Putting the team into Team Formulation in adult mental health and learning disability services: Conceptual foundations.

SHORT, VALENTINA

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Abstract

Team formulation is considered central to care delivery by mental health and learning disability multi-disciplinary teams. A systematic review completed as part of the thesis indicated team formulation research is scarce, of variable quality, and mainly explores practice acceptability. Team formulation lacks distinct definition and is based on psychological case formulation theory, a central tenet of one-to-one psychological therapy which does not include team theory. While there is emerging research on the impact of team formulation on the team, the systematic review found no reports of the impact of the team on the formulation. The development of a definition and model of team formulation, based on both team and case formulation theories was central to this thesis. The model proposed the role of team factors as critical to team formulation. The model guided the choice of two empirical studies, examining team factors and their relationship with the knowledge sharing required for team formulation.

Participants for both studies were recruited from clinical teams in a National Health Service organisation. Results of Study One showed perceived team communication quality (CQ) was a significant predictor of the level of a knowledge sharing system known as the transactive memory system (TMS), used for the task of team formulation. This relationship was not mediated by team identification (TI) or moderated by the effect of professional identification (PI) on team identification. However, there were significant correlations between CQ and TI, CQ and TMS, and TI and TMS. Study Two focussed on TI and TMS, to explore this relationship in depth and understand its relevance to the model of team formulation. It found that TI and the TMS for team formulation were closely related in a reciprocal manner,

enhancing conditions for team formulation. Synthesis and discussion of both studies support the inclusion of team factors in the model of team formulation, highlighting application of the model for future research and clinical practice.

The thesis makes a novel contribution to team formulation theory, by uniting team and case formulation research. It provides a model to guide future team formulation research. The utility of the model is demonstrated by the two studies conducted for the thesis. Both studies advance understanding of team conditions and their relevance to the knowledge sharing required in team formulation. Furthermore, the thesis provides opportunities for teams to develop or enhance team formulation practice by suggesting the theory based core components and flow of team formulation practice.

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Abbreviations

AMH – Adult Mental Health

BA – Batchelor of Arts

BPS – British Psychological Society

BSc – Batchelor of Science

CASP – Critical Appraisal Skills Programme

CAT – Cognitive Analytical Therapy

CBT – Cognitive Behavioural Therapy

COC – Central Organising Theme

CQ – Communication Quality

DCP – Division of Clinical Psychology

DSM – Diagnostic and Statistical Manual (of mental disorders)

EABCT – European Association for Cognitive and Behavioural Therapies

Five P's – Presenting, Predisposing, Precipitating, Perpetuating, Protective

ICD – International Statistical Classification of Diseases

IPO – Input Process Output

MDT – Multi-Disciplinary Team

NHS – National Health Service

NICE – National Institute for Health and Care Excellence

OT – Overarching Theme

PI – Professional Identification

RCT – Randomised Controlled Trial

SMM – Shared Mental Model

ST – Sub Theme

T - Theme

TF – Team Formulation

TI – Team Identification

TMS - Transactive Memory System

UK – United Kingdom

USA – United States of America

WHO – World Health Organisation

Declaration

I, Valentina Short, confirm that the work presented in this thesis is my own. This thesis was prepared in accordance with the guidelines outlined by Durham University's Graduate School and in the Department of Psychology's Postgraduate Handbook.

I was the principal author for the systematic review presented in chapter two. Citations for other contributors for chapter two are listed below:

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Statement of Copyright

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Preface

Conceptual foundations

Team formulation is a practice used in mental health and learning disability care teams, whereby team members meet to discuss the mental health problems of a patient. The formulation discussion by team members focuses on identifying the origins of the problems, factors maintaining the problems, and the coping strategies being used by the patient. The discussion is intended to generate team understanding and inform the generation of an individualised plan of care.

This thesis offers a distinct, research driven theoretical definition and model of team formulation. It integrates team research with case and team formulation research, forming the basis for expansion of team formulation research possibilities and evidence base.

The first two chapters in the thesis focus on understanding the theory and practice of team formulation. This begins in Chapter One with an introduction to the practice and presentation of the findings of a broad scoping review examining the team formulation literature. The scoping review aimed to explore the practice of team formulation and to give a general indication of its evidence base. The results of the scoping review identified areas of fundamental concern for the practice of team formulation. Findings showed team formulation was a poorly defined but emerging team practice. It is considered useful by teams but the practice varies with regard to who is involved and how the formulation is conducted. Furthermore, the format of the formulation discussed by teams depends on the discipline leading the discussion. It is generally an adopted and adapted form of a psychological case formulation typically used in one-to-one psychological therapies. This highlights a bias within

the literature whereby the process of conducting formulation in a team setting is mainly viewed through the lens of psychological case formulation. Apart from lack of formulating knowledge and ability amongst team members, scarce attention is given to team factors and processes and the influence of these on the practice of team formulation. The scoping review reveals that, at present, there is no distinct concept of team formulation that fully unites the activity of formulating with team factors and processes.

Whilst the scoping review achieved its aims of providing a broad picture of the practice and evidence base of team formulation, it did not provide an explicit account of the research evidence underlying team formulation. A systematic review was therefore conducted and is reported in Chapter Two. Unlike the scoping review, the systematic review excluded non-research literature such as opinion pieces and practice reports. Building on the findings of the scoping review, the systematic review particularly aimed to explore proposed definitions of team formulation and associated models. In addition, the systematic review aimed to identify research evidence regarding the impact of team formulation on the team, and the impact that formulating together as a team has on the formulation produced by the team.

Findings of the systematic review showed no distinct definition of team formulation or underpinning conceptual model, which incorporates team factors and processes. Thus the role of the team in team formulation has not been examined. Research is beginning to investigate the impact that the act of formulating as a team has on individuals in the team, but no research is identified that investigates the impact of the team on the formulation.

Having identified a lack of theoretical unity between team factors, processes and team formulation, Chapter Three describes a model and its development that aims to counter the theoretical gaps identified by the systematic review. In this model, case and team formulation research are brought together with general team research, and research supported theories. This conceptual model of team formulation provides the basis for the design and research questions of the empirical studies of the thesis.

The model for team formulation proposes that team factors and processes influence various aspects of team formulating. One key aspect is knowledge sharing, a well-researched team process that also occurs as part of team formulation when information is shared within the team about the patient. Choosing this as a first area to study acts as a first exploration of the central proposition of the thesis, that team factors and processes and team formulation are important to place alongside each other in a model of team formulation. Thus, for the first empirical study in the thesis reported in Chapter Four, three team characteristics; communication quality, team identification and professional identification are examined for their impact on a fourth team system known as a transactive memory system (TMS) which explains the efficient sharing of knowledge in teams. The study considers all four of these processes in relation to team formulation by examining, i) team communication quality as a predictor of the TMS functioning for team formulation, ii) team identification as a mediator of perceived communication quality and the TMS for team formulation (as it facilitates knowledge sharing when team members who identify with one another communicate more frequently), and iii) professional identification as a moderator of the relationship between team identification and the TMS for team formulation. Professional identification is proposed to moderate team

identification. If professional identification creates closed sub-group working in which resources are not shared with the wider team, this reduces wider team identification and its mediating effect between communication quality and TMS development. Conversely, if professional identification brings sub-group resources to the wider team, motivating team members to contribute to team goals, this increases team identification and its mediation between communication quality and TMS development. Examined through a cross sectional survey study of 84 teams, findings showed that as expected communication quality in a team was a significant predictor of the level of TMS functioning for team formulation. Significant and positive correlations were also established between communication quality and team identification, communication quality and the TMS and team identification and the TMS. However, there was no evidence that team identification mediated the relationship between communication quality and the TMS, or that this mediation effect was moderated by professional identification. These findings were unexpected and contrary to other research findings (see Liao, O'Brien, Jimmieson, & Restubog, 2015). Reasons for the difference in findings to previous studies are discussed, and point towards differences in study design, sample characteristics and sample size. The correlation between team identification and the TMS for team formulation is explored further in Study Two as reported in Chapter Five.

A qualitative study design is employed for Study Two in order to understand in depth *how* these two team factors relate, rather than *if* they relate. In this second study, 30 staff from four teams take part in semi-structured interviews focusing on team identification and its relationship to team formulation. The semi-structured interview questions are specifically designed to capture instances of the ways in which team identification and components of the TMS for team formulation might

relate to one another. Deductive thematic analysis reveals that the TMS for team formulation and team identification are closely related and have a reciprocal role in relation to each other. The team formulation TMS helps to build team identification, through expression of shared values and goals, and team identification forms the basis for effective working relationships and quality communication that enables the TMS for team formulation to develop. The findings of this study therefore give support to the inclusion of team identification in the model of team formulation, specifically in relation to the ways in which team identification supports the development of knowledge sharing for team formulation (via the TMS).

The findings of both studies, along with the model of team formulation, are discussed and synthesised in the sixth and last chapter of the thesis. This includes a consideration of the way in which both studies support the aims of the thesis individually and jointly, through exploration and synthesis, which unites team research and theory with case and team formulation research, enabling development of a definition and model of team formulation. The thesis concludes with key findings and implications for future research and clinical practice:

Key findings and results;

The studies within the thesis demonstrate that;

- Team formulation operates through a TMS.
- Team communication quality predicts the development of the TMS.
- Team identification enables the team conditions, such as communication quality, to support development of the TMS through shared team values and goals.

The practical implications of these findings suggest that;

- The model could be used to guide research. This could start with a follow up of the research recommendations emanating from the two studies in the thesis, or by using the model as a guide to other possible research areas, for example, clinical outcomes of team formulation, or how patients should be involved.
- The model could be used to guide practice and training. In particular the model could help organisations and teams to focus on team conditions in training, which are suggested to help optimise team formulation practice, and as demonstrated by Study Two, are a mechanism through which team values and identification might be developed.
- The model may support development of a tool by which the practice of team formulation could be evaluated. This would be useful for organisations who are already describing a deliberate organisation-wide roll out of team formulation into their teams (see Dexter-Smith, 2007).
- The model might provide teams with support to improve consistency in thinking about team formulation and understanding of the intended individual team outcomes.

The theory based definition, model and results of the empirical studies in this thesis present a transformed understanding of team formulation. They do so by emphasising the role of team conditions in the implementation of team formulation, and validating the team context in which team formulation takes place as relevant to team formulation. This distinguishes ‘team-formulation’, as distinct practice to case formulations carried out by teams.

Chapter One

General Introduction

1.1. Introduction

This chapter introduces and defines three key concepts; case formulation, teams in adult mental health care and team formulation. A précis of the origins of case formulation and challenges to it are outlined, in order to provide the context in which team formulation is practiced. This is followed by a depiction of teams working in adult mental health services. Finally, the research and literature on team formulation is critiqued and summarised. Thus, the introduction enables team formulation to be understood within the context in which it is practiced in clinical care and examined in this thesis.

1.2 Case Formulation

1.2.1 Definition of case formulation.

Case formulation, also referred to as "psychological formulation", (Division of Clinical Psychology, 2010, p.5), "case conceptualisation" (Kuyken, Padesky, & Dudley, 2009, p.3) and "psychotherapy case formulation" (Eells, 2006, p.4), has multiple definitions (Johnstone & Dallos, 2014). Throughout this thesis the definition offered by the Division of Clinical Psychology (DCP) in the United Kingdom is applied:

"Psychological formulation is the summation and integration of the knowledge that is acquired by the assessment process that may involve psychological, biological and systemic factors and procedures. The formulation will draw on psychological theory and research to provide a framework for describing a client's problems or needs, how it developed and is being maintained"

(Division of Clinical Psychology, 2010, p.5)

1.2.2 The origins of case formulation.

Psychological formulation emerged from three developments in mental health care: namely, a dissatisfaction with the psychiatric diagnostic classification system, the birth of the 'scientist-practitioner' model within clinical psychology, and the assertion that patients should be understood and treated as individuals (Lane & Corrie, 2015). It was not until the 1980s that the term "case formulation" was applied (Turkat, 1985, p.2). This section outlines the evolution of case formulation to its present day use.

Mental health problems have been understood and diagnosed through the use of psychiatric classification systems since the 1800s (Bentall, 2003). Having gained prominence in the early 1900s, the Diagnostic and Statistical Manual (DSM) (APA, 2013) and International Classification of Diseases (ICD) (WHO, 1992) are the two classification systems that remain in use today. Within psychiatry, diagnostic classification is underpinned by the idea that groups of behaviours, regarded as symptoms, and observed across groups of patients, indicate the presence of particular mental illnesses (Bentall, 2003). However, the psychiatric diagnostic classification system has received criticism over a number of decades, with issues relating to lack of reliability (whether consistently reproducible over time and situations) and validity (correct representation of what it is intended to represent). For example, an examination of application and understanding of psychiatric diagnosis by psychiatrists, across three large state psychiatric hospitals in America in the 1930s showed wide variation in application, and that diagnosis by classification, as a system for understanding mental health problems was unreliable and outdated (Boisen, 1938). A highly critical early accusation of the psychiatric diagnostic classification system was that it failed to provide an understanding of the causes,

course or solutions of mental illness. While diagnostic classification in physical illness was becoming more accurate, psychiatric diagnostic classification, including its goals, were viewed as implicit, vague and largely determined by the individual psychiatrist applying the diagnosis (Ash, 1949; Zigler & Phillips, 1961). More contemporary criticisms of the diagnostic classification system condemn the addition of new diagnoses that occurs with each new edition. For example, the latest version of the DSM (version five), is criticised for increasing the medicalisation of normal human experiences by the addition of binge eating and temper dysregulation disorder with dysphoria. These are diagnoses asserted as valid by large pharmaceutical companies, whilst the robustness of underpinning research is disputed (Pickersgill, 2014; Wykes & Callard, 2010). A fundamental shift in how mental health problems are construed has evolved in parallel with the growing dissatisfaction of the psychiatric classification system. This shift began to emerge from within the founding of clinical psychology, as a distinct clinical discipline to psychiatry, in the 1950s and 1960s.

Early forms of formulation stemmed from the birth of Behaviour Analysis and Therapy which offered a framework to understand and examine patient behaviours (Bruch, 2015; Crellin, 1998). For example, in a direct criticism of the diagnostic classification system, a behavioural-analytical approach was suggested as an alternative (Kanfer & Saslow, 1965). Within this approach, the particulars of the individual patient's life pattern, along with behaviours displayed by the patient, and their individual social situation, all formed the basis of understanding for guiding interventions. This early formulation approach focused on the individual's experience, perception and response to problems (Kanfer & Saslow, 1965). Further criticism of the psychiatric diagnostic classification system directly confronted

psychiatric intervention as well as classification, an instance of which can be seen in a meta-analysis from the 1950s, considered to be a seminal text (Eysenck, 1952). In this, psychotherapy, the major intervention offered by psychiatrists was criticised for its lack of effectiveness in helping patients to recover (Eysenck, 1952). The paper concluded that the way in which data was previously used to determine whether recovery in patients had taken place presented a major problem, suggesting that studies marking the presence of recovery should be planned and employ experimental methods (Eysenck, 1952).

Along with other seminal psychology texts this has been viewed as the introduction of the scientist-practitioner model which emphasised clinically experimental work, underpinning the idea of the hypothesis within formulation (Bruch, 2015). Clinical psychology texts advocated assessment and individual case conceptualisation *in* the clinical setting, in order to facilitate a more direct understanding of the individual patient's mental health problems. This strengthened the case for formulation (Shapiro, 1957) and began to link scientific understanding and testing with the self-report of the patient. The approach legitimised individual experience as a valid mechanism for understanding behaviours displayed in mental illness. The phenomenon of formulation advanced again when it was proposed that not all patients with the same diagnosis responded equally to the same treatments, and that individual patients present with more than one problem, not always related to the main problem (Meyer, 1975). Moreover, therapy was proposed as an on-going dynamic process based in theory, and able to predict future behaviour through the underpinning hypothesis. Additionally, it was suggested that the hypothesis should be tested and reviewed in a scientific manner, as understanding of the individual patient developed (Meyer, 1975).

The next advance for case formulation occurred with the proposal of the 'Behavior Analysis Matrix' that emphasised the 'conceptualisation of human behaviour' (Turkat, 1979). The matrix emphasised the role of the clinical interview and hypothesis testing, and guided the clinician towards a highly idiosyncratic understanding of the individual. This was in contrast to the understanding of behaviours exhibited by patients grouped by diagnosis (Turkat, 1979). The matrix guided behavioural analysis to include attention to the antecedents, the patient's behaviour and the consequences of the behaviour in relation to cognitive, autonomic, motor movements and environmental responses in the patient (Turkat, 1979). Eventually, the term 'case formulation' was used to describe the process of formulating, in reference to the presenting individual clinical cases to which formulation was being applied (for example see Turkat, 1985). Consequently, mental illness, once defined by a person's behaviours, and whether these corresponded with a class of behaviours also observed in other people, was now beginning to be understood by self-reports from the individual patient, psychological hypothesising and observation of individual behaviours. This was combined with a focus on wider social and cultural considerations (for example see Turkat, 1986).

Over time, other psychological therapies have developed, each making unique contributions to the development of case formulation (Eells, 1997). For example, the psychoanalytical approach brings models of personality, the psychotherapy interview and emphasis on the individual case study. The humanistic school highlights the person instead of the disorder, sees therapist and patient as equals, brings holism over reductionism and gives techniques that aid insight and understanding of experience. Behaviour therapy places an emphasis on the environment and the importance of experimentation, while cognitive-behavioural

approaches give specificity to the cognitive patterns and schemas underpinning distinct disorders (Eells, 1997).

Each psychological therapy makes a unique contribution to case formulation, but also overlaps in various aspects. For example, differences lie in the focus of therapeutic target and outcome, the role of historical factors, how the formulation is used with the patient and the prescriptiveness of the formulation (Sturmey, 2009). However, overlap also exists between the therapeutic traditions, as each speculate on key features of the patient, integrate a unified set of ideas that are linked to treatment, and are considered provisional and predictive (Sturmey, 2009). Although there is no harmonised definition of case formulation, it has been suggested that the majority of definitions include descriptive, prescriptive and predictive aspects of the case (Sim, Gwee, & Bateman, 2005).

As well as developing across a range of psychological therapies, the use of case formulation is no longer within the sole domain of clinical psychology and has evolved to be used by a range of professional disciplines. For example, it is a required skill and competency for psychiatrists and mental health nurses (NMC, 2016; RCPsych, 2016). However, despite such developments, there are challenges to the reliability, validity, application and usefulness of case formulation.

1.2.3 Challenges to case formulation.

Studies examining case formulation report a number of challenges to its underlying evidence base. These include challenges to the scientific constructs, reliability, validity, and impact on patient outcomes (Bieling & Kuyken, 2003; Dudley, Park, James, & Dodgson, 2010; Kuyken, 2006; Kuyken, Fothergill, Musa, & Chadwick, 2005). Research involving 23 clinicians demonstrated three differing views on the dominant use of formulation, such as using it for ‘here and now’

problems, function and process issues and the understanding of trait issues in the patient's problems (Flitcroft, James, Freeston, & Wood-Mitchell, 2007). Research involving 47 cognitive behavioural therapists reported a lack of agreement on the patient's problems and the cognitive mechanisms underlying those problems (Persons, Mooney, & Padesky, 1995). A replication of this study, with 46 clinicians, reported the same results, and additionally, found that the lack of agreement was associated with level of therapy training (Persons & Bertagnolli, 1999).

An evaluation of research evidence for individualised case formulation found that descriptive elements of the formulation (observable patient problems), were more likely to be given in the formulation, than the explanatory elements (the causes and maintenance factors involved in the problem), which are considered to be fundamental to a formulation (Bieling & Kuyken, 2003). This evaluation concluded that the evidence for case formulation reliability is modest, and that research examining the impact on therapy outcomes and validity was lacking (Bieling & Kuyken, 2003). Another study involving 115 mental health practitioners supported these conclusions. This study demonstrated further that the reliability of formulation depended on level of therapist training. Practitioners with less training, focused more on descriptive elements and less on theory driven conclusions regarding the patients' problems (Kuyken et al., 2005).

Research has also shown reliability issues. For example, therapists with different levels of experience constructed different formulations for the same client (Kuyken et al., 2005). This has major implications for treatment, as different explanations lead to different treatments (de Kwaadsteniet, Hagmayer, Krol, & Witteman, 2010). This was clearly demonstrated in a study of 151 psychologists examining cases of anorexia and conduct disorder (Berens, Witteman, & van de Ven,

2011). Furthermore, there are specific challenges relating to the content of case formulations, concerning their ability to accurately measure problems, predict problems and assign the correct treatment to the problems (Mumma, 2011). There is also criticism that case formulation (specifically in Cognitive Behavioural Therapy) (CBT), relies on psychiatric diagnostic classification (Sturmey, 2009). This is evident within CBT case formulation, which uses formulation models based on specific diagnoses. For example, there is a formulation model specific to the diagnosis of Post-Traumatic Stress Disorder (see Ehlers & Clarke, 2000). Criticisms of case formulation have primarily targeted cognitive behavioural formulations, however, formulations intrinsic to other types of psychological therapy have also received criticism. For example, a study of psychodynamic case formulation also found that accuracy of formulation was linked to level of therapist skill in interpreting relationship themes inherent in psychodynamic psychotherapy (Crits-Christoph, Cooper, & Luborsky, 2001).

The problems with case formulation have led researchers to argue whether it is needed at all, or whether treatment decisions could be based entirely on standardised treatment manuals (Aston, 2009). A review of case formulation concluded that there is a paucity of research examining the evidence base for case formulations, in particular reliability, validity and clinical outcomes (Aston, 2009).

Despite these concerns, from its inception to more contemporary literature on case formulation, clinicians and academics writing about case formulation stress its underlying scientific basis (see Butler, 1998; Clark & Fairburn, 1997; Johnstone et al., 2018; Ryle & Kerr, 2002). This involves the inclusion of a hypothesis and a clinically experimental approach to individual patient problems. For example, the use of the behaviour analysis matrix in the 1970s advocated the integration of

scientific knowledge, produced by prior behavioural scientists (Turkat, 1979). While more recently, the scientific underpinning to case formulation in a suggested model of CBT formulation, included CBT theory and research, along with patient experience, to drive the empirical approach to the formulation (Kuyken et al., 2009). Moreover, it is suggested that in comparison to diagnosis, the act of formulating with a patient is useful in terms of supporting the patient to bring meaning to their experiences, while incorporating clinician held theory and research (Butler, 2006; Johnstone, 2018).

In conclusion, the development of case formulation has culminated in a series of key defining characteristics, yet no singular overarching definition (Johnstone & Dallos, 2014). Case formulation is viewed as an improvement on psychiatric classification due to its personalised, scientific nature, yet, as with classification it is criticised for a lack of reliability and validity. It is within this context that case formulation has been adopted as team formulation for use by teams who aim to develop a shared understanding of the patient. In order to understand the implications of this for mental health teams the next section portrays team working in mental health.

1.3 Mental health and learning disability teams

Within the last five decades, alongside the growth of case formulation, teams have also become the major means by which health care is delivered (Borrill et al., 2013; D'Amour, Ferrada-Videla, San Martin Rodriguez, & Beaulieu, 2005). Team working is the primary method of mental health care delivery in the United Kingdom (UK) and the United States of America (USA) (Baker, Day, & Salas, 2006; West & Lyubovnikova, 2013). Teams are considered particularly useful when complex tasks exceed individual worker knowledge, or when the task is ill defined (Salas, Cooke,

& Rosen, 2008). The expectation that health care will be delivered by a multi-disciplinary team is evidenced in key statutory reports (Department of Health, 2011; NHS, 2012; NHS England, Local Governmemnt Association, & Association of Directors of Adult Social Services, 2015; Social Care, 2014). In the UK, teams typically occur in secondary care adult mental health and learning disabilities services and include both in-patient ward based teams and community teams. This includes teams with a focus on early intervention in mental health problems, affective problems (such as depression and anxiety), psychosis, crisis, acute ill health, rehabilitation, drug and alcohol, forensic and forensic learning disability. These multi-disciplinary secondary care teams comprise a diversity of professionally trained staff, supported by non-professional health care staff. Mental health and learning disability teams are generally configured with mental health nurses, social workers, psychiatrists, clinical psychologists, occupational therapists and health care assistants (for example see RCPsych, 2013). Thus the team provides a range of mental health skills, knowledge and interventions.

Mental health and learning disability secondary care teams provide a range of specialist interventions including pharmaceutical, psychological interventions, social and practical support. These teams aim to support people to recover, and in some instances to live well with long term problems (Department of Health, 2011). Interventions are offered as the team works together, to deliver aspects of care aligned to individual team member skills, knowledge and roles. The care to be offered is articulated within a care plan. This sets out the identified problems, risks and recovery goals, and who in the team will offer each aspect of care (Hall & Wren, 2008). The team, working collaboratively with the patient, decide which interventions should be included in the care plan. The decision about which

treatment to offer is based on assessment, diagnosis, individual and team formulations and interventions should be evidence based (HMG/DH, 2011). Therefore, in order to achieve a clear and accurate understanding of patient need, team members must work together and share a range of relevant skills and competences to deliver recovery oriented care (Pringle & Brittle, 2008).

However, the expectations that team work will deliver high quality health care must take into account the conditions in which modern teams operate. In the midst of pressure for evidence based, efficient and timely interventions in the UK (HMG/DH, 2011; Mental Health Task Force, 2015), the very essence of what it means to work in a team is also changing. For example, team work once implied that work was carried out by a group of people who always shared the same team base, and whose membership was stable. Now, health care teams are frequently geographically dispersed, and have visiting, peripheral team members, who provide input into the team, but who are not perceived by the core team as a team member (Tannenbaum, Mathieu, Salas, & Cohen, 2012). Team dispersal and structure are known to impact on team stability, decision making, communication, team roles, team identity, team identification with one another, and knowledge sharing (Salas et al., 2008; West & Lyubovnikova, 2013). The impact on the team can be poor performance and the creation of pseudo rather than real teams, leading to a low degree of interdependence, shared decision making and team reflexivity (Tannenbaum et al., 2012; West & Lyubovnikova, 2013). Furthermore, teams currently function in the context of frequently changing service provision (Gilburt, Peck, Ashton, Edwards, & Naylor, 2016), with reduced funding and expectations that the quality of care will be high (NHS Providers, 2017; Social Care, 2014; Vize, 2017). There is also evidence that mental health teams are adjusting their referral

criteria to accept patients who are experiencing a wider range of mental health problems as services respond to national pressures, whilst coping with reduced funding and increasing referral rates (Lavelle, 2017). It is therefore critical that teams determine patient needs with a high degree of accuracy and match care to those needs. In the UK, team formulation is now a key mechanism for achieving this within mental health teams (see Johnstone, 2018).

