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Abstract Although using a combination of quantitative and qualitative approaches is widely advocated, there is considerable scope for confusion due to the complex ontological and epistemological issues that need to be resolved. This paper examines some of the issues that may arise when the methods are combined. Three distinct standpoints with regard to using mixed method approaches are highlighted: a methodological purist position, a pragmatic standpoint and an anti-conflationist position. It is suggest that an anti-conflationist approach that is underpinned by the philosophy of critical realism is compatible with all three of the purposes of methodological triangulation identified by Risjord and his co-authors (Risjord et al., 2001, 2002) and that adopting a critical realist perspective may circumvent many of the problems that are associated with paradigm 'switching'. The case for adopting a critical realist framework is illustrated by a case study, in which a combination of quantitative and qualitative methods was used to explore how and why gatekeeping decisions emerge at the interface between primary care and community mental health teams.

Key words critical realism, mixed methods, logic of justification, gatekeeping

In the fields of health and social research the use of mixed method approaches is widely advocated (Pawson and Tilley, 2001; Creswell, 2003; Johnstone, 2004). However, using a combination of quantitative and qualitative methods can be a methodological 'minefield', because of the complex ontological and epistemological issues that are involved (Blaikie, 1991). Researchers need to consider carefully their rationale for using a combination of methods, as there is considerable scope for confusion (Creswell et al., 2004). This paper examines the methodological issues

that can arise in mixed-method studies and outlines a critical realist rationale for using a combination of quantitative and qualitative methods.

The paper begins with a section that describes the traditional distinctions which have been made between quantitative and qualitative methods. This is followed by a section that outlines the different methodological positions which may be taken with respect to the issue of using a combination of methods. The philosophy of critical realism is then introduced and the critical realist stance towards methodological triangulation is compared with the usual positivist and interpretivist standpoints. The paper concludes with a brief outline of a critical realist study that used a combination of quantitative and qualitative methods in a mixed-method design.

The distinction between quantitative and qualitative methods

At a fundamental level all forms of research and inquiry develop from the human desire to understand and make sense of the world (Dzurec and Abraham, 1993). However, a distinction has traditionally been made between quantitative and qualitative methods. This distinction is reinforced by the structure of many methodology textbooks, which often treat both methods as distinct paradigms (Philip, 1998).

Quantitative approaches that incorporate standardised measures and statistical techniques are usually associated with a positivist paradigm that is linked with the natural sciences. This paradigm is based on the philosophy that our preconceptions need to be set aside in order to identify objective facts based on empirical observations. The goal of positivistic research is to identify generalisable laws that are based on the identification of statistical relationships between dependent and independent variables (Ackroyd, 2004.) Subjects are chosen using sampling techniques that are designed to eliminate potential sources of bias and generalisations are made from the sample to a wider population. Methods that are associated with the positivist paradigm include structured interviews and questionnaires, randomised controlled trials, systematic reviews and statistical analysis of official data.

Qualitative approaches based on non-numerical narratives are associated with the interpretivist paradigm. The interpretivist paradigm places a much greater emphasis upon the way in which the world is socially constructed and understood (Blaikie, 2000). It incorporates a wide range of philosophical perspectives, including symbolic interactionism, phenomenology, ethnomethodology and hermeneutics. The research methods that are typically associated with interpretivism are small-scale but intense, and the interaction between the researcher and the participants in the study is seen as an integral part of the research process (Philip, 1998). Participants are selected using purposive or theoretical sampling approaches on the basis of how useful they are likely to be for the pursuit of the inquiry, and the views of participants who are not necessarily representative of the general sample may be actively sought out (Goering and Streiner, 1996; Strauss and Corbin, 1998). Methods associated with the interpretivist paradigm include focus groups, unstructured interviews, textual analysis and ethnographic case studies.

The various aspects to the quantitative/qualitative distinction incorporate: differences between the ontological and epistemological principles that underpin both methods; differences between the strategies employed in both forms of inquiry; and differences in the respective cannons for judging the credibility of findings. These difference are summarised in Table 1.

