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Short, Valentina, Covey, Judith A., Webster, Lisa A. et al. (4 more authors) (2019)
Considering the team in team formulation:a systematic review. *Mental Health Review Journal*. pp. 11-29. ISSN 1361-9322

<https://doi.org/10.1108/MHRJ-12-2017-0055>

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Considering the team in team formulation: A systematic review

Journal:	<i>Mental Health Review Journal</i>
Manuscript ID	MHRJ-12-2017-0055.R1
Manuscript Type:	Research Paper
Keywords:	Evidence based team formulation, Team formulation definition, Team formulation theory, Team context and team formulation, Team formulation impact, Team formulation

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Considering the team in team formulation: a systematic review

Abstract

Purpose: Team formulation, used to understand patient problems and plan care is a growing practice in adult mental health and learning disability services. This paper explores definitions applied to team formulation (as distinct to therapy formulation), its underpinning theories, and the inter relationship between the team and the process of formulation.

Design/Methodology/approach: A database search (main search term of team formulation) of peer-reviewed studies was conducted using PRISMA guidelines. A main and second reviewer conducted quality appraisals and thematic analysis. Data were analysed by convergent qualitative synthesis design using thematic analysis to transform evidence from quantitative and qualitative studies into qualitative findings.

Findings: Initial searching produced 4532 papers, 10 of which were eligible for inclusion. Team formulation has no distinct definition. Theories underpinning the practice of therapy formulation emanating from general psychological theory underpin team formulation. Seven studies applied psychological theories to the examination of team formulation. No studies examined the impact of the team on the formulation. Six themes were generated regarding the impact of team formulation on the team; 'increased knowledge and understanding', 'altered perceptions, leading to altered relationships, feelings and behaviours', 'space to reflect', 'useful when stuck or challenged', 'perceived increase in effectiveness', and 'improved team working'.

Research limitations/implications: Limited evidence and variable quality compromised availability of review evidence.

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3 **Originality/value:** This is the first review to examine team formulation through the context
4 of the team. The authors argue that a conceptual framework to encompass team inputs,
5 processes and outputs in team formulation practice should guide future research.
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10 **Keywords:** Team formulation. Evidence based team formulation. Team formulation
11 definition. Team formulation theory. Team context and team formulation. Team formulation
12 impact.
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16 **Paper type:** Literature review
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18 Declaration of Interest: None
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Introduction

Multi-disciplinary mental health and learning disability clinical teams, working together to develop individual patient case formulations is an increasing practice within the United Kingdom (Johnstone, 2011). Known as 'team formulation', the purpose is to develop a shared understanding of the patient to determine the interventions (Johnstone, 2014). Research underpinning team formulation is of relevance to clinical practice globally. National guidelines indicate that care that should be provided based on diagnosis (for example see NICE, 2014a, 2014b; NIMH, 2016), however individualised care is also required (HMG/DH, 2011; World Health Organization, 2015). Team formulation guides the design of individual care for patients experiencing a range of mental health problems, some of which are considered complex (for example see Berry, Barrowclough, & Wearden, 2009). Therefore, determining a patient's unique needs through the lens of team formulation may afford this individualised focus. Understanding the evidence base for this practice is of critical importance in supporting teams to use evidence based practice.

Individual psychological case formulation (therapy formulation) emanated from behaviour therapy in the 1950's when it was developed as a central component for understanding the problematic behaviours of individual patients (Bruch, 2015). Now it is recognised as a central tenet of most one-to-one psychological therapies where a single therapist works with a single patient to develop a collaborative formulation (Sturmey, 2009). Studies examining therapy formulation report a weak evidence base. For example, a recent systematic review examining the inter-rater and test-retest reliability of therapy formulations across various therapeutic modalities reported considerable differences in reliability. This ranged from slight to substantial, depending on practitioner experience and therapy modality (Flinn, Braham, & das Nair, 2015). Furthermore, there is limited evidence for impact on patient outcomes (Bieling & Kuyken, 2003; Kuyken, 2006). Researchers examining formulation within the Cognitive

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3 Behavioural Therapy (CBT) model challenge whether the scientific constructs underpinning
4 formulation are evidence based and able to demonstrate a valid framework for understanding
5 patient problems. Research has not yet comprehensively examined the descriptive and
6
7 explanatory elements of therapy formulation, particularly in relation to outcome prediction
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9 (Bieling & Kuyken, 2003).
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14 Despite these uncertain foundations, formulation has continued to evolve, from one-to-one
15 application in individual psychological therapy, to its most recent application by teams. The
16 earliest published report of formulation being used by teams was in 1997, when a practice
17 account of the use of Cognitive Analytic Therapy (CAT) formulation was described as a team
18 endeavour, used to understand patients diagnosed with personality disorder. This descriptive
19 account, published in a non-peer reviewed professional forum magazine (Dunn, 1997) has
20 preceded further descriptive accounts (for example see Davenport, 2002; Robson & Quayle,
21 2009; Shirley, 2010; Whomsley, 2010), and the suggested evidence for the benefits of team
22
23 formulation continues to expand. However, evidence is originating from a small research base
24
25 accompanied by a greater number of practice accounts and opinion pieces, published in non-
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27 peer reviewed publications, which attest to the benefits of team formulation. This is evident
28
29 from a succinct summary of team formulation offered by Johnstone, which highlights the
30
31 benefits of team formulation as supporting increased team functioning and well-being (for
32
33 example using the expertise of all team members, increasing team ability to reflect), and
34
35 bringing a more balanced and effective approach to interventions (Johnstone, 2014). This
36
37 evidence base poses several problems. Rather than evidence-based practice, team formulation
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39 is developing from a basis of untested and poorly collated, practice-based experience. As the
40
41 practice spreads, the degree to which team formulation can be considered a separate
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43 phenomenon to therapy formulation, with its own unique definition and underpinning theory,
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45 is not clear. Furthermore, researchers have examined the impact of the clinician on the
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3 therapy formulation, scrutinising the level of practitioner skill and experience on the
4 formulation produced (Dudley, Park, James, & Dodgson, 2010; T. D. Eells, Lombart,
5 Kendjelic, Turner, & Lucas, 2005), however, it is unclear whether studies on team
6 formulation are similarly accounting for the team context.
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11 The impact of team processes on the execution of specific team tasks is well documented. A
12 large study of over 400 United Kingdom National Health Service health care teams, including
13 teams from physical and mental health care, concluded that team processes such as
14 participation, reflexivity, decision making, leadership and communication impacted on team
15 levels of effectiveness and innovative practice (Borrill et al., 2013). Teamwork is also
16 essential for team reliability and patient safety (Baker, Day, & Salas, 2006) and professional
17 differences in teams impact on joint working and knowledge sharing (Baxter & Brumfitt,
18 2008). **Nonetheless, the impact of the team processes involved in team formulating remain**
19 **undefined and untested.** Considerations such as these may be crucial in developing an
20 evidence base that embeds team formulation within the team context.
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33 The aim of this paper is to report the results of a systematic mixed study review of team
34 formulation research. The specific objectives are to provide a systematic map of research on
35 team formulation in adult mental health and learning disability services (including forensic
36 and older people's services), and to examine and synthesise the findings in relation to:
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- 42 a. how team formulation is being defined as a phenomenon in its own right
43 and as distinct to psychological therapy formulation
 - 44 b. the theoretical underpinnings of team formulation
 - 45 c. the impact on the formulation through team involvement
 - 46 d. the impact on the team due to formulating as a team
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54 The present review takes a deductive, theory driven approach to examine if current research
55 on team formulation addresses these aspects and highlights the direction for future research.
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Method