1.4 Team formulation

Guidelines on psychological formulation include a section on team formulation, suggesting that psychological formulation forms the basis for this clinical practice (see Johnstone, 2011). It is not clear when teams began to formulate together. However, one of the earliest published articles was a case study in which Cognitive Analytical Therapy (CAT) formulations were shared with the wider community mental health team, in order to help the team provide care that was non-blaming with regard to patient behaviours (Dunn & Parry, 1997). This early team formulation was shared with the team using a framework to design and evaluate care. Since then, team formulation has increasingly emerged as a legitimate team activity, with recognition in reports by the British Psychological Society (BPS) (Johnstone, 2011).

1.4.1 The scope of team formulation

To understand the use of team formulation in practice and identify priorities for research, a scoping review of team formulation research and literature was conducted as part of this thesis in 2014 (See Appendix A for search strategy and search terms, and Appendix B for conference poster). Scoping reviews offer an exploratory systematic search of key concepts from all types of literature in order to identify existing commentary, types of existing evidence and gaps in research for a

particular research topic (Colquhoun et al., 2014). For the topic of team formulation, this included a library and wide data-base search of literature and research, including grey literature.

Psychological formulation guidelines formed the basis for search terms (Johnstone, 2011). A total of 4,530 articles were screened resulting in 186 articles for full text examination, resulting in 36 articles for inclusion in the review. The review included a range of mental health and learning disability settings for all patient age ranges, and various therapeutic backgrounds (e.g. CBT and CAT). Results were analysed to establish type of literature available (e.g. research or non-research) and emerging themes were explored by thematic analysis (Braun & Clarke, 2006).

The review identified a limited body of research evidence and literature, which had either investigated or commented on team formulation, implementation and staff training. Only 12 research studies were identified (Berry, Barrowclough, & Wearden, 2009; Christofides, Johnstone, & Musa, 2012; Craven-Staines, Dexter-Smith, & Li, 2010; Hollingworth, 2014; Hood & Christofides, 2013; Ingham, 2011; Ingham & Clarke, 2009; Ingham, Clarke, & James, 2008; Maguire, 2006; Summers, 2006; Thompson et al., 2008; Walton, 2011). All results supported the use of team formulation but the evidence base for many studies was poor when assessed using research quality evaluation tools (CASP, 2017a, 2017b).

Evidence arising from observation and experimentation reported that team formulation has three major benefits; it improves team functioning, helps with treatment planning and outcomes, and helps the team to understand patients who present with challenging and complex problems. It achieves these benefits in several ways. It promotes a common team language (Craven-Staines et al., 2010; Thompson et al., 2008), by raising team morale (Hood & Christofides, 2013), and supporting

team decision making (Hollingworth, 2014). It improves team functioning by its impact on staff, which reduces staff anxiety and stress about patients presenting with complex problems, while increasing staff feelings of value (Christofides et al., 2012; Walton, 2011), team cohesion and confidence (Craven-Staines et al., 2010; Ingham, 2011; Ingham & Clarke, 2009; Ingham et al., 2008). Researchers propose that there is a relationship between team formulation and more focused coordinated interventions, thus improving treatment planning and outcomes (Christofides et al., 2012; Craven-Staines et al., 2010; Hollingworth, 2014; Summers, 2006). For example, a survey of the team formulation perceptions of 22 multidisciplinary staff showed staff perceived formulating together as supporting the generation of new ideas from which to plan interventions (Hollingworth, 2014). Team formulation is reported to help staff who have no psychological training to understand patients, thus leading to more benevolent staff perceptions of patients, removing blame for problems, and increasing psychological understanding, which in turn reduces patient distress and increases therapeutic outcomes (Berry et al., 2009; Ingham & Clarke, 2009; Maguire, 2006).

Team formulation is described as being implemented in different ways. The most prevalent method involves a team psychologist facilitating a team discussion focused on creating a shared formulation (Berry et al., 2009; Ingham et al., 2008). Other methods include the team psychologist or psychological therapist presenting a formulation to the team, assembled collaboratively beforehand with the patient (Hewitt, 2008). Leadership and facilitation are recognised as contributing to the success of planned formulation meetings (Christofides et al., 2012; Craven-Staines et al., 2010; Maguire, 2006). However, qualitative research indicates that informal use of team formulation in ad-hoc team discussions is more likely to occur (Christofides

et al., 2012). Research reports that whole teams can be trained in the use of team formulation (Ingham, 2011; Ingham et al., 2008; Thompson et al., 2008). One of the methods employed to train teams in formulation derives from an early framework emanating from psychiatrist training. This uses a multi-perspective model, which suggests that individual and systemic patient factors should be considered against predisposing, precipitating, perpetuating and protective factors when formulating (Weerasekera, 1993). This model has since evolved into a framework, known as the 'five P, s', (as it now also includes presenting problems) and is a framework suggested for team formulating by researchers with a CBT stance (Ingham, 2011; Ingham & Clarke, 2009; Ingham et al., 2008).

Less was revealed by the scoping review about the involvement of the patient in the formulation process. An audit examining how both patients and staff could be introduced to the use of collaboratively developed psychological formulations, reported patient feedback that formulation helped patients to normalise their feelings whilst gaining an increased appreciation of their problems (Kennedy, Smalley, & Harris, 2003). Two further case examples (Kennedy, 2009) and a practice description (Whomsley, 2010) suggest that involving patients can improve their self-worth and therapeutic outcomes. Potential disadvantages to sharing the formulation with patients was reported as distressing for the patient (Christofides et al., 2012), with the experience of feeling scrutinised and/or being treated as an experiment (Whomsley, 2010).

Overall, the literature on team formulation suggests it is a positive practice, found to be helpful by team members. Few challenges were identified about the practice, but of those identified in research studies, included whether the staff viewed the team formulation as an unchanging reality about the patient (Summers, 2006),

and a practice not central to other kinds of team discussions held about patients (Thompson et al., 2008). In certain cases, staff were likely to avoid poorly managed team formulation meetings (Craven-Staines et al., 2010). There was also concern about the risk of tension in teams, if perceived as competing with other existing models of understanding, such as the medical model (Hood & Christofides, 2013).

Significant gaps were identified in the research and literature, representing a major challenge to the evidence base for team formulation. Although a link has been reported between team formulation and team functioning, this has not been explicitly examined, as the explicit meaning of 'functioning' has not been outlined. Research examining the link between team formulation, treatment planning and outcomes is limited to mainly single case descriptive research with the exception of one qualitative study (Summers, 2006). Although there are many perceptions of a link, there is limited clarity with regard to whether patient related clinical outcomes or team related outcomes are being pursued. Studies that unequivocally examine patient outcomes when team formulation is used formally or informally, are absent. The rationale for using team formulation is therefore ambiguous when considering that links to treatment planning and improved outcomes may be perceptions rather than the findings of robust research.

Furthermore, no studies identified by the scoping review explicitly examined the relationship between medical concepts of diagnosis and the wider concept of formulation. Team formulation meetings are attended by a range of professional disciplines. Therefore this may warrant future investigation as professional differences in teams have been considered by other researchers who have explored team shared mental models (SMM) (McComb & Simpson, 2014) and variance of

opinions in multi-disciplinary teams (Colombo, Bendelow, Fulford, & Williams, 2003).

The evidence for implementing team formulation demonstrates a narrow bandwidth of research, which has tended to focus on the methods for introduction and maintenance of the activity. There is an implicit assumption that case and team formulating are related, yet there is no research to support this. For example, studies that offer a definition of formulation predominantly use definitions based on case formulation (for example see Craven-Staines, Dexter-Smith, & Li, 2010; Kennedy, 2009; Summers, 2006, and Appendix C for more examples). Research and literature on team formulation suggest that it mainly adopts a CBT stance (for example see Ingham, 2011), and therefore criticisms of CBT formulation might also apply to team formulation. However, guidance on team formulation advocates that it should go beyond using single therapeutic approaches for formulation (for example solely CBT), to that of an integrative formulation (Johnstone, 2011). A wide range of factors are recommended to be included, with particular attention being paid to life experiences and the threats posed to the person by these (Johnstone, 2011; Johnstone et al., 2018).

The common concepts that arise in case formulating, which are also discussed in team formulation literature and research include understanding the patient's history and its relationship to presenting problems. This may be adding to the view that the two are similar. Overall, there is a lack of understanding about the role of psychological theory in team formulation that is viewed as a key underpinning mechanism in case formulation (Butler, 1998; Kuyken et al., 2009). The use of supervision to enhance and maintain learning that occurs in case formulation is lacking in team formulation literature and research, and would benefit

from attention. Additionally, while leadership and effective facilitation are recognised in contributing to the success of team formulation discussions (see Christofides et al., 2012; Craven-Staines et al., 2010; Maguire, 2006) this has not been empirically examined.

There are also issues relating to reliability (whether team formulation consistently produces what was intended across time and situations) and validity (whether it correctly represents what it is intended to represent in relation to the patient being discussed) in team formulation. Indeed, it is acknowledged that team formulation discussions may not even be recorded and clinical decisions reached not followed through (Wainwright, 2010). Reliability and validity issues are of substantial importance and worthy of investigation. Teams who formulate need to be able to consider whether their formulations are reliable and valid across time and situations, acting as hypotheses to be tested. Furthermore, teams should assess whether the formulation is meaningful for the patient, recorded, leads to treatment that matches the formulation, and brings theory and practice together (Butler, 1998). This links to the implicit assumption that the case formulation model is also appropriate for team formulation (for example see Maguire, 2006). Moreover, there is little adaptation of case formulation to a team setting (for example see Robson & Quayle, 2009).

Research suggests that although it is possible to train teams, the training for team formulation appears to relate primarily to the mechanistic flow of formulation, rather than team members acquiring a deeper understanding of psychological theories that inform the psychological nature of formulations (e.g. emotion or behaviour). An instance of this can be seen in training in which teams are trained to apply frameworks of formulation, employed only with facilitative support but

without deeper understanding (e.g. the five ‘P’s’) (Ingham, 2011). Equally, it is not clear whether individual team members assimilate formulation skills into practice over time as a result of formulation training, or whether it is a skill only maintained with direct and continued facilitation. Psychological therapies in which case-formulation is an integral element, require concentrated training that underpins the understanding and application of formulation (Eells & Lombart, 2003). It has been reported that those clinicians with greater training are more able to build comprehensive formulations (Dudley et al., 2010). The impact of training teams in the process of team formulation without this deep background knowledge is not yet known.

Findings from the scoping review found little research on the involvement of patients in team formulation. A basic tenet of psychological formulation is that there should be collaboration with the patient in the development and evolution of the formulation (Beck, 1995; Kuyken et al., 2009). Collaborative case formulation building is viewed as a cornerstone of good clinical practice in case formulation (Kuyken, Padesky, & Dudley, 2008), but it is unknown whether the inclusion of the patient in team formulation results in enhanced outcomes. Conversely, no studies focused on possible harms resulting from the involvement of patients in team formulation, and whether the style of involvement is a risk to personal recovery. Studies on case formulation have questioned whether patients find involvement a wholly positive process (Morberg Pain, Chadwick, & Abba, 2008), and caution has been advised regarding the speed and depth of involvement (Kinderman & Lobban, 2000).

In summary, an evidence base for team formulation is beginning to emerge. Nonetheless, this is based on a small number of studies of variable quality, supported

largely by practice based evidence, rather than evidence based practice. Some of this less substantiated practice based evidence is also included as evidence for team formulation within the BPS guidelines (for example see Whomsley, 2010 in Johnstone, 2011). Team formulation has a fundamental challenge while researchers have no distinct operational definition to follow other than definitions borrowed from case formulation. Examination of a phenomenon begins with definition of the phenomenon (Coolican, 2009). Furthermore, conceptual models provide a basis from which to guide research systematically (Leshem & Trafford, 2007). The lack of a distinct model of team formulation to systematically guide research, and that encapsulates the team context is a major challenge for the advancement of team formulation as an evidence based activity. The model would facilitate the building of the evidence base for team formulation, to improve clinical outcomes, more targeted personalised care and skill acquisition for staff.

1.5 Thesis Aims and objectives

The aim of this thesis is to explore and develop the conceptual foundations for team formulation. The objectives to achieve this are:

- To examine the definitions and theories applied to team formulation in research.
- To explore team formulation research to identify the impact of team formulation on the team, and the impact of the team on the formulation.
- To explore a wide range of team theories which in conjunction with the first two objectives may be relevant to the development of a conceptual framework that outlines a theory based model of team formulation.
- To articulate a conceptual framework distinct to team formulation.

- To be guided by the proposed conceptual framework in the conduct of empirical research that begins to explore the proposed conceptual foundations of team formulation.

To lay the foundations for a theoretical model, a systematic literature review is presented in Chapter Two. This is distinct to the scoping review reported in the present chapter as it explicitly reviews research based team formulation literature with specific objectives aligned to the objectives of the thesis. Unlike the scoping review, which reviewed all types of literature, the systematic review examines definitions applied to team formulation (as distinct from case formulation), underpinning theories applied in team formulation, and the inter-relationship between the team and the process of formulation. Building on the systematic review, Chapter Three extends existing team formulation literature to propose a theoretical model of team formulation. This model aids the identification of specific hypotheses to be tested, against which team formulation can begin to be examined and its evidence base increased systematically. In addition to using team formulation research findings identified by the systematic review, the model is compiled from theory and research on organisations, teams and case formulation. Adopting an input-process-output model, the model unites the team with formulation. This produces a cyclical model, which acknowledges current team formulation research which proposes outcomes from team formulation may have both team and clinical utility. Chapters Four and Five report two novel empirical studies derived from the theoretical model. Both studies have a focus on team conditions in which team formulating takes place. They examine the knowledge sharing that takes place in teams between team members during team formulation activity (for example

knowledge sharing about the patient). The first of these studies reported in Chapter Four, is a moderated-mediation design which tests whether team identification (TI) mediates the relationship between perceived communication quality (CQ) and whether this mediation effect is moderated by professional identification (PI). Based on the findings of Chapter Four, further exploration of TI is reported in Chapter Five. This uses a qualitative research design to explore in depth the relationship between TI and the TMS for team formulation as experienced by team members who engage in team formulation. Chapter Six provides an overall discussion of the thesis, taken from the systematic review, proposed team formulation model and empirical studies. It includes theoretical and practical implications of the thesis, including strengths, limitations and suggestions for future team formulation research.

The following chapter reports a systematic review of team formulation research. This research was accepted for publication in the Mental Health Review Journal in October 2018, and the chapter is identical to the accepted manuscript.

Chapter Two

Considering the team in team formulation: a systematic review[1]

2.1 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 4,532 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

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altered relationships, feelings and behaviours', 'space to reflect', 'useful when stuck or challenged', 'perceived increase in effectiveness', and 'improved team working'.

2.2 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, 2014, 2014a; NIMH, 2016), however individualised care is also required (HMG/DH, 2011; WHO, 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 1950s 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 Behavioural Therapy (CBT) model challenge whether the scientific constructs underpinning formulation are evidence based and able to demonstrate a valid framework for understanding patient problems. Research has not yet comprehensively examined the descriptive and explanatory elements of therapy formulation, particularly in relation to outcome prediction (Bieling & Kuyken, 2003).

Despite these uncertain foundations, formulation has continued to evolve, from one-to-one application in individual psychological therapy, to its most recent application by teams. The earliest published report of formulation being used by teams was in 1997, when a practice account of the use of Cognitive Analytic Therapy (CAT) formulation was described as a team endeavour, used to understand patients diagnosed with personality disorder. This descriptive account, published in a non-peer reviewed professional forum magazine (Dunn & Parry, 1997) has preceded further descriptive accounts (for example see Davenport, 2002; Robson & Quayle, 2009; Shirley, 2010; Whomsley, 2010), and the suggested evidence for the benefits of team fomulation continues to expand. However, evidence is originating from a small research base accompanied by a greater number of practice accounts and opinion pieces, published in non-peer reviewed publications, which attest to the benefits of team formualtion. This is evident from a succinct summary of team formulation offered by Johnstone, which highlights the benefits of team formualtion as supporting increased team functioning and well-being (for example using the

expertise of all team memebrs, increasing team ability to reflect), and bringing a more balanced and effective approach to interventions (Johnstone, 2014). This evidence base poses several problems. Rather than evidence-based practice, team formulation is developing from a basis of untested and poorly collated, practice-based experience. As the practice spreads, the degree to which team formulation can be considered a separate phenomenon to therapy formulation, with its own unique definition and underpinning theory, is not clear. Furthermore, researchers have examined the impact of the clinician on the therapy formulation, scrutinising the level of practitioner skill and experience on the formulation produced (Dudley, Park, James, & Dodgson, 2010; Eells, Lombart, Kendjelic, Turner, & Lucas, 2005), however, it is unclear whether studies on team formulation are similarly accounting for the team context.

The impact of team processes on the execution of specific team tasks is well documented. A large study of over 400 United Kingdom National Health Service health care teams, including teams from physical and mental health care, concluded that team processes such as participation, reflexivity, decision making, leadership and communication impacted on team levels of effectiveness and innovative practice (Borrill et al., 2013). Teamwork is also essential for team reliability and patient safety (Baker, Day, & Salas, 2006) and professional differences in teams impact on joint working and knowledge sharing (Baxter & Brumfitt, 2008). Nonetheless, the impact of the team processes involved in team formulating remain undefined and untested. Considerations such as these may be crucial in developing an evidence base that embeds team formulation within the team context.

The aim of this paper is to report the results of a systematic review of team formulation research. The specific objectives are to provide a systematic map of

research on team formulation in adult mental health and learning disability services (including forensic and older people's services), and to examine and synthesise the findings in relation to:

a. how team formulation is being defined as a phenomenon in its own right and as distinct to psychological therapy formulation
b. the theoretical underpinnings of team formulation
c. the impact on the formulation through team involvement
d. the impact on the team due to formulating as a team

The present review takes a deductive, theory driven approach to examine if current research on team formulation addresses these aspects and highlights the direction for future research.

2.3 Method

2.3.1 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[2]. 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, Psyinfo, 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.

[2] Search terms employed for the scoping review discussed in Chapter One were appropriate to use again for the systematic review. These are given in Appendix A.

2.3.2 Inclusion screening.

Based on the inclusion criteria in table 2.1, all identified records were screened by title and then abstract before final full text reading of identified records.

Table 2.1. *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

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

2.3.3 General approach.

A convergent qualitative synthesis design using thematic analysis (Figure 2.1) was employed to transform evidence from both quantitative and qualitative studies into qualitative findings (Pluye & Hong, 2014). A theory-driven strategy focusing on specific research objectives as pre-defined themes, and an amalgamation of evidence from both intervention and non-intervention research were used to understand the phenomena of ‘team’ within team formulation (Fetters, Curry, & Creswell, 2013; Hong, Pluye, Bujold, & Wassef, 2017).

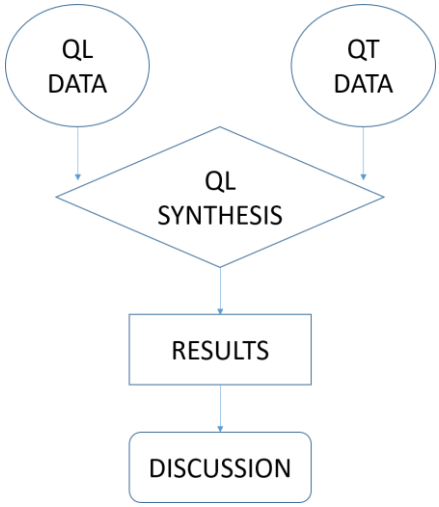

Figure 2.1. Synthesis design (Hong et al., 2017).

2.3.4 Data extraction and quality assessment.

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

2.3.5 Data synthesis

Examination began with introductory and background sections to studies in order to identify definitions of team formulation (review aim one). Thematic analysis was used (Braun & Clarke, 2006) in which line-by-line coding was applied for both quantitative and qualitative studies to create descriptive themes for all other review

aims. Theoretical underpinnings (review aim two) were identified and logged semantically, as they were cited in the studies. Thematic analysis was employed to establish the purpose of citing theories within studies.

Coding was employed to locate instances where the impact of the team on the formulation, and the formulation impact on the team (review aims three and four) was reported in study findings. Located instances were subjected to selective and semantic coding, in which the reviewers used the explicit descriptions given in research findings (Braun & Clarke, 2013). Visual mapping was applied for instances located for review aim four in order to develop themes derived from coding (Braun & Clarke, 2013). NVivo qualitative data software was used to support the coding process (QSR International Pty Ltd, 2015). Final themes were reached through consensus agreement with an independent second reviewer (NH-G). This type of data transformation analysis is suitable to precede the development of a conceptual framework where none currently exists (Hong et al., 2017) as is the case for team formulation.

2.4 Results

Figure 2.2 illustrates the search process. The search resulted in 10 research studies that matched the inclusion criteria and all were UK based studies. Of these, five were uncontrolled pre-post studies (Berry et al., 2009; Ingham, 2011; Ingham, Clarke, & James, 2008; Maguire, 2006; Revolta, Orrell, & Spector, 2016), three of which had a descriptive feedback element (Ingham, 2011; Ingham et al., 2008; Revolta et al., 2016). There were three qualitative studies (Christofides, Johnstone, & Musa, 2012; Mohtashemi, Stevens, Jackson, & Weatherhead, 2016; Summers, 2006), and two randomised controlled trials (RCT) (Berry et al., 2016; Kellett, Wilbram, Davis, & Hardy, 2014). One of the RCTs was a mixed method study

employing non-blinded randomisation and content analysis of semi-structured interview material (Kellett et al., 2014).

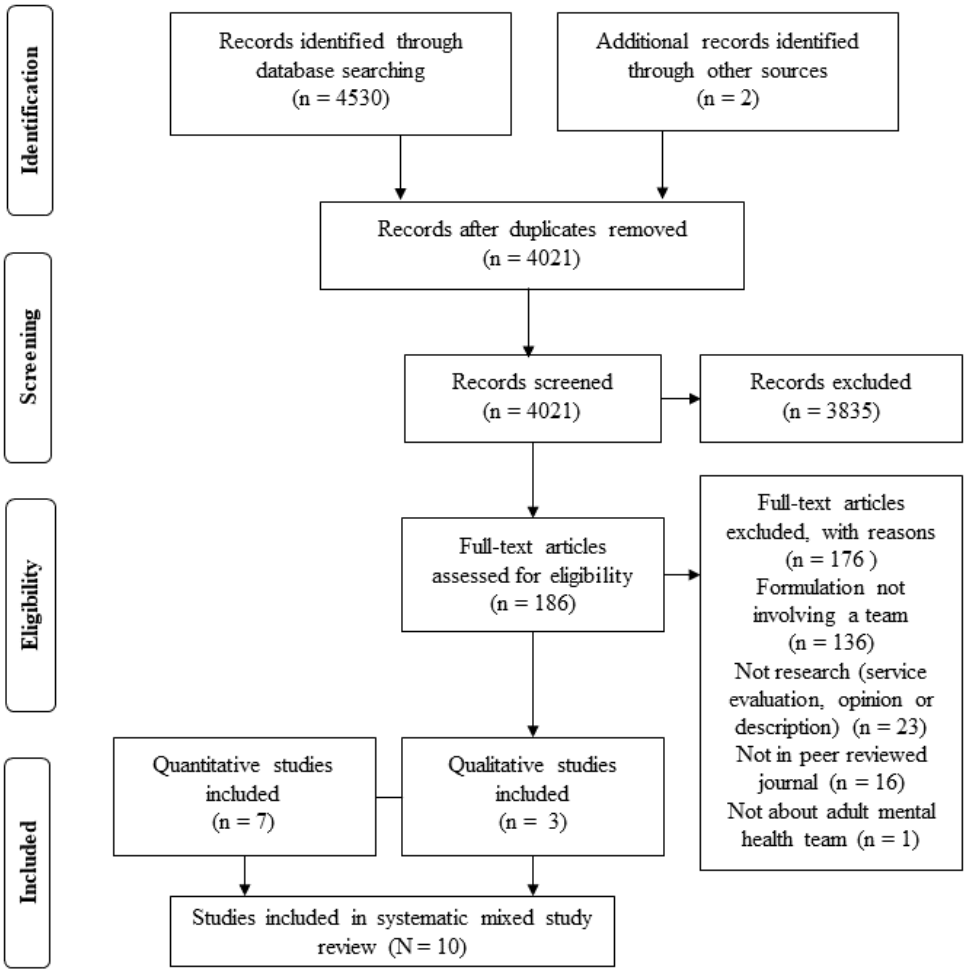

Figure 2.2. PRISMA diagram

Study characteristics and key findings including reported effect sizes are presented in table 2.2. The team formulation in the studies was conducted either as team formulation meetings involving the whole or part of the team where the meeting was facilitated by a psychologist or psychological therapist; or team formulation training centred on real clinical case material, including team discussion. Team supervision was also provided in some instances.

