidence’ versus ‘A Typology of Evidence’

Within EBP, research findings are given a weighting which is informed by a ‘Hierarchy of Evidence’. There have been many of these since the first hierarchy was proposed in 1979 by the Canadian Task Force on the Periodic Health Examination (1979), most notably that of Sackett et al. (2000).

Table 1 shows a widely-used and well-regard approach to ordering ‘levels’ of evidence developed by the Scottish Intercollegiate Guidelines Network (2015). The levels of the hierarchy are ordered by study design, with the highest weightings given to designs which maximise internal validity (i.e. allow causal inferences to be drawn). Accordingly, systematic reviews and meta-analysis of RCTs and well-designed RCTs themselves are accorded a privileged status.

Table 1: Hierarchy of ‘Levels’ of Evidence
(Scottish Intercollegiate Guidelines Network, 2015)

Levels of Evidence	
1++	High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs) or RCTs with a very low risk of bias
1+	Well conducted meta-analyses, systematic reviews or RCTs with a low risk of bias
1 -	Meta-analyses, systematic reviews or RCTs with a high risk of bias
2++	High quality systematic reviews of case control or cohort studies High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2+	Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2 -	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, e.g. case reports, case series
4	Expert opinion

Systematic reviews are designed to be transparent, replicable, rigorous and more accountable alternatives to traditional narrative reviews (Torgerson & Torgerson, 2008). The methodology of systematic review has been developed to minimise bias by identifying the most complete set of relevant studies, both published and unpublished, statistically significant and non-significant, to investigate clearly-specified research questions (Boyle, Connolly, & MacKay, in press). Reviewers are required to provide details of the inclusion and exclusion criteria used to determine the studies which will be included in the review and also details of the reasons for these decisions. Details of coding and data extraction from the included studies including checks on reliability and validity are also provided, together with the methodology for synthesis and pooling of the data by means of meta-analysis (Centre for Reviews and Dissemination, 2008). Databases of systematic reviews of topics linked to mental health and well-being and education which are of relevance to EPs include The Cochrane Collaboration (<http://uk.cochrane.org/>), The Campbell Collaboration (<http://www.campbellcollaboration.org>), the EPPI-Centre at the Institute of Education, University College London (<http://eppi.ioe.ac.uk/cms/>), and the What Works Clearinghouse (<http://ies.ed.gov/ncee/wwc/>).

Meta-analysis provides statistical techniques for synthesising data from systematic reviews by pooling effect sizes from the included studies to provide aggregate effect sizes and confidence intervals which provide information about the statistical significance of the findings (i.e. whether the null hypothesis can be rejected and the alternative hypothesis, for example that there is an intervention effect which is not due to chance, accepted). These techniques, which include meta-regression and equivalents to analysis of variance, increase statistical power and if the dataset of included studies is large enough, also permit the investigation of associations between outcome variables and study variables of interest (which may be linked to aspects of the implementation of an intervention) (Boyle et al., in

press; Hattie et al., 2014; Lipsey & Wilson, 2001). However, the techniques do not allow causal inferences to be drawn (Borenstein, Hedges, Higgins, & Rothstein, 2009).

Detailed protocols have been developed by the American Psychological Association (2008) for coding data from group design and small-*n* experimental designs (Robson, 2011) which incorporate the principles of implementation science in regard to the synthesis of core programme ‘ingredients’. Guidelines are also available for carrying out systematic reviews using interpretative approaches to synthesise qualitative data (Dunst & Trivette, 2012; Heaton, 1998; Popay et al., 2006; Snilstveit, Oliver, & Vojtkova, 2012) as well as Bayesian approaches (Sutton & Abrams, 2001).