Table 1 Traditional distinctions that are associated with quantitative and qualitative methods

	Quantitative methods	Qualitative methods
Ontology	Tangible reality	Intangible reality
Epistemology	Regularities established via empirical research and deductive/inductive reasoning	Knowledge constructed via social interaction/hermeneutic understanding
Methodology	Hypothesis testing	In depth fieldwork
Data analysis	Verification/falsification	Interpretation of meaning

Alternative positions

Debate between methodological purists/pragmatists

The question of whether or not quantitative and qualitative methods should be combined has been a source of controversy and debate between the supporters of two competing methodological standpoints that have been characterised as the purists and the pragmatists (Tashakkori and Teddlie, 1998). The methodological purists tend to take an absolutist standpoint and argue strongly in favour of their preferred methodology (Petter and Gallivan, 2004). They take the view that quantitative and qualitative methods are based on mutually exclusive assumptions and, given that there is almost no common ground between them, the methods are incommensurable (Guba and Lincoln, 1989). For example, Leininger, arguing from an interpretivist perspective, has cautioned against the use of a mixture of quantitative and qualitative research methods. She argues that the qualitative and qualitative paradigms are so radically different that they cannot be reconciled (Leininger, 1994; Ford-Gilboe et al., 1995).

The methodological pragmatists such as Tashakkori and Teddlie (1998) and Johnson and Onwuegbuzie (2004) accept the same set of paradigmatic assumptions as the purists. However, they argue that researchers should use whatever methods are needed to obtain the optimum results, even if this involves 'switching between' alternative paradigms. The logic of the pragmatist position is that neither quantitative or qualitative methods alone are sufficient to develop a complete analysis. As a consequence, they need to be used in combination, so that they can complement each other (Creswell et al., 2004). However, applying a pragmatic approach in practice may prove to be a considerable challenge as researchers wrestle with methodological tensions that are difficult to resolve (Johnstone, 2004). Researchers who attempt to integrate positivist and interpretivist approaches may encounter difficulties as they try to make sense of 'dissonant data' obtained using methods based on conflicting epistemological assumptions (Perlesz and Linsay, 2003; Johnstone, 2004). For example, it may prove difficult to link highly contextualised interpretative findings with quantitative findings that establish empirical generalisations (Bryman, 2004).

The anti-conflationist position

The basic suppositions upon which the traditional quantitative/qualitative distinction has been founded have been challenged by another group of methodologists who have adopted an anti-conflationist position (Bryman, 1992; Hammersley, 1992; Layder, 1993; Roberts, 2002; Bryman and Bell, 2003). The anti-conflationists have pointed out that, although there are general differences between quantitative and qualitative methods, these differences cannot be described as an all-embracing

dichotomy. They argue that there are many approaches which cross the traditional quantitative–qualitative divide and the differences between methods are not always as extreme as they are made out to be. Qualitative methods are often used in the preparatory stages of quantitative research and qualitative methods can be used to test theoretical hypotheses. Within the field of qualitative research it is also common for researchers to adopt a degree of 'quasi-quantification' and quantitative researchers often use statistics as a form of descriptive narrative (Bryman and Bell, 2003).

The anti-conflationists maintain that it is necessary to distinguish between the logic of justification and the specific method that is employed. They argue that a methodology should not be conflated with the technical aspects of a method, as the same method can be used by researchers who come from different ontological and epistemological starting positions. This is most obvious in the sphere of qualitative research which is associated with a diverse range of methodological stances. Methods are not linked exclusively to specific philosophical standpoints. Van Maanen (1988), for example, has identified distinct differences between realist, confessional and impressionistic accounts of ethnographic field studies. The key difference between the methodological pragmatists and the anti-conflationists is that the anti-conflationists adopt a more principled approach when combining methods. For the anti-conflationists it is only appropriate to combine methods if a common ontological and epistemological position can be sustained. Anti-conflationist positions have been adopted by researchers who have approached quantitative and qualitative methods from a range of philosophical perspectives, but the following discussion focuses primarily upon the perspective of critical realism.