Literature searching

A search strategy was created with an initial search in the Web of Science database, using the term 'team formulation'. This enabled development of a wider range of terms (Table one).

Boolean operators were used and searches restricted to peer reviewed, human studies and disciplines related to mental health services. The electronic databases were searched during October 2016 and included Cinahl, Medline, Psycarticles, Psycinfo, SCIE, Social Sciences Citation Index and Embase. Date boundaries were not specified in order to maximise output from search results that ran from inception date of each database.

Insert Table one here. Search Terms

Inclusion screening

Based on the inclusion criteria in Table two, all identified records were screened by title and then abstract before final full text reading of identified records.

Insert Table two here. Inclusion Criteria

Exclusion criteria included records focused on psychological therapy formulation that did not involve a team, opinion pieces, and descriptive records.

General approach

1
2
3 A convergent qualitative synthesis design using thematic analysis (Figure one) was employed
4 to transform evidence from both quantitative and qualitative studies into qualitative findings
5
6 (Pluye & Hong, 2014). A theory-driven strategy focusing on specific research objectives as
7
8 pre-defined themes, and an amalgamation of evidence from both intervention and non-
9
10 intervention research were used to understand the phenomena of ‘team’ within team
11
12 formulation (Fetters, Curry, & Creswell, 2013; Hong, Pluye, Bujold, & Wassef, 2017).
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19 Insert Figure 1 here. Synthesis design
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24 ***Data extraction and quality assessment***

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26 A standardised data extraction form (EPPI-Centre, 2003) was adapted to fit with specific
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28 review aims. The type of quality assessment used was matched to study type. Quality
29
30 assessment tools included Quality Assessment Tool for Before-After (Pre-Post) Studies With
31
32 No Control Group (NIH, 2014), Critical Appraisal Skills Programme (CASP) Qualitative
33
34 Studies Checklist (CASP, 2017a) and CASP Randomised Control Trial Checklist (CASP,
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36 2017b). Quantitative studies with a qualitative element were assessed for both where
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38 possible. If the qualitative part of the study was not reported as such, then the main study
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40 design was assessed. Three studies were quality appraised by a second reviewer to ensure
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42 consistency in quality appraisal.
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47 ***Data synthesis***

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51 Examination began with introductory and background sections to studies in order to identify
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53 definitions of team formulation (review aim one). Thematic analysis was used (Braun &
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55 Clarke, 2006) in which line-by-line coding was applied for both quantitative and qualitative
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3 studies to create descriptive themes for all other review aims. Theoretical underpinnings
4 (review aim two) were identified and logged semantically, as they were cited in the studies.
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6 Thematic analysis was employed to establish the purpose of citing theories within studies.
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10 Coding was employed to locate instances where the impact of the team on the formulation,
11 and the formulation impact on the team (review aims three and four), was reported in study
12 findings. Located instances were subjected to selective and semantic coding, in which the
13 reviewers used the explicit descriptions given in research findings (Braun & Clarke, 2013).
14
15 Visual mapping was applied for instances located for review aim four in order to develop
16 themes derived from coding (Braun & Clarke, 2013). NVivo qualitative data software was
17 used to support the coding process (QSR International Pty Ltd, 2015). Final themes were
18 reached through consensus agreement with an independent second reviewer (NH-G). This
19 type of data transformation analysis is suitable to precede the development of a conceptual
20 framework where none currently exists (Hong et al., 2017) as is the case for team
21 formulation.
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35 Results

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38 Figure two illustrates the search process. The search resulted in 10 research studies that
39 matched the inclusion criteria and all were UK based studies. Of these, five were
40 uncontrolled pre-post studies (Berry et al., 2009; Ingham, 2011; Ingham, Clarke, & James,
41 2008; Maguire, 2006; Revolta, Orrell, & Spector, 2016), three of which had a descriptive
42 feedback element (Ingham, 2011; Ingham et al., 2008; Revolta et al., 2016). There were three
43 qualitative studies (Christofides, Johnstone, & Musa, 2012; Mohtashemi, Stevens, Jackson, &
44 Weatherhead, 2016; Summers, 2006), and two randomised controlled trials (RCT) (Berry et
45 al., 2016; Kellett, Wilbram, Davis, & Hardy, 2014). One of the RCTs was a mixed method
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3 study employing non-blinded randomisation and content analysis of semi-structured
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5 interview material (Kellett et al., 2014).
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8 Insert figure two here. PRISMA diagram
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11 Study details and key findings including reported effect sizes are presented in table three. The
12
13 team formulation in the studies was conducted either as team formulation meetings involving
14
15 the whole or part of the team where the meeting was facilitated by a psychologist or
16
17 psychological therapist; or team formulation training centred on real clinical case material,
18
19 including team discussion. Team supervision was also provided in some instances.
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23 Insert table three here. Included Studies Details
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26 27 *Quality appraisal results* 28

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30 Three of the pre-post uncontrolled intervention studies were deemed to be of poor quality
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32 (Ingham, 2011; Ingham et al., 2008; Maguire, 2006) due to high levels of bias. Two further
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34 studies of this kind were judged as poor to fair quality (Berry et al., 2009; Revolta et al.,
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36 2016) because although still vulnerable to high levels of bias due to design, clearer detail was
37
38 reported about loss-to-follow-up of participants and p-values for pre to post intervention.
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42 Three of the pre-post studies also contained a qualitative element in the form of descriptive
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44 feedback gathered from the sample post intervention (Ingham, 2011; Ingham et al., 2008;
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46 Revolta et al., 2016). In all three studies, this qualitative data focussed on acceptability of
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48 formulation training given. CASP qualitative study analysis (CASP, 2017a) suggests that the
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50 style of reporting in all three studies is not in keeping with high quality qualitative research
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52 reporting.
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3 Use of the CASP qualitative study tool indicated that the methodological quality of the three
4 qualitative studies was variable, but generally of fair quality. However the qualitative part of
5 the mixed method study (Kellett et al., 2014) was poor. The RCT feasibility study (Berry et
6 al., 2016) was also assessed using the CASP for RCT tool and was rated as fair.
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10 11 12 ***Definitions of team formulation*** 13

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16 None of the studies offered a definition of formulation explicit to team formulation, and
17 where a definition was given this was distinct to the therapy type. There was no examination
18 of whether this definition of formulation was applicable to a formulation conducted by a
19 team.
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26 Five studies employing therapy formulation definitions, researched team formulation against
27 these definitions (Christofides et al., 2012; Ingham, 2011; Kellett et al., 2014; Mohtashemi et
28 al., 2016; Summers, 2006). These studies identified formulation as a hypothesis, drawing on
29 psychological theory, regarding the origins, development and maintenance of mental health
30 problems. Four studies provided the function of a formulation, but not the definition (Berry et
31 al., 2009; Berry et al., 2016; Ingham et al., 2008; Revolta et al., 2016). Formulation function
32 was described as providing a framework to understand the origin, development and
33 maintenance of mental health problems. One study did not provide a definition or describe
34 the function of a formulation (Maguire, 2006).
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46 ***Theoretical underpinnings*** 47

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49 Thirteen theories emerged across 10 studies in relation to team formulation research.
50 Theories were used to support both study rationale and question, or as underpinning the team
51 formulation process. Explicit explanation in describing the link between theory and its
52 application in the study varied. For example Berry and colleagues (Berry et al., 2009; Berry
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3 et al., 2016) offered a clear link between attribution theory and study rationale. However,
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5 other researchers referred to psychological theory as underpinning formulation, without
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7 defining the theory (Ingham, 2011; Mohtashemi et al., 2016; Summers, 2006). With the
8
9 exception of one study (Kellett et al., 2014), theory was applied to individual staff working in
10
11 teams and not applied to group level data. The relationship to theory, its part in the studies
12
13 and related findings is outlined in table four.
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17 Insert table four here. Underpinning theories.
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20 ***Team impact on the formulation***

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23 None of the studies purposely examined the impact of the involvement of the team on the
24
25 quality, content or outcomes of the produced formulation. It was not possible to apply
26
27 convergent qualitative synthesis as only one study reported results indicating two impacts that
28
29 the team had on the formulation. Firstly, the amount of perceived creativity brought to the
30
31 formulation by use of team input:
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34 “Participants believed that formulations benefited care planning, staff-patient relationships,
35
36 staff satisfaction and team working, through increasing understanding of patients, bringing
37
38 together staff with different views and encouraging more creative thinking” (Summers, 2006,
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40 p.341).
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43 Secondly, the view that the team formulation was an enduring concept rather than a
44
45 hypothesis subject to change over time:
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48 “At least three participants seemed to consider formulations as statements of fact” (Summers,
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50 2006, p.342).
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53 ***Formulation impact on the team***

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3 Eight studies reported team outcomes occurring as a result of team formulation and coding
4 resulted in 66 codes from which six themes were conceptualised. These themes were:

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6 ‘increased knowledge and understanding’, ‘altered perceptions, leading to altered
7 relationships, feelings and behaviours’, ‘space to reflect’, ‘useful when stuck or challenged’,
8
9 ‘perceived increase in effectiveness’, and ‘improved team working’.
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14 *Increased knowledge and understanding.* Team formulation increased understanding and
15 knowledge of the patient, the origin and nature of their problems, and increased knowledge of
16 the way the team and patient interacted. Although not the most frequently coded, this theme
17 was the mechanism through which all other themes were described as operating, and as such
18 could be seen as a key outcome of team formulation.
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25 *Altered perceptions, leading to altered relationships, feelings and behaviours.* Closely linked
26 to this was the most frequently coded theme that described the impact of team formulation on
27 staff perceptions and the resulting change in staff/patient relationships, staff feelings about
28 the patient and staff behaviours towards the patient. Perceptions were altered in relation to the
29 patient’s problems, their efforts at recovery, how long recovery might take and how much
30 control the patient and staff member had in this. Changed perceptions about staff/patient
31 relationships were positive, however one study did report that staff perceived a worse
32 relationship with patients after formulating. The impact of altered perceptions was described
33 as resulting in altered staff feelings and behaviours, in particular less blaming behaviours
34 towards patients, increased empathy and a more positive approach to care. Patients also
35 reported feeling less criticised by staff. Furthermore, there was an impact on the staff
36 perceptions of their own emotions in terms of feeling more satisfied, but with the recognition
37 that formulating can be personally emotionally challenging.
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54 *Space to reflect.* The third theme captured the opportunities for clinical reflection afforded by
55 team formulation. Reflection was possible as meeting to formulate gave the team increased
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3 time to think about the patient. This supported creation of new ideas about the patient and the
4 care, and was viewed as a major benefit of team formulation. There was one concern that
5 such reflection could result in a high degree of speculative suggestion based only on partial
6 information.
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11 *Useful when stuck or challenged.* The fourth theme identified team formulation as a useful
12 process when patients presented with behaviours that challenged the team. Team formulating
13 was also reported as useful when teams felt 'stuck' in thinking about how to progress a
14 patient's care.
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21 *Perceived increase in effectiveness.* The impact of having time to think and increasing
22 understanding about the patient lead to the fifth theme in which team formulating was
23 perceived as helping to increase the effectiveness of the team. This was described as bringing
24 consistency to team practice, improving problem solving ability, supporting the team to
25 change clinical direction and changing unhelpful patterns of relating with the patient. An
26 increase in clinical confidence was perceived, leading to care which was more helpful for
27 being based on a formulation (rather than diagnosis alone).
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37 *Improved team working.* The sixth theme, also linked to team effectiveness, described the
38 impact of team formulation on the team as a unit, relative to strengthening how team
39 members work together. Within this theme, team formulation was reported as improving the
40 team climate and working capability. In addition, trust and sharing within the team were
41 reported as improved directly due to team formulating. Team practices were improved
42 through team formulation that brought unity to understanding, different perspectives, ideas
43 and disciplines. Sharing information in this way was viewed as a practice of effective teams
44 and communication via team formulation credited for turning individuals in teams into team
45 members.
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Discussion

This is the first review that focuses on the ‘team’ aspect of team formulation, providing a comprehensive systematic mixed studies review of the peer reviewed research evidence for this team practice. The key objectives were to identify the definitions and theories applied to team formulation research, and to qualitatively synthesise findings on the bidirectional influences of team formulation and team.

Methodological Rigour

The methodological rigour of the 10 studies included suggests an emerging field of research with study quality being highly variable and mostly low. Using team formulation as the intervention in pre-post uncontrolled small-scale studies formed half of all methodological approaches. This represents a problem for the evidence base for team formulation as it is difficult to determine causation and there is a risk of high levels of bias (Goodacre, 2015).

The Cochrane Collaboration recommends that such studies constitute insufficient evidence to inform theory (Cochrane, 2017).

Rigour of analysis was difficult to determine for all three studies examining the impact of team formulation on team members. The small number of studies further reduces the available research evidence that the impact of formulating has on team members.

While RCTs are considered capable of providing reliable evidence of effectiveness (Cochrane, 2017), the two RCTs within the review were compromised by methodological limitations. For example, Kellett and colleagues recognised that the sample size was small and there was a risk of contamination between the intervention and ‘treatment as usual’ arms (Kellett et al., 2014). Berry and colleagues acknowledged that the reported modified staff

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3 perceptions could be attributed to staff feeling that their own needs for support were better
4 met rather than the impact of formulating (Berry et al., 2016).
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8 ***Definitions of Team Formulation*** 9

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11 Defining a phenomena in research is critical for the measurement of variables and
12 comparison of findings across studies (Coolican, 2009). One included study provided no
13 definition of formulation (Maguire, 2006) and the remaining nine applied the definition of
14 therapy formulation to team formulation. This assumption that team formulation *is* the same
15 as therapy formulation has not yet been examined and is further challenged by therapy
16 formulation having more than one definition (Johnstone & Dallos, 2014). The Division of
17 Clinical Psychology in the United Kingdom offers an overarching definition that describes
18 psychological therapy formulation as the amalgamation of all knowledge gained by an
19 assessment process that may involve psychological, systemic and biological aspects. The
20 definition posits therapy formulation as drawing on psychological research and theory, to
21 provide a framework for describing problems, needs and their development and maintenance
22 (DCP, 2010). Other key authors of formulation literature emphasise the hypothetical nature of
23 therapy formulations (Butler, 1998; Tracy D. Eells, 2006). Applying the therapy formulation
24 definition to team formulation fails to account for the influences and context of the team
25 itself. Any working definition should account for the focus on a shared understanding as
26 proposed by Johnstone (Johnstone., 2011), but in addition acknowledge that this is
27 underpinned by team involvement:
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49 ‘Team formulation is a shared team activity drawing on psychological theories
50 (individual and group), where two or more team members meet to discuss an evolving
51 integrated formulation. Team formulation is a shared understanding which includes a service
52 user’s personal meaning of their experiences and which leads to a hypothesis about the causes
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3 and maintenance of their mental health problems, strengths and coping, in turn leading to an
4 agreed individualised plan of care to support personal recovery. The service user is involved
5 in the formulation discussion wherever possible'.
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11 ***Theory and Team Formulation***
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15 There is an assertion that team formulation is underpinned by psychological theories used in
16 therapy formulation. Some studies specify which psychological theory, whilst others do not
17 (see table four). This represents an assumption that therapy formulation and team formulation
18 can be underpinned by the same theories; however, this has not been empirically examined.
19

20
21 In addition there is an emergence of studies drawing on theory (such as attachment or
22 attribution) which drive study hypotheses proposing a relationship between team formulation,
23 staff perceptions, attitudes and behaviours towards service users, resulting in a changed
24 relationship. **Four** of the included studies have tested these hypotheses (see Berry et al., 2009;
25 Berry et al., 2016; Ingham, 2011; Kellett et al., 2014). However, due to the number of studies
26 and quality, there is no level of generalisation in these theories yet (Ravatch & Riggan, 2012),
27 and not all study hypotheses were supported in relation to this changed staff-patient
28 relationship (see Berry et al., 2016). In keeping with the properties of a theory, none offered
29 have explanatory qualities in relation to the processes of team formulation (Ravatch &
30 Riggan, 2012). In other studies, claims that such theories are important within team
31 formulation remain an untested assertion (for example see Christofides et al., 2012; Ingham
32 & Clarke, 2009). None-the-less, together these studies represent an early attempt to examine
33 an evolved form of formulation (from therapy to team), and give partial support to the impact
34 of team formulation on team members.
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3 The application of theory in the studies is mainly about individuals in teams, rather than
4 teams per se. Only one study aggregated the analysis of individuals in the teams studied to a
5 group level (see (Kellett et al., 2014). This suggests that researchers are examining individual
6 team members rather than the team as a unit. This narrow focus ignores the range of well-
7 tested theories relating to teams generally, that may also be relevant to team formulation. For
8 example, theories of shared mental models in teams describe a cognitive representation of
9 shared team knowledge in relation to a task or team values (Mathieu, Maynard, Rapp, &
10 Gilson, 2008). Team formulation may lead to developing such a shared mental model, in
11 relation to either a particular patient, the general task of formulating or the values that
12 formulating can bring to a team when ideas are shared. In addition, theories of team identity
13 and cohesion may underpin team formulation research by explaining the collective sense-
14 making that team formulation may bring, and which is understood to help team identity
15 develop (Huettermann, Doering, & Boerner, 2017). Regular team formulating may help in
16 developing team cohesion as team members share this common task around a set of common
17 goals and team values (Mathieu et al., 2008).

36 ***Team Impact on Formulation***

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38
39 The impact of the team on the formulation was not examined in any of the included studies.
40
41 Therapist factors have been found to impact on therapy formulation quality (Dudley et al.,
42 2010; T. D. Eells et al., 2005), yet this review did not find any studies examining the quality
43 of the formulation produced by a team. Training the team in the mechanics of formulating
44 was examined (see (Ingham, 2011), however this was by brief training without accompanying
45 long-term supervision or on-going learning; aspects both recognised as important in one-to-
46 one therapy competency and skill development (BABCP, 2010). Status of team members has
47 been reported as influencing the ability of other team members to have a voice within group
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3 meetings and discussions (Mannix & Sauer, 2006; Silver, Troyer, & Cohen, 2000). In team
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5 formulation, the dominance of one profession may serve to reduce the input of other team
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7 members and influence the formulation if key information is withheld.
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10 Although the clinical focus of the teams was reported, there was no examination of the type
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12 of team and how this influenced the team formulations. Team type is of key interest in team
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14 research where there is recognition of the interplay between team type, task and outcomes.
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16 For example, established researchers of teams suggest that composition, technology and
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18 distance and the degree of empowerment and delayering present in different types of teams
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20 impacts on task performance (Tannenbaum, Mathieu, Salas, & Cohen, 2012). Other
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22 researchers suggest that not all teams function as 'real' teams, which can also influence task
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24 performance. For example 'pseudo' teams, who possess lower degrees of interdependence,
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26 shared objectives, reflexivity and boundedness may also have lower task performance ability
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28 (West & Lyubovnikova, 2012).
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33 ***Formulating and its Impact on the Team***

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36 To date, team formulation studies offer only partial insights into the impact of the team
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38 formulation on the team. The review identified themes suggesting that team formulation leads
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40 to increased understanding, team reflection time and problem solving ability. This part of the
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42 review yielded the most results, perhaps reflecting the interest of researchers to identify
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44 influences on the team. However, only four included studies used validated self-report and
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46 observational measures (Berry et al., 2009; Berry et al., 2016; Kellett et al., 2014; Revolta et
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48 al., 2016), while the remaining six studies used un-validated self-report measures and
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50 descriptions of staff observations and experiences (see table three). Overall, the small number
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52 and variable quality of included studies limits the evidence for the impact of team
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54 formulation on the team.
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3 Three studies (Berry et al., 2009; Berry et al., 2016; Revolta et al., 2016) examined the
4 impact of team formulation on the attitudes of team members but did not account for possible
5 confounds researched in other fields. For example, self-categorisation theory demonstrates
6 the influence of group membership on attitudinal changes of individuals. The theory posits
7 that individuals compare self to others, and are motivated to adopt the values and attitudes of
8 other group members due to the desire to belong to the 'in-group' (Haslam, Powell, &
9 Turner, 2000; Hogg & Terry, 2000; Reynolds, Turner, & Haslam, 2003). The impact of self-
10 categorisation in relation to team formulation is yet to be explored.
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21 Time for the team to reflect on care and treatment planning by formulating as a team is also
22 identified as a key theme within the included studies. However, from the included studies
23 suggesting that team formulation confers this time for reflection, there is no examination of
24 whether team formulation is the only or most appropriate method of team discussion for
25 improving treatment planning. Research with mental health multi-disciplinary team meetings
26 has also shown an association between the meeting process and effective treatment planning
27 (Raine et al., 2014). In order to understand the value of team formulation as a mechanism for
28 this, further research targeting whether teams have increased reflection time specifically
29 because of team formulation should be undertaken. This also applies to the fourth theme
30 identified, where team formulation was perceived as a good tool for helping teams struggling
31 with patient behaviours. Knowing the specifics of what it is about team formulation that leads
32 to this perception; above other forms of team discussion is needed to strengthen this claim.
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47 Within the included studies, the ability of team formulation to reduce patient behaviours that
48 challenge due to altered staff perceptions of the patient seems largely to be an opinion and
49 claims of this outcome require consideration in conjunction with study design and limitations.
50 To illustrate this, the study by Ingham (2011), used an idiosyncratic observation measure of a
51 patient's challenging behaviours over time, before the introduction of formulation and after it.
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3 However, this measure was not validated and inter-rater reliability not assessed. The study
4 may have been subject to high levels of bias given its design (Goodacre, 2015), and observed
5 changes in the patient's behaviour could have been due to other factors such as medication or
6 recovery.
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12 The perception that team effectiveness increases because of team formulation was inferred as
13 a finding, but not directly tested in three of the included studies (Christofides et al., 2012;
14 Ingham, 2011; Revolta et al., 2016). Research into team effectiveness is extensive and
15 includes factors such as team cohesion, participation, member attitudes to the team and
16 clarity of objectives (Borrill et al., 2013; Richter, Dawson, & West, 2011). None of these
17 factors were examined in the studies reviewed and therefore the impact of team formulation
18 on team effectiveness must largely be seen as an untested assumption.
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29 Overall, the findings of the fourth review aim suggest a growing interest in the impact that
30 team formulation may have on a team. Findings suggest that it can help increase a team's
31 emotional awareness and ability, while helping them to operate more efficiently. If these are
32 potential impacts then the use of team formulation may herald a new way forward in
33 promoting team effectiveness. However, present research is limited in the number of studies,
34 quality and design and cannot be considered as reliable evidence of this impact.
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42 *Limitations.* The decision to limit the review to studies published in peer reviewed journals,
43 accessible by academic database was taken in order to focus the review on the most robust
44 available evidence. This is in keeping with guidance on evidence based healthcare (National
45 Academy of Sciences, 2001; NICE, 2014b). This is important as the practice of team
46 formulation is increasingly used to plan care decisions; a crucial aspect of care. The inclusion
47 of only ten studies for analysis, although potentially affecting the ability to answer the review
48 aims, did ensure that only robust evidence was included. However, this may have limited the
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3 ability to answer the review questions with assurance. Studies published within non-peer
4 reviewed professional forum magazines and those not accessible by academic database would
5 have increased the available number of studies amenable to review, but may have reduced the
6 credibility of evidence. To mitigate further against the small number of studies reviewed, a
7 robust methodology using PRISMA guidelines (Moher, Liberati, Tetzlaff, Altman, & Grp,
8 2009) was employed including the use of a second reviewer for quality appraisals.
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17 The included research studies were variable in research aims, design, methodology,
18 reporting, statistical analysis, sample size, and type. This heterogeneity prevented the use of
19 one type of review analysis such as meta-analysis or qualitative evidence synthesis.
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21 Therefore, an accepted review style that could analyse the contribution of both quantitative
22 and qualitative findings, and include the use of quality appraisals was used with rigour (Hong
23 et al., 2017). This style limited the statistical analysis of quantitative findings, but did
24 consolidate all kinds of evidence into a format by which the review aims (three and four)
25 could be addressed. A second reviewer, who independently generated themes relating to the
26 review aims, strengthened the approach.
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37 **Conclusions**

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41 This review found a paucity of research studies. The quality of included studies was variable
42 and their mixed focus considerably restricts the degree of evidence behind the practice of
43 team formulation. Yet this is a promising approach that may impact beneficially on teams as
44 well as conferring clinical benefits via individualised care planning and increased
45 understanding of patients. Specific aspects, which remain poorly understood, include the
46 influence of the team on the formulation and the influence of formulating as a team on the
47 team. The untested assumption about team formulation that it can be suitably and wholly
48 underpinned by therapy formulation theory, is likely to continue until team formulation is
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3 clearly defined within its own right as a team psychological activity. A conceptual
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5 framework, which informs systematic consideration of the range of factors and theories
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7 involved in team formulation, which takes into account the team inputs, processes, and
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9 outputs, of formulating as a team, should inform future research. Such a guiding conceptual
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11 framework would highlight the possibilities for future research as abundant. Lessons can be
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13 gained from therapy formulation in this respect. The evidence for therapy formulation is also
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15 considered weak, however it is drawn from sound case observations, together with general
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17 theories, which in combination produce testable theories specific to therapy formulation
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19 (Bieling & Kuyken, 2003).
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23 Defining and increasing the evidence base for team formulation remains a challenge, but
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25 represents a worthwhile one if the benefits to teams as well as patients are to be firmly
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27 established.
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http://www.euro.who.int/_data/assets/pdf_file/0020/280604/WHO-Europe-Mental-Health-Acion-Plan-2013-2020.pdf

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3 Table One. Search Terms
45 Search Term
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8 Team formulat*

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10 Team clinical case formulat*11
12 Team case meeting13
14 Formulatt* meeting15
16 Case conceptualization17
18 Case discussion19
20 Team case discussion21
22 Case planning23
24 Team case planning25
26 Clinical case meeting27
28 Team clinical case meeting29
30 Clinical formulatt* meeting31
32 Staff focused formulatt*33
34 Complex case discussion35
36 Complex case forum37
38 Multi-disciplinary team meeting39
40 Cognitive case formulatt*41
42 Cognitive case conceptualization43
44 Cognitive case discussion45
46 Cognitive behavioral formulatt* meeting47
48 Cognitive behavioral conceptualization meeting49
50 Case formulatt* meeting
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Team case conceptualization

Team psychiatric formulation*

Team psychological formulation*

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Table two. Inclusion criteria

Inclusion Criteria

- **Review aims**
 - Gives any definition of formulation (applied to a team formulation study), or;
 - Offers a theoretical basis for *team* formulation (includes therapy formulation theories if used as underpinning team formulation), or;
 - Explores the impact the team has on the formulation, or;
 - Explores the impact on the team of formulating as a team.
- **Setting/population**
 - Relevant to adult mental health multi-disciplinary teams (includes learning disability, services for older people, offender health), and;
 - Team formulation implemented in consultation, supervision or shared team format, and;
 - Involves any therapeutic modality (e.g. *CBT, *CAT)
- **Study features**
 - Any study design.
 - Published in peer reviewed journal and available on academic database.
 - Any publication date, in English language
 - Includes studies regarding evaluation of training teams to formulate

*CBT = Cognitive Behavioural Therapy. CAT = Cognitive Analytical Therapy

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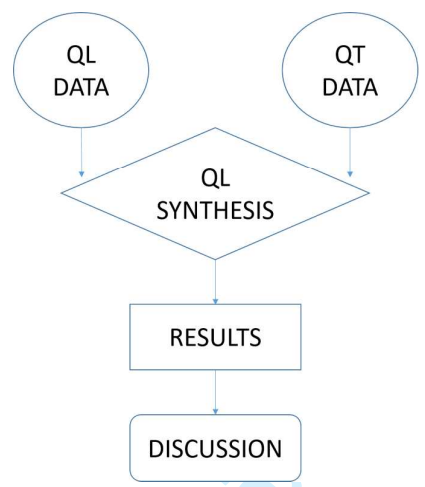


Figure 1. Synthesis design (Hong et al., 2017).

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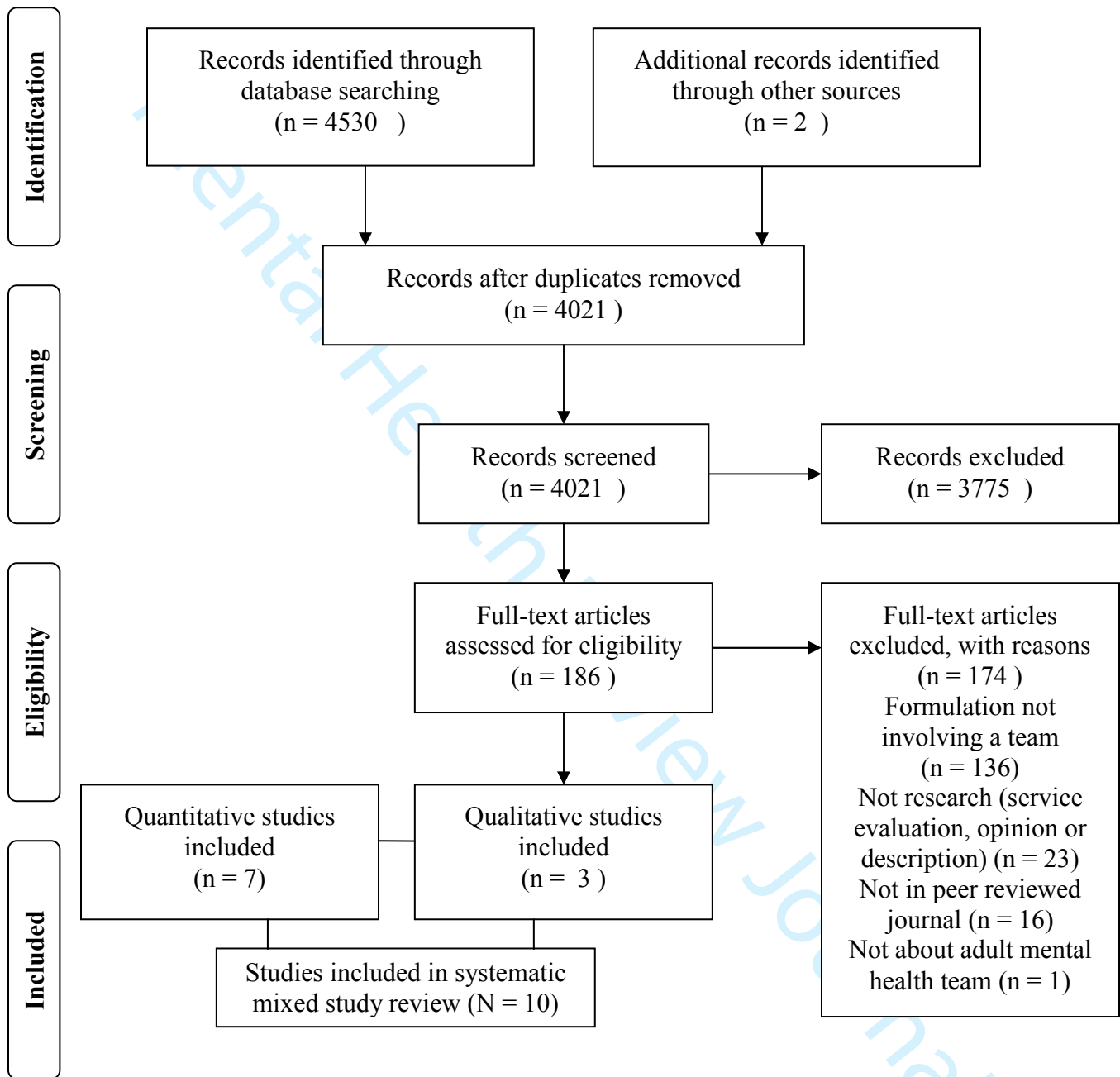


Figure two. PRISMA Flow Diagram illustrating systematic review process

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Table three. Included study characteristics

Study authors	Aim of research	Methodological approach	Participants and setting	Formulating method	Key findings	Effect size
Summers 2006	To understand benefits and limitations of using psychological formulations for patients with serious mental illness. To find out via staff views.	Qualitative. Grounded theory. Semi-structured interviews	25 staff. High dependency rehabilitation unit	Team meets to formulate then therapist writes formulation up. Sometimes discussed with patient.	Staff believed formulations benefit the care plans. Staff-patient relationships, staff satisfaction, team working through understanding improved. Some staff see formulation as tentative, others as statement of fact.	NA*
Maguire, 2006	To formulate target behaviours in group of homeless men. To provide CBT* interventions. To enable staff to use CBT techniques, via formulations and supervision. To train staff to operate within CBT framework, to increase perceived capability.	Uncontrolled quantitative pre-post intervention study. Self-report using un-validated scale.	Four residents. 15 staff. Residential for homeless men	Staff training with two groups of staff. Individual formulation and treatment given to patients by team psychologists. Staff supervision and training sessions by psychologist. Not reported whether whole team was involved in project.	Staff perceived they could be more effective, less hopeless, possibly less stressed as a result of training.	Not available
Berry et al., 2009	To develop formulations for individual patients' mental health needs with staff teams and explore effects of the formulation process on staff appraisals of	Uncontrolled quantitative pre-post intervention study. Self-report using validated measures.	30 staff. Three rehabilitation in-patient units.	Formulations meetings held with groups of staff facilitated by psychologist.	Statistically significant changes in staff perceptions on all dimensions post intervention. Predictions supported.	Not available

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2		patients.				
3	Ingham et al.,	To pilot a novel	Uncontrolled	10	CBT formulation	Hypothesis supported.
4	2008	training workshop in	quantitative pre-post	unqualified	training workshop for	Staff improved in all
5		bio-psychosocial	intervention study.	care staff.	direct care staff. Does	of the 5Ps except
6		formulation in terms	Un-validated pre-post	Acute in-	not report if all in the	'predisposing'. Staff
7		of its effects upon	scale to measure	patient mental	same team. Used 5Ps*	found training
8		awareness of bio-	change in ability to	health in	framework	satisfactory. Staff
9		psychosocial case	formulate plus self-	intellectual		appraisal ability of
10		formulation with	report.	disability		formulation changed.
11		direct care staff.		setting		Greater feelings of
12						mastery and
13						understanding of
14						patient problems.
15						Psychological
16	Christofides,	To investigate use of	Qualitative. Inductive	10	Psychologists who use	NA
17	et al., 2012	psychological	thematic design. Semi-	Community	formulation in MDTs	
18		formulations in MDT*	structured interview.	and in-patient	were interviewed. They	hypotheses were
19		working as reported		adult mental	reported this as	shared more often
20		by clinical		health	contributing informally	informally.
21		psychologists		services	within formulation	
22					meetings	
23					Psychologist trains team	Challenging behaviour
24	Ingham, 2011	To provide a pilot	Uncontrolled	Seven staff.	in formulation and	in patient decreased.
25		evaluation of brief	quantitative pre-post	Intellectual	applies to one patient in	Participants felt
26		formulation	intervention study.	disabilities in	training.	workshops were very
27		development	Un-validated pre-post	adult mental		satisfactory.
28		workshops with direct	observational measure,	health		
29		care staff supporting	plus un-validated self-			
30		people with	report.			
31		intellectual disability.				
32	Kellett et al.,	To evaluate the	RCT*.	10 patients in	Consultancy model.	No differences in
33	2014	clinical and	Validated self-report	each arm.	Staff were trained,	patient outcomes. CAT
34		organisational	perception scale.	Eight staff	supervised and had	facilitated enhanced
35		efficacy of	Validated self-report	Assertive	CAT* meetings with	team practice.
36		formulation based	measure re team	outreach.	the therapist.	
37		consultancy. Has three	climate.			(staff results)
38		hypotheses; reduces	Semi-structured			Participative safety
39						(d = 1.72) large
40						Support for innovation
41						(d = 2.42) large
42						Task orientation
43						(d = 0.30) mod
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	patient's distress, interviews.					Team vision (d = 0.14) small
Berry et al., 2016	To assess the feasibility and potential efficacy of a ward based psychological intervention to improve staff-patient relationships. Main aims were to determine rates of recruitment, uptake and retention and estimate effect size on a range of patient and staff outcomes.	RCT. Feasibility study. Validated self-report measures of staff/patient alliance, perceived criticism, ward atmosphere and staff well-being. Mixture of self-report and validated observation measures used for patient perceptions. Observation of ward environment and case notes.	51 patients, 85 staff across 10 wards. Rehabilitation in-patients	24 one hour sessions facilitated by a psychologist and therapist. Formulations derived from the meetings. All staff on duty who were available attended the mtgs.	Patients felt less criticised by their keyworkers and reported improved relationships and ward organisation. Staff in the intervention arm reported lower depersonalisation. But no significant differences in terms of staff perceptions of relationships, stress and other aspects of burnout, patient outcomes, length of stay, change in treatment or relapse. Staff reported a worse relationship with patients after the intervention. Some aspects of staff burnout improved. Team formulation reduced patient perceptions of criticism by	Therapeutic relationship effect sizes. Individual results given for each question in each scale for control and intervention mean and SD. Effect sizes calculated using effect size calculator. Effect sizes included: Working Alliance Inventory (two results given) (d = -0.648) moderate negative effect (d = 1.142) large positive effect. Perceived Criticism Scale (four results given). (d = 0.499) small positive (d = 0.729) med positive (d = -1.742) large negative

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2					developing empathy	(d = -1.674) large
3					and understanding	negative
4					from staff.	Ward Atmosphere
5						Scale (six results given)
6						(d = -0.154) small
7						negative
8						(d = -0.058) small
9						negative
10						(d = 0.018) small
11						positive
12						(d = 2.212) large
13						positive
14						(d = 3.334) large
15						positive
16						(d = 1.518) large
17						positive
18						d = 0.59 (medium
19	Revolta et al.,	To evaluate the	Uncontrolled	37 staff across	Training workshops	Formulation skills and
20	2016	feasibility of training	quantitative pre-post	three	delivered which	ability to develop
21		staff from a variety of	intervention study.	dementia care	included ability to	appropriate
22		settings on the BPS*	Some qualitative	homes	formulate. Training	interventions increased
23		model of dementia,	feedback sought too		staff in teams to use a	significantly. No
24		examining its impact	regarding training.		model which includes	significant difference
25		on attitudes,	Validated self-report		team formulation.	found in overall
26		competence and	measures. Observation			approach to dementia,
27		formulation skills.	of pre-post ability			and no significant
28			using a validated			change to levels of
29			model.			hope or person-
30						centeredness. No
31						significant difference
32						on sense of
33						competence. All
34						groups showed an
35						improved attitude
36						towards dementia.
37						Training helped to
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Mohtashemi et al., 2016	To understand how psychiatrists understand the concept of formulation, including team formulation	Qualitative. Informed by grounded theory.	12 psychiatrists. Various settings. AMH	Team formulation is facilitated by a psychologist	improve understanding of dementia and problem solving ability. Four conceptual categories emerged. - Formulation leads to a diagnosis, and psychological understanding is not always needed, but helpful. -Created unified understanding between psychology and psychiatry and team communication device. Brings information together. -Time is a barrier to using psychological understanding. -Pressure to treat people medically at cost of psychological understanding. Gap in psychiatry training.	NA
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*NA = Not Applicable. *CBT = Cognitive Behavioural Therapy. *5Ps = Presenting problem, Predisposing, Precipitating, Perpetuating, Protective Factors.
 *MDT = Multi-Disciplinary Team. *RCT = Randomised Controlled Trial. *CAT = Cognitive Analytic Therapy. *BPS = Bio-Psycho-Social. *AMH = Adult Mental Health.

Table five. Theories underpinning team formulation research

Study	Theories applied	How applied	Was application of theory supported in findings*
Summers, 2006	Psychological theory (does not specify which)	Applies the psychological theory underpinning therapy formulation to team formulation.	NA*. Theory not focus of research study
Maguire, 2006	Change	Used to examine whether formulation would increase staff understanding of a particular behaviour often observed in sample patient group (reluctance to change), that may invoke hopelessness, burnout and stress in staff.	Yes
Ingham et al., 2008	Bio-psychosocial	Applies theory to support integration of clinical knowledge used in therapy formulation to team formulation.	Yes
	Attribution	To see if formulating can alter unhelpful/critical appraisals and impact on staff helping behaviours.	NA: Impact of intervention on staff attribution not tested
Berry et al., 2009	Social exchange	To rationalise the study of staff-patient relationships as a central determinant of relapse and recovery.	Yes
	Attribution	To support study rationale in relation to staff attributions of patient behaviours and mental health problems. To see if formulating can alter unhelpful/critical staff appraisals and impact on staff helping behaviours.	Yes
	Cognitive Behavioural	To provide background theoretical evidence for use of formulation in teams. Applies the psychological theory underpinning therapy formulation to team formulation.	NA: Theory not focus of research study
	Interpersonal	To provide background theoretical evidence for use of formulation. Applies the psychological theory underpinning therapy formulation to team formulation.	NA: Theory not focus of research study
	Attachment	To provide background theoretical evidence for use of formulation. Applies the psychological theory underpinning therapy formulation to team formulation.	NA: Theory not focus of research study
	Cognitive Analytical	To provide background theoretical evidence for use of formulation. Applies the psychological theory underpinning	NA: Theory not focus of research study

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Ingham, 2011	Psychological theory (does not specify which)	therapy formulation to team formulation. To provide background theoretical evidence for use of formulation. Applies the psychological theory underpinning therapy formulation to team formulation.	NA: Theory not focus of research study
	Attribution	To support study rationale in relation to staff attributions of patient behaviours and mental health problems. To see if formulating can alter unhelpful/critical staff appraisals and impact on staff helping behaviours.	Yes
	Systemic	Used for study rationale; patterns and narratives within staff-patient relationships are explored via formulation with the intention of producing a change in relationships.	No distinct reporting in findings in relation to this theory and impact of intervention
Christofides et al., 2012	Behaviour	Applies behavioural theory underpinning therapy formulation to team formulation.	NA: Theory not focus of research study
	Psychodynamic	Applies formulation to understand staff countertransference feelings towards service user to inform formulation.	NA: Theory not focus of research study
Kellett et al., 2014	Communication	As study rationale suggesting that therapy formulation may improve team communication and clarity of objectives.	Task orientation tested as part of quantitative measure, otherwise communication and clarity of objectives not tested.
	Attachment	Formulating staff-patient relationships can draw staff attention to dysfunctional roles and procedures adopted by both, to see if this would alter practice.	Yes
Berry et al., 2016	Social exchange	To support the study of staff-patient relationships as a central determinant of relapse and recovery.	Yes
	Attribution	To support study rationale in relation to staff attributions of service user behaviours and mental health problems. To see if formulating can alter unhelpful/critical staff appraisals and impact on staff helping behaviours.	Yes
Revolta et al., 2016	Bio-psychosocial	Applies theory to support content of team training in use of bio-psychosocial formulation with team.	Yes
Mohtashemi et al., 2016	Psychological theory (does not specify)	To provide background theoretical evidence for use of formulation. Applies the psychological theory underpinning	NA: Theory not focus of research study

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5 which) therapy formulation to team formulation.

6 *Note: Findings need to be regarded in conjunction with study quality appraisal and effect sizes where reported.

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8 *NA = Not applicable.
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