Critics of systematic review, meta-analysis, RCTs, and indeed of the Hierarchy of Evidence approach, take the view that the favoured methodology in turn favours ‘scientific’ notions of ‘effectiveness’ and ‘outcomes’ over understandings of implementation and context (Biesta, 2007; Boyle, 2012; Burden, 2015; Clegg, 2005; Dunst & Trivette, 2012). Peticrew and Roberts (2003) build upon the work of Muir Gray (1997) to propose an alternative framework to the Hierarchy of Evidence, a ‘Typology of Evidence’, which links key research questions to research designs, ranging from systematic reviews, RCTs, and quasi-experimental designs with non-equivalent groups to qualitative approaches. An adaptation of Peticrew and Roberts’ approach which incorporates additional research questions of relevance to EPs is shown in Table 2.

This approach helps to clarify the role of evidence in educational psychology at the level of research. It highlights the fact we do not have to value certain types of evidence more highly than others per se, as in the case of the hierarchy of evidence approach. It holds, rather, in the spirit of mixed methods (Robson, 2011), that it may be more helpful to acknowledge the utility of a more functional approach which incorporates understandings from implementation science and which holds that (a) some research designs may be more

appropriate than others when we seek to address specific questions; and (b) specific research designs may have to be used in combination to provide the appropriate evidence which will allow us to answer the key questions of ‘What... works, for whom, in what circumstances, in what respects and why?’ (Pawson et al., 2005).

**Table 2: ‘Typology’ of Evidence: The Relationship between Research Questions and Research Designs
(adapted from Petticrew & Roberts, 2003, p. 528, following Gray, 1997)**

Research Questions	Research Designs							
	Qualitative Research	Survey	Case Control Studies	Cohort Studies	RCTs	Quasi-Experimental Designs	Non-Experimental Evaluations	Systematic Reviews
Effectiveness <i>Does this intervention work?</i>				+ ¹	++	+		+++
Process of service delivery <i>How does this intervention work?</i>	++	+					+	+++
Salience (Impact) <i>Does this intervention matter?</i>	++	++						+++
Safety <i>Will this intervention do more good than harm?</i>	+		+		++	+	+	+++
Acceptability <i>Will users be willing or want to take up this intervention?</i>	++				+	+	+	+++

Feasibility <i>Is this intervention feasible in terms of the demands made upon users and stakeholders?</i>	++	+						
Cost effectiveness <i>Is it worthwhile for the local authority/establishment to implement this intervention?</i>					++			+++
Appropriateness <i>Is this the right service for the target users?</i>	++	++						++
Satisfaction with the service <i>Are users, providers and other stakeholders satisfied with the service?</i>	++	++	+	+				+

1. '+++' highly-appropriate research design; '++' very appropriate research design; '+' appropriate research design

**Table 3: ‘Typology of Evidence’:
The Relationship between Purpose of Assessment, Assessment Questions
and Assessment Approaches
(adapted from Boyle & Fisher, 2007, pps. 15 and 212)**

Purpose of Assessment (Assessment Question)	Assessment Approach				
	<i>Norm-referenced</i>	<i>Criterion-referenced</i>	<i>Curriculum-based</i>	<i>Dynamic Assessment</i>	<i>Interviews (inc. focus groups) and observations in different settings over a period of time</i>
Determining entitlement or eligibility for additional support <i>(How does this individual’s scores compare with those for a representative sample from a population?)</i>	++++ ¹	+	+		+
Establishing accountability <i>(Is this individual making appropriate levels of progress?)</i>	+++	++	++		+
Gathering information about instructional needs <i>(Is this individual receiving an appropriate curriculum and appropriate instruction?)</i>	+	+++	+++	+++	+
Gathering information about situated, or context-specific problems, such as social, emotional or behavioural difficulties					

<i>(Has there been a change in on-task behaviour in class? What is the nature of the individual's reported behavioural problems?)</i>					+++
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1. '+++' highly-appropriate approach; '++' very appropriate approach; '+' appropriate approach

As a corollary, Table 3 shows a ‘Typology of Evidence’ approach, adapted from Boyle and Fisher (2007), similarly links evidence obtained from assessment approaches ranging from norm-referenced to dynamic assessment, interviews and observation approaches to the purpose of the assessment and examples of some specific assessment questions. This is a functional approach based on the principle that we should select the assessment strategy or combination of strategies which will yield the most reliable and dependable results in response to the purpose of carrying out the assessment.

