Synthesising diverse evidence: the use of primary qualitative data analysis methods and logic models in public health reviews.

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ABSTRACT

Objectives

The nature of public health evidence presents challenges for conventional systematic review processes, with increasing recognition of the need to include a broader range of work including observational studies and qualitative research, yet with methods to combine diverse sources remaining underdeveloped. The objective of this paper is to report the application of a new approach for review of evidence in the public health sphere. The method enables a diverse range of evidence types to be synthesised in order to examine potential relationships between a public health environment and outcomes.

Study design

The study draws on previous work by the National Institute for Health and Clinical Excellence on conceptual frameworks. It applied and further extended this work to the synthesis of evidence relating to one particular public health area, the enhancing of employee mental wellbeing in the workplace.

Methods

The approach utilised thematic analysis techniques from primary research together with conceptual modelling to explore potential relationships between factors and outcomes.

Results

The method enabled a logic framework to be built from a diverse document set that illustrates how elements and associations between elements may impact on the wellbeing of employees.

Conclusions

Whilst recognising potential criticisms of the approach, it is suggested that logic models can be a useful way of examining the complexity of relationships between factors and outcomes in public health, and of highlighting potential areas for interventions and further research. The use of techniques from primary qualitative research may also be helpful in synthesising diverse document types.

INTRODUCTION

Public health policy is increasingly based on summaries of information collated through systematic reviews of the literature.[1] Systematic review methods developed by The Cochrane Collaboration[2] and the National Institute for Health and Clinical Effectiveness[3] have explored questions regarding the effectiveness of clinical interventions and have consequently given preference to quantitative studies. Public health however, may offer particular challenges to the conventional systematic review method, due to the nature of the evidence available and the complexity of the interventions.[4, 5]

A systematic review endeavours to use transparent and replicable methods to identify, evaluate and interpret available evidence to address a research question. A review will define inclusion and exclusion criteria, include an examination of study quality, and commonly will synthesise findings into evidence statements.[5, 6] The quality of the evidence included is assessed according to the study design, conduct and analysis.[1] Reviewers set the minimum quality standard for evidence that will be considered, based on the conventional hierarchy of design that places experimental studies, and in particular, randomised controlled trials at the top. These study design hierarchies however, are problematic in areas of research such as public health, with its preponderance of non-trial evidence exploring wider issues such as how do interventions work, what are patients' experiences or how can public health be improved and health inequalities reduced? [7, 8] In addition to these issues, many areas of study lack research of sufficient quality or quantity on a topic to contribute to a meaningful systematic review.[9]

In recognition of these limitations, there has been increasing interest in developing review methods to incorporate diverse types of evidence including qualitative research.[7,10,11] Conventional systematic reviews have been criticised on a number of grounds: that they provide a lack of context for social interventions;[12] that they are of limited use to policymakers, practitioners and other groups due to the lack of studies available;[8] they exclude important work;[12] and that they lack consideration of feasibility and implementation. Widening the types of evidence included in a review may help to overcome these criticisms.

As the potential for different types of evidence to make a contribution to a review has been explored, methods for the synthesis of qualitative research have expanded.[13] Approaches such as "qualitative meta-synthesis"[14] are being increasingly applied in a wide variety of areas.[15, 16] Researchers in the area caution however, that approaches to qualitative synthesis of secondary research need to be further developed to be just as explicit as methods in primary research,[9] and that forms of data extraction used for this type of study require further improvement and evaluation.[10,11] Whilst it is argued that the benefit of including diverse study types in a review is to provide context for interventions and explanations for their effects,[17] the integration of different types of data in the same review remains a key challenge.[17] In some reviews different types of evidence are given different weighting or are used to answer different sub-questions. Alternatively, it has been suggested that qualitative evidence could be used to refocus the outcome of the quantitative synthesis.[18]

In addition to these challenges associated with the incorporation of diverse evidence types, public health reviews examine interventions that are often complex. This may

be associated with the characteristics of the intervention or study populations, or may be a result of examining multi-factorial outcomes rather than a causal chain between an agent and an outcome that is relatively short and simple.[4, 19] There may be long and complex causal pathways that are subject to effect modifications and variation between settings, thus creating considerable challenges for reviews to link public health interventions to outcomes.[19]

It has been suggested that conceptual models (logic models) could prove useful by providing a structure for exploring these complex relationships between public health practice and outcomes.[20] Logic models (also known as impact models) originate from the field of programme evaluation, and are typically diagrams or flow charts that convey relationships between contextual factors, inputs, processes and outcomes.[21] It is argued that logic models are valuable in providing a "roadmap" to illustrate influential relationships and components from inputs to outcomes.[20,22] These models have been used widely in the health promotion literature to identify domains underlying best practice.[23,24,25]

The work outlined in this paper aimed to pilot a new approach to systematic review of the evidence, which had the potential to overcome these issues of study design hierarchies, limited available evidence, and complex causal pathways. The method was developed with the objective of drawing on acknowledged systematic review processes, yet enabling diverse sources of evidence to be examined and synthesised, to develop an improved understanding of the processes and outcomes underpinning a complex area of public health.