Critical realism

Critical realism is a relatively new philosophical perspective that offers a radical alternative to the established paradigms of positivism and interpretivism (Houston, 2001; McEvoy and Richards, 2003). It is a philosophy of science that is founded upon a priori or necessary truths about the nature of the world. Critical realists maintain that progress is possible because the intransitive dimension of reality (enduring structures and processes) provides a point of reference, against which theories can be tested (Bhaskar, 1978). However, from a critical realist perspective, it is impossible to fully apprehend this reality, as our perceptions are shaped by our theoretical resources and investigative interests. Our knowledge of the world is always mediated by the discourses available to us, but we can get empirical feedback from those aspects of the world that are accessible (Sayer, 2004).

Critical realists distinguish between three different ontological domains or modes of reality (Bhaskar, 1978; Delorme, 1999). These are: the empirical (those aspects of reality that can be experienced either directly or indirectly); the actual (those aspects of reality that occur, but may not necessarily be experienced); and the real or 'deep' structures and mechanisms that generate phenomena (see Figure 1). These causal mechanisms cannot be apprehended directly as they are not open to observation, but they can be inferred through a combination of empirical investigation and theory construction. For critical realists, the ultimate goal of research is not to identify generalisable laws (positivism) or to identify the lived experience or beliefs of social actors (interpretivism); it is to develop deeper levels of explanation and understanding.

From a critical realist perspective there are two main problems with positivistic methodologies. First, that they focus exclusively on observable events and fail to take full account of the extent to which these observations are influenced by prior theo-

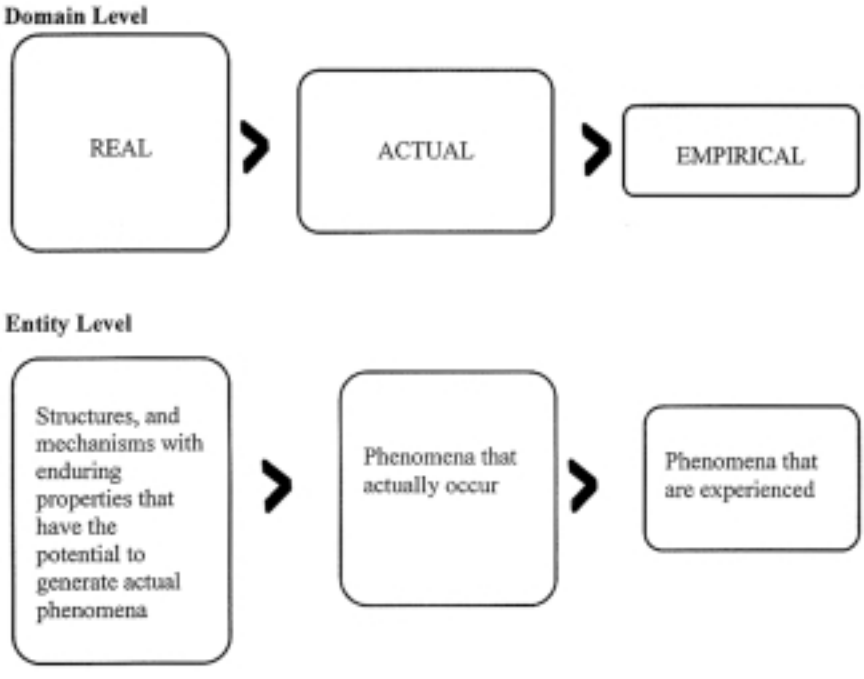

Figure 1 The three ontological domains.

retical frameworks (Olsen, 2002). Second, that they deal with relationships between the various elements of social systems in isolation. They treat them as though they are 'cut off' from external influences in a closed system and fail to take account of the interactions between mechanisms and the contexts in which they occur (Collier, 1994). Critical realists argue that the real world operates as a multi-dimensional open system. Instead of following a set order, effects arise due to the interaction between social structures, mechanism and human agency. Causal mechanisms have the potential to make an impact, but the actualisation of the mechanism is dependent upon the variable conditions in which the mechanism operates (Lawson, 1997). It is therefore more appropriate to think in terms of the tendencies that are produced by underlying causal mechanisms, than in terms of empirical generalisations (Lawson, 2003).