Reliability and validity of evidence

For evidence to be of value it should be reliable and valid (Boyle & Fisher, 2007; Cronbach, Gleser, Nanda, & Rajaratnam, 1972; Ysseldyke, Salvia, & Bolt, 2013). This is true not only of quantitative data, but also of qualitative data, although as Lincoln and Guba (1985, pp. 294-301) note, terms such as ‘credibility’, ‘transferability’, ‘dependability’ and ‘confirmability’, which are less positivist but capture the same issues, may be more appropriate in the case of the latter (Golafshani, 2003).

There is one issue common to both quantitative and qualitative data which is worth highlighting here. All evidence is subject to error (e.g. measurement error, scoring error, situational factors and other issues surrounding sampling) (Boyle & Fisher, 2007). Accordingly, when using published instruments, for example, it is good practice to report confidence intervals where they are available, as they indicate the precision of our measurement.

This degree of precision also defines the minimal differences in score change which are not likely to be due to measurement error. This is an important consideration when we evaluate the evidence for the success of an intervention, either at the level of research, or at the level of an individual. The concept of the minimal difference (Weir, 2005) is an important

one for the evaluation of evidence. Firstly, achieving a statistically significant score change is not sufficient in itself. To rely on a score change on its own assumes error-free measurement. What is required in addition to a statistically-significant difference is confirmation that the score changes observed exceed the minimal difference based upon the reliability of the instrument which cannot be accounted for by measurement error. Weir (2005) provides helpful examples of how to use the standard error of measurement from published tests and scales to calculate the minimal significant difference. This can be compared with effect sizes from pilot data, meta-analyses or group-designs to help in the selection of instrumentation for an intervention study. In the case of unpublished scales, he provides worked examples of how to compute the intra-class correlation coefficient, a measure of reliability which can be used to calculate the minimal difference, from any repeated measure dataset. These procedures are also applicable to individuals. For example, it is possible to calculate a minimal difference for an individual which would indicate whether the evidence of score change following an intervention is such that test-retest measurement error can be discounted.

In the next section, we will consider evidence-based interventions and their potential for closing the gap between research and practice.

The gap between research and practice: Evidence and implementation science

The gap between research and practice, in terms of effectively implementing evidence-based controlled studies in uncontrolled, live contexts, is a complex one requiring a range of actions, activities and measures. Over the past few decades there has been recognition by Educational and School psychology that EBIs may have the potential to have considerable impact in schools but there are concerns about the reliability of responses and outcomes arising across different school contexts implementing the same EBI (Forman et al., 2013).

Implementation Science, (which is discussed in Chapter 3 in this text), has made a significant contribution to discussion surrounding the role of evidence and the specific expectations embedded in the concepts of EBI and EBP. EBIs are defined as research-proven prevention and intervention programmes offering a strong empirical basis (i.e. demonstrating positive outcomes in multiple, well designed studies) (Stoiber & DeSmet, 2010).

The criteria generally applied to EBI are: two or more studies; careful specification of the client population; random assignments of participants across conditions; use of intervention manuals documenting intervention protocols; multiple outcome measures including measurement of the target problem; statistically significant differences between the intervention and comparison group after treatment and replication of outcomes by an additional research team (Kadzin & Weisz, 2010). However, it remains true that regardless of the success of carefully developed programmes and interventions, when applied in real contexts and delivered by teachers and practitioners, success becomes unpredictable. This begs a number of questions about the range and compatibility of the application of the concepts underpinning success in controlled and live contexts. What happens to the concept of evidence when it moves into schools and other organisations where a range of factors and processes begin to impinge on EBI and to transform outcomes? Despite delayed attention to this topic and ongoing lack of clarity about the nature of processes impacting on EBIs in real contexts, the term ‘evidence-based practice’ seems to suggest that the concept of EBI is empirically valid and able to be broadened to include practice issues.

What is ‘evidence based practice’ in school?