METHODS

The approach described in this paper was developed following an earlier phase of work using a conventional systematic review methodology. This review had the purpose of examining evidence relating to interventions to improve employee mental wellbeing in the workplace. The review identified that there was "insufficient evidence" of organisation-wide approaches to promoting mental wellbeing, and suggested that useful evidence may have been excluded because of the narrow focus of the original research question.[26] The findings suggested that other types of evidence that had been excluded from the traditional review process could be equally valid and relevant to inform policy decisions regarding effectiveness. Research in the field included a growing body of cohort studies, and influential work from authors using cross-sectional designs. This wider literature suggested that the influence of the working environment on the mental wellbeing of employees was complex.

Conceptual modelling

An alternative approach to reviewing the literature was therefore proposed, based on previous work at the National Institute for Health and Clinical Excellence (NICE) on conceptual modelling described in a previous paper.[27] Briefly, the development of NICE public health guidance is informed by conceptual understanding of the causal pathways that influence health[27] and this understanding provides a theoretical rationale for potential interventions for improving health. The conceptual model is based on two premises. The first is that there are causal pathways from the wider determinants of health to individual level health outcomes. The second is that there are causal pathways from the wider determinants of health to patterns of population level health. These causal pathways embrace a range of phenomena at a variety of

different analytic levels including economic, social, political, physical and biological factors. The conceptual model distinguishes four causal vectors of population, environment, organisation and society and describes the interaction between these four vectors and human experience.[27]

Following the limited findings using the conventional systematic review method, it was proposed to pilot a new approach to review by further developing the use of conceptual modelling. The four vector model was applied to conceptualise the factors associated with workplace mental wellbeing, based on initial searching and assessment of literatures in the field of occupational medicine, organisational psychology, organisational management and development as well as public health. The modelling process aimed to identify the range of factors that operate through population-wide institutional structures and systems, environmental agents, socio-cultural mechanisms and the work organisation setting that potentially impact on the mental wellbeing of employees (see Figure 1).

INSERT FIGURE 1 HERE

A more detailed logic model (see Figure 2) was then developed from this framework to conceptualise the main components of a healthy work organisation and work characteristics that could potentially enhance mental wellbeing and those that pose risks (act as stressors).

INSERT FIGURE 2 HERE

Applying and further developing the method

Having developed this theoretical model, the next stage proposed was to refine and explore the elements of the model and the nature of these relationships by a review of the available evidence across all published forms. An expert reference group was established to support the identification of relevant evidence, in addition to the experimental studies that had formed part of the previous systematic review.

The documents included in the review encompassed a diverse range of empirical and non-empirical work (see Table 1).

INSERT TABLE 1 HERE

Synthesis of evidence

A key part of systematic reviews is data extraction, where information from the documents under scrutiny is obtained in a consistent, transparent and replicable method using a pre-designed extraction pro-forma[10] In common with standard systematic review procedures a pro-forma for extraction was designed for this work. The form was similar to that of traditional reviews, seeking information relating to population, key findings, study design and study limitations. In contrast to other reviews however, there was no accompanying assessment of study quality using pre-defined criteria.

It has been argued that qualitative reviewers should look for inspiration from their own modes of working and seek to incorporate these, rather than applying pre-existing systematic review procedures.[28] With this in mind we drew on techniques from primary qualitative data analysis in order to synthesise the different types of

evidence included in this review. Qualitative data takes the form of narrative, with themes and concepts as the analytical device[11] and with thematic analysis a frequently used method.[29] We applied these techniques to this synthesis by reading and extracting the key findings from each source document, and recording these on the extraction summary form, thereby transforming the set of documents into a common narrative form.