Table 2.2. *Included study characteristics and key findings*

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	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	Staff perceived they could be more effective, less hopeless, possibly less stressed as a result of training.	Not available

	to use CBT techniques, via formulations and supervision. To train staff to operate within CBT framework, to increase perceived capability.			sessions by psychologist. Not reported whether whole team was involved in project.		
Ingham et al., 2008	To pilot a novel training workshop in bio-psychosocial formulation in terms of its effects upon awareness of bio-psychosocial case formulation with direct care staff.	Uncontrolled quantitative pre-post intervention study. Un-validated pre-post scale to measure change in ability to formulate plus self-report.	10 unqualified care staff. Acute in-patient mental health in intellectual disability setting	CBT formulation training workshop for direct care staff. Does not report if all in the same team. Used 5Ps* framework	Hypothesis supported. Staff improved in all of the 5Ps except 'predisposing'. Staff found training satisfactory. Staff appraisal ability of formulation changed. Greater feelings of mastery and understanding of patient problems.	d = -1.927 (large effect)

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 patients.	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
Ingham, 2011	To provide a pilot evaluation of brief formulation development workshops with direct care staff supporting people with intellectual disability.	Uncontrolled quantitative pre-post intervention study. Un-validated pre-post observational measure, plus un-validated self-report.	Seven staff. Intellectual disabilities in adult mental health	Psychologist trains team in formulation and applies to one patient in training.	Challenging behaviour in patient decreased. Participants felt workshops were very satisfactory.	Not available
Christofides, et al., 2012	To investigate use of psychological	Qualitative. Inductive thematic design. Semi-	10 Community and in-patient adult mental	Psychologists who use formulation in MDTs were	Psychological hypotheses were shared more often	NA

	formulations in MDT* working as reported by clinical psychologists	structured interview.	health services	interviewed. They reported this as contributing informally within formulation meetings	informally.	
Kellett et al., 2014	To evaluate the clinical and organisational efficacy of formulation based consultancy. Has three hypotheses; reduces patient's distress, patients easier to engage with, team climate will improve. Qualitative part aims to explore staff experience	RCT*. Validated self-report perception scale. Validated self-report measure re team climate. Semi-structured interviews.	10 patients in each arm. Eight staff Assertive outreach.	Consultancy model. Staff were trained, supervised and had CAT* meetings with the therapist.	No differences in patient outcomes. CAT facilitated enhanced team practice.	(staff results) Participative safety (d = 1.72) large Support for innovation (d = 2.42) large Task orientation (d = 0.30) mod Team vision (d = 0.14) small
Berry et al., 2016	To assess the feasibility and	RCT. Feasibility study.	51 patients, 85 staff across 10	24 one hour sessions facilitated	Patients felt less criticised by their	Therapeutic relationship effect

	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.	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.	wards. Rehabilitation in-patients	by a psychologist and therapist. Formulations derived from the meetings. All staff on duty who were available attended the mtgs.	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	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).

					reduced patient perceptions of criticism by developing empathy and understanding from staff.	(d = 0.499) small positive (d = 0.729) med positive (d = -1.742)large negative (d = -1.674) large negative Ward Atmosphere Scale (six results given) (d = -0.154) small negative (d = -0.058) small negative (d = 0.018) small positive (d = 2.212) large positive (d = 3.334) large positive (d = 1.518) large positive
Revolta et al., 2016	To evaluate the feasibility of training staff	Uncontrolled quantitative pre-post intervention study.	37 staff across three dementia care homes	Training workshops delivered which	Formulation skills and ability to develop	d = 0.59 (medium positive effect) on problem solving

	from a variety of settings on the BPS* model of dementia, examining its impact on attitudes, competence and formulation skills.	Some qualitative feedback sought too regarding training. Validated self-report measures. Observation of pre-post ability using a validated model.		included ability to formulate. Training staff in teams to use a model which includes team formulation.	appropriate interventions increased significantly. No significant difference found in overall approach to dementia, and no significant change to levels of hope or person-centeredness. No significant difference on sense of competence. All groups showed an improved attitude towards dementia. Training helped to improve understanding of dementia and problem solving ability.	exercise
Mohtashemi et al., 2016	To understand how	Qualitative. Informed by	12 psychiatrists. Various settings.	Team formulation is facilitated by a	Four conceptual categories	NA

	psychiatrists understand the concept of formulation, including team formulation	grounded theory.	AMH	psychologist	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 = 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.

2.4.1 Quality appraisal results

Three of the pre-post uncontrolled intervention studies were deemed to be of poor quality (Ingham, 2011; Ingham et al., 2008; Maguire, 2006) due to high levels of bias. Two further studies of this kind were judged as poor to fair quality (Berry et al., 2009; Revolta et al., 2016) because although still vulnerable to high levels of bias due to design, clearer detail was reported about loss-to-follow-up of participants and p-values for pre to post intervention.

Three of the pre-post studies also contained a qualitative element in the form of descriptive feedback gathered from the sample post intervention (Ingham, 2011; Ingham et al., 2008; Revolta et al., 2016). In all three studies, this qualitative data focussed on acceptability of formulation training given. CASP qualitative study analysis (CASP, 2017a) suggests that the style of reporting in all three studies is not in keeping with high quality qualitative research reporting.

Use of the CASP qualitative study tool indicated that the methodological quality of the three qualitative studies was variable, but generally of fair quality. However the qualitative part of the mixed method study (Kellett et al., 2014) was poor. The RCT feasibility study (Berry et al., 2016) was also assessed using the CASP for RCT tool and was rated as fair.

2.4.2 Definitions of team formulation

None of the studies offered a definition of formulation explicit to team formulation, and where a definition was given this was distinct to the therapy type. There was no examination of whether this definition of formulation was applicable to a formulation conducted by a team.

Five studies employing therapy formulation definitions, researched team formulation against these definitions (Christofides et al., 2012; Ingham, 2011; Kellett et al., 2014; Mohtashemi et al., 2016; Summers, 2006). These studies identified formulation as a hypothesis, drawing on psychological theory, regarding the origins, development and maintenance of mental health problems. Four studies provided the function of a formulation, but not the definition (Berry et al., 2009; Berry et al., 2016; Ingham et al., 2008; Revolta et al., 2016). Formulation function was described as providing a framework to understand the origin, development and maintenance of mental health problems. One study did not provide a definition or describe the function of a formulation (Maguire, 2006).

2.4.3 Theoretical underpinnings

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

Table 2.3. *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	NA: Theory not focus of research study

		therapy formulation to team formulation.	
Study	Theories applied	How applied	Was application of theory supported in findings*
	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 therapy formulation to team formulation.	NA: Theory not focus of research study
Ingham, 2011	Psychological theory (does not specify which)	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.
Study	Theories applied	How applied	Was application of theory supported in findings*
	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 which)	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

*Note: Findings need to be regarded in conjunction with study quality appraisal and effect sizes where reported.
*NA = Not applicable.

2.4.4 Team impact on the formulation

None of the studies purposely examined the impact of the involvement of the team on the quality, content or outcomes of the produced formulation. It was not possible to apply convergent qualitative synthesis as only one study reported results indicating two impacts that the team had on the formulation. Firstly, the amount of perceived creativity brought to the formulation by use of team input:

"Participants believed that formulations benefited care planning, staff-patient relationships, staff satisfaction and team working, through increasing understanding of patients, bringing together staff with different views and encouraging more creative thinking" (Summers, 2006, p.341).

Secondly, the view that the team formulation was an enduring concept rather than a hypothesis subject to change over time:

"At least three participants seemed to consider formulations as statements of fact" (Summers, 2006, p.342).

2.4.5 Formulation impact on the team

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

Increased knowledge and understanding. Team formulation increased understanding and knowledge of the patient, the origin and nature of their problems,

and increased knowledge of the way the team and patient interacted. Although not the most frequently coded, this theme was the mechanism through which all other themes were described as operating, and as such could be seen as a key outcome of team formulation.

Altered perceptions, leading to altered relationships, feelings and behaviours. Closely linked to this was the most frequently coded theme that described the impact of team formulation on staff perceptions and the resulting change in staff/patient relationships, staff feelings about the patient and staff behaviours towards the patient. Perceptions were altered in relation to the patient's problems, their efforts at recovery, how long recovery might take and how much control the patient and staff member had in this. Changed perceptions about staff/patient relationships were positive, however one study did report that staff perceived a worse relationship with patients after formulating. The impact of altered perceptions was described as resulting in altered staff feelings and behaviours, in particular less blaming behaviours towards patients, increased empathy and a more positive approach to care. Patients also reported feeling less criticised by staff. Furthermore, there was an impact on the staff perceptions of their own emotions in terms of feeling more satisfied, but with the recognition that formulating can be personally emotionally challenging.

Space to reflect. The third theme captured the opportunities for clinical reflection afforded by team formulation. Reflection was possible as meeting to formulate gave the team increased time to think about the patient. This supported creation of new ideas about the patient and the care, and was viewed as a major benefit of team formulation. There was one concern that such reflection could result in a high degree of speculative suggestion based only on partial information.

Useful when stuck or challenged. The fourth theme identified team formulation as a useful process when patients presented with behaviours that challenged the team. Team formulating was also reported as useful when teams felt 'stuck' in thinking about how to progress a patient's care.

Perceived increase in effectiveness. The impact of having time to think and increasing understanding about the patient lead to the fifth theme in which team formulating was perceived as helping to increase the effectiveness of the team. This was described as bringing consistency to team practice, improving problem solving ability, supporting the team to change clinical direction and changing unhelpful patterns of relating with the patient. An increase in clinical confidence was perceived, leading to care which was more helpful for being based on a formulation (rather than diagnosis alone).

Improved team working. The sixth theme, also linked to team effectiveness, described the impact of team formulation on the team as a unit, relative to strengthening how team members work together. Within this theme, team formulation was reported as improving the team climate and working capability. In addition, trust and sharing within the team were reported as improved directly due to team formulating. Team practices were improved through team formulation that brought unity to understanding, different perspectives, ideas and disciplines. Sharing information in this way was viewed as a practice of effective teams and communication via team formulation credited for turning individuals in teams into team members.

2.5 Discussion

This is the first review that focuses on the 'team' aspect of team formulation, providing a comprehensive systematic 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.

2.5.1 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 perceptions could be attributed to staff feeling that their own needs for support were better met rather than the impact of formulating (Berry et al., 2016).

2.5.2 Definitions of Team Formulation

Defining a phenomena in research is critical for the measurement of variables and comparison of findings across studies (Coolican, 2009). One included study provided no definition of formulation (Maguire, 2006) and the remaining nine applied the definition of therapy formulation to team formulation. This assumption that team formulation *is* the same as therapy formulation has not yet been examined and is further challenged by therapy formulation having more than one definition (Johnstone & Dallos, 2014). The Division of Clinical Psychology in the United Kingdom offers an overarching definition that describes psychological therapy formulation as the amalgamation of all knowledge gained by an assessment process that may involve psychological, systemic and biological aspects. The definition posits therapy formulation as drawing on psychological research and theory, to provide a framework for describing problems, needs and their development and maintenance (Division of Clinical Psychology, 2010). Other key authors of formulation literature emphasise the hypothetical nature of therapy formulations (Butler, 1998; Eells, 2006). Applying the therapy formulation definition to team formulation fails to account for the influences and context of the team itself. Any working definition should account for the focus on a shared understanding as proposed by Johnstone (Johnstone, 2011), but in addition acknowledge that this is underpinned by team involvement:

‘Team formulation is a shared team activity drawing on psychological theories (individual and group), where two or more team members meet to discuss an evolving integrated formulation. Team formulation is a shared understanding which includes a service user’s personal meaning of their experiences and which leads to a hypothesis about the causes and maintenance of their mental health problems, strengths and coping, in turn leading to an agreed individualised plan of care to support personal recovery. The service user is involved in the formulation discussion wherever possible’.

2.5.3 Theory and Team Formulation

There is an assertion that team formulation is underpinned by psychological theories used in therapy formulation. Some studies specify which psychological theory, whilst others do not (see table 2.3). This represents an assumption that therapy formulation and team formulation can be underpinned by the same theories; however, this has not been empirically examined. In addition there is an emergence of studies drawing on theory (such as attachment or attribution) which drive study hypotheses proposing a relationship between team formulation, staff perceptions, attitudes and behaviours towards service users, resulting in a changed relationship. Four of the included studies have tested these hypotheses (see Berry et al., 2009; Berry et al., 2016; Ingham, 2011; Kellett et al., 2014). However, due to the number of studies and quality, there is no level of generalisation in these theories yet (Ravatch & Riggan, 2012), and not all study hypotheses were supported in relation to this changed staff-patient relationship (see Berry et al., 2016). In keeping with the properties of a theory, none offered have explanatory qualities in relation to the processes of team formulation (Ravatch & Riggan, 2012). In other studies, claims that such theories are important within team formulation remain an untested

assertion (for example see Christofides et al., 2012; Ingham & Clarke, 2009). None-the-less, together these studies represent an early attempt to examine an evolved form of formulation (from therapy to team), and give partial support to the impact of team formulation on team members.

The application of theory in the studies is mainly about individuals in teams, rather than teams per se. Only one study aggregated the analysis of individuals in the teams studied to a group level (see Kellett et al., 2014). This suggests that researchers are examining individual team members rather than the team as a unit. This narrow focus ignores the range of well-tested theories relating to teams generally, that may also be relevant to team formulation. For example, theories of shared mental models in teams describe a cognitive representation of shared team knowledge in relation to a task or team values (Mathieu, Maynard, Rapp, & Gilson, 2008). Team formulation may lead to developing such a shared mental model, in relation to either a particular patient, the general task of formulating or the values that formulating can bring to a team when ideas are shared. In addition, theories of team identity and cohesion may underpin team formulation research by explaining the collective sense-making that team formulation may bring, and which is understood to help team identity develop (Huettermann, Doering, & Boerner, 2017). Regular team formulating may help in developing team cohesion as team members share this common task around a set of common goals and team values (Mathieu et al., 2008).

2.5.4 Team Impact on Formulation

The impact of the team on the formulation was not examined in any of the included studies. Therapist factors have been found to impact on therapy formulation quality (Dudley et al., 2010; Eells et al., 2005), yet this review did not find any

studies examining the quality of the formulation produced by a team. Training the team in the mechanics of formulating was examined (see Ingham, 2011), however this was by brief training without accompanying long-term supervision or on-going learning; aspects both recognised as important in one-to-one therapy competency and skill development (BABCP, 2010). Status of team members has been reported as influencing the ability of other team members to have a voice within group meetings and discussions (Mannix & Sauer, 2006; Silver, Troyer, & Cohen, 2000). In team formulation, the dominance of one profession may serve to reduce the input of other team members and influence the formulation if key information is withheld.

Although the clinical focus of the teams was reported, there was no examination of the type of team and how this influenced the team formulations. Team type is of key interest in team research where there is recognition of the interplay between team type, task and outcomes. For example, established researchers of teams suggest that composition, technology and distance and the degree of empowerment and delayering present in different types of teams impacts on task performance (Tannenbaum, Mathieu, Salas, & Cohen, 2012). Other researchers suggest that not all teams function as 'real' teams, which can also influence task performance. For example 'pseudo' teams, who possess lower degrees of interdependence, shared objectives, reflexivity and boundedness may also have lower task performance ability (West & Lyubovnikova, 2012).

2.5.5 Formulating and its Impact on the Team

To date, team formulation studies offer only partial insights into the impact of the team formulation on the team. The review identified themes suggesting that team formulation leads to increased understanding, team reflection time and problem solving ability. This part of the review yielded the most results, perhaps reflecting

the interest of researchers to identify influences on the team. However, only four included studies used validated self-report and observational measures (Berry et al., 2009; Berry et al., 2016; Kellett et al., 2014; Revolta et al., 2016), while the remaining six studies used un-validated self-report measures and descriptions of staff observations and experiences (see table 2.3). Overall, the small number and variable quality of included studies limits the evidence for the impact of team formulation on the team.

Three studies (Berry et al., 2009; Berry et al., 2016; Revolta et al., 2016) examined the impact of team formulation on the attitudes of team members but did not account for possible confounds researched in other fields. For example, self-categorisation theory demonstrates the influence of group membership on attitudinal changes of individuals. The theory posits that individuals compare self to others, and are motivated to adopt the values and attitudes of other group members due to the desire to belong to the 'in-group' (Haslam, Powell, & Turner, 2000; Hogg & Terry, 2000; Reynolds, Turner, & Haslam, 2003). The impact of self-categorisation in relation to team formulation is yet to be explored.

Time for the team to reflect on care and treatment planning by formulating as a team is also identified as a key theme within the included studies. However, from the included studies suggesting that team formulation confers this time for reflection, there is no examination of whether team formulation is the only or most appropriate method of team discussion for improving treatment planning. Research with mental health multi-disciplinary team meetings has also shown an association between the meeting process and effective treatment planning (Raine et al., 2014). In order to understand the value of team formulation as a mechanism for this, further research targeting whether teams have increased reflection time specifically because of team

formulation should be undertaken. This also applies to the fourth theme identified, where team formulation was perceived as a good tool for helping teams struggling with patient behaviours. Knowing the specifics of what it is about team formulation that leads to this perception; above other forms of team discussion is needed to strengthen this claim. Within the included studies, the ability of team formulation to reduce patient behaviours that challenge due to altered staff perceptions of the patient seems largely to be an opinion and claims of this outcome require consideration in conjunction with study design and limitations. To illustrate this, the study by Ingham (2011), used an idiosyncratic observation measure of a patient's challenging behaviours over time, before the introduction of formulation and after it. However, this measure was not validated and inter-rater reliability not assessed. The study may have been subject to high levels of bias given its design (Goodacre, 2015), and observed changes in the patient's behaviour could have been due to other factors such as medication or recovery.

The perception that team effectiveness increases because of team formulation was inferred as a finding, but not directly tested in three of the included studies (Christofides et al., 2012; Ingham, 2011; Revolta et al., 2016). Research into team effectiveness is extensive and includes factors such as team cohesion, participation, member attitudes to the team and clarity of objectives (Borrill et al., 2013; Richter, Dawson, & West, 2011). None of these factors were examined in the studies reviewed and therefore the impact of team formulation on team effectiveness must largely be seen as an untested assumption.

Overall, the findings of the fourth review aim suggest a growing interest in the impact that team formulation may have on a team. Findings suggest that it can

help increase a team's emotional awareness and ability, while helping them to operate more efficiently. If these are potential impacts then the use of team formulation may herald a new way forward in promoting team effectiveness. However, present research is limited in the number of studies, quality and design and cannot be considered as reliable evidence of this impact.

Limitations. The decision to limit the review to studies published in peer reviewed journals, accessible by academic database was taken in order to focus the review on the most robust available evidence. This is in keeping with guidance on evidence based healthcare (National Academy of Sciences, 2001; NICE, 2014b). This is important as the practice of team formulation is increasingly used to plan care decisions; a crucial aspect of care. The inclusion of only ten studies for analysis, although potentially affecting the ability to answer the review aims, did ensure that only robust evidence was included. However, this may have limited the ability to answer the review questions with assurance. Studies published within non-peer reviewed professional forum magazines and those not accessible by academic database would have increased the available number of studies amenable to review, but may have reduced the credibility of evidence. To mitigate further against the small number of studies reviewed, a robust methodology using PRISMA guidelines (Moher, Liberati, Tetzlaff, Altman, & Grp, 2009) was employed including the use of a second reviewer for quality appraisals.

The included research studies were variable in research aims, design, methodology, reporting, statistical analysis, sample size, and type. This heterogeneity prevented the use of one type of review analysis such as meta-analysis or qualitative evidence synthesis. Therefore, an accepted review style that could

analyse the contribution of both quantitative and qualitative findings, and include the use of quality appraisals was used with rigour (Hong et al., 2017). This style limited the statistical analysis of quantitative findings, but did consolidate all kinds of evidence into a format by which the review aims (three and four) could be addressed. A second reviewer, who independently generated themes relating to the review aims, strengthened the approach.

2.6 Conclusions

This review found a paucity of research studies. The quality of included studies was variable and their mixed focus considerably restricts the degree of evidence behind the practice of team formulation. Yet this is a promising approach that may impact beneficially on teams as well as conferring clinical benefits via individualised care planning and increased understanding of patients. Specific aspects, which remain poorly understood, include the influence of the team on the formulation and the influence of formulating as a team on the team. The untested assumption about team formulation that it can be suitably and wholly underpinned by therapy formulation theory, is likely to continue until team formulation is clearly defined within its own right as a team psychological activity. A conceptual framework, which informs systematic consideration of the range of factors and theories involved in team formulation, which takes into account the team inputs, processes, and outputs, of formulating as a team, should inform future research. Such a guiding conceptual framework would highlight the possibilities for future research as abundant. Lessons can be gained from therapy formulation in this respect. The evidence for therapy formulation is also considered weak, however it is drawn from sound case observations, together with general theories, which in combination produce testable theories specific to therapy formulation (Bieling & Kuyken, 2003).

Defining and increasing the evidence base for team formulation remains a challenge, but represents a worthwhile one if the benefits to teams as well as patients are to be firmly established.

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Chapter Three

A model for team formulation

3.1 Introduction

3.1.1 The need for a model of team formulation

The systematic review reported in Chapter two (Short et al., in press), proposed that case formulation has been assimilated into team practice under the guise of 'team formulation' as evidenced in research reports, practice accounts and guidelines (for example see Ingham, 2011; Johnstone, 2011; Maguire, 2006). However, this has occurred without a distinct definition or attention to key constructs and concepts that would tie case and team formulation together theoretically and operationally. The systematic review established that psychological theories required for case formulation are also applied to team formulation. For example, the formulation cited in a study examining the use of team formulation to alter staff views of patients is reported to be based on cognitive behavioural, interpersonal and attachment theories which underpin case formulation (Berry, Barrowclough, & Wearden, 2009). Whilst in another study, the team formulation is based on a bio-psycho-social model of case formulation (Ingham, 2011). The application of case formulation theories to team formulation strengthen the proposal that team formulation is a transposed form of case formulation. Furthermore, the systematic review showed that whilst there were studies examining the impact of the formulation on the team (for example see Berry et al., 2016; Kellett, Wilbram, Davis, & Hardy, 2014), there were no studies that examined the impact of the team on the formulation. These omissions are highly problematic and indicate the transposing of a phenomenon used in one-to-one therapy (case formulation) to a team practice. This demonstrates a lack of coherent examination and understanding of a range of team concepts which are well researched for other team tasks and, which may also be

involved in team formulation. Example concepts include; team communication, leadership and team composition (West & Lyubovnikova, 2013), shared mental models (Maynard & Gilson, 2014), and team cohesion (DeOrtentiis, Summers, Ammeter, Douglas, & Ferris, 2013).

The lack of a conceptual definition and theoretical framework presents a major challenge for research on team formulation and risks research overlooking key variables involved in the process of team formulation. The implication being that the evidence base for team formulation will be limited by continued alignment to case formulation only, without recognition of the team context and aspects of team working, which could enhance the development of team formulation as a practice.

This chapter describes the development of a conceptual framework for team formulation and proposes this as the 'team formulation model' (see figure 3.1). The chapter outlines a review of concepts reported by organisational, team, case and team formulation research, which provide the theoretical basis for the proposed model.

3.2 Method

3.2.1 Identification of concepts

Development of the conceptual framework for team formulation started with an exploration of the potential key concepts. This involved discussions with experts in the field, including academic supervisors and clinical academics who have published on case formulation (for example R. Dudley; (Dudley & Kuyken, 2014). These discussions resulted in the decision to use 'case formulation', 'team formulation' and 'team' as initial concepts to explore further. This corresponded with the premise that team formulation is based on the existing practice of case formulation and is undertaken by a team, therefore supporting the three major concepts.

Following identification and definition of concepts, a review of team and case formulation concepts was conducted to inform the hypotheses of the thesis. This built on the scoping and systematic reviews of team formulation outlined in Chapters One and Two, and was a highly iterative process aided by the construction of a visual representation of the concepts and the potential relationships between concepts (Glatthorn, 1998; Maxwell, 1996; Ravatch & Riggan, 2012).

3.2.2 Principal definitions

Theoretical definitions explain and indicate the presence of a phenomenon, whilst operational definitions provide the detailed information about the phenomenon in order that it can be measured precisely (Shoemaker, Tankard Jr, & Lasorsa, 2004). Definitions are therefore integral to the development of conceptual frameworks as they provide specificity to the concepts included, allowing for measurement and examination (Kerlinger, 1969). Principal theoretical and operational definitions applied within the team formulation model are given below.

Case formulation

There are many definitions of case formulation, which have arisen out of distinct psychological therapies. The majority of definitions are based on the assertion that case formulation presents a hypothesis about an individual's difficulties drawn from psychological theory (Johnstone & Dallos, 2014). The definition of case formulation offered by the Division of Clinical Psychology (DCP), a part of the British Psychological Society (BPS), in the UK, captures this and will be the principal definition of case formulation used within the conceptual framework. To recap from page one this defines case formulation as;

"the summation and integration of the knowledge that is acquired by the assessment process that may involve psychological, biological and systemic factors

and procedures. The formulation will draw on psychological theory and research to provide a framework for describing a client's problems or needs, how it developed and is being maintained" (Division of Clinical Psychology, 2010, p. 5).

However, there is recognition that this widely applied definition ignores the evolving, collaborative process of case formulation, which incorporate the personal meanings the patient gives to their experiences and difficulties (Johnstone & Dallos, 2014). These elements are therefore included in the proposed team formulation model.

In addition to the definition of case formulation, it is important to note the purpose and function of case formulation, and the differing stances of professional disciplines towards case formulation. For example, for psychiatrists the intended outcome of a case formulation is diagnosis (RCPsych, 2016), whereas psychologists aim to increase psychological understanding in order to inform therapy (Johnstone, 2011). This latter aim is in keeping with the model offered in this thesis, alongside a key purpose of case formulation which is to enable selection and planning of interventions (Johnstone, 2011).

Team formulation

It is suggested that teams should use an integrative model for formulation (Johnstone, 2011, 2014). This is defined as:

"A provisional explanation or hypothesis of how an individual comes to present with a certain disorder or circumstances at a particular point in time. A number of factors may be involved in understanding the aetiology of the disorder or condition. These include biological, psychological and systemic factors … All these variables interact under certain conditions to produce a specific condition or

phenomenon … A comprehensive formulation then needs to examine all three models carefully" (Weerasekera, 1996, p. 4).