EBP is a more comprehensive concept than EBI which, if applied as intended, has the potential to clarify, focus and improve the quality of the work carried out by Educational and School Psychologists and the work of teachers and practitioners in schools. However, to do

so, existing barriers to EBP need to be carefully explored and understood. Within education and Educational and School Psychology, EBP is practice which has demonstrated research evidence to support it. The term implies that there is readily accessible and coherent scientific evidence which can be appropriately applied to support the adoption, implementation, delivery and evaluation of programmes, interventions and practices (Kratochwill & Shernoff, 2003). Although EBP presumes the existence of coherent, psychological, scientific evidence to support key practices in educational contexts, in fact this has proved more difficult to develop and progress than in, for example, medical contexts where it has nevertheless presented considerable challenges (Kratochwill, 2007). EBP is intended to make use of evidence on the most appropriate assessment and intervention protocols for a particular client or system.

Kratochwill (2007) notes the need for the idea of EBP to be expanded to identify, develop and include specific EBP which is urgently required by Educational and School Psychologists. Educational and School Psychologists are engaged in highly contextualised, applied work in relation, not only to systemic challenges and organisational issues, but also to direct case work where a lack of integrated knowledge and evidence complicates already significant barriers to the effectiveness of interventions.

Creating and expanding evidence-based practice in educational and school psychology

Much is known currently about the role of contextual variables in the context of organisational psychology and about the contribution of key factors, issues and processes in enabling and promoting more effective organisations. However it is only relatively recently that an *integrated core of scientific evidence* has emerged clarifying how educational and school psychology can best support practitioners to deliver EBP effectively. This evidence has been established by Implementation Science and extends beyond immediate practice issues within schools to the development of *effective and targeted service delivery* for

Educational and School Psychology Services and to the capacity to consult and advise at policy level (Kelly, 2012). Psychologists' activities in what might be referred to as the 'implementation zone' involve applying evidence-based, implementation frameworks to developing the understanding, readiness, willingness, capacities and resources required in schools or other contexts e.g. community projects and parent training facilities, to support the effectiveness of their practice in delivering both specific interventions and in delivering high quality teaching (Myers, Durlak, & Wandersman, 2012). Implementation frameworks and related theory, knowledge and skill base are of particular relevance to Educational and School Psychologists who need to play a central and pivotal role in supporting the effective delivery of EBI and EPB in schools. Educational and School Psychologists have developed frameworks for practice reviewed in this text which already anticipate and address many of the emerging implementation challenges e.g. the Problem Solving Frameworks; consultation and communication expertise; research skills; knowledge and skills in training and in supporting organisational change. In their review and analysis of implementation science research, Fixsen, Naoom, Blasé, Friedman, and Wallace (2005) draw attention to the two-pronged approach required to apply Implementation Science, making a clear distinction between two key types of evidence-based practices and outcomes: *intervention strategies* which include the strategies used by teachers, practitioners and others to effect changes and produce desired outcomes in a targeted population and *implementation practices* which include sets of evidence-based implementation strategies to *promote the adoption and use* of evidence-based intervention practices. Implementation Science itself provides a major, complex multi-layer evidence-based framework, guiding training and practice for Educational and School Psychology. The Core Drivers Model (Blasé, Van Dyke, Fixsen, & Wallace Bailey, 2012) represents an application of this particular approach in educational

contexts. The development of these areas of linked science and practice tackles the key questions and issues presented by the failure to generalise from empiricism to EBP.

Conclusion

In this chapter, we considered the nature of evidence and its role in relation to professional practice. What is striking is the number of layers of ‘evidence-awareness’ required by Educational and School Psychologists and other helping professions. These range from an understanding of evidence in the light of factors such as epistemological stance and the effects of beliefs and values, to an understanding of the links between study design and research and assessment questions, and to issues relating to the precision of measurement. However, evidence-awareness culminates in the implications for EBP and EBI and the centrality of Implementation Science, and while ‘evidence’ of itself may not constitute a framework, any problem-solving framework used by Educational and School Psychologists should be informed by an awareness of the role of evidence.

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