In order to synthesise the findings, each extraction sheet was read and coded using analysis techniques from primary qualitative studies. The extraction summaries were loaded into the software programme NVivo[30] in the form of individual documents. Each document was then read on a line-by-line basis and a code assigned to chunks of text in line with primary qualitative data analysis methods.[31] The codes described elements that could impact on wellbeing, and highlighted any associations between elements described by authors. Following the coding of documents, the data within each code was re-examined for consistency by the review team, with agreement reached through consensus.

RESULTS

A revised logic model (Figure 3) was built by the process of examining the coded data to identify core elements of the work-place and associations between elements in an iterative process. The review findings further developed and expanded the initial model, suggesting a distinction between elements of work context, work content and individual factors. Examination of the data also highlighted where authors reported that stronger potential associations between causative elements and outcomes may be found (see Box 1, Box 2, Box 3). By examining where these associations are reported,

the revised model suggested that wellbeing should be considered a mediating factor in behavioural and attitudinal outcomes, which are then mediating factors in any business outcomes. This contrasted with the initial model in which wellbeing was directly linked to outcomes. By reviewing the extended range of literature the work confirmed the complexity of the area and was able to identify potential associations between the multiple factors which could impact upon worker mental well-being. The building of the logic framework from the data also enabled potential outcomes to be suggested, and indicated where intervention points may be located.

INSERT FIGURE 3 HERE

Box 1. Associations between work context and wellbeing

1. Management style and employee wellbeing
2. Organisational justice and employee wellbeing
3. Work-place support and employee wellbeing
4. Participation and employee wellbeing
5. Communication systems and wellbeing.

Box 2. Associations between work content and wellbeing

1. Work demands and employee wellbeing
2. Level of control and employee wellbeing
3. Effort and reward and employee wellbeing
4. Role and employee wellbeing
5. Working schedules and employee wellbeing
6. Sense of fulfillment and employee wellbeing
7. Job stability and employee wellbeing.

Box 3. Associations between individual employee factors and wellbeing

1. Psychological flexibility and wellbeing
2. Social resources and wellbeing.

DISCUSSION

The methods employed successfully demonstrated how the logic framework approach may be applied to the public health sphere. The work in particular enabled the further development and examination of relationships between the workplace and employee wellbeing. We suggest that the logic model developed has value in providing further explanation of influences between elements, and offers a structure for further research to develop and test research questions and explore outcomes. The techniques employed were successful in achieving a synthesis of a very heterogeneous set of documents, enabling work from different disciplines in different forms to be included. The inclusion of this diversity provided depth and context in understanding the area, and afforded valuable information in regard to identifying where current work was being targeted, and where challenges for future research lay. Following the review, the findings were assessed against other recent review exercises in the area[32, 33] and found to be consistent.

This approach to reviewing however may be considered controversial in a number of ways. Systematic reviews are typically based on extensive and pre-defined searching of the literature, using predominantly electronic databases. The work described here contained no searching and sifting of databases, being instead based on documents identified by a previous systematic review, together with material identified by an expert reference group. While recognising that these methods lead to criticism of potential selection bias, it is suggested that the review may still be termed systematic

in that it used transparent and replicable methods to extract, analyse and synthesise the evidence documents. It may also be argued that qualitative philosophies of data saturation rather than extensive searching are appropriate for qualitative synthesis, although the charge of subjective decision-making remains.

The inclusion of such a diverse range of literature with no quality assessment process or prioritising of evidence is at odds with conventional systematic reviews. The review process did not include an examination of the quality of the source evidence as all documents were treated equally. This may be controversial in light of the growth in tools designed to assess the quality of primary qualitative study designs.[34] It has been argued that as with quantitative studies, the synthesis of qualitative data requires excluding or downgrading by weighting, the studies that are of insufficient quality to fully contribute to a synthesis.[11]

However, it has also been argued that critical appraisals of the type used in quantitative synthesis are less appropriate for reviews of qualitative evidence where "the conceptual yield of included papers is more important than the robustness of the study design".[13] Also, it is reported that currently there is no consensus on "how or even whether to appraise the quality of individual qualitative studies".[35] As the review described here included a significant quantity of non-empirical work, using an assessment of study quality was not feasible. The philosophy of combining such as heterogeneous body of literature with the purpose of gaining a greater in-depth understanding also seems to be in conflict with notions of prioritising of one type of data above another.

The use of primary qualitative data analysis techniques in summarising and synthesising the evidence also proved valuable. The volume of text within the set of documents was considerable, including many books, book chapters and policy documents that ran to several hundred pages in length. Computer-aided qualitative data analysis software is designed to deal with large volumes of text data, and while it is important to emphasise that the software acts as data manager not as data analyst, the coding, storage and retrieval capabilities are beneficial in dealing with large quantities of text.