Critical realists acknowledge the value of interpretivist methodologies that focus upon discourse, human perception and motivation, as human reasons can serve as causal explanations (Bhaskar, 1989). However, they are critical of interpretivists who fail to relate discourses to the underlying social structures, which may enable or constrain the actions of individuals or to the social networks in which social actors are embedded (Granovetter, 1985; Williams, 2003). Critical realists also allow for the possibility that the accounts of research participants may be partial or even misguided (Potter and Lopez, 2001).

> Appraisal of the testimony of respondents amounts to much more than simply checking whether they are telling the truth, it entails looking at the processes that shaped their views and assessing the extent to which they may be distorted by ideology.
>
> (Wainwright, 1997: 3).

The logic that underpins critical realism is called 'retroduction'. This involves moving from the level of observations and lived experience to postulate about the underlying structures and mechanisms that account for the phenomena involved (Mingers, 2003). Retroduction has been defined as 'a mode of analysis in which events are studied with respect to what may have, must have, or could have caused them. In short it means asking why events have happened in the way they did' (Olsen and Morgan, 2004: 25). Ginzburg (1990) traces the evolution of retroductive reasoning back to the needs of hunters. In order to track down their prey, hunters needed to develop the ability to look for clues such as broken branches, hoof marks, tufts of hair and odours, and ask themselves, 'What does it indicate?' When they encountered unusual clues such as new scents they were then able to speculate what the cause of the scent might be. Retroductive reasoning takes place in a similar manner in the context of scientific research, as mechanisms are postulated to account for observed phenomena via analogy, metaphor and model building (Lawson, 1989). From a critical realist perspective, the best explanations are those that are identified as having the greatest explanatory power. Explanations are always potentially open to revision. Accepted theories may be rejected in favour of more convincing alternatives, if the alternative is better able to explain a phenomena and generate theoretical implications that are actually realised (Sayer, 2002).

Critical realists argue that the choice of methods should be dictated by the nature of the research problem. In many cases it is suggested that the most effective approach will be to use a combination of quantitative and qualitative methods or techniques (Olsen, 2002). What is most important from a critical realist perspective is how quantitative and qualitative methods are used (Pratschke, 2003). The strength of quantitative methods is that they may be used to develop reliable descriptions and provide accurate comparisons. In the exploratory phase of an investigation, quantitative methods can identify patterns and associations that may otherwise be masked. This may help to tease out new and unexpected causal mechanisms. Quantitative methods can also be used to test out theories about how causal mechanisms operate under particular sets of conditions (Mingers, 2004). The key strength of qualitative methods, from a critical realist perspective, is that they are open ended. This may allow themes to emerge during the course of an inquiry that could not have been anticipated in advance. Qualitative methods can help to illuminate complex concepts and relationships that are unlikely to be captured by predetermined response categories or standardised quantitative measures. The next section compares the critical realist position with respect to methodological triangulation (Denzin, 1978), with the positivist and interpretivist positions.

Methodological triangulation

'Triangulation entails using more than one method or source of data in the study of a social phenomena' (Bryman and Bell, 2003: 291). Within the social sciences the use of the term 'triangulation' is only loosely associated with the original meaning of the term adopted from the fields of surveying and navigation (Sim and Sharp, 1998). However, triangulation is usually employed for three main reasons: confirmation, completeness and 'abductive inspiration' or retroduction (Risjord et al., 2001, 2002).

Confirmation

The use of triangulation for the purpose of confirmation comes closest to the original use of the term, which describes a set of techniques that are used to locate a fixed position. In social and evaluation research, data is triangulated for the purpose of confirmation in order to enhance the reliability and validity of the findings. By using a combination of methods, researchers attempt to counteract the biases that are associated with single-method studies (Denzin, 1989: Shih, 1998). It is suggested that quantitative and qualitative findings may corroborate each other and support a more robust conclusion than either source of data could support alone (Risjord et al., 2001). For example, Kopinak (1999) found that qualitative data obtained from interviews and ethnographic observations verified the findings from a quantitative survey in a mixed-method study of refugee well-being. This approach to triangulation makes sense from both a positivist and critical realist perspective, as it is based on the assumption that there is a tangible social reality. The goal of confirmation makes less sense from an interpretivist perspective. Interpretivists are agnostic over the question of whether or not there is a tangible reality, stressing instead the importance of alternative subjective positions and different ways of making sense of the world (Blaikie, 1991).