Team formulation has also been described as "the process of facilitating a group or team of professionals to construct a shared understanding of a service user's difficulties" (Johnstone, 2014, p.216). However, this lacks the specificity which distinguishes it from other team meetings which often have the same purpose, and result in the same outcome, for instance the Multi-Disciplinary Team (MDT) meeting (Mohr, 1995; Nic A' Bháird et al., 2013). Importantly, neither definition captures the involvement of a team, team processes or underpinning team theories, both of which have been shown to impact on team activities (Salas, Cooke, & Rosen, 2008).

The systematic review (reported in Chapter 2) resulted in a proposed definition of team formulation based on research studies of case and team formulation. It considers theoretical and operational factors and will be used as the principal definition of team formulation within the model:

"Team formulation is a shared team activity drawing on psychological theories (individual and group), where two or more team members meet to discuss an evolving integrated formulation. Team formulating develops a shared understanding which includes the personal meaning a patient gives to their experiences and which leads to a hypothesis about the causes and maintenance of their mental health problems, strengths and coping, in turn leading to an agreed individualised plan of care to support personal recovery. The service user is involved in the formulation discussion wherever possible" (Short et al., in press).

Team

The operational definition of a team for the proposed model is;

"Two or more individuals who socially interact (face to face or increasingly virtually), possess one or more common goals, are brought together to perform organisationally relevant tasks, exhibit interdependence, with respect to workflow, goals and outcomes; have different roles and responsibilities; and are together embedded in an encompassing organisational system, with boundaries and linkages to the broader system context and task environment" (Kozlowski & Ilgen, 2006, p.79).

Teams who undertake team formulation can also be considered as "self-managing teams" (Magpili & Pazos, 2018 p.3), (for example see Berry et al., 2016). These types of teams have a collective responsibility and self-govern, whilst organising, managing and implementing tasks towards an agreed goal. In order to reach their goal a set of diverse skills and knowledge is required within the team (Magpili & Pazos, 2018).

3.2.3 Review of concepts (approach)

Identification and description of the main concepts informing the team formulation model are outlined below.

A concept review, (building on the scoping and systematic reviews reported in chapters one and two respectively) was undertaken, initially beginning with the principal definitions given above. The aim of the concept review was to identify, map and synthesise theory and research findings across the areas of organisational and team research, case formulation theory and research, and team formulation research, to inform the design and content of the conceptual framework (Ravitch & Riggan, 2012). A wide range of material was targeted, including electronic databases, books, book chapters and grey literature such as policy reports (Arksey & O'Malley, 2005; Colquhoun et al., 2014). Inclusion criteria encompassed any study

design and clinical setting. The review of team concepts included teams from any setting (for example from armed services and industry) and was not limited to health care teams. Any type of team was considered if it met the definition of 'team' given above. Date boundaries were not set for searches.

3.3 Results

A number of key concepts resulted from the concept review. Key concepts relating to each of the principal definitions are given below, along with the potential implication for a model of team formulation. As team formulation arises from the practice of case formulation, the review is presented in the order of case formulation, team formulation and finally team concepts.

3.3.1 Case formulation key concepts

Case formulating is an activity and task within various psychological therapies such as Cognitive Behavioural Therapy (CBT), Cognitive Analytical Therapy (CAT), Psychodynamic therapy and systemic family therapy (Johnstone & Dallos, 2006). The DCP formulation guidelines recommend that team formulation be based on an integrative model of formulation (Johnstone, 2011). Therefore, concepts related to an integrative form of case formulation were the focus of the concept review of formulation literature (rather than therapeutic tradition-specific formulations). In keeping with inductive inference (Kreider, 2016), and in relation to a conceptual model of team formulation, aspects of a case formulation should manifest within a team formulation. Pertinent aspects of case formulation include the models and theories of the formulation being applied, activities needed to construct a formulation, the process for formulation and the type of task. Research findings and the implications for team formulation are considered below.

Models and theories

Formulation has been defined as a "provisional map of a person's presenting problems, describing the territory of problems and explaining the processes that caused and maintain the problems" (Bieling & Kuyken, 2003, p. 53). It is currently a central component of one-to-one psychological therapy within various therapeutic models. The style and emphasis of case formulating is aligned to the therapeutic tradition from which it derives. For example, in CBT, emphasis is placed on the cognitions proposed to underpin the patient's presenting problem, whilst in relational or family therapy the problem is viewed as being located within the family or relationships (Dallos, Stedmon, & Johnstone, 2014). Frameworks have been offered which combine various therapeutic models. For example, a multi-perspective model which combines individual and systemic factors into a grid (Weerasekera, 1993). This guides the clinician to consider the role of predisposing, precipitating and perpetuating factors that may be responsible for initiating and maintaining the problem. This model also considers patient protective factors that can facilitate a coping response (Weerasekera, 1993). However, frameworks are criticised as failing to integrate the differing theoretical bases of the various traditions of formulation, which would determine the formulation as 'integrated', rather than eclectic (Dallos et al., 2014). An integrative model ensures the formulation is based on a combination of models and theories rather than a single therapeutic modality such as CBT, CAT, psychodynamic or systemic (Dallos et al., 2014).

Johnstone (2014) advocates that team formulation should be based on an integrative model, (Johnstone, 2014) although a CBT approach is common (for example see Ingham & Clarke, 2009; Kennedy, 2009). Basing team formulation on an integrated model of case formulation is therefore dependent on the existing evidence base for case formulation. The expectation that formulations are theory

driven and link theory to practice (Bieling & Kuyken, 2003; Butler, 1998; Johnstone, 2011) is challenged by the lack of consensus about how to create an integrated formulation (Dallos et al., 2014). Furthermore, the DCP guidelines (Johnstone, 2011) do not provide guidance on this. It has been questioned whether formulations can really be integrated, given the different philosophical biases (Dallos et al., 2014).

Overall, in order to comply with the definition of a formulation, and meet the intended purpose (Johnstone, 2011), a formulation should describe the problems (and protective factors), prescribe a relevant set of interventions and predict the success of treatment (Johnstone & Dallos, 2014). Studies examining case formulation have reported a weak evidence base, with reliability and validity difficult to determine, as well as limited evidence for impact on patient outcomes (Bieling & Kuyken, 2003; Kuyken, 2006). To illustrate, researchers examining formulation within the CBT model challenge whether scientific constructs underpinning formulation are evidence based, and whether the provision of a valid framework for understanding patient problems can be demonstrated (Kuyken, Fothergill, Musa, & Chadwick, 2005). Research has not yet comprehensively examined descriptive and explanatory elements of formulation, particularly in relation to outcome prediction (Bieling & Kuyken, 2003). It has also been demonstrated that links between the case formulation and treatment decisions are weak (Groenier, Pieters, Witteman, & Lehmann, 2014).

Nevertheless, case formulation allows the integration of patient information from multiple sources, and offers a framework to apply an idiosyncratic assessment of patient problems in order to target treatment (Haynes & Williams, 2003). These are likely to enhance the work of teams, providing individualised care to patients with complex problems (Rainforth & Laurenson, 2014). Overall, it is clear that

further research is necessary to clearly define the components of an integrated formulation, to guide team formulation practice. This should include attention to the underpinning theories, and model used to guide the team.

Required process and activities for case formulation

Formulation should be viewed as an iterative process where the formulation evolves, rather than being a single event in time (Dallos et al., 2014; Johnstone & Dallos, 2014). The process involves the identification of problems, a description of the problems, integration and synthesis of patient information. These should lead to a (theory driven) hypothesis about what is driving and maintaining the patient's problems (Johnstone, 2011; Ridley, Jeffrey, & Roberson, 2017; Westmeyer, 2003) and include ideas for the therapy goals. The result of which is a treatment plan (Johnstone & Dallos, 2014).

Alongside the process and intended outcome of formulation, are considerations about the level of patient involvement in the process of formulation. Literature on case formulation acknowledges that there are levels of involvement, depending on patient capability (James, 2008), and iatrogenic considerations of whether sharing the whole formulation may cause harm to the patient (Kinderman & Lobban, 2000; Morberg Pain, Chadwick, & Abba, 2008). The therapeutic model in which the formulation is based will also determine differing levels of patient involvement (Johnstone & Dallos, 2014). The complexity of patient involvement has been captured in a paper offering a conceptual model of patient involvement in treatment decision-making (Entwistle & Watt, 2006). The conceptual model offered (2006) highlights that the nature of involvement extends beyond what patients say and do, to what they also think and feel about their involvement, their role within the involvement, their perceived influence in decisions made, and their relationships

with health care team members (Entwistle & Watt, 2006). These are areas not yet explored within team formulation literature, however DCP guidelines suggest that a case formulation, running parallel to the team formulation, should be prepared with the patient (Johnstone, 2011). If team formulation is an iteration of case formulation, then level of patient involvement will be a required consideration within a conceptual model of team formulation.

Case formulation as a task type

It is important to consider the kind of task type into which case formulating falls, as there is strong evidence that task type influences team performance of the task (Lyons et al., 2012; McGrath, Arrow, & Berdahl, 2000; Wageman, Gardner, & Mortensen, 2012). Research has shown the link between task type and performance is moderated through the levels of task interdependence (DeChurch & Mesmer-Magnus, 2010), and whether the task is more conceptual or behavioural in nature (Stewart & Barrick, 2000). The activities involved in case formulating suggest it has varying levels of interdependence based on level of patient involvement. Task interdependence drives knowledge sharing, (Huang, 2009) and collaborative team behaviours (Wageman et al., 2012) that in turn foster meaningful task understanding (Salas, Wilson, Murphy, King, & Salisbury, 2008). Case formulation is characterised in DCP guidelines as both a conceptual and behavioural task (Johnstone, 2011), as it involves both thinking and doing. The characteristics of task type and levels of interdependence, required for case formulation, are therefore essential for a conceptual model of team formulation, which has case formulation as a basis.

An integrated taxonomy of task types, based on a review of team and task type literature, defines the differing processes required to complete a task, and the structural qualities of the task (Wildman, Thayer, Rosen, et al., 2012). There are

seven task types within the taxonomy (see Table 3.1), two of which are relevant to case formulation. Case formulation is a 'human service', where one person provides a service to another person or group. It is also an 'ill-defined problem solving' task, as it is a highly idiosyncratic clinical activity, with no pre-determined or certain answers to the problems presented by individual patients.

Table 3.1 *Integrated Set of Task Types*

Task Type	Description
Managing others	Directing, supervising, or overseeing the work of others in an authoritative role.
Advising others	Providing professional support, such as expert assistance or advice, in a consultative role where the advisor lacks authority over those whom he or she is advising.
Human service	Social interaction where an individual or team is providing a good or service to another party.
Negotiation	Social interaction in which two or more parties in conflict seek to resolve differences and reach agreement.
Psychomotor action	Technical and/or motor functioning requiring psychological processing to perform calculated or elaborate movements, including the manipulation, operation, or use of a product, machine, or object, or a task that is achieved by engaging in psychomotor action of some sort.
Defined problem solving	Problem solving tasks with predetermined or conclusive solutions or correct answers.
Ill-defined problem solving	Problem solving tasks lacking predetermined or conclusive solutions or correct answers, such as idea, plan, or knowledge generation.

(Wildman, Thayer, Rosen, et al., 2012, p. 107) (Permission to reproduce granted)

3.3.2 Summary of case formulation concepts

A conceptual model of team formulation must recognise the salient features of *case* formulation and the impact of the team context. An examination of the models and theories that underpin case formulation, along with its required activities and processes, indicate that transposing the model of case formulation to team formulation is insufficient for a robust evidence base for team formulation. A conceptual model of team formulation should be underpinned by its own relevant

theories. These may overlap with case formulation theories and models, but will also differ by the addition of the team context and identification of task type.

3.3.3 Team formulation concepts

The intended outcome of team formulation is to create a collective team understanding of the patient's presenting issues (Johnstone, 2014). It can be created as a response to a struggling team where a patient's behaviours are challenging the team, or where the patient's circumstances are complex (Johnstone, 2014). Team formulation can also be used as part of a service model and routinely carried out within the team (Dexter-Smith, 2010).

Models and theories

The systematic review (reported in Chapter Two) revealed a wide range of psychological theories underpinning team formulation (Short et al., in press). These included bio-psychosocial, cognitive-behavioural, interpersonal, attachment, cognitive-analytical, systemic, behavioural and psychodynamic theories. The application of these theories dates back to the inception of formulation, and signify its evolution as a way of understanding patient situations and problems (Bruch, 2015). Their use within team formulation research further highlights case formulation as the basis for team formulation.

Within the systematic review group and social theories were reported in a small number of studies, whereby the team was posited as a vehicle for the formulation (for example see Berry et al., 2009; Berry et al., 2016; Kellett et al., 2014). These theories included attribution, communication, change and social exchange theories, and indicate an increasing acknowledgement of the interplay between the team and team formulation. The use of these theories in team

formulation research supports the inclusion of team concepts within the model of team formulation, and highlights the impact that team formulating has on a team.

Required process and activities for team formulation

There are a number of methods for conducting a team formulation. In some instances the whole team is trained in the practice of formulation, followed by formulation discussions with the whole team (Ingham, 2011). In other cases, there is no specific training for team members, but the team psychologist will facilitate a discussion based on team member knowledge of the patient, and then write up the formulation (Summers, 2006). In some instances there is no formal team formulation meeting, rather psychologists will informally add formulation elements into team discussions, not specifically named as team formulation meetings (Christofides, Johnstone, & Musa, 2012). The formulation can also be conducted with the patient and then shared with the team (Dunn, 1997; Hewitt, 2008; Maguire, 2006; Robson & Quayle, 2009). Team involvement can be staggered (Meaden & Hacker, 2011), with no consistent model regarding who attends the team formulation; sometimes it may be the whole team, and on other occasions just those involved in the patient's care (Davenport, 2002; Johnstone, 2014). The most common model is to involve the team in the discussion, whilst actively constructing a formulation (Berry et al., 2009; Craven-Staines, Dexter-Smith, & Li, 2010; Ingham & Clarke, 2009; Ingham, Clarke, & James, 2008; Kennedy, Smalley, & Harris, 2003; Lake, 2008; Shirley, 2010; Summers, 2006; Wainwright, 2010; Walton, 2011; Whomsley, 2010; Wilcox, 2013).

When the team is directly involved in the process of formulation, the specific formulating activities can include, a review of the patient's notes, followed by a meeting and discussion with the wider team. The meeting takes about 90 minutes, and is written up afterwards to produce a care plan (Johnstone, 2014). Achieving a

hypothesis is mentioned less frequently in team formulation literature, but is acknowledged as hypothesising about the patient's thoughts (Summers, 2006), or as a hypothesis open to testing and revision (Whomsley, 2010).

The meeting is usually facilitated by a psychologist or psychological therapist, whose role is to help the team reflect, discuss, be creative and ask questions, rather than to provide solutions (Johnstone, 2014). Team formulation meetings can focus on both patient and staff issues. This focus on team members was a feature of team formulation in five studies (Berry et al., 2009; Hartley, Jovanoska, Roberts, Burden, & Berry, 2016; Ingham, 2011; Ingham et al., 2008; Kellett et al., 2014). Within the meeting there is a specific focus on formulating, with the aim of producing a care plan that can be tested (Summers, 2006; Whomsley, 2010). The care plan is shared with the patient after the formulation meeting (if they have not been involved prior to, or during the meeting), for their feedback, and agreement (Johnstone, 2014).

The implication of these activities for a conceptual model of team formulation is that team formulation follows a process with an aim and a desired end result, and has distinctive features of team working, where team members work together to produce the formulation. The form of working is both behavioural (there are actions to complete) and cognitive (creative and analytical thinking is involved).

Team formulation as a task type

Applying Wildman and colleagues' (2012) taxonomy of task types framework (Wildman, Thayer, Rosen, et al., 2012) to team formulation suggests that it fits with the task types described, however it also entails additional task types to those of case formulation: In addition to task types of human service and ill-defined problem solving, it includes managing others, advising others and negotiation. The

team context of team formulation means that it is likely to require supervision of psychological concepts fundamental to psychological formulation, and the discipline of psychology (Johnstone, 2011). These psychological concepts help to explain human behaviour, thoughts and emotions (Johnstone & Dallos, 2014). Use of psychological concepts can be observed in a pilot study (Berry et al., 2009), where the team psychologist drew on a number of psychological theories to support the creation of a psychological formulation with other team members. These include Beck's (1976) cognitive model (Beck, 1976), cognitive analytic theory (Ryle & Kerr, 2002) and attachment theory (Bowlby, 1997). Team formulation also includes providing professional support and advice in a consultative manner (for example see Hewitt, 2008) and may also involve negotiation when team members struggle to agree on aspects of the formulation (see Whomsley, 2010). A conceptual model of team formulation requires these additional task type considerations, and acknowledgement that the task type for team formulation may also fluctuate depending upon the individual patient and team circumstances, in order to offer a more comprehensive account of this team activity.

3.3.4 Summary of team formulation concepts

The team formulation meeting is a facilitated team discussion that should apply psychological theory to the cause and ongoing problems experienced by the patient, in order to share team understanding regarding the cause of problems and how they are being maintained. There is a flow to team formulation that involves gaining knowledge of the patient and their situation and problems and then discussing these within the team. In order to formulate, team members must communicate, make decisions, link theory to practice and collaborate with other team members. There

may be nominated roles such as facilitation and recording of the formulation. This will require communication, discussion and collaboration across the team.

The following section explains organisational and team concepts including team characteristics, team knowledge and knowledge sharing, before outlining the proposed model of team formulation in section 3.6.

3.3.5 Organisational and team concepts

Multi-disciplinary teams conduct team formulations (Johnstone, 2014), within the context of a diversity of organisational and internal team influences which are known to exert a ubiquitous, direct and critical impact on the function and performance of teams (Gillespie, Chaboyer, Longbottom, & Wallis, 2010; Magpili & Pazos, 2018; Scholl, LaRussa, Hahlweg, Kobrin, & Elwyn, 2018). Key organisational and team concepts are explored below.

3.3.5.1 Organisational factors

Resources, Policy and Culture

Organisational factors that are external to the team may impact on internal team factors and thus influence team formulation activity. External factors include an individual's culture, organisational culture, organisational goals and polices, the structure of the organisation, and team accessibility to training, resources and rewards. These factors may impact on team characteristics, available skills, autonomy, preference for and execution of a team task. For example, in the case of an individual's culture, differences exist between how different cultures view the relationship between team worker and organisational management structure (Magpili & Pazos, 2018). The overarching cultural view held about organisational management can determine the level of value placed in the management structure by team staff, and therefore level of acceptance and commitment to ideas and

instruction may be different across cultures (Magpili & Pazos, 2018; Scholl et al., 2018). Teams engaging in team formulation will encounter these external influences.

A further example relates to diagnosis; still the dominant international and national means by which treatment is determined for mental health problems (Jablensky, 1999; Lafrance & McKenzie-Mohr, 2013). In the UK, this is highlighted by national guidance and policy that are based on psychiatric diagnoses to advise on care (for example see NICE, 2014) and record care episodes for organisational financing (NHS Digital, 2017). Application of national guidance and policy within local policies may influence the use of team formulation as the main team method for understanding and recording a patient's mental health problems. An instance of this is evident in the background financing system that must be used on a statutory basis by all NHS Trusts in England (NHS Digital, 2017). In this system mental health codes based on the International Classification of Disease diagnostic system (WHO, 1992) are applied to all episodes of care. This coding by provider organisations (such as NHS Foundation Trusts) is required for financial remuneration from commissioning bodies. The use of this system requires every patient to receive a diagnosis (NHS Digital, 2017). However, there is no such equivalent system that requires every patient to have a formulation.

Conversely, organisational policies may determine that team formulation is conducted as part of a clinical care protocol pathway and state how it should be undertaken (Dexter-Smith, 2010; Johnstone, 2014). Other examples of organisational influence on the team include; which team member the organisation determines necessary in the performance of team tasks, and the reduced funding of mental health services which may impact on team staffing (and therefore skill diversity of the team), training and resources (Vize, 2017).

3.3.5.2 Team characteristics

Team characteristics also impact on team motivation, cognitions, values and attitudes, thus influencing team performance and functioning (Marks, Mathieu, & Zaccaro, 2001; Salas, Cooke, et al., 2008). The review of team concepts resulted in 12 internal team characteristics, helping to provide a more detailed understanding of the team context in which team formulation occurs.

Team Leadership

Research demonstrates the wide ranging impact of leadership on both team tasks and processes. In the team formulation model that follows in which team formulation is hypothesised as both task and process, leadership relates to all the other team characteristics proposed as inputs into team formulation and the process of formulating.

Research into team leadership is extensive (for example see Borrill et al., 2013; Zaccaro, Green, Dubrow, & Kolze, 2018). A sample of research relevant to the team formulation model is given here. Leadership is shown to moderate the quality of care health teams can offer, via its impact on staff wellbeing and task effectiveness (Baker, Day, & Salas, 2006; Firth-Cozens & Mowbray, 2001). Leadership determines a range of team characteristics which influence team behaviours, attitudes, values, identity, communication strategies, cohesion and consensus building, (Bergman, Rentsch, Small, Davenport, & Bergman, 2012; Garcia-Guiu Lopez, Molero Alonso, Moya Morales, & Moriano Leon, 2015; Marks et al., 2001; Salas, Wilson, et al., 2008; Zaccaro, Rittman, & Marks, 2001). These are aspects hypothesised as critically relevant in the team formulation model, as they enable the required knowledge sharing, cooperative and collaborative behaviours that occur when formulating as a team. Leadership determines the knowledge a team

possesses, how this is shared, coordinated and used (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000; Salas, Sims, & Burke, 2005). In relation to team formulation, team leaders may recruit team members who have no knowledge of case or team formulation. Team leaders may also execute poor team communication strategies that hinder the coordinated sharing of knowledge, or which favour a different type of patient information-sharing meeting over team formulation.

Team Identification (TI)

Team identification is that part of the self-concept of each team member in which they recognise and value being part of the team. It is defined as a deep bond between an individual and a social unit where a perception of belonging exists and the person identifies with the work team (Edwards & Peccei, 2007). TI derives from theories of social identity and self-categorisation (Huettermann, Doering, & Boerner, 2017). Both theories posit that people define themselves based on 'in-group' membership in comparison to other groups perceived as being 'out-groups' (Tajfel, 1974), and cognitive self-categorisation into certain groups based on perception of the values of the group (Turner, Oakes, Haslam, & McGarty, 1994). TI symbolises an individual's oneness with the team and develops from individual and collective 'sense-making' processes, whereby other team members serve as reference points for comparisons to 'out-groups' to achieve a converged identity with the team (Ashforth & Mael, 1989; Huettermann et al., 2017). This converged identity is noticeable as team members share the same values, norms, attitudes and behavioural standards, and categorise themselves as belonging to the team. Team members may identify with each other for specific timeframes of team work, or in a more enduring and deeper way, indicating that identification has impacted on the self-concept of the team member (Huettermann et al., 2017). There is extensive research on the influence of TI in

teams (Ashforth, Harrison, & Corley, 2008). This shows increases in task performance (Solansky, 2011; van Knippenberg, 2000; Yurchisin & Park, 2010), team cooperation effort, participation and organisational decision-making (Bartel, 2001; Kramer, 2006; Simon, 1976; Tompkins & Cheney, 1985), and information sharing and team coordination (Cheney, 1983; Grice, Gallois, Jones, Paulsen, & Callan, 2006; Tyler, 1999).

It is closely linked to team communication (Hogg & Giles, 2012) and drives the knowledge sharing behaviours in a team (Kane, 2010; Liao, Jimmieson, O'Brien, & Restubog, 2012). The relationship between team communication and knowledge sharing in teams is mediated by the identification of team members with one another (Liao, O'Brien, Jimmieson, & Restubog, 2015). It is therefore important to the understanding of team formulation, which requires communication of a diversity of factors between multi-disciplinary team members. Team identification manifests through shared behaviours, norms and values, and is strongly associated with the level of task performance and team learning that is achieved by cohesion and interdependency (Solansky, 2011; Tajfel, 1981; Van der Vegt & Bunderson, 2005).

Team cohesion

Team cohesion is defined as the amount of unity a team has in working together in the pursuit of objectives (Carron & Brawley, 2012) and mediates task effectiveness through the trust experienced between team members (DeOrtentiis et al., 2013). Performance behaviours are also influenced, through the mediation effects of cohesion on task coordination (Beal, Cohen, Burke, & McLendon, 2003). Therefore, cohesion is an important team quality within the model, which proposes that behaviours required for the process of team formulating (such as knowledge

sharing, discussion, collaboration and communication), will be underpinned by team cohesiveness.

Stability

Stability is the degree of expectation by team members for working together in the present and future (Hollenbeck, Beersma, & Schouten, 2012). This team quality is included in the model, as evidence suggests that stability is associated with effective processes and shared mental models (SMM) for teams (West & Lyubovnikova, 2013). The team formulation model proposes that team formulation processes are developed over time as the team's SMM and Transactive Memory System (TMS) develop (explained below).

Composition

Team composition is defined as the aspects the team contains as a whole, such as skills and experience (Mathieu, Maynard, Rapp, & Gilson, 2008). Research has demonstrated clear moderating and mediating associations between team composition and team task performance. When skills are lacking due to the composition of the team, task performance is reduced (Wildman, Thayer, Rosen, et al., 2012). Within the model of team formulation, team membership must include the appropriate skills and abilities for the tasks of team formulating; to take the formulation through its process, to reach predicted outcomes, and to enable psychological processes such as the TMS to develop. The model highlights the need for team members with a variety of skills and knowledge, for example, knowledge of what a formulation should contain and knowledge of the patient and their circumstances.

Professional Identification (PI)

Professional identification is the degree to which people in different disciplines identify with their own profession (Ashforth, Harrison, & Corley, 2008). PI can be observed when team members from the same professional background form sub-groups within a wider team. This private form of identification also impacts on how knowledge is shared across teams (Liao et al., 2015).

PI has been reported to strengthen team knowledge when there is low team identification, and when professional groups within the wider team share their resources with the team (Liao et al., 2015). People categorise themselves into groups based on their perceptions of how similar or dissimilar the group is to themselves (Tajfel, 1974; Lloyd, Schneider, Scales, Bailey, & Jones, 2011). PI is a powerful form of personal identification that can override identification with other groups (Miscenko & Day, 2016). It has both a positive and negative moderating impact on team performance (van Knippenberg, De Dreu, & Homan, 2004). It can facilitate the sharing of diverse knowledge (Liao et al., 2015) but it can also lead to an 'us and them' situation where knowledge sharing is impeded (Kreindler, Dowd, Star, & Gottschalk, 2012; van Knippenberg et al., 2004). PI is therefore an important concept within team formulation, as groups of staff from different disciplines work together in the preparation and production of the formulation.

Dispersion

Dispersion refers to the amount of team work that is undertaken by team members working across locations and time, who may require an increased level of technology to complete the team task (Cramton, 2001). Research demonstrates that geographical dispersion of team members moderates team performance as it either brings absent skills and knowledge to a geographically dispersed team through the

use of technology, or it obstructs effective information sharing, coordination, collaboration, and problem solving (Cramton, 2001; Hill & Bartol, 2016; Hoegl, Ernst, & Proserpio, 2007). For example, early research into the use of videoconferencing demonstrated a negative association to team performance (McDonough, Kahn, & Griffin, 1999). This has implications for team formulation, which may increasingly rely on the input of geographically dispersed team members through the use of technology, used to enable participation in team activities such as team formulation. Research has reported that team dispersion can also moderate a team's ability to reflect, as teams that are together less reflect less (Schippers, West, & Dawson, 2012). This has implications for proposed secondary outputs of team formulation, which suggest that team formulation also leads to team reflection (Berry et al., 2009).

Team workload

Team workload is defined as the work placed on the whole team (Bowers, Braun, & Morgan, 1997) and is shown to moderate task performance. A high workload is cumulatively associated with burnout (emotional exhaustion, reduced personal accomplishment and depersonalisation) (Maslach & Jackson, 1981), which impedes task performance (Helfrich et al., 2017). Burnout is a recognised phenomenon in mental health staff (O'Connor, Neff, & Pitman, 2018). Workload and time pressures also act as barriers to pathway implementation in mental health services (Prytys, Garety, Jolley, Onwumere, & Craig, 2011), and are a major source of concern for staff (Onyett, 2011). Lack of time (due to workload pressures) has been reported as a barrier to the implementation of team formulation in acute in-patient services in the UK (Berry et al., 2017).

Reflexivity and interdependence

Reflexivity is defined as the team's ability to consciously reflect on the functioning of the team (Schippers et al., 2012), and interdependence is defined as the level of dependence between team members in order to complete a task (West & Lyubovnikova, 2013).

Goal interdependence contributes as an antecedent to team reflexivity when the goals require cooperation rather than competitiveness or independent action. This was the finding of research examining 100 teams (Tjosvold, Tang, & West, 2004). Cooperative goal interdependence happens when teams regularly take time out to examine the goal they are trying to achieve, how well they are working together towards that goal, and what they might need to change as a team to achieve the goal (West & Lyubovnikova, 2013). In a model of team formulation, this particularly relates to how team members work together in the input stage of knowledge sharing, when different ideas contributing to the formulation are developed, which feed into the goal of the formulation discussion.

Efficacy

Efficacy is the collective belief of the team for the ability to successfully perform a task (Lindsley, Brass, & Thomas, 1995). The findings of a meta-analysis of team efficacy showed a positive association with team performance, particularly when the moderating variable of task interdependence was high. As members of the team coordinate their actions, they are more likely to be influenced by the performance, motivation and opinions of other members, which in turn increases the sense of team efficacy (Gully, Incalcaterra, Joshi, & Beaubien, 2002). This is relevant to the model of team formulation, in which it is proposed that team

formulation is an interdependent team task, requiring coordinated actions across the team and involving identification between team members.

Team climate

Team climate is defined as the consistent, affective reactions in the team (George, 1990). Researchers have established a clear relationship between team climate and team performance, reporting that it mediates and predicts team task-execution and performance. For example, strength of team climate mediates the relationship between team climate and team performance (Gonzalez-Roma, Fortes-Ferreira, & Peiro, 2009). While team climate predicts the rate of team innovation (Pirola-Merlo, 2010). Early team climate research purported that emotional feelings (or affect) encountered by team members whilst at work, impact upon the thoughts they experience and subsequent behaviours they display, in turn impacting on the team climate (Weiss & Cropanzano, 1996). Research has since demonstrated that social team climate mediates between constructive practices (such as respect, support and inspiration) and work engagement and performance (Geue, 2018). Furthermore, relationship discord in teams is reported to mediate the relationship between task conflict and team affect (Gamero, Gonzalez-Roma, & Peiro, 2008).

Conversely, a good team climate predicts better decision making, and a greater likelihood of decisions being implemented (Raine et al., 2014). Research also demonstrates that a good team climate moderates a team's ability to develop a functioning TMS, by moderating expertise recognition, knowledge sharing and team member contribution, thus maximising knowledge availability within the team (Huang, 2009). Earlier research also found a relationship between a team's positive

affect and increased cognitive coping ability in team members (Fredrickson & Joiner, 2002).

The model of team formulation proposes that team climate may influence the team's ability to carry out the process of team formulation. Research directly examining the relationship between team climate and team formulation showed that the use of formulation advice offered to teams improved team climate over time (Kellett et al., 2014). This supports the proposition within the model of team formulation that team formulation activity creates an outcome which links back directly to team characteristics.

Team member status

This team quality refers to the differentiation of team member status based on team member characteristics observed by other team members. This perceived differentiation determines a distinction in observable power and prestige, even when the characteristic is not related to the requirements of the task (Berger, Zelditch, & Cohen, 1972). Team member status can lead to conflict in teams and moderate the decision making ability of the team (Silver, Troyer, & Cohen, 2000; West & Lyubovnikova, 2013). This occurs through the amount of contribution individual team members make, which is moderated by their status within the team. Those with lower status may be invited to contribute less to decision making, and feel less able to contribute (Silver et al., 2000).

Member status, connected to the diversity of disciplines within health care teams, is reported to moderate and contribute to complexity of team relationships (Gillespie et al., 2010). Disciplines in mental health teams also work to differing underlying philosophical models (Colombo, Bendelow, Fulford, & Williams, 2003).

However, dominance of the model held by medical doctors within healthcare teams is well established (Baxter & Brumfitt, 2008).

This is relevant within the team formulation model, in which the process of formulating is proposed to involve equal levels of contribution into multi-disciplinary discussion and collaboration, on a range of ideas held by different disciplines, in order to make decisions and produce a formulation.

3.3.6 Team knowledge and knowledge sharing

Knowledge sharing is defined as the process through which a person learns from another person, or is affected by their knowledge (Argote & Fahrenkopf, 2016). Learning is dependent upon available knowledge and interactions occurring between team members (Cooke, Salas, Cannon-Bowers, & Stout, 2000; Wildman, Thayer, Pavlas, et al., 2012). Research has shown a strong positive association between knowledge sharing and team performance (Argote & Fahrenkopf, 2016; Cooke et al., 2000; Levine & Prietula, 2012). This association is moderated by team relational factors and conditions such as the social network within the team, the task type and complexity, staff emotions, motivation and how well staff identify with one another (Argote & Fahrenkopf, 2016; Cross & Borgatti, 2000). Furthermore, research has demonstrated that communication and team knowledge sharing are inextricably linked (Hsu, Shih, Chiang, & Liu, 2012; Wang, Huang, Davison, & Yang, 2018). Known moderators of the degree of knowledge shared are the characteristics of the person giving the knowledge, the characteristics of the knowledge recipient, the competence of the communicator, and the motivation of the information recipient (Argote & Fahrenkopf, 2016). Team member attitudes and behaviours have been shown to mediate communication styles impacting on knowledge sharing (de Vries, van den Hooff, & de Ridder, 2006).

Team knowledge and knowledge sharing are also team characteristics, however they may carry special prominence above other team characteristics in the task of team formulation, which encompasses knowledge sharing as a prominent feature. This is demonstrated by Johnstone (Johnstone, 2014), who outlines various elements of a team formulation that require knowledge to be shared among team members: Amongst these, there is knowledge sharing about the current difficulties being experienced by the patient, knowledge sharing about staff feelings and reactions (to the patient) and the shared generation of new knowledge. Given the team context in which team formulation occurs, knowledge sharing may also be subject to the conditions reported below to influence knowledge sharing in teams, suggesting that knowledge sharing is a highly relevant concept within the team formulation model.

Available knowledge

Team knowledge has been defined as the sum of task and team related knowledge, including understanding of the current situation requiring the use of the knowledge that is held by team members (Cooke et al., 2000). Team knowledge is optimised when the content is suitably proportioned among team members, and matches the task in a way that enables team members to assess and manage the needs of the task (Cooke et al., 2000). Case and team formulation literature suggest that the knowledge required by teams in order to formulate relates to knowledge of psychological theory and the patient (Johnstone, 2014; Kuyken, Padesky, & Dudley, 2008). Knowledge relating to how to construct a psychological *case* formulation is also a discipline specific requirement for psychologists and nurses (Division of Clinical Psychology, 2010; NMC, 2016). For psychiatrists, the knowledge of *case* formulation construction that leads to a diagnosis is also a necessity (RCPsych,

2016). Team formulation research tends to prioritise the knowledge input of team psychologists over other team members (for example see Christofides et al., 2012; Hood & Christofides, 2013).

Research has not examined how knowledge is proportioned across team members for the task of team formulation, and whether the required knowledge differs from that required for case formulation.

Communication

Team communication is integral to a conceptual model of team formulation, as it facilitates the sharing of knowledge and execution of team tasks. Team communication is defined as the exchange of information between two or more team members (Hoegl & Gemuenden, 2001), either verbally or non-verbally (Marlow, Lacerenza, Paoletti, Burke, & Salas, 2018). Team communication is key to team performance of tasks, as demonstrated in research findings (Borrill et al., 2013; Salas et al., 2005; Salas, Wilson, et al., 2008). For example, in a large scale study of over 7,000 National Health Service (NHS) staff in the UK, including community mental health team staff, effective team communication had a significant association with higher levels of innovative care (Borrill et al., 2013). In another study of 60 healthcare staff across seven health care sites in Canada, communication was shown as a core competency for collaborative practice with evidence of a positive association with patient outcomes (Suter et al., 2009).

Communication quality, defined as the degree to which communication across team members is effective, clear, timely, flowing and completed (Gonzalez-Roma & Hernandez, 2014), has a significantly stronger association with team performance than communication frequency or volume (Marlow et al., 2018). Teams who have face to face interactions and familiarity with one another, perform better,

independent of task type. This was the conclusion of a meta-analysis of 150 studies examining the moderating impact of communication characteristics between team communication and performance. Within this meta-analysis, performance was measured as the outcome of team activity in three ways; creative, decision-making or generic performance (Marlow et al., 2018). Team communication is vital as it enables team members to find out what others know in relation to the task to be completed, and where the expertise for the task resides in the team. Team communication also facilitates task learning, and the collective utilisation of available information resources required for task execution (Hollingshead & Brandon, 2003; Mesmer-Magnus & DeChurch, 2009). These factors are critical to team formulation, which as a task, requires team members to share knowledge for a range of information including the patient, their individual situation, their problems, strengths and formulation (Johnstone, 2014).

Transactive Memory System (TMS)

The TMS is a group memory phenomenon occurring when group members who hold differing knowledge to one another, draw on the differentiated knowledge to complete a task (Wegner, 1987). This relies on team members perceiving other team members as credible knowledge holders, and coordinating use of the knowledge in the task execution (Hsu et al., 2012; Lewis, 2003). TMS research proposes that group members are aware of knowledge held by others, and can call upon this knowledge for the task to be achieved (Salas, Fiore, & Letsky, 2012). A TMS is comprised of transactive components and stages. Components include the knowledge held by the individual and the team, and the transaction of this, whilst the stages involve team members knowing who knows what (also known as directory

updating), allocation of knowledge to the relevant team member and finally retrieval of the information by other team members (Peltokorpi, 2008; Wegner et al., 1985).

Each of these components is needed and influences the sharing, validation and accuracy of knowledge of the transactive memory by the team. In this model, transactive memory is an iterative, dynamic process that exists within dynamic team environments (Brandon & Hollingshead, 2004). These are conditions which may impact on the level of functioning of the TMS (Lewis & Herndon, 2011), and which may be of relevance to a TMS for the task of team formulation that occurs in a dynamic team environment. Team and organisational research has demonstrated that teams bring together differentiated knowledge, enabling greater efficiency and effectiveness in task performance. For example, this has been demonstrated in aviation (Littlepage, Hein, Moffett, Craig, & Georgiou, 2016) and knowledge work teams (Huang, Liu, & Zhong, 2013).

TMSs have been commonly measured by proxy markers such as specialisation, coordination and credibility, which map onto the stages and components of a TMS (Lewis & Herndon, 2011). Specialisation is the knowledge that team members hold for the task, coordination is the team managing access to this knowledge, and credibility is the belief team members have of the likelihood of fellow team members having the required knowledge (Lewis, 2003). These describe processes of encoding knowledge, storage and retrieval that must exist for a functioning TMS (Wegner, 1987).

Perceptions of what *is* task relevant knowledge may be at odds amongst team members, depending on discipline and training, which influence both individual socialisation to the particular model of illness and model of formulation (Colombo et al., 2003; D'Amour, Ferrada-Videla, San Martin Rodriguez, & Beaulieu, 2005). This

can be observed in the intended aim of formulation held by team members from different disciplines, which is guided by training and professional organising institutions. During a formulation, a psychiatrist will be looking for information that will indicate a fit between the patient's symptoms and diagnostic criteria (RCPsych, 2016). However, a psychologist is interested in information about the patient and their circumstances that will help to build a hypothesis about the causes of the mental health problem and the underlying psychological mechanisms or social conditions that are maintaining the problem (Johnstone, 2011). Therefore the goals of obtaining task relevant information can differ across disciplines. Lewis and Herndon (Lewis & Herndon, 2011) suggest that when the purpose of obtaining the task relevant knowledge is at odds in the minds of individuals within the TMS, they may be less likely to share their differentiated knowledge, and as a consequence reduce the likelihood of attaining the intended overarching task goal; in this case a team formulation.

Shared Mental Model (SMM)

A shared mental model denotes the overlap and coming together of team member mental representations of various team and task features (Maynard & Gilson, 2014) (in contrast to a TMS which concerns differentiated knowledge). It represents a central psychosocial feature that mediates and moderates team behaviour, effectiveness and task performance (Cohen & Bailey, 1997; Fransen, Kirschner, & Erkens, 2011; Maynard & Gilson, 2014). SMMs relating to team formulation hold a position of key importance within the model of team formulation, due to the influence they have on shared team decision making and team approach consistency (Colombo et al., 2003). Lack of a SMM can result in care variations depending upon the individual team member involved. For example, unless there is a

SMM regarding the order of treatment, a psychiatrist may first suggest medication, whereas a social worker may first focus on social change to reduce mental distress (Colombo et al., 2003).

Development of the SMM begins with how personal meaning of team related concepts are articulated by individual team members within the team setting. This develops into a harmonised understanding of the concept that is refined through team collaboration and co-construction amongst team members (Van den Bossche, Gijselaers, Segers, Woltjer, & Kirschner, 2011). For example, some of the team may articulate the concept of formulation as an activity that leads to a diagnosis, whilst other team members may articulate it as an activity that leads to understanding of patient needs. Through a process of collaboration and co-construction amongst team members, the meaning of the concept is refined and eventually harmonised to an agreed understanding. This relates to team formulation in a number of ways. First, representations of illness held by staff must match for treatment to be effective (Tarrier, 2006). However, in team formulation, the model of mental illness and formulation held by team members may vary considerably. Views of mental illness may emanate from a medical, social, cognitive behavioural, psychological, psychotherapeutic or systems model (Colombo et al., 2003), and be influenced by professional background, focus of training and team member status (Mathieu et al., 2000; Maynard & Gilson, 2014; McComb & Simpson, 2014). For example, ideas may be held by some team members that all patients who present with voice hearing experiences will require anti-psychotic medication, or that their voice hearing is connected to a particular diagnosis. However, there may be other team members who support the belief that distressing voice hearing is a response to adverse life events, linked to personal meanings rather than diagnosis. Such ideas may exist before any

clinical or collaborative assessment is made and will be central to care offered, and how mental illness is constructed.

Second, studies suggest that staff find team formulation a satisfying activity, which helps increase understanding of the patient (Berry et al., 2009; Summers, 2006). However, other studies report that staff also believe that formulation takes a long time to carry out (Craven-Staines et al., 2010), can be frustrating (Hood & Christofides, 2013) and even emotionally challenging (Christofides et al., 2012; Thompson et al., 2008). Such views may indicate some of the individually held mental models that exist about team formulation, which contribute to the team's SMM for team formulation.

Third, learning behaviours, influential in the development of appropriate shared mental models (D'Amour et al., 2005) are dependent on how team learning is organised. For example whether the training is delivered to a single discipline within the team or the MDT together, the degree of reflexivity by the team, regularity of training and access to training. The impact of *how* team training is organised in relation to development of the SMM for formulation is particularly under-researched. One team formulation study, with a focus on team training, reported that training whole teams fostered development of a SMM (Thompson et al., 2008). However, this study included only nurses and social workers, therefore not accurately reflecting the diversity of the whole team that exists within mental health teams, which is likely to include team psychologists, psychiatrists, occupational therapists and professionally unqualified support worker staff (RCPsych, 2013).

Finally, SMMs are subtle, pervasive and powerful and they are profoundly influenced by the behaviours, motivations and attitudes of other team members (Gully et al., 2002). Convergence and overlapping of knowledge held by different

team members, and perceptions of *what* knowledge is held by others in the team is tied to the development of a SMM across the team (Maynard & Gilson, 2014; McComb & Simpson, 2014). The few studies exploring staff perceptions and experiences of team formulation have not focused on the development of a SMM for formulating, *prior* to formulating. However it is through the lens of such prior held shared models that team formulation is performed.

3.3.7 Summary of concept review

The results of the concept review indicate that a model of team formulation should be underpinned by research on case and team formulation, as well as organisational and team research. Case and team formulation research has informed the model by indicating how team formulation is theorised, the integrated formulation model it should rest within, and the impact of formulating. Equally, case and team formulation research has informed the processes and activities that should be included. Results from team research show that organisational factors external to the team may influence the process of team formulation and therefore should be included in the model. Team research also revealed a number of internal team characteristics that may influence the process of team formulation and in particular highlighted the relevance of knowledge sharing.

3.4 The model of team formulation

The model that follows is a synthesis of all concepts and begins with a description of the flow of the model.

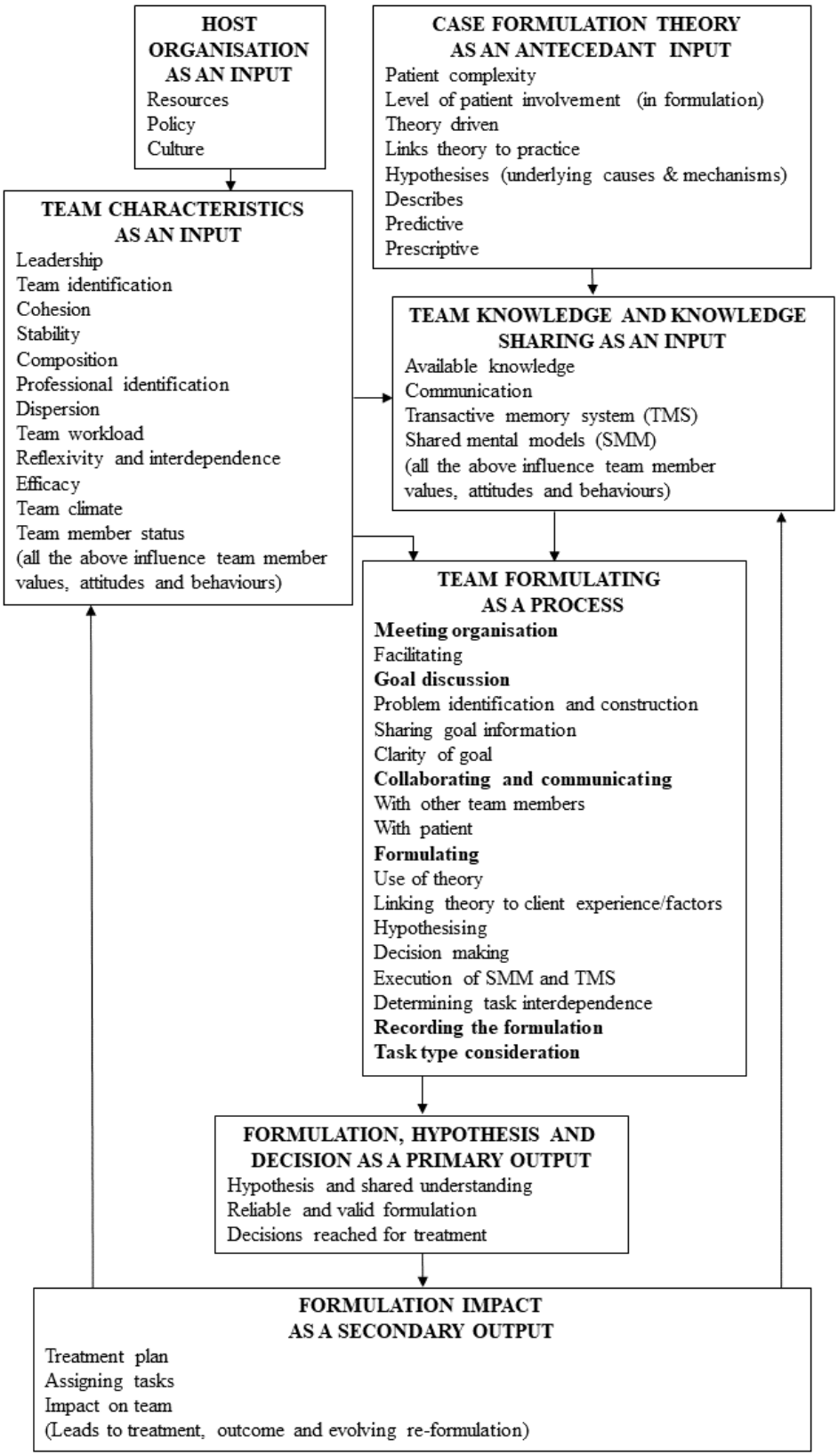

Figure 3.1 Proposed model of team formulation

Taking all identified concepts into account, the proposed model of team formulation follows a cyclical Input-Process-Output process model (IPO) (Cohen & Bailey, 1997) that describes a flow of events and involved concepts (Maxwell, 1996).

Inputs are pre-existing factors that will influence and act as antecedents to team formulating activities. *Processes* are the activities or actions carried out by the team, which mediate between the inputs and team activity outcomes, and *outputs* are the consequences of team activity (McGrath, 1984). In figure 3.1, seven boxes, connected by arrows, give an overview of the model. The model flows from top to bottom, with the top four boxes representing inputs into the process of team formulating, which result in primary and secondary outputs. The model flows cyclically as indicated by arrows. An explanation of each of the seven boxes is given below. This includes: relevance to the model of team formulation, direction and reason for flow to the next box, and the utility of the information given within the box.

Host organisation as an input

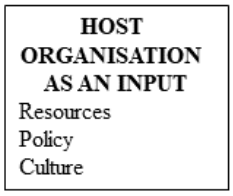

Figure 3.2 Organisational inputs

Figure 3.2 acknowledges the influence of organisational factors on teams. The box links directly to the input box (figure 3.3) of team characteristics. It links to this box in acknowledgement that resources, policies and organisational culture will determine how teams are configured and operate, and that this may have a direct impact on how team formulation is enacted. For example, resources given to the

team may result in one psychologist working across two teams, limiting availability to support the team in formulating. Organisational policy may favour the use of diagnosis over formulation for treatment planning, and the culture of the organisation may be medically dominant, again potentially limiting the use of psychological formulation.

For teams using team formulation, knowing and appraising organisational influences may help teams to use the best available knowledge resources or team characteristics in ways that optimise team formulation abilities (Vaghefi, Lapointe, & Shahbaznezhad, 2018). For example, if psychological input into the team is limited the team may want to consider how they best use the limited resource.

Team characteristics as an input

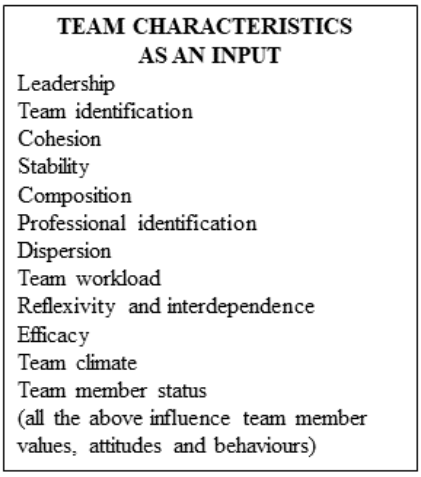

Figure 3.3. Team characteristics as an input

Figure 3.3 gives team characteristics that represent team conditions that may influence team member values, motivations, cognitions and attitudes. These variables denote dynamic team properties that are dependent on team context, inputs, processes and outcomes (Marks et al., 2001). To include such qualities in a model of team formulation, recognises the influence they may have on team formulating as a process (figure 3.6) through the knowledge sharing that takes place in the team prior

to formulating (figure 3.5). For example, using the quality of 'stability'; teams in which team members frequently change may impact on the knowledge available and required for team formulation.

Highlighting team characteristics in the model raises awareness of the potential impact they may have on the process of team formulating. This has utility for teams aiming to optimise team formulation performance, via initially addressing team characteristics.

Case formulation theory as an input

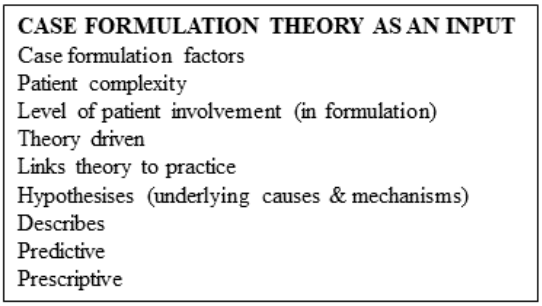

Figure 3.4. Case formulation theory as an input

Figure 3.4 makes the relationship between case and team formulation explicit, as case formulation forms the theoretical and operational basis for team formulation in the model, in keeping with guidelines and the evidence for case formulation (Johnstone, 2011). Inclusion of the box makes the use of integrated formulation unequivocal, as no one therapeutic tradition is highlighted over another. This box includes complexity of patient issues and the level of involvement that occurs on an individual basis in case formulation, both also requiring consideration in team formulation.

Case formulation theory as an input links directly to the knowledge and knowledge sharing that occur in the team context contained within the team knowledge and knowledge sharing input box (figure 3.5), indicating that team

knowledge and knowledge sharing should be informed by an integrated case formulation approach.

Team knowledge and knowledge sharing as an input

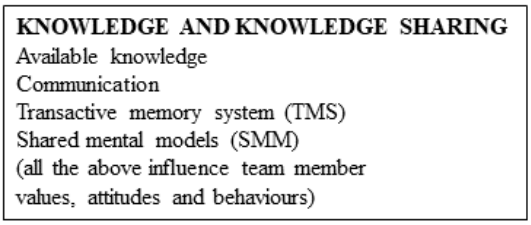

Figure 3.5. Team knowledge and knowledge sharing as an input

Figure 3.5 contains further team characteristics proposed to be of key relevance to the task of team formulating. These qualities enable the knowledge required by formulating teams to be used by the team. The team characteristics of knowledge and knowledge sharing, relate directly to the act of formulating as a process (figure 3.6), and facilitate the availability of formulation knowledge (for example knowledge of the patient or how to formulate) within the team. This box (figure 3.5), indicates team characteristics that optimise the team formulating knowledge held by the team. For example, teams with regular and high quality communication have better team performance for tasks (Marlow et al., 2018).

Team formulating as a process

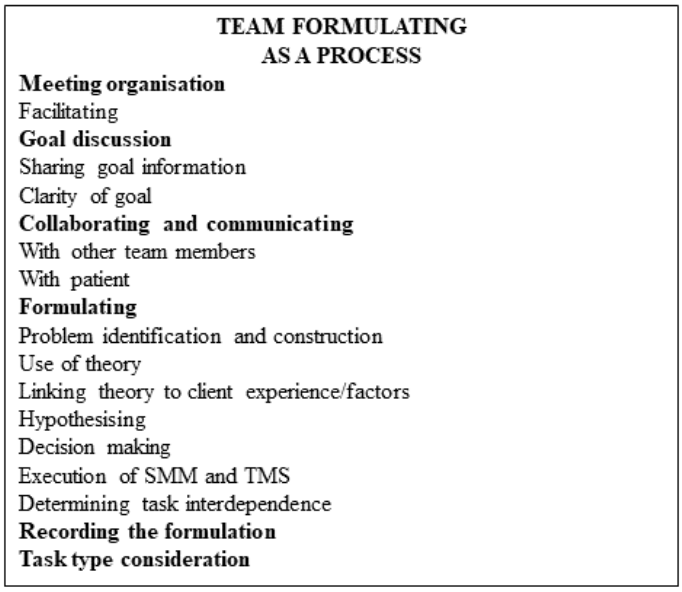

Figure 3.6. Team formulating as a process

The key activities in figure 3.6 relate to the processes involved when the team meets to formulate. The model proposes that to be effective and efficient, the meeting should be facilitated and that the goal of the formulation discussion should be the primary consideration of those attending. Case formulation has been described as a process (Johnstone, 2011) and in this model this is also applied to team formulation. This is indicated by the two key processes of collaboration and communication of team members during the meeting. In the model the process of formulating within a team is recognised as being based in case formulation theory and practice, but also critically linked to processes that occur in a *team* context. These include hypothesising as a team, making joint team decisions, making use of SMMs and the TMS for team formulation and determining how tasks arising from the formulation discussion will be realised in an interdependent manner. Recording the formulation is also an integral part of team formulating within this model. This is acknowledged as an aspect previously missed out by some teams (Wainwright,

2010). This process box also acknowledges that formulating in a team is a dynamic process, which will change based on input factors such as patient complexity, team characteristics and how the knowledge is shared and used by the team. These are all factors that will determine the task type (Wildman, Thayer, Rosen, et al., 2012) for each formulation. This process box therefore outlines the activities essential for team formulating to take place as a team process. This box offers information to teams in terms of the practical application of team formulating and acts as a precursor to the primary outcomes for team formulating (figure 3.7).

Formulation, hypothesis and planning as a primary output

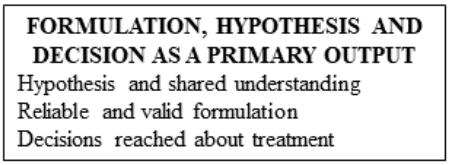

Figure 3.7. Formulation, hypothesis and decision as a primary output

Figure 3.7 describes the first of two outputs of team formulation. The process of team formulating should result in a hypothesis that brings shared understanding to the team about the origins and maintenance of a patient's problems (Johnstone, 2014). The formulation produced should have a level of reliability (i.e. if discussed again it would have similar features) and be valid (i.e. it should make sense and have a high degree of fit with the patient's situation). A further primary output of formulating is that the team decides on a treatment approach for optimal effectiveness based on the hypothesis. The primary aim of team formulating is highlighted within this box; used by teams it will help to keep the aim of formulating clear. However, in keeping with team formulation research, there are additional outputs to team formulation. These are considered to be the impact (and secondary

output) of having reached a hypothesis, shared understanding and treatment agreement (figure 3.8).

Formulation impact as a secondary output

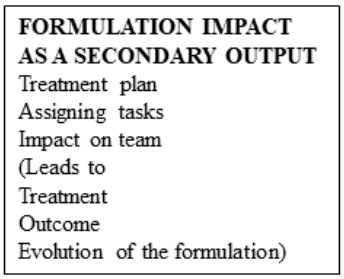

Figure 3.8. Formulation impact as a secondary output

A secondary output of formulating is the development of a treatment plan, and assigning of tasks to various team members (Figure 3.8). This final aspect of team formulating leads to a treatment outcome, which when re-discussed in further team formulation meetings underpins the evolving nature of formulation. In addition, based on evidence from team formulation research the model acknowledges that formulating impacts on the team, in terms of team characteristics in values, cognitions and attitudes (Berry et al., 2009). Additionally, the model proposes that secondary outputs impact on the team's ability to carry out further team formulations, by enhancing existing knowledge of the skills required to formulate through repetition of working through a formulation, and by further development of the team's SMM for team formulation. This fits with theory of learning (Kolb, 2015). Consequently, a further secondary output of team formulating loops back to both team characteristics inputs (figure 3.3), and the team knowledge input (figure 3.5) that the team will hold for future formulations. This is of utility to teams aiming to recognise the full potential of team formulation.

3.4.1 Summary of proposed model of team formulation

The model of team formulation describes team formulation as a cyclical process. This begins with inputs that will influence the formulation discussion in advance of it taking place. These include the organisational context in which the team operates, the theory underlying case formulation and the qualities inherent in the team including available knowledge and how this is shared. The model then moves on to describe what should happen when a team meets to formulate, and the key components of the process of team formulating. The model progresses to describe the primary and secondary outputs that may occur as a result of formulating. This creates a feedback loop into team characteristics and knowledge sharing, enhancing the team's abilities to formulate together again in the future.

3.4 Discussion

This model offers the first conceptualisation of team formulation. Derived from research and literature on teams, case and team formulation, the model posits that the main concepts involved in team formulation include the pre-existing context in which teams formulate, the pre-existing team characteristics (including knowledge required for formulation and how this is shared), the process of formulating and the outputs which occur as a result. The interplay of team, case formulation and team formulation concepts have not been explicit or evident in previous team formulation research. However, synthesising evidence together from all three areas, enables a more coherent, explicit and evidence based adoption of case formulation into team formulation. Articulating a model of team formulation brings a number of benefits. The model advances team formulation practices, based in theories and research that relate to the context that team formulation takes place within, and the activities involved. The model acts as a guide for teams to evaluate and guide team practice

against. The model acknowledges the usefulness of team formulating in relation to the clinical hypothesis it guides the team towards, and the implications of this for patient treatment. The model supports developing team formulation research, which reports that team formulation has an influence on team characteristics and behaviours. Finally, by combining team research into a model for team formulation, the model offers a framework that acts as a basis for an expanded choice of future research on team formulation. This will be demonstrated by the choice of studies to follow within this thesis.

Strengths and limitations

A potential criticism of the model is that in keeping with prior team formulation research, it also rests team formulation on case formulation theory, which has been criticised for its lack of reliability and validity (Bieling & Kuyken, 2003). Nonetheless, this limitation is acknowledged, and is counteracted by the extensive body of research on teams that has not previously been applied to team formulation. The model is a starting point for team formulation theory, one which should be reviewed in tandem with further advances in the understanding of both case and team formulation research. Furthermore, the model of team formulation emphasises the importance of formulation as a *developing* hypothesis, underpinned by theory. This highlights the nature of formulation as an evolving process, rather than an event which leads to a right or wrong set of consistent ideas about a patient and their circumstances (Butler, 2006). The aim of team formulation is to increase the possibilities for understanding patient problems (Johnstone, 2014). This occurs as the team develops knowledge of the patient and their life experiences over time (rather than as a static event), therefore guiding highly individualised treatment. This is congruent with the proposal that formulations are changeable dynamic

frameworks, useful for a number of purposes, over and above considerations of reliability and validity (Butler, 2006).

A further limitation is that IPO models have received criticism for failing to capture the interactions involved in processes (Ilgen, Hollenbeck, Johnson, & Jundt, 2005). However, the team formulation model proposes the act of team formulating as a highly interactive process involving communication, knowledge sharing and continued team learning. This is in keeping with early authors of the IPO model who proposed the possibility of feedback loops (for example see Cohen & Bailey, 1997; McGrath et al., 2000).

3.5 Conclusions and next steps for research

In keeping with the aims of the thesis, the objective of this chapter was to explore the potential conceptual foundations distinct to team formulation and develop this into a model of team formulation. This was achieved by reviewing and synthesising research findings on team formulation, case formulation and team research into an IPO model. This is a novel model that incorporates factors proposed to influence team formulation, suggesting how the process for team formulation should flow, what the task of team formulation should contain and result in. It offers teams the opportunity to go beyond simply adapting case formulation theory into team formulation practice. It does this by indicating to teams the team conditions which they may find useful to consider as they develop their team formulation abilities and by acting as a guide to the process and content of a team formulation. The model also acts as a map to guide future team formulation research.

Research into the theory of team formulation and the underlying psychological principles upon which it is based have been identified as a need (Johnstone, 2011). A further thesis objective was to employ the proposed model in

the conduct of empirical studies. A fundamental part of the model, which underpins the process of formulating, and which may also be considered of immediate practical relevance to teams, is that part of the model focussing on knowledge and knowledge sharing (figure 3.5). This resonates with the cognitive nature of team formulation that requires knowledge of the patient alongside theoretical formulation knowledge (Kuyken et al., 2008). Knowledge held by a team, and the way in which this is communicated and shared, is central to enhanced task performance (Marlow et al., 2018). Team formulating has been described as a multi-disciplinary venture (Johnstone, 2011), but this is in the absence of understanding the operation of knowledge sharing for team formulation within a multi-disciplinary interdependent context (as contrasted to one team member developing the formulation and reporting it back to the rest of the team).

The utility of starting at this point in an exploration of the model, is to provide evidence based information that helps teams to consider and strengthen how they share knowledge in order to prepare to, and undertake the process of team formulation in a fully interdependent multi-disciplinary way. The two studies reported in the next two chapters of this thesis therefore begin to explore knowledge sharing required for team formulation. This starts in Chapter Four by exploring the team processes and characteristics involved in team knowledge sharing (Liao et al., 2015). The study surveys teams who use team formulation, to see whether perceived communication quality predicts the TMS for team formulation, and whether TI mediates this relationship, and whether the relationship between TI and the TMS is moderated by PI. Building on the results of this study, in which a correlation is found between TI and the TMS for team formulation, Chapter Five reports a second study, which uses a qualitative approach to offer a deeper exploration of the relationship

between TI and the TMS for team formulation via the individual experiences of team members.

The findings of the two studies are synthesised and discussed together in Chapter Six (discussion chapter). The implications and directions for future research are considered, alongside suggestions for future research based on other parts of the model of team formulation proposed within the present chapter.

Chapter Four

Study One: Team social and cognitive processes underpinning team formulation[3]

4.1 Introduction

This study focusses on knowledge sharing, proposed as a necessary requirement for the process of team formulation in the model of team formulation described in the previous chapter. In the model knowledge sharing enables the collection of knowledge about the patient as an input into team formulation, and knowledge held by various team members comes together in the process of the team formulation discussion. The aims of this study are to investigate knowledge sharing through the concepts of communication quality, team identification, professional identification and the transactive memory system for team formulation (all defined in the previous chapter). The design and predictions were informed by research carried out in Australia by Liao and colleagues (Liao et al., 2015). This research was considered a good basis for study design, given its explicit focus on team conditions also included in the model of team formulation.

In Liao et al.'s (2015) study 126 Australian medical, surgical and mental health multi-disciplinary teams took part in a cross-sectional survey examining in-patient clinical meetings. The clinical meetings were described as discussions that occur in teams to help with clinical decisions. Teams were defined as at least three people of different disciplines working together (for example a nurse, doctor and

[3] A paper reporting the findings of this study is currently under review with Archives of Psychiatric Nursing. Author list: Valentina Short[1, 2], Dr Judith A. Covey[1], Dr Lisa A.D.Webster[3] ,Dr Ruth Wadman[4], Professor Joe Reilly[2,4], Professor Helen Stain[3].
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physiotherapist) and in the study this numbered from three to 21 team members, with an average of seven members per team participating. However, mental health teams formed only 31% of the total number of teams in the study and the number of team members participating for each mental health team is not reported. In addition, how the clinical meeting task might differ across specialities is not supplied.

Liao and colleagues (2015) hypothesised that communication quality predicted the transactive memory system and that the relationship between communication quality and the transactive memory system (TMS) was mediated by team identification and that the relationship between team identification and the transactive memory system was moderated by professional identification. In their study, the rationale behind the proposed moderated-mediation effect was given as "engaging in high quality communication with each other can create a collective sense of team identification, that subsequently encourages team members to engage in collective goals of building a TMS" (Liao et al., 2015, p. 967), however "if professional identification produces silo-working effects, it will weaken the positive effects of team identification on TMS. If professional identification provides sub-group identification resources, it will strengthen the positive effect of team identification on TMS" (Liao et al., 2015, p. 968).

Professional identification might therefore have opposing moderating effects on the relationship between team identification and the transactive memory system. On one hand professioanl identification might have a negative effect by generating intergroup discord when groups of professionals view other groups of professionals working within the same team as an 'out-group' in keeping with social identity theory (Hekman et al., 2009, cited in Liao et al., 2015). This impacts on the relationship between team identifcation and the transactive memory system, as it can

reduce sub-group knowledge resources available to the wider team, thus weakening the positive effects of team identification on the transactive memory system (Liao et al., 2015). Alternatively professioanl identification might have a positive effect because it brings knowledge resources to the task and whole team from the various disciplines, which motivates whole team working towards goals thereby strengthening the effect of team identification on transactive memopry system.

Study findings supported this alternative moderated-mediation effect. A statistically significant positive association was found between team communication quality and level of transactive memory system which was mediated by the extent of team member identification with one another. This mediation effect was found to be positively moderated by professional identification wherein low team identification was counteracted by professional identification which brought knowledge resources to the task from the various different disciplines, thus strengthening the relationship between team identification and the transactive memory system. Liao and colleagues (2015) concluded that professional identification might deliver team resources that serve to strengthen the team identification and therefore its relationship with the transactive memory system. Findings from this study confirmed results from other studies examining the impact of communication quality on knowledge sharing (Hollingshead, 1998; Palazzolo, 2005; Palazzolo, Serb, She, Su, & Contractor, 2006), and the influences of team identification and professional identification on transactive memory system development and functioning (Richter, West, Van Dick, & Dawson, 2006; Van der Vegt & Bunderson, 2005).

There is no known research however examining the role and development of a transactive memory system for team formulation. In particular, the influence of team social and cognitive processes, such as team identification and professional

identification, and the quality of communication that takes place between team members engaging in team formulation have not been explored. This is pertinent to team formulation, as the model of team formulation outlined in Chapter Three suggests that staff of differing professions who hold individual and differentiated pieces of knowledge needed for the unified team formulation, bring their knowledge together within a team context via a transactive memory system specific to team formulation. As discussed in Chapter Three a transactive memory system specific to team formulation is liable to hold differentiated knowledge specific to a formulation and its component parts (causation and maintenance of problems, and hypothesis). This is in contrast to the differentiated knowledge required for a general clinical discussion as described by Liao and colleagues (2015), in which the content of discussion may differ depending on the focus of the team, for example a surgical team discussion in contrast to a paediatric team discussion.

The following section outlines the way in which communication quality, team identification and professional identification might operate in relation to the transactive memory system for team formulation. This is based on previous research for each of these team processes and their influence on transactive memory systems examined from other types of teams and groups (Hollingshead, 1998; Messenger, 2013; Michinov, Olivier-Chiron, Rusch, & Chiron, 2008). The study described in this chapter hypothesises that communication quality predicts the transactive memory system for team formulation, and that the relationship between communication quality and the transactive memory system are mediated by team identification. The study further hypothesises that the relationship between team identification and the transactive memory system for team formulation are moderated by professional identification.

4.1.1 Communication quality as a predictor of the TMS for team formulation

The evolution of a transactive memory system is highly dependent on communication quality and the two phenomena are inextricably bound (Wegner, 1987). As communication quality precedes the formation, development and on-going use of TMS (Lewis, 2004; Palazzolo et al., 2006; Ren & Argote, 2011), it is of key importance to the transactive memory system for team formulation. Communication between team members is essential as it is required for specialisation, coordination and credibility (Liao et al., 2015). There are no known studies examining communication quality as a predictor of the transactive memory system for team formulation. However, as well as the study by Liao and colleagues (Liao et al., 2015), other studies demonstrate a relationship between communication quality and knowledge sharing. For example, communication practices that are co-operative, and build connections between team members, reduce the need for lengthy conversations about knowledge differences (Majchrzak, More, & Faraj, 2012). Communication underpins the coordination of different pieces of information held by team members (Moreland & Myaskovsky, 2000), and it enables team members to determine credibility of fellow team members by evaluating competence during work based encounters (Tang, 2015). Nonetheless, and in keeping with team formulation guidelines (Johnstone, 2011), team formulation discussions require team members to share aspects of knowledge about the patient. Communication quality is therefore a potential predictor of the transactive memory system for team formulation, enabling knowledge sharing that takes place in a team ahead of, and during formulation discussions.

Hypothesis One: Communication quality predicts the level of transactive memory system for the task of team formulation.

4.1.2 Team identification as a mediator of communication quality and the team formulation transactive memory system

Team identification develops and strengthens as team members communicate and interact whilst working on tasks, leading to shared cognitions, perspectives, attitudes and behaviours and as people increasingly perceive themselves as belonging to the group (Hogg, Abrams, Otten, & Hinkle, 2004; Jans, Leach, Garcia, & Postmes, 2015; Tajfel, 1974). While team identification has not been explored in relation to team formulation, previous studies demonstrate its impact on transactive memory system development and level. For example, research (described earlier) by Liao and colleagues, demonstrated the mediating effect of team identification in the relationship between communication quality and transactive memory system (Liao et al., 2015). Team members who identify with one another are more able to make use of each other's knowledge, through increased awareness and confidence of that knowledge (Kane, 2010). Links between team performance and transactive memory system have also been highlighted in a comprehensive review of transactive memory system literature (Peltokorpi, 2012), and longitudinal research has shown enhanced team performance is associated with stronger team identification (Solansky, 2011). Hence the relationship between communication quality and transactive memory system for team formulation might be at least partly explained through the effects that improved team identification has on enhancing communication quality in keeping with the study by Liao and colleagues (Liao et al., 2015).

Hypothesis Two: Team identification mediates the relationship between perceived communication quality and level of transactive memory system required for the task of team formulation.

4.1.3 Professional identification as a moderator of the effects of team identification on the TMS for team formulation

The present study examines whether professional identification moderates the relationship between team identification and the transactive memory system in the same way originally hypothesised by Liao and colleagues: Professional identification is hypothesised to influence the strength of the relationship between team identification and the transactive memory system (Liao et al., 2015). If professional identification fosters silo-working it will reduce the positive effect of team identification on the transactive memory system, as knowledge sharing required for the transactive memory system will be reduced. On the contrary, if professional identification brings sharing of resources held by professional sub-groups to the wider team, it will enhance the positive effect of the team identification on the transactive memory system by increasing knowledge sharing required for the transactive memory system. The ability of professional identification to moderate is therefore connected to the degree of relational distance it may create in the wider team, which can generate difficulties within team communication and coordination of specialised knowledge needed for a functioning transactive memory system (Liao et al., 2015).

These are conclusions supported by other studies examining the relationship between professional identification and team identification in teams. For example, the effect of professional identification, in which the relationship between team identification and the transactive memory system is strengthened, is demonstrated in a study of 47 tertiary healthcare teams (Mitchell, Parker, & Giles, 2011). This study found that where professional identities existed in the team, and there was strong inter-professional group openness, similar to the resource sharing described by Liao

and colleagues (Liao et al., 2015), there was a higher degree of team identification and teams were more effective in their performance of tasks, thus supporting the moderating effect of inter-professional group openness on team identification (Mitchell et al., 2011). Additionally, when specialisation of skills is enhanced within sub-group membership (or groups of professional identities), sub-groups may be clearer about those skills to be communicated with the wider team, needed to support goal attainment (Brown, Crawford, & Darongkamas, 2000). Team formulation literature delineates the role of psychologists in team formulation (see Berry, 2007; Johnstone, 2011), but the role of other sub-team groups such as psychiatrists, nurses and non-professionally qualified staff, remains under reported. Moreover, interactions between professional sub-team groups is also unexplored.

Other studies support the premise that professional identification can limit the relationship between team identification and the transactive memory system. For example, professional sub-groups can emerge in which the nature of the sub-group means that specialist professional resources are not sought by the wider team (Kreindler, Dowd, Star, & Gottschalk, 2012). Additionally, language used by professional sub-groups may not be conducive to whole team language or team understanding, required for goals and procedures (Hewett, Watson, Gallois, Ward, & Leggett, 2009). This was demonstrated in an ethnographic study of operating theatre professional sub-groups, where clear inequality between professions was observed (Finn, 2008).

Hypothesis Three: Professional identification moderates the relationship between team identification and the transactive memory system required for the task of team formulation, by regulating the degree of available shared team knowledge required for the transactive memory system.

4.2 Method

4.2.1. Participants

Teams were identified from an organisational directory of team names for in-patient and community multi-disciplinary adult mental health and learning disability teams in a National Health Service Trust in the North of England. From this directory a total of 155 teams were identified, however, it was not possible to identify which used team formulation. Recruitment spanned a six week period (April/May 2016) and involved direct recruitment with teams via their manager. In keeping with the definition of team, responses were considered representative of a team if two or more team members from the same team participated (Salas et al., 1992). All eligible people were invited to take part. The inclusion criteria were staff from clinical teams working in adult mental health or learning disability (including services for older people and forensic services), and included nurses, medical staff, psychologists, occupational therapists, other professionally qualified staff allied to healthcare (for example art psychotherapists) and non-professionally qualified staff such as support workers, engaging in team formulation. Individual and team anonymity was guaranteed (see appendix D). The study was approved by the ethics committees of the participating institutions.

4.2.2 Data collection and measures

Data was collected via the Qualtrics on-line platform (Qualtrics, 2016) (see appendix E for on-line survey questions).The survey was an online survey comprising 34 items including nine demographic questions about profession and use of team formulation.

Given that team formulation is known by other names, for instance, psychological case formulation (Christofides, Johnstone, & Musa, 2012), an operational description, originating in the UK Division of Clinical Psychology Guidelines on Formulation (Johnstone, 2011) was provided within the survey: 'Team formulation has been described as a shared understanding of the patient's problems, their cause and maintenance. It includes deciding on interventions to alleviate the problems'.

Measures in Study One replicated validated scales from the Liao study (Liao et al., 2015). This was with the exception of the TMS scale, which was amended to reflect the task of team formulation, rather than the ward based team discussions surveyed by Liao and colleagues (for example 'I am confident relying on the information that other team members bring to the discussion', was replaced by 'I am confident relying on the information that other team members bring to the team formulation discussion'). Internal consistency for sections of the replicated scale relating to each of the study variables was tested using Cronbach's alpha.

4.2.1. Communication quality (CQ)

Questions relating to CQ were constructed from a social contact scale used to examine intergroup contact between Muslims and Hindus in Bangladesh (Islam & Hewstone, 1993). This study confirmed the hypothesis that specific kinds of contact (for example, quantity and quality) are related to intergroup anxiety, perceived outgroup variability and out group attitudes. Liao and colleagues used findings from this study as relevant to CQ in the context of work-related contact, employing the question: 'In the context of work-related contact how would you describe communication within your team?' This had four related, seven point sub-Likert

scaled questions which rated CQ on usefulness, meaningfulness, positivity and pleasantness (Liao et al., 2015) (Cronbach's alpha .86).

4.2.2 Team identification (TI)

This scale is based on social identity theory that posits a person's self-concept partially develops from self-knowledge of their membership to social groups, alongside the emotional importance they attach to that membership (Tajfel, 1974). Three factors have been proposed as relevant to this model of social identity, namely centrality (level of importance attached to group membership), in-group affect and in-group ties (Cameron, 2004). Using Cameron's scale, Liao and colleagues asked about perceived ties to other team members (rated on a seven point Likert scale). For example; 'I really fit in with other team members', rated from strongly agree to strongly disagree (Liao et al., 2015) (Cronbach's alpha .88).

4.2.3 Professional identification (PI)

The extent to which a team member affiliates to the profession from which they derive (PI), (Hekman et al., 2009; Mael & Ashforth, 2001) was measured using three items from an occupational commitment scale (Blau, 2003) (Cronbach's alpha .85). Occupational commitment is the psychological link between an individual and their occupation, based on their feelings towards that occupation. Blau proposed and corroborated that occupational commitment has a four dimensional structure centred on the amount of positive feelings a person has towards their profession, their sense of obligation, perceptions of availability of comparable alternatives, and the investments that would be lost if they left their profession (Blau, 2003). An example question from this scale was 'I am proud to be in my peer group' which asked

participants to rate this on a seven point Likert scale; ‘strongly agree’ to ‘strongly disagree’.

4.2.4 Transactive memory system (TMS)

TMS measurement was aligned to Lewis’ (2003) scale used by Liao and colleagues. However, as exact details of amendments to this could not be elucidated from the Liao study, the entire measure of TMS devised by Lewis was employed (Lewis, 2003). This was minimally amended to capture specific team formulation TMS information. For example, the statement ‘Each team member has specialised knowledge of some aspect of team formulation’ replaced the original scale item of ‘Each team member has specialised knowledge of some aspect of our project’. Cronbach’s alpha was .91 for the amended combined scale, .74 for specialisation, .86 for coordination and .90 for credibility.

4.2.5. Analysis

Data was analysed using the Statistical Package for the Social Sciences version 20 (IBM, 2011). Data was appropriate for parametric testing. Bivariate correlation analyses tested associations between study variables. Continuous data were analysed using means, medians and standard deviations and categorical data were analysed for frequency. Individual responses were matched to team responses using a team coding system and individual level data was aggregated to team level data by the use of intra-class correlation statistical analysis.

PROCESS macro (Hayes, 2013) was utilised to test all hypothesised relations. This uses a conditional process analysis method permitting a bootstrap test of indirect effects in mediation at different levels of the moderator’s confidence intervals (CIs) (MacKinnon, Lockwood, & Williams, 2004). Bootstrapping produces

an empirical estimate of the sampling distribution of a statistic, by replacing samples from the original data set and then employing that data set to calculate effects. 95% CIs were estimated from 10,000 bootstrap samples allowing for non-normality of distribution of mediated effects (Preacher, Rucker, & Hayes, 2007). CIs are deemed statistically significant if values between the low (LLCI) and high (ULCI) do not contain zero (Hayes, 2013).

PROCESS Model 4 (simple mediation model) (Hayes, 2013), was used to obtain total and direct effects of the predictor variable (CQ) on the outcome variable (TMS) (H1) and estimates of indirect effects of CQ on TMS through TI (H2). PROCESS Model 14 (second stage moderated-mediation model) (Hayes, 2013), was used to test whether PI moderates the indirect effect of CQ on TMS through TI (H3). All analyses were performed with mean-centred variables.

4.2.6. Aggregation Analyses

Team level constructs of CQ, TI, PI and TMS were measured by individual level data. The assumption being that team member responses should be more similar to other team members from their own team than to team members from other teams (Bliese, 2000). Variance attributable to the team-level, including all variables, was examined using intraclass correlation coefficients ICC (1) and ICC (2). ICC (1) assesses variance attributable to team level and ICC (2) assesses reliability of team member responses (LeBreton & Senter, 2008). The acceptable cut-off value for ICC (1) is .12 (James, 1982), and ICC (2) is .60 (Glick, 1985).

The values for perceived CQ were [ICC(1) .83, ICC (2) .80, $df_1 = 83$, $df_2 = 249$, $F = 7.0$, $p < .001$], TI; [ICC(1) .87, ICC (2) .91, $df_1 = 83$, $df_2 = 166$, $F = 11.0$, $p < .001$], PI; [ICC(1) .78, ICC (2) .69, $df_1 = 83$, $df_2 = 166$, $F = 5.6$, $p < .001$], and

TMS; [ICC (1) .89, ICC (2) .83, $df_1 = 83$, $df_2 = 1162$, $F = 7.8$, $p < .001$]. Thus demonstrating that aggregation of individual data to group level was acceptable.

4.3 Results

4.3.1 Participant characteristics

Individual responses were returned from 652 participants. Participant data was not used where consent was not given ($n = 25$) and inclusion criteria were not met ($n = 91$). An open text option was given for 'team name' in order to determine number of participants from each team. Participants who left this box blank or gave an unclear response were removed ($n = 118$), as were participants who were a single responder from their team as the study focus was on teams ($n = 41$).

The remaining responses ($N = 377$) represented 57.8% of returned questionnaires, of which 76.7% were female ($n = 289$). The most common age group was 45 – 54 years; 44.6% ($n = 168$), and the most common educational attainment was degree level (BSc/BA level) 27.1% ($n = 102$). The majority of participants were trained nurses (51.2%, $n = 193$), followed by psychologists (11.1%, $n = 42$) and psychiatrists (9.3%, $n = 35$). Just under one third of participants had been qualified in their profession for longer than 20 years (28.9%, $n = 109$), and 3.2% ($n = 12$) in their profession for less than one year. Many had been with their team for more than five years (44%, $n = 166$), while 20.7% ($n = 78$) had been with their team less than one year. Participants taking part in team formulation less than one week prior to completing the survey was 55.2% ($n = 208$) and within the last month 27.3% ($n = 103$). 17.5% ($n = 66$) had taken part over one month prior.

Team level responses were received from 84 teams (54.2% of total approached), which for a correlated design is sufficient to achieve a power of 80% to detect a medium effect size. Responses ranged from two to 18 members per team.

Teams with three or more people responding numbered 56, representing 66.7% of the total team response. Team response by two team members, represented 33.3 % (*n* = 26) of total team responses received. Therefore the majority of teams were represented by three or more people.

4.3.2 Descriptive Statistics

Table 4.1 reports means, standard deviations and bivariate correlations for team level data. Bivariate correlations showed statistically significant positive correlations between CQ and TMS ($r = .50$, $p < .05$), CQ and TI ($r = .63$, $p < .05$, and between TI and TMS ($r = .44$, $p < .05$). Teams with higher perceived CQ had statistically significant higher levels of TMS ($r = .50$, $p < .05$). PI, although correlated with CQ, was not statistically significantly correlated with TI and TMS at the team level.

Table 4.1 Means, standard deviations and bivariate correlations for team level data

	M	SD	CQ	TI	PI
Team-level data (*N = 84*)					
1. CQ	6.01	0.44			
2. TI	5.82	0.61	.63*		
3. PI	5.41	0.61	.11	.16	
4. Transactive Memory System	5.62	0.40	.50*	.44*	.06

Note. Two tailed tests

* $p < .05$

4.3.3. Conditional Process Analysis Results

Figure 4.1 illustrates the moderated-mediation model.

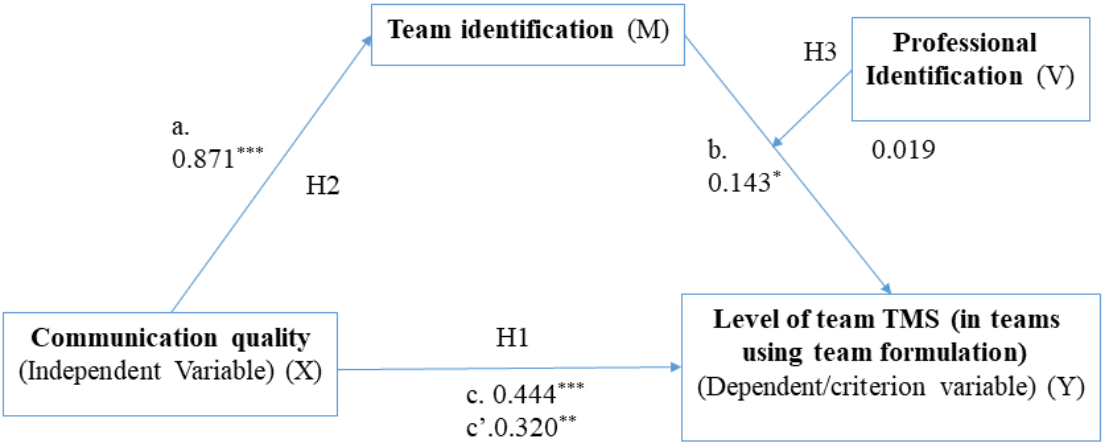


Figure 4. 1 Results of moderated-mediation model

Notes:

*$p > .05$

** $p < .01$

*** $p < .001$

a = effect of CQ on TI

b = effect of TI on TMS

c = total effect of CQ on TMS

c' = direct effect of CQ on TMS

Model 4 showed that CQ demonstrated a statistically significant total effect on TMS (total effect: c = 0.444, $p < .001$), therefore CQ acted as a significant predictor of TMS. Model 4 (simple mediation model) also showed the direct effect of CQ on TMS to be significant (c' = .322, p <.01), which suggests that TI does not totally mediate the relationship between CQ and TMS. However, the coefficient for the direct effect is smaller than the coefficient for the total effect, which could suggest that TI partially mediates the relationship between CQ and TMS. However, the indirect effect of CQ on TMS through TI included zero (95% CI), although it was

close to significance (indirect effect coefficient = 0.124; LLCI -0.021, ULCI 0.278) (H2).

Model 14 (second stage moderated-mediation model) also showed that indirect effects of CQ on TMS through TI were not moderated by PI (interaction coefficient = 0.019, SE = 0.076, t = 0.245, p = .807) and the CI of the index of moderated mediation included zero (index = 0.016, LLCI -0.122, ULCI 0.204).

4.4 Discussion

This study tested a proposed model of team formulation. It explicitly amalgamated team formulation, theories of team and professional identification and transactive memory system research. It hypothesised that three team factors, namely communication quality, team identification and professional identification, would each have a statistically significant impact on the level of transactive memory system for team formulation. Results confirmed only one hypothesis, namely that communication quality was a significant predictor of the transactive memory system.

A moderate positive and significant correlation was established between communication quality and the transactive memory system for team formulation supporting hypothesis one, with conditional process analysis confirming that communication quality acted as a significant predictor of the transactive memory system. This result is the first demonstration that team communication practices taking place prior to the team formulation discussion predict the strength of the transactive memory system held by the team for team formulation, and therefore the level of ability in performing team formulations. It is consistent with previous research that demonstrates a positive association between communication quality and transactive memory systems for clinical discussions (Liao et al., 2015).

Hypothesis two was not supported, and although a significant correlation was demonstrated between team identification and the transactive memory system, PROCESS analysis indicated that team identification did not mediate the relationship between communication quality and the transactive memory system. Although communication quality was significantly related to team identification, it did not make an independent contribution to the transactive memory system and the indirect effect was therefore not significant. This finding contradicts previous research conducted with health care teams (Liao et al., 2015). A few explanations could account for this difference in findings: First, the direction of the causal chain between communication quality, team identification and the transactive memory system may not be as straightforward as suggested by the model put forward by Liao and colleagues (2015). Team identification may be acting as a causal variable for communication quality (this would be supported with the degree of shared variance reported between communication quality and team identification in the present study), or it may be the transactive memory system which is causing team identification. Known as the feedback model, this can be ruled out when both mediator and outcome variables undergo manipulation before analysis (Kenny, 2018), and this may be a consideration for future research examining these variables. Second, both mediator and outcome variables may have been confounded by an omitted variable not measured in this study (Kenny, 2018). In this case, this might be the ability of team members to adopt the perspective of team mates or levels of team trust. Both of these variables are reported to impact on team identification (Gockel & Brauner, 2013; Tang, 2015). Finally, data was collected at a single point in time, without experimental manipulation, thereby reducing the ability of analysis to determine the strength of team identification as a mediator (Hayes, 2013). Other

factors have been shown to impact on team identification, which may have influenced its mediating ability, such as motivation to belong to the team, levels of team interdependence and cohesiveness (Solansky, 2011).

Additionally, study findings did not support hypothesis three – there was no evidence that professional identification moderated the relationship between team identification and the transactive memory system. This finding might be explained by the number of team members in the teams analysed. In the study by Liao and colleagues (Liao et al., 2015), teams with fewer than three members of staff were excluded, meaning that 126 teams were analysed on three or more team members. Within the present study, teams represented by three people numbered just over two thirds of all team responses analysed (n = 56). Analysing a higher number of teams with three or more staff may have given a better representation of the mix of professional identities existing within each team, ensuring that data was sensitive enough to capture distinct professional sub-group data via the validated scale questions asked. The lack of moderation effect could also be explained by factors impacting on the ability of professional identification to act as a moderator. For example work-place factors are known to impact on how professional identities operate within the wider team: First, geographical isolation of the sub-group, could limit the presence of professional sub-groups in the team (O'Leary & Mortensen, 2010). Second, role blurring could prevent the development of professional identities (Brown et al., 2000), and third, the impact of undertaking tasks incompatible with professional identity may also limit the formation of a professional identity (Miscenko & Day, 2016). These factors are potentially applicable to the participating teams. For example, work place geographical isolation of a sub-group might be observed when psychologists work across multiple teams, making it difficult to

provide continuous input into any one team, and to take part in tasks performed by that team, such as team formulation. Additionally, the role of professional identification reported by Liao and colleagues (2015) suggested that although it acted as a moderator, this was not in the way hypothesised. Instead, professional identification was considered to moderate by bringing additional knowledge resources to the team when team identification was low. This might indicate that professional identification was acting more like a mediator than a moderator in the study by Liao and colleagues, in that the addition of professional resources had a causal role in transactive memory system development.

Furthermore, in the study by Liao and colleagues (2015), participants were drawn from a range of multi-disciplinary health care teams, with mental health teams representing only 31% (n = 39) of the overall sample. Differences in communication styles of different kinds of multi-disciplinary teams may account for non-replication of findings reported by Liao and colleagues, as mental health teams accounted for 100% of the present study sample. Communication differences such as these can be observed in a study of communication within a surgical team (Lingard, Reznick, Espin, Regehr, & DeVito, 2002) when contrasted with a study of communication in a mental health team (Donnison, Thompson, & Turpin, 2009).

Overall, the results of Study One concur only partially with the study conducted by Liao and colleagues (Liao et al., 2015). This may have been due to the aspects outlined above, or differences in study design. For example, Liao and colleagues surveyed team members about a general clinical discussion, and their approach to the teams to collect survey data was to distribute by-hand to team members, rather than online. Further research examining the mediating effect of team identification on communication quality and the transactive memory system,

and the moderating effect of professional identification on team identification in its relationship to the TMS is needed to explain the difference in findings.

Nonetheless, along with Liao and colleagues (Liao et al., 2015) and other studies which also indicate influential relationships existing between the variables examined in the Study One (for example Kane, 201; Solansky, 2011), the present study found that moderate and significant correlations exist between communication quality and team identification, communication quality and the TMS for team formulation, and team identification and the transactive memory system for team formulation. Taking this into account indicates that further exploration is required in order to grasp the relevance of team conditions to the model of team formulation, which proposes that team processes influence team formulation activity.

Study One has three main limitations. First, participants were self-selecting. This kind of sampling means that the results are not generalisable and could explain the lack of observed mediation and moderation effects. In order to counter this, as many teams as possible, identified from the organisation's list of teams, were sent study information, and based on descriptions of teams from previous team formulation studies, the teams within this study were typical of teams that use team formulation. In addition, this kind of sampling does not preclude the use of mediation and moderation analysis in trying to understand the relationships explored in the study (Hayes, 2013). Samples of this kind are also acceptable within early exploratory studies of phenomena, as they signpost to the areas of study for subsequent studies (Sue & Ritter, 2012).

Second, the cross sectional design meant that change over time could not be examined in the team. This may have impacted on the depth of study findings, as all

variables in the study are dynamic human processes, and therefore may change over time (Kozlowski, 2015). To mitigate this, the survey used a validated scale, which had good internal consistency, as demonstrated by Cronbach alpha scores (Tavakol & Dennick, 2011).

Third, the definition used for 'team' meant that responses from 33.3% of teams, where only two team members responded, were used to aggregate individual results to a team level. However, careful consideration was given to the definition of 'team' used, which was supported by other peer reviewed studies also using this definition (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000; Mitchell, Parker, & Giles, 2011; Patel, Pettitt, & Wilson, 2012) and ICC calculations showed reliability at the team analysis level.

Despite these limitations, Study One makes meaningful theoretical and practical contributions to transactive memory systems within real health care teams. Theoretically, the findings expound the role of knowledge and knowledge sharing involved in team formulation, through demonstrating the importance of communication as a predictor and team identification as a correlate of the transactive memory system for team formulation. A practical first step for teams could be in understanding how the transactive memory system for team formulation is operating in their team, with a view to enhancing this, through improved team communication quality and team identification. Activities that promote top-quality information exchanges should be adopted, as these lead to internalisation of team goals, in turn underpinning knowledge coordination practices leading to an enhanced transactive memory system (Liao et al., 2015). For example the use of daily 'huddles' has been reported to lead to enhanced team communication and practice (Rodriguez, Meredith, Hamilton, Yano, & Rubenstein, 2015), whilst joint team training leads to

shared team goals (Liang, Moreland, & Argote, 1995). Enhanced communication practices also facilitate team member interactions, collaborative practice and understanding of others' team roles, thus increasing awareness of knowledge expertise in the team (Hollingshead & Brandon, 2003; Suter et al., 2009). Developing the team's TMS for team formulation as an explicit strategy may also prove useful. This tactic has been described in a case study of inter-team communication, where practices to enhance encoding, storage and retrieval of task relevant information were specifically targeted across cancer care teams, resulting in an improved transactive memory system (Henry et al., 2016).

To conclude, by demonstrating a predictive relationship between communication quality and the transactive memory system for team formulation, and the reported correlations, findings from Study One indicate that there are important team characteristics and processes to consider for team formulation. The study yielded unexpected results in relation to the moderated-mediation model, and understanding the results would be a valid choice for a subsequent study. However, equally interesting are the correlations that were identified between communication quality and team identification, communication quality and the transactive memory system and team identification and the transactive memory system. These correlations suggest a relationship between these variables, therefore they may add support to the inclusion of the relationships between team characteristics and team knowledge sharing in the model of team formulation (how Figure 3.3 on page 106 of the thesis relates to figure 3.5 on page 108 of the thesis). This suggests that a study design which facilitates a more in-depth understanding of *how* the variables relate rather than *if* they relate would be appropriate. Undertaking an in-depth exploration would therefore aim to build on the findings of the present study by adding to the

understanding of the relationship between variables. Research that uses a qualitative methodology which supports in-depth exploration, and which, in addition, involves a greater number of team members from each team is therefore proposed as a further study.

In order to ensure depth and clarity of focus, only one of the correlations from the present study is chosen as the focus of interest in the next study, reported in Chapter Five. The relationship between team identification and the transactive memory system for team formulation is chosen as it enables a focus to be placed on a wider team representation (for example in contrast to professional identification and its relationship to knowledge sharing, which would explore only sub-groups within the wider team). Team identification and the relationship it has with the transactive memory system for team formulation, is examined through the experiences of teams who use team formulation.

Chapter Five

Study Two: Team identification and the transactive memory system for team formulation

5.1 Introduction

The aim of this study was to explore the relationship between team identification (TI) and the transactive memory system (TMS) for team formulation. Further exploration is needed because the study in Chapter Four identified a positive and significant correlation between TI and the TMS for team formulation. This association warrants further examination to develop an understanding of the relationship between TI and the TMS within the model of team formulation, and to establish further support for the inclusion of these team processes in the team formulation model presented in Chapter Three. The objectives of the present study were therefore to apply a methodology that builds on the survey results of the previous study, to give a broader and richer exploration of the relationship between TI and the TMS for team formulation. Thus, data collected via semi-structured interviews held with adult mental health team members who experience team formulation, was subjected to deductive thematic analysis. This methodology involves identification of patterns and themes across a data set, enabling a comprehensive description of the phenomenon under scrutiny. It is chosen as a methodology for the study to follow as it can be used to identify patterns and themes that relate to existing theory (Braun & Clarke, 2013).

Before describing study methods and results, the introduction expands further on the evidence reported in the previous chapters for the relationship between TI and TMS.

5.1.1. Team identification and transactive memory systems

TI was defined in Chapter Three and identified as a phenomenon which might be of importance in a model of team formulation, due to its links to team communication (Hogg & Giles, 2012). In Chapter Four, TI was discussed as a potential mediator in the relationship between perceived CQ and the team formulation TMS. Building on the previous chapters, this present section considers the relationship between TI and TMSs, by outlining studies which report *any* kind of relationship. This is required to set the context for the present study.

The relationship between a TMS as a specific form of team knowledge sharing, and the relationship with TI has been reported in research. For example, in a survey study of 53 French companies, TMS was reported as a partial mediator of the relationship between TI and team effectiveness; although, the coordination component of the TMS fully mediated in this relationship between TI and team effectiveness (Michinov & Juhel, 2018). In a simple mediation model this suggests a relationship in which TI has a causal connection to a TMS (Hayes, 2013). In another study using a simulated decision making task, the language of 60, four person teams was analysed, with results showing that behaviours associated with higher levels of TI mediated between development of team cognitions and development of the TMS. Thus also indicating that TI precedes and leads to TMS development (Pearsall et al., 2010). In contrast, a study including 151 physicians and nurses working in French hospitals, reported that TMSs predicted perceptions of TI held by team members (Michinov, Olivier-Chiron, Rusch, & Chiron, 2008). This suggests a mutual relationship in which a TMS exerts a direct effect on TI. Swaab and colleagues (Swaab et al., 2007) demonstrated this reciprocal interconnectedness of TI and TMSs in an experimental study in which 52 groups of three people were randomly assigned

to role-playing situations involving negotiation during conflict. This study reported group identification as both a precursor to and product of a TMS. As a precursor, group identification and the relationship with the TMS were mediated by increased shared cognitions. As a product, the sharing of task related cognitions occurring during group interactions mediated the relationship between the group identification and TMS (Swaab et al., 2007). A relationship has also been reported between the level of conflict in a team and the team's ability to deploy their TMS. This was demonstrated in a survey study of 111 banking teams, where stronger social relationships resulted in lower levels of team conflict which enabled use of decision-making team knowledge resulting in higher team performance (Rau, 2005). Therefore, suggesting that social interaction, a building block for TI, (Postmes, Haslam, & Swaab, 2011) moderates conditions in which a TMS can develop.

However, a TMS is only one form of knowledge sharing proposed to occur in teams (see Chapter Three). Other studies which report on TI and the broader phenomena of knowledge sharing in teams (without specific mention of TMS) may also supply evidence for an interlinked relationship between TI and the TMS. For example, TI is reported to predict knowledge sharing (Kane, 2010), while also moderating the degree of expertise diversity employed in teams (both by the action of TI on communication) (Van der Vegt & Bunderson, 2005). Ryan and O'Connor (Ryan & O'Connor, 2013) demonstrated that tacit knowledge is acquired through social interaction, and people who like each other are more likely to want to find out what the other person knows (Brandon & Hollingshead, 2004).

In summary, TI and TMSs are reported to have a bidirectional relationship in each other's formation, and as suggested by Swaab and colleagues, both TI and TMS may act as catalysts for each other (Swaab et al., 2007). This is pertinent to Study

Two, as the previous research by Liao and colleagues reports TI only as a causal factor in TMS development (Liao et al., 2015), however, the studies described above show a more multi-faceted relationship. Understanding the relationship between TI and the TMS for team formulation through the experiences of team members may help to understand the nature of this multi-faceted relationship in more detail. The research question is: What can the experiences of members of adult mental health teams reveal about the relationship between TI and the TMS for team formulation?

5.2 Method

5.2.1 Study design

It is acknowledged that the majority of studies of TMS employ a quantitative methodology (Wildman, Salas, & Scott, 2014), and this is the case for those studies cited above. Using a qualitative approach may offer insights into how (rather than whether) TI and TMS relate to one another. This is supported by the use of a qualitative approach in other studies employed to explore team cognition. For example, semi-structured interviews were used with 36 participants to explore team coordination of knowledge in a large telecommunications firm (Espinosa, Slaughter, Kraut, & Herbsleb, 2007). In particular, in relation to understanding team cognitions, qualitative interviews can be perceived as less threatening than observing a team carrying out a task in vivo, and unlike cross sectional surveys, are more able to capture dynamic and interactive information (Wildman et al., 2014). Therefore, Study Two uses a qualitative approach, employing semi-structured interviews and deductive thematic analysis to explore the nature of the relationship between TI and the TMS for team formulation.

Exploring team formulation in this way offers a novel contribution to the understanding of the social process of TI, the cognitive team process of the TMS, and the relationship between these processes as experienced by team members for the task of team formulation.

5.2.2 Analytical approach

Thematic analysis can be applied inductively or deductively. In inductive thematic analysis identification of patterns and themes emanates directly from the data set. Deductive thematic analysis, used in the present study, approaches data from a pre-determined theoretical basis (Braun & Clarke, 2013). This approach was used as there is pre-exisitng theory from which the concepts of interest (TI and TMS) can be identified. This includes TMS theory, as proposed by Wegner (Wegner, 1987), and TI theory constructed from theories of social identity (Tajfel, 1974) and self-categorisation theory (Turner, Oakes, Haslam, & McGarty, 1994) (all described in Chapter Three).

A theoretical framework based in pre-existing theory was used to analyse the data by identification of instances of TMS and TI phenomena and where they may relate to each other. This was based on proxy markers of a TMS; specialisation, credibility and coordination (Lewis, 2003), and aspects of TI reported as research findings (Ellemers, De Gilder, & Haslam, 2004; Huettermann, Doering, & Boerner, 2017; Jackson, 2002; Liao, O'Brien, Jimmieson, & Restubog, 2015; Morton, Wright, Peters, Reynolds, & Haslam, 2012; Solansky, 2011) (See table 5.1).

A critical realist perspective is held which acknowledges that reality can be researched, but only through the prism of social influence (Braun & Clarke, 2013).

Table 5.1 *Theoretical framework used for analysis*

TI marked by instances of:		TMS marked by instances of:
• A deep cognitive and social bond between a person and a social unit. A sense of belonging. • Collective sense making, by people using other people as a point of reference • Same values, norms, goals, attitudes, behaviour standards that develops into cohesion and interdependency • Impact on self-concept • Placing team goals above own goals • Pride and respect in team work • Increased communication leading to evidence that team member knows what other team members know • Voluntary joint training • Turning to others in the team for help • Attitudes which express "our team is better than other teams" • Use of "we", "us" language in relation to questions about team formulation preparation/execution.	⟷ Evidence of any instances that demonstrate a link from TMS to TI or vice versa as experienced by team members.	• Specialisation ◦ The team knowledge stock – depth and breadth ◦ Understanding who has what knowledge ◦ Cognitive diversity/differentiated knowledge ◦ Domains of expertise ◦ Knowing who knows what ◦ Relying on others for their knowledge ◦ Using others knowledge to reduce own workload • Credibility ◦ How credible team members think their team mates knowledge is. ◦ Relying on each other for credible resource processing ◦ Confidence in relying on others knowledge ◦ Beliefs about the reliability of others knowledge • Coordination ◦ Working together well ◦ Smooth operations of task actions ◦ No confusion about who does what

A nominal group process was used to design interview questions relevant to the study aims (see appendix F for questions and underlying rationale). In this technique, experts are selected on their expertise and knowledge of the specific issue of interest (Fink, Kosecoff, Chassin, & Brook, 1984; Hsu & Sandford, 2007). For

Study Two, a multi-disciplinary group of five clinical staff from a neighbouring NHS organisation, considered as expert by virtue of their professional qualifications and experience, acted as an expert panel to review the semi-structured interview questions. Criteria for panel member choice were based on length of experience of team working in adult mental health (more than ten years), involvement in team formulation practice, and expert understanding (through qualification) of psychological case formulation. Anonymised panel member details are given in Appendix G. The panel was supplied with information about pre-existing theory for TI and TMS and asked to comment on the rationale behind each semi-structured interview question (its links to TMS and TI), and whether the question being asked would elicit the experience and perceptions of staff in relation to that aspect, and therefore help achieve the research aim.

The questions sought information about TI or TMS, or combined both phenomena into single questions. An example of a question pertaining solely to TI was 'How alike are you to other members in your team: What are the similarities (or differences)?' This was based on research showing that teams with a strong TI share norms and behaviours that develop into a sense of interdependency and cohesion (Henry, Arrow, & Carini, 1999; Tajfel, 1981; Wheelan, 2004). An example of a question solely relating to TMS was 'What pieces of knowledge are needed by the team to carry out a team formulation and who has that type of knowledge in this team?' This question was based on the proxy markers, specialisation, credibility and coordination of a TMS (Lewis, 2003). It is reported that TI has a helpful impact on team cooperation, through the routine expectations team members place on each other, suggesting that they are more likely to know what other team members would do in the same situation (Jackson, 2011). Therefore, questions linking both TI and

TMS were asked, for example; ‘What would your colleagues do if they were stuck with aspects of a formulation?’ This question links TI and TMS as it seeks to find out whether the team member would know what their colleagues would do (marker of TI, in keeping with the findings reported by Jackson, 2011), and this is in relation to the acquisition of team knowledge for team formulation (marker of TMS).

Taking this approach, the study aimed to provide specific insights, in particular: What the experiences of team members using team formulation can tell us about TI and the relationship it might have to TMS for team formulation, and how the relationship between TI and TMS for team formulation manifests in adult mental health teams.

5.2.3 Participants and sampling

Thirty individual team members were recruited (team one: N = 9, team two: N = 10, team three; N = 5, team four; N = 6). Participants were recruited from nursing (*n* = 19), psychology (*n* = 5), social work (*n* = 2), psychiatry (*n* = 2), occupational therapy (*n* = 1) and unqualified support work (*n* =1). Sixteen had taken part in team formulation within the last week, seven within the previous month and seven over one month previously. There were 22 female participants and eight males. The majority of participants were aged from 45 – 54 years. Most participants had worked with their team for one to five years (*n* = 14), followed by six to 10 years (*n* = 7), five people for under one year, and four people for longer than 10 years. This demographic information confirmed the sample group as appropriate to the research question, as it reflected the multi-disciplinary make-up of staff who routinely carried out team formulation, as described by previous team formulation research (For example see Hollingworth, 2014; Summers, 2006).

Teams were defined as at least two team members working on a common task (Kozlowski & Ilgen, 2006; Salas, Dickinson, Converse, & Tannenbaum, 1992); in this instance team formulation. Teams were purposively identified from the survey of 84 multi-disciplinary adult mental and learning disability healthcare teams reported in Chapter Four. In the survey, TI was found to correlate with the level of ranked TMS by team. Teams with higher TI also reported a higher functioning TMS for team formulation. This correlation concurred with the findings of Liao and colleagues (2015). Within the present study, a supervisory research team member, who did not know the teams (RW), identified four teams, by dividing the TMS rank into quartiles, and randomly choosing one team from each quartile. This randomisation process was necessary to ensure that maximum variation was achieved from the sample, with staff experiences captured from a range of teams where the TMS for team formulation was in different levels of development.

With their manager's permission, 94 team members were approached at team clinical meetings. All potential participants received written participant information at least one week in advance of written consent procedures, and for those agreeing to be interviewed, verbally again just prior to the collection of written consent and interview (see appendix H). Interviews lasted for 20-25 minutes and were conducted in a private room at the team base of the participant. Participants were given the option to have the interview conducted away from their team base.

5.2.4 Data collection

The source of data collection was individual one-to-one digitally recorded, semi-structured interviews. Interview questions were open-ended, developed from the research literature on TI and TMS (Ellemers et al., 2004; Huettermann et al.,

2017; Jackson, 2002; Lewis, 2003; Liao et al., 2015; Morton et al., 2012; Solansky, 2011; Tajfel, 1974; Turner et al., 1994; Wegner, 1987;).

Interviews were semi-structured to allow for flexible, deeper exploration of experiences and perspectives, and to encourage participants to expand on their answers when information salient to the research question was raised. Interviews were transcribed verbatim and data was anonymised using team and participant codes.

Researcher interpretations of the participant's experiences were checked for accuracy by asking one of the participants to comment on the transcript of their interview, in order to see if their account of team formulation experiences had been expressed accurately (Miles, Huberman, & Saldana, 2014).

A second reviewer (NHG) was employed to review and discuss researcher-derived codes to see if they were reasonable interpretations.

5.2.5 Data analysis

The data set comprised transcripts from 30 individual semi-structured interviews. Thematic analysis was utilised to find repeated patterns of meaning across the data (Braun & Clarke, 2013).

In order to manage the data set, participant transcripts were split into five groups on NVIVO (QSR International Pty Ltd, 2015) with each group containing six transcripts. Splitting the transcripts in this way aided reflective analysis, as each group of transcripts could be coded in turn. Selective coding was applied line by line to each transcript, looking for instances of TI connected to any aspect of TMS. Identification of specific instances was aided by use of the theoretical knowledge outlined in table 5.1. Transcript sections that did not pertain to TI and TMS were discarded. All participants were given a code name within NVIVO to maintain

confidentiality. Analysis and data collection ran concurrently. The steps taken are described in table 5.2.

Table 5.2 *Data analysis flow.*

Time	Data Analysis flow
↓	1. Transcripts for first six participants (named 'group one' in NVIVO) analysed for instances of TI and Transactive Memory System components (TMS).Those containing no instances were discarded. 2. Instances of interest within 'group one' transcripts given researcher derived codes and initial themes developed. 3. Interview questions re-considered and amended to ensure capture of information relating to research aim and central organising concept. 4. Group one transcripts and researcher derived codes sense-checked with independent reviewer, and codes amended where needed. 5. Further interviews held with next 12 participants (Split into two groups on NVIVO and named 'groups two and three') Transcribed and researcher-derived codes applied. 6. Researcher-derived codes checked with a participant to establish if the participant felt that the latent meaning of their interview was captured. 7. Groups one to three researcher-derived codes examined together to check for any common themes. Common themes grouped together as 'candidate themes'. 8. Further interviews held with remaining 12 participants (Transcripts split into two further groups on NVIVO and labelled as 'groups four and five'). 9. Transcripts for groups four and five examined and researcher-derived codes applied. These codes were examined for their fit with themes extracted from groups one to three. 10. Candidate themes for all five groups reviewed and checked against whole data set of 30 participant transcripts. Candidate themes developed further. 11. Each candidate theme was examined for potential sub-themes. 12. Themes placed with over-arching themes relating to central organising concept and research question (Examples of researcher derived codes and matching transcript sections are in appendix I).

5.2.6 Ethical considerations

The study complied with ethical standards for research. Ethics approval was granted by Durham University ethics committee and the Research and Development team of the host NHS organisation (Approval numbers: ethics committee 16/23.

R&D ref 0412/16). Permission to approach team members was sought directly from the relevant NHS senior manager. The study was assessed for risk and ethical guidance was drawn from the Ethics and Governance Toolkit available from Durham University. Participants were given the option to see their transcript, and withdraw from the study. Assurances were given about data security and anonymity. An empathic style of questioning aimed to overcome any issues of power imbalance between researcher and participant (Reinharz, 1992).

5.3 Results and discussion

5.3.1 Central organising concept: The relationship between TI and TMS

This study identified a clear pattern across the data, showing that the experiences of team members can reveal substantial information about the relationship between TI and the TMS for team formulation, indicating that they are closely bound. This occurred across overarching themes, themes and subthemes, and is consistent with the idea of a central organising concept (Braun & Clarke, 2013).

The impact of TI on the TMS for team formulation occurs as team members identify together within their work around a set of shared values, behaviours and goals, and as team members experience good team communication as part of their identification with one another. In turn, this directly influences the TMS in three key ways. Firstly, it enables staff to know who knows what in the team, and assign knowledge ownership to various team members. Secondly, it plays a central role in the perceived credibility of fellow teammates. Thirdly, it means that team members coordinate and use their knowledge easily with one another.

The results of each overarching theme, theme and subtheme are reported below. In order to keep themes tied to existing literature and the research aim, pre-existing theory was used to guide the search for instances of the presence of a TMS

in the data, and to name the overarching themes identified. For example the term 'directory updating' emanates from work by Wegner and colleagues (Wegner, Erber, & Raymond, 1991), and 'specialisation', 'credibility' and 'coordination' are all terms used for proxy markers of a TMS by Lewis (Lewis, 2003). Figure 5.1 gives an overview of the relationships between over-arching themes, themes and subthemes. Results and discussion are presented together to enable findings to be critically analysed in context to existing research.

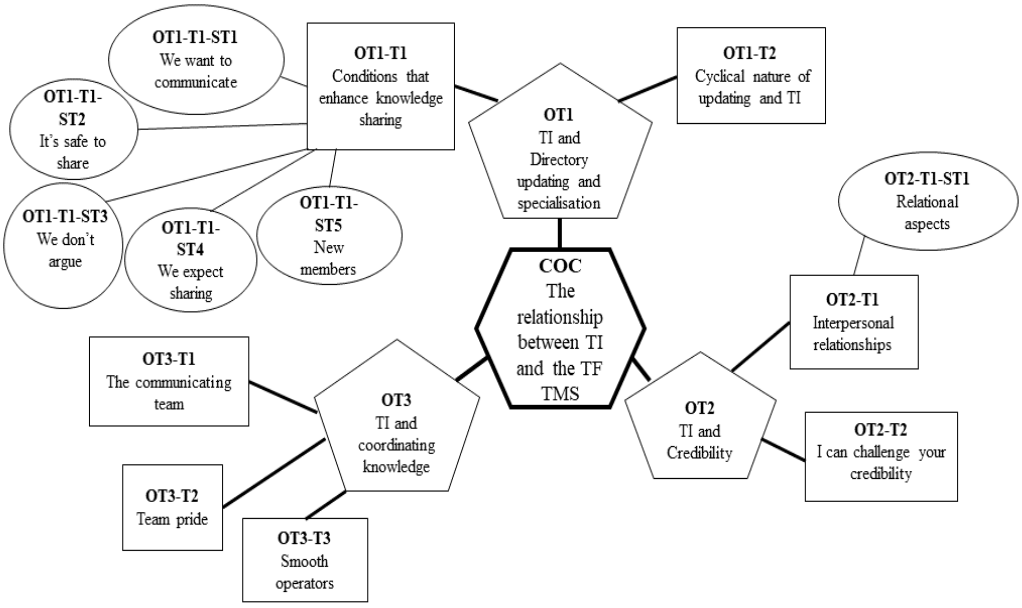


Figure 5.1. Relationship between overarching themes, themes and sub-themes (COC = Central Organising Concept. TI = Team Identification. TMS = Transactive Memory System. TF = Team Formulation. OT = Overarching Theme. T = Theme. ST = Sub Theme).

5.3.2 Overarching theme one: TI and directory updating and specialisation (OT1)

This overarching theme described participant's accounts of their experiences. It showed a clear relationship between TI, directory updating and specialisation (knowing the knowledge of other team members about team formulation). This fits

with research by Kane, which demonstrated that TI predicts knowledge sharing in teams (Kane, 2010), and research by Liao and colleagues (which informed the research design in Chapter Four) that found a positive association between perceived CQ and the TMS for clinical discussions was mediated at an individual level by TI (Liao et al., 2015). The finding also resonates with research by Pearsall and colleagues, which reported that TI mediates the relationship between team cognitions and the TMS in decision making tasks (Pearsall et al., 2010). Although Study Two has not examined the mediating effects of TI, it builds on the research by Pearsall and colleagues as it demonstrates that team members perceive TI as a team phenomenon which creates the conditions in which team knowledge is shared, and which helps the TMS for team formulation to develop.

Two themes were identified within this overarching theme, indicating that cohesive teams create and operate in conditions where a number of behaviours, values and processes foster and enhance knowledge sharing, and where TI and directory updating are mutually perpetuating.

Research examining inter-group relationships suggests that familiarity with each other positively influences the development of a TMS. For example, a study of 69 project teams found that team familiarity and trust enhanced the team awareness of where knowledge resided in the team (Akgun, Byrne, Keskin, Lynn, & Imamoglu, 2005). This knowledge location has been demonstrated in database development teams (He, Butler, & King, 2007) and student teams (Littlepage, Robison, & Reddington, 1997). However, other research has found a less clear link and while familiarity may be linked to identification, knowing a person does not mean that identification with that person will follow (Jackson & Moreland, 2009; Michinov & Michinov, 2009). A more closely related theory, which may underpin these themes,

is that of social identity theory, which postulates that people in 'in-groups' who identify and wish to remain within the group, will adopt behaviours and values of the group as they categorise themselves as part of the group (Tajfel, 1974). This could account for the experiences expressed within these themes where team members actively engage in behaviours such as directory updating that will enable them to know who holds the knowledge.

For example in the following section of transcript, the participant describes the team as friendly, with positive attitudes and reflective behaviours that help to increase their knowledge through discussion of perceived mistakes; a within-group quality that the participant thinks is unique to that team and which enhances their learning:

"something that feels quite unique about the team, it's a very friendly place to be and very welcoming and I think because people have got that kind of attitude they also have a very positive attitude for learning, though its not that we necessarily offer the best care or we always get it right or em that we don't make any mistakes but I think that what everyone wants to do is reflect and learn about what we maybe could have done differently em and for me my experience of this is that it is done in a really none threatening way so we can say quite difficult things to each other. But we are not kind of getting at each other and it's almost from that that it feels quite a unique thing, that there are not disagreements or arguments. It's more 'let's think and reflect about this case together' em and that's always a nice observation about something that maybe doesn't always happen in other teams".

5.3.2.1 Theme one: Conditions that enhance knowledge sharing (OT1-T1)

The data revealed that communication was the norm and team members identified with each other whether through formal or informal communication

processes. Team members wanted to share their knowledge, and felt safe doing so, even if they felt that their own knowledge was lacking. Indeed, there was an expectation that knowledge would be shared, and this sharing was required as team members worked interdependently on team formulation. These facets of the relationship between TI and the TMS for team formulation were divided into five distinct but interlinking subthemes.

Sub theme one: We want to communicate (OT1-T1-ST1)

In keeping with prior research communication was strongly linked to the development of a TMS (Ren & Argote, 2011), and communication is a key feature of teams where team members identify with one another (Huettermann et al., 2017). This subtheme highlights the communicative transactions that occur within teams, where team members identify with one another. One participant highlighted this transactive nature of communication, as they talked about how the team coordinated their knowledge to help the patient move forward towards recovery:

"but I still think that pulling together, voicing our information, sharing information and being able to say 'right then how are we going to move forward with this individual? '[…]' it is still going to be higher quality in theory than somebody just making the decision on their own, six eyes are better than two or three heads are better than one".

Other aspects of this subtheme highlighted that team bonding fosters and enriches open, informal and formal communication, where team members are more likely to share their information willingly, meaning that there is awareness of where the knowledge is:

"we chip in from all sides and getting the right path always prevails, it really does you know. I have a different opinion to say '[…]' people chip in and then I step

back perhaps and say 'well yeah you are right' and we move on. It's mainly always a team effort, it really is".

This willingness to communicate with each other was also experienced through a desire by team members to follow team process, created specifically to enhance team communication. For example, here a participant talks about formally organised team processes that feed into the formulation discussion:

"the supercell (an organised communication group within the team), *particularly the psychologist* (member) *in terms of formulation feeds into the huddle every day or largely every day as well, so the information and the way we very much think about the clients, the way to move forward with people is expanded upon"..*

Sub theme two: It's safe to share (OT1-T1-ST2).

This theme identifies that team members in bonded teams feel safe to seek the knowledge of others and share their own, even if they feel their own knowledge is lacking. Seeking and sharing information has been examined via a number of theories including Social Awareness Theory (Greenspan & Granfield, 1992), Social Capital Theory (Kramer, 2006; Sander & Univ, 2013), Social Exchange Theory (Cropanzano, Anthony, Daniels, & Hall, 2017), and Social Identity Theory (Tajfel, 1974). Building on these theories, knowledge sharing behaviour can be categorised to include: personal characteristics (such as confidence, educational background and length of work experience), network characteristics (social ties to others, quality of relationships) and mental motivations (such as the perception of the costs and benefits of sharing and perception of ownership of the knowledge) (Guan, Wang, Jin, & Song, 2018).

One participant provided an example of personal characteristics (feeling confident), network characteristics (being able to laugh together), and a mental

motivation (feeling safe expressing views in this team without being judged by colleagues):

"I think as well its important as well to feel safe enough to say these things and I think that's why the huddle works coz I don't feel that you are judged. We do have a bit of a laugh but I do think that people will take on face value what you are saying and you need to feel confident enough to put yourself out there and say 'well this is what I have done but I am not certain that this is right, can you help me?", and I think other people struggle to say 'I don't know what I am doing' em but I don't feel that in this team".

Sub theme three: We don't argue (OT1-T1-ST3)

The process by which teams deal with disagreement is an indicator of TI. Team members who identify with one another tend to cooperate in order to preserve the integrity of the group over the individual (Jackson, 2011). TI is reported to influence TMS development through the moderation of team conflict, which allows a team to deploy knowledge sharing (Rau, 2005). The present study did not examine TI as a moderator, however, it may support the research by Rau, as one of the perceptions of TI held by team members was that TI reduces arguments in the team (see OT1-T1-ST3), which in turn enables team members to share their specialised knowledge with each other.This was evident in participant responses when specifically asked about how their team dealt with disagreement. There was indication of team members backing down politely, giving way to others opinions, and in doing so increasing the formulation knowledge shared with each other;

"well I think can't say I have ever encountered much disagreement, but I guess, well I work along the lines of if there is a clear rationale and evidence. I am

sure people would listen to you, at the end of the day there is a way you have got to go isn't there? But, I think it would be something that you would certainly be able to note why, why not this way?, and there would be evidence for why and if, if it's something that someone knows more about than I do and has more experience to back it up, then it's good to go that way".

and evidence that discussion was the norm rather than argument, also helped with knowledge sharing:

"We are not kind of getting at each other and it's almost from that, that feels quite a unique thing, that there are not disagreements or arguments. It's more 'let's think and reflect about this case together', and that's always a nice observation about something that maybe doesn't always happen in other teams".

Sub theme four: We expect sharing (OT1-T1-ST4).

However, intermingled with polite, team-enhancing behaviour, there was also an expectation placed on team members to share their knowledge:

*"I remember it being quite a scary thing when I came to the team when I was first qualified, '[…]', I remember it being quite scary, '[…]' pressured to have all the answers, I think when you are the person that seems to be hosting it (*the formulation discussion*), there is that pressure to be able to come up with a solution".*

This may represent the determination of the team to meet the goal of formulating, and by expecting others to share their knowledge, increase the pool of knowledge in the team and enable directory updating. This fits with ideas expressed in literature about social cohesion, where social relations, a sense of belonging and orientation towards a common goal keep the group in a state of cohesion (Schiefer & van der Noll, 2017). This section of data also provided an example of information

allocation as originally described by Wegner. This aspect of a TMS occurs when the knowledge holding is allocated to the most relevant team member (Wegner, 1987).

Sub theme five: New members (OT1-T1-ST5)

This subtheme identified how new staff were brought into the knowledge sharing:

"so (since) I come into the team I have noticed that everyone is friendly, everyone is nice, if you approach anybody they are helpful. The more experienced members of the team will share their experience and are willing to help you and sort of give you hints, and it's like everybody has their own skills, like some people are better at '[…]' and they will share that skill with you, and if somebody knows something that somebody else doesn't they will tell you. And obviously the patients that I have got on my case load I didn't know them when I came in, but other people who have seen them in the past will give me hints about them".

And new team members are also encouraged to share their new knowledge to feed into the teams TMS for formulation:

"there are different people, like '[X]' come in newly qualified she will have a wealth of knowledge that I haven't got that she can add to".

Time invested in identifying the knowledge of new team members helps to develop the TMS, as team members are brought into the knowledge sharing aspect of a TMS, which increases the differentiated knowledge pool, and sharedness of the TMS. This occurs when existing team members socialise new team members to the TMS (Brandon & Hollingshead, 2004).

5.3.2.2 Theme two: Cyclical nature of updating (the directory) and TI (OT1-T2)

This theme identifies the role that the TMS (specifically directory updating), has in developing TI. For example, this participant identifies with other team

members in the team and finds sharing stories about previous experiences therapeutic:

"there are some very difficult situations that we all come across, it's good that we can kinda sound out to each other, it's a kind of therapeutic thing really to share with other people some of the good stories and some of the horror stories".

And in another example sharing knowledge seems to create a cognitive bond with the information giver:

"X is good at explaining all the different therapies, the different forms she might use to do the different tests, it's quite interesting yeah".

The reciprocal nature of TI and TMS reported in previous research (Swaab et al., 2007). This cyclical nature of TMS and TI is thought to occur when people communicate to learn about the expertise of each other. As they do so in the context of relating as team members, it provides the basis for TI to increase (Liao, Jimmieson, O'Brien, & Restubog, 2012).

5.3.3 Overarching theme two: TI and credibility (OT2)

Participants expressed a relationship between TI and their perceptions of their teammates' credibility. Two themes were identified: Perceptions of credibility arising from the relationship (not the knowledge held by the other person), and the ability to challenge individual team member's credibility, due to a strength of identification with each other.

Research has shown that judgements about the expertise of another originate from the history of conversations held with the other person (Wegner, 1986). Groups with a long history of working together and conversing, demonstrate greater precision in identifying expertise within the group (Wegner, 1986). Identifying expertise in others is a main tenet of a TMS (Wegner et al., 1991). This was coined

'credibility' within Lewis's proxy marker of the presence of a TMS measuring team member reliance on other team member's knowledge (Lewis, 2003). Additionally, group members may know where knowledge resides in their group, but not access the knowledge holder. Judgements about the expertise of another are also informed by the relationship the knowledge seeker has with the knowledge holder, their cooperation in giving that information (Borgatti & Cross, 2003; Lin, 1999), and the degree of trust in the relationship (Peltokorpi, 2012). This aspect of a TMS concerns teammates valuing what another team member knows (Borgatti & Cross, 2003). Relational aspects were demonstrated in the experiences of team members, as theme one shows.

5.3.3.1 Theme one: Interpersonal relationships (OT2-T1)

The relationship between knowledge seeker and holder is key to why particular team members are deemed as credible, for their knowledge of formulation. The theme highlights the shared histories of team members that enable awareness of the knowledge of others, but more importantly in what way the relationship and identification with the knowledge holder builds perceptions of credibility and underpins access to knowledge. This was seen repeatedly within the data. For example, in the following section of transcript a participant explains that they would seek knowledge from someone whom they trust and with whom they have a relationship:

"I take a little bit of (time) getting to know '[…]' myself and I do the same with other people. I like to get to know them and then you build up a relationship based on that, '[…]'. So I would go to the person I trusted most".

A diversity of reasons for relational credibility are set out in sub-theme one.

Sub theme one: Relational aspects (OT2-T1-ST1)

A number of aspects were elicited from the data, suggesting that team members hold other team members as credible for a number of reasons pertinent to their relational based perceptions of the other person. For example, when others have shared values, goals and behaviours:

"I think with everybody in a way, because we share the same goals and values you know, you sort of aspire to be like them, I mean with me only being qualified for '[…]' years I do think I put my own faith in them you know. You sometimes reach out to them and say how do you do this, how do you do that?".

Trust and closeness:

"It's absolutely vital '[…]' there's got to