In addition to the building of the logic framework, the software program facilitated retrieval of all the data extracts coded to each element during the writing of the final review report. This enabled the narrative synthesis to draw upon the full range of work in describing the influence of each element of the framework in a systematic way. The method also enabled the frequency of coding for each element to be reported, providing information regarding trends within current work (see Appendix 1).

The mixing of different study designs within a single synthesis has been criticised[16] and the removal of contextual information and theoretical underpinning from qualitative work may also be perceived as a limitation. Dixon-Woods et al.[16] draw a distinction between qualitative reviews that are integrative and reviews that are interpretive. The work outlined here could be described as primarily integrative, as the key purpose was to identify elements of the work-place and descriptions of any relationships between these elements, rather than developing new concepts. This integrative intent may be subject to claims of being reductionist or averaging.

However, far from endeavouring to simplify the issues, the goal of this work was to extend understanding of the complexity of the relationships "rather than to aggregate and merge findings in a kind of averaging process".[15]

Conclusions and recommendations

In contrast to systematic reviews that offer evidence statements, or meta-analysis of quantitative data to give pooled effect sizes, the logic framework does not offer ready answers to questions of where best practice is to be found. Work aiming to develop specific guidance may benefit from having a less broad focus than the one described here. However, the wider focus did provide a method of illuminating complex pathways within public health, which may then be further examined via other methods.

The balancing of research rigour with methods that explore processes and outcomes has been an ongoing debate in the field of health promotion.[23,24] Potentially the logic framework could be further extended to include notions of levels of evidence, with analysis of the range of types of evidence underpinning each element of the framework. Walsh and Downe[15] describe the recurrence of themes between studies as adding to validity, and potentially the frequency of coding table could also be used in this way. A further refinement of the method could also be the development of systematic ways of identifying topic experts and criteria for inclusion of their recommended texts.

While recognising the limitations of this study in terms of potential selection bias of included material, this exploratory work indicates that primary qualitative data

analysis techniques are useful methods of examining a broad range of literature in order to develop an understanding of complex public health issues. We suggest that using these methods to construct logic frameworks can offer helpful insights into multifaceted pathways underpinning public health interventions and outcomes, and has the potential to be developed further.

Ethical Approval

Not required.

Competing Interests

None

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Appendix 1. Frequency of coded elements

Node	Documents Coded	Passages Coded
Study designs	50	103
Stress programmes	36	101
Prevalence	39	76
Employer benefits	43	75
Implementation	38	72
Job type or employer type differences	36	71
Individual attributes	34	66
Changing work characteristics	18	49
Working schedules	22	49
Associations/demand and other factors	21	43
Associations/ERI and other factors	19	42
Management	27	39
Associations/job satisfaction and other factors	22	36
Health inequalities	22	34
Associations/management and worker wellbeing	21	34
Job design/control	16	33
Associations/health and stress	20	32
Associations/health and work	19	32
Job strain and job stress definitions	12	32
Job design/demand	19	29
Gender differences	19	28
Well-being	14	28
Associations/control and health	14	20
Associations/control and strain	12	19
Organisational climate	10	18
Associations/home life and other factors	13	18
Associations/support and other factors	10	15
Effort and reward	11	15
Support	12	15
Job design/other job features	7	14
Employee participation	7	13
Associations/role and other factors	6	11
Organisational justice	4	10
Associations/Organisational justice and other factors	5	9
Associations/communication and other factors	6	8
Associations/ management and business outcomes	5	8
Associations/health and job security	6	8
Associations/participation and positive outcomes	6	8
Associations/control and organisation outcomes	6	6
Associations/health and overcommitment	6	6
Associations/depression and other factors	2	4
Associations/health and other factors	3	4
Associations/psychological flexibility & control	1	3

Figure 1. Conceptual framework for public health guidance applied to workplace mental wellbeing