Completeness

Quantitative and qualitative data may be triangulated for the purpose of completeness in order to obtain complementary perspectives, and a greater level of detail than could be obtained from using either data source. The potential benefits of combining methods for the purpose of developing a more complete understanding are illustrated by Rogers and Nicolaas (1998). They concluded that using a combined method approach enabled them to develop a more comprehensive picture of the patterns and processes of primary care use than that had been developed in previous studies using quantitative or qualitative methods alone. However, the goal of completeness is more ambiguous than that of confirmation. From a positivist perspective, the goal of completeness may be to reveal different aspects of a phenomenon, whereas for an interpretivist it may be to provide a wider range of perspectives. Both these goals are compatible with a critical realist perspective. Quantitative and qualitative methods can be employed to reveal different facets of the same reality and also to examine reality from different perspectives.

Abductive inspiration

Abductive inspiration is very similar in meaning to the critical realist concept of retroduction. Methodological triangulation for the purposes of confirmation and completeness may play a valuable role in a research strategy that is underpinned by critical realism. This is because detailed observations may provide a platform for making retroductive inferences about the causal mechanisms that are active in a given situation. An example of the use of triangulation for the purpose of retroduction is the two-stage strategy that was employed by Byng (2002). Byng explored how and why improvements in the care of people with long-term mental illness occurred. The first stage of the strategy that he employed consisted of an exploratory randomised controlled trial of a shared care development, which gave mixed results. This was followed by a series of retrospective interviews with practitioners in the field. Byng concluded that, whilst the strategy did not provide all the answers he was seeking, it helped him to develop a much deeper understanding of the processes that lead to effective shared care.

Retroduction makes little sense from either a positivist or an interpretivist perspective, but for different reasons. Positivists maintain that researchers should confine themselves to making observations about empirical events, as they search for regularities from which to make generalisations (Fleetwood, 2001). They are wary of speculative theory and argue that we cannot make claims about social structures and mechanisms that cannot be observed (Halfpenny, 1987). Retroduction is also problematic for interpretivists because their ontological standpoint is restricted to the understanding of subjective meaning. The material aspects of reality are intangible from an interpretivist perspective and there is no firm basis to support retroductive inferences about social structures or mechanisms.

In summary, a critical realist approach is generally compatible with all three of the purposes of methodological triangulation identified by Risjord and his co-authors: confirmation, completeness and abductive inspiration or retroduction (Risjord et al., 2001, 2002). The goal of retroduction makes little sense from either a positivist or an interpretivist perspective. However, the purposes of confirmation and completeness are compatible with a positivistic approach. For interpretivists, the purpose of methodological triangulation is limited to the purpose of completeness, where it may help to provide a wider range of perspectives.

Although the primary goal for critical realist researchers is explanatory understanding based on the development of retroductive inferences, methodological triangulation for the purposes of confirmation and completeness may also play a valuable role in the research process. This is because detailed observations may provide a platform for making retroductive inferences about the causal mechanisms that are active in a given situation. The following case study provides an example of how a combined method approach may be used in conjunction with a critical realist framework.

Illustrative case study

A mixed-method approach was employed by the authors in a study that aimed to develop a better understanding of how gatekeeping decisions emerge at the interface between primary care and community mental health teams. A quantitative survey was followed by a series of qualitative interviews with gatekeeping clinicians and service managers. The aim of the quantitative survey was to describe the underlying pattern of practice in the locality in which the study was conducted. The qualitative interviews were then carried out in order to explore how this pattern of practice emerged.

The quantitative survey data was obtained retrospectively from patients' records. Data was obtained for a cohort of patients and analysed using the Pearson's χ^2 test, analysis of variance and log-linear modelling procedures. This gave a detailed picture of the aggregate pattern of referral outcomes. The data indicated that access to ongoing support was selective and that priority was given to patients with more severe mental health and social problems, a previous history of hospitalisation and a diagnosis of schizophrenia or bi-polar affective disorder. The majority of patients were referred back to their GP following an initial assessment or short-term crisis intervention by the psychiatrists and community psychiatric nurses who were established members of the CMHTs. However, senior house officers who were attached to the CMHTs during their training had a different pattern of practice and were more likely to provide patients with crisis support (McEvoy et al., 2000, 2002).

The initial qualitative interviews took the form of guided conversations based on a semi-structured interview schedule and a Grounded Theory method was used to

analyse the data (Layder, 1993; Strauss and Corbin, 1998; Goulding, 1999). The findings from these initial interviews corroborated the findings from the quantitative survey and also provided a much broader view of the intricacies of the decision-making process. The core concept that emerged from the analysis was a logic of action (Bacharach et al., 1996) called the hierarchy of appropriateness (Charles-Jones et al., 2003). Four dimensions to the hierarchy were identified: severity of mental illness, risk, beneficence and a moral dimension based on normative judgements about the legitimacy of the patient's presenting problems. The severity of the patient's mental illness and associated risk factors had the greatest impact upon gate-keeping decisions. The impact of judgements about beneficence and the legitimacy of the patient's problems were most evident when marginal decisions were made.

The later interviews were strongly influenced by the realistic analytical procedures advocated by Pawson and Tilley (1997). Two key questions guided these interviews. First, what influence did the gatekeeping process have on the formation of the hierarchy of appropriateness? Second, why did the hierarchy of appropriateness take the form it did? Data from these interviews laid the foundations for the development of a theoretical model that described the main factors which influenced the form of the hierarchy of appropriateness. Four factors were abstracted: (1) the need to fit in with strategic planning objectives, (2) the need to manage the flow of work, (3) the need to carry the burden of responsibility and (4) the position of the CMHT in the economy of care. These factors were inter-related and their overall effect was to place a strong onus on the establishment and implementation of a clearly defined service boundary.

It could be argued that it was not necessary to carry out the retrospective survey in order to develop an understanding of the factors that explained how and why the gatekeeping decisions emerged in the form they did. This argument has some credence given that, although the survey helped to identify the general outcomes of the gatekeeping process, it gave few direct insights into the nature of the process itself or the reasons why the hierarchy of appropriateness emerged. However, it underestimates the significance of the role that the quantitative survey played in providing a basis for the later stages of the study. Although quantitative data sources are not necessarily more reliable than qualitative sources (Yeung, 2003), it is still reasonable to assume that the pattern of practice the survey mapped out was far more reliable than the anecdotal accounts of the interviewees. The survey was based on categories and outcome measures that had an acceptable degree of face validity and they were backed up by statistical tests, which indicated that they were unlikely to be chance findings. The findings from the quantitative survey were also consistent with the findings from other recent studies that have examined the targeting of patients by CMHTs (Barr, 2000; Cornwall et al., 2001; Keown et al., 2002) and they provided a platform from which to proceed with the qualitative stage of the inquiry.

Interviewees tend to construct narratives built around exemplars and critical instances, and they can over-emphasise novel and unusual events in contrast to routine occurrences (May, 1991). They are also likely to be influenced by the dynamics of the interview encounter and there may be a natural tendency for them to feel pressured into 'saying the right sort of things' (Rubin and Rubin, 1995). Therefore we think that we would have been less inclined to take the interviewees' assurances that they prioritised patients with severe mental illness at face value, without the independent confirmation that the quantitative data gave. We also suspect that we may have attributed greater weight to the influence of the assessment of beneficence and moral attributions if the dimensions of severity and risk had not previously been identified as such strong influences.

The data from the semi-structured qualitative interviews augmented the survey findings. Instead of being classified into pre-determined categories (Patton, 1990), the data was obtained in the form of the interviewee's own 'natural' language. The flexibility of the interview format also lent itself to the exploration of the gatekeeping process, as it enabled alternative lines of inquiry to be pursued. For example, it was identified that the hierarchy of appropriateness was affected by a range of factors such as the drive to compensate for the lack of alternative resources and the reluctance of some clinicians to challenge GPs about referrals that they regarded as inappropriate. The links between these situational factors and the wider organisational context were explored and, in the final stages of the inquiry, the theoretical model (see Figure 2) that emerged from the analysis was checked out with the interviewees in the field.

On the whole, critical realists have tended to devote more attention to the development of qualitative research methods than quantitative approaches (Porpora, 2001). One of the reasons for this may be that qualitative methods can be adapted more easily to pursue alternative lines of inquiry in the search for retroductive explanations. It is obviously far easier to change a line of inquiry as potential explanations emerge during the course of a series of conversational interviews, as the interviewer is not committed to the measurement of predetermined variables. However, the potential contribution of descriptive statistics in the search for retroductive explanations should not be underestimated. A classic example to illustrate this point is the case of the London cholera outbreak in 1854. When the cases of cholera were mapped it could be seen that they were grouped around a single water pump (Law and Urry, 2004).

The two key questions that arose from the quantitative survey were: why were the general patterns of practice so consistent? And why was the pattern of practice amongst the SHOs different to that of the other gatekeeping clinicians? Possible

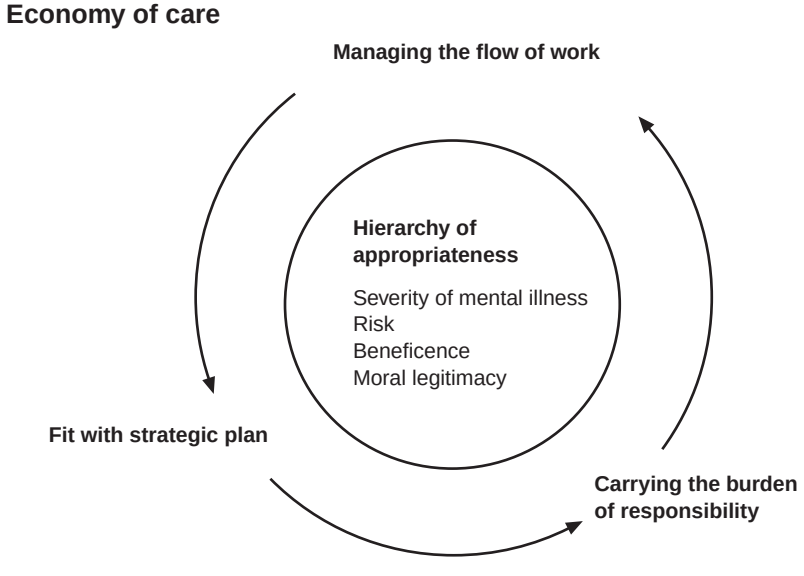

Figure 2 Diagram illustrating how gatekeeping decisions emerged.

explanations were sought in the interviews with the gatekeeping clinicians and service managers, and the findings suggested that the main factors which influenced the pattern of practice were mutually reinforcing. For example, the threat of sanctions or damage to their reputation should an adverse event occur militated against a relaxed interpretation of the gatekeeping clinician's role and reinforced the tendency to target patients with severe mental illness in line with government policy. The findings from the qualitative interviews indicated that the reason why pattern of practice was different amongst the SHOs was related to the different organisation context in which they worked. They were new to psychiatry and were not exposed to the same workload pressures as the established members of the CMHTs.

Concluding comments

The discussion indicated that a critical realist approach is compatible with all three of the purposes of methodological triangulation identified by Risjord and his co-authors (Risjord et al., 2001, 2002) and that it may circumvent many of the problems associated with paradigm 'switching'. The case for adopting a critical realist framework was further reinforced by the illustrative case study. The quantitative survey helped to identify clear and consistent patterns of practice, which were confirmed and elaborated upon by the findings from the semi-structured interviews. Using both the quantitative and qualitative approaches gave the inquiry a greater sense of balance and perspective. The findings from both approaches also stimulated the retroductive reasoning that led to the development of the theoretical model, which explained why gatekeeping decisions tended to emerge in the way they did.

There has been an extensive discussion of philosophical issues with critical realist circles. However, there are still relatively few examples of the application of critical realist principles in practice, despite the efforts of researchers such as Porter (1993), Kowalczyk (2002) and Naess and Jensen (2002). It is hoped that this discussion will act as a stimulus for further discussion and debate about the role that critical realism may play as an approach that offers an anti-conflationist perspective upon the traditional quantitative–qualitative divide.

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