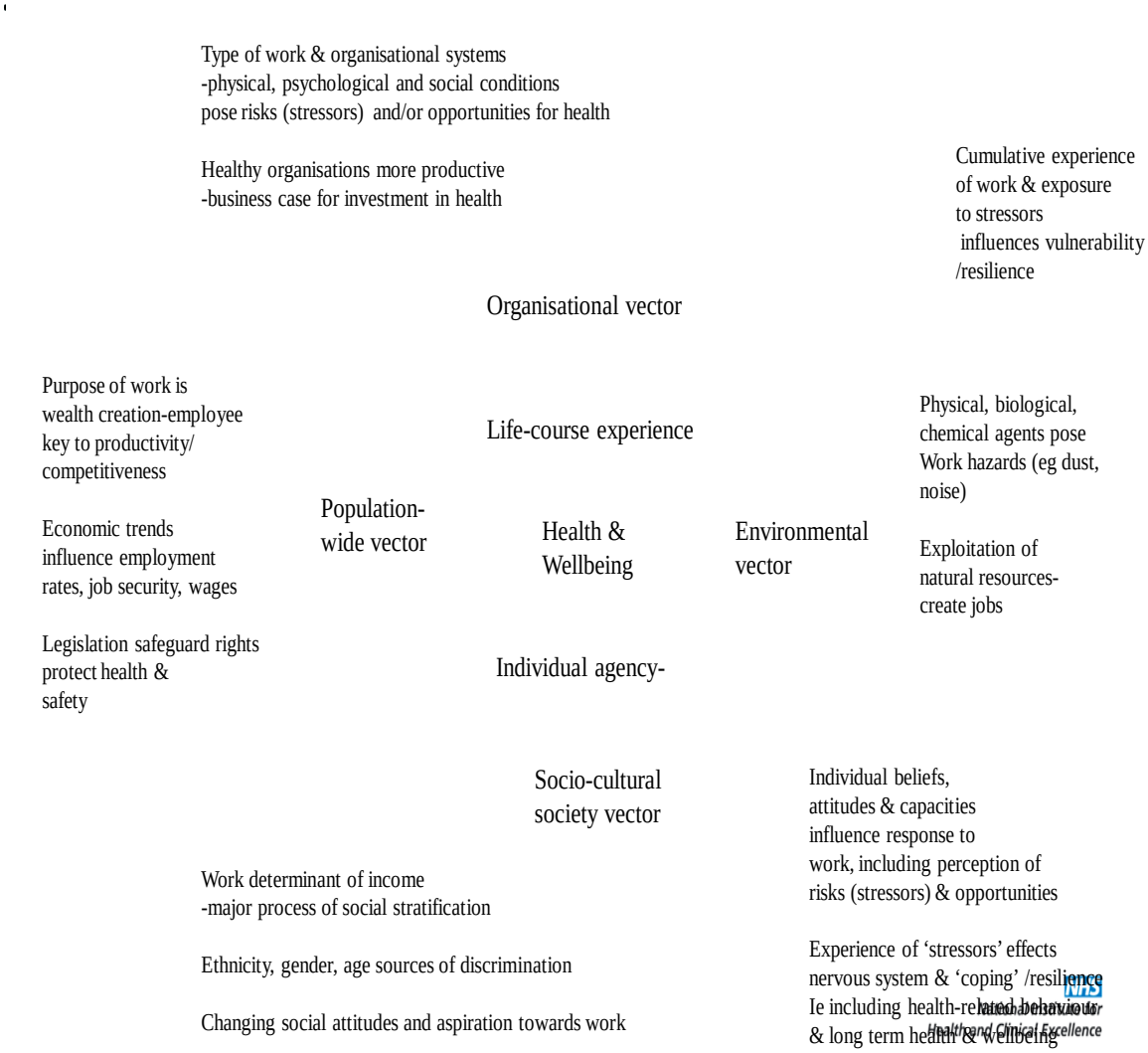

Figure 2. The initial logic model

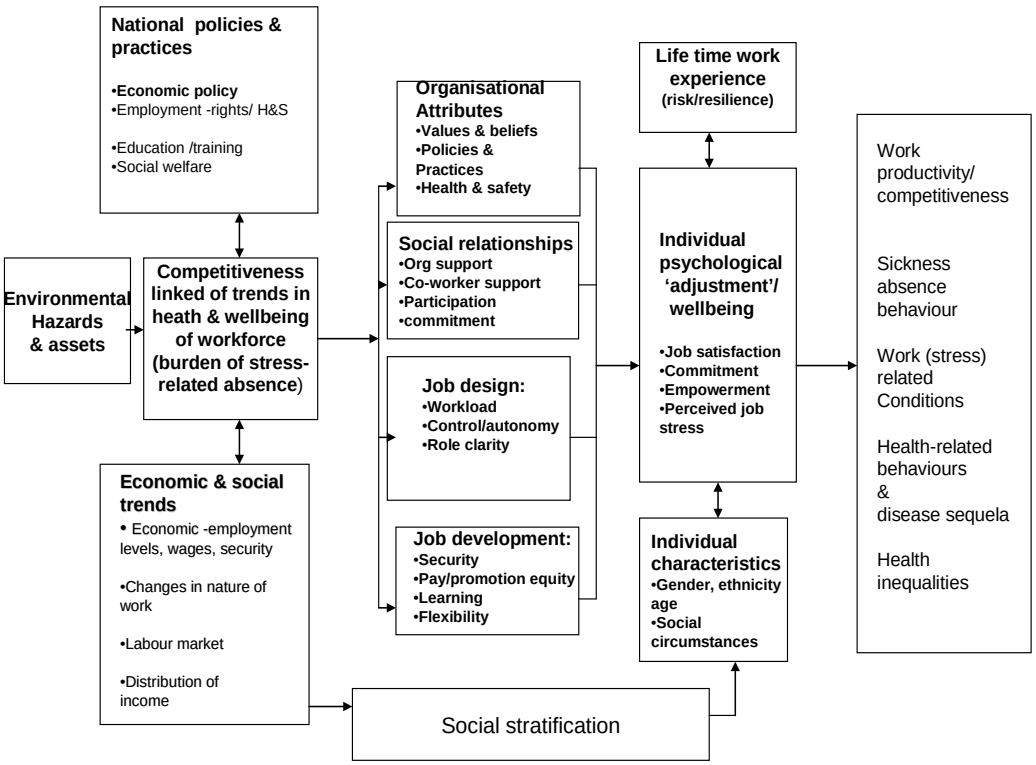

Figure 3. Revised logic framework for workplace mental wellbeing

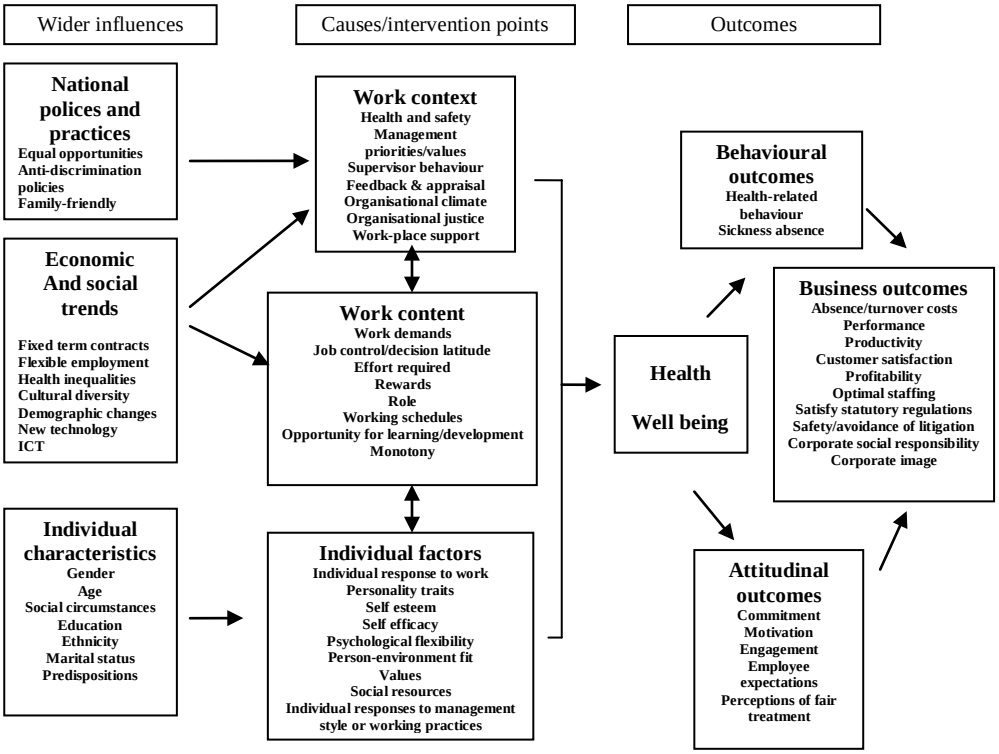

Table 1. Documents included in the review

Review papers	45
Discussion papers	35
Surveys reporting associations	31
Surveys reporting prevalence	30
Policy documents/reports	29
Cohort studies	19
Books	10
Meta analysis papers	8
Cluster randomised controlled trials	5
Case studies	4
Book chapters	3
Qualitative studies	2
Randomised controlled trials	1
Controlled before and after studies	1
Case control studies	1
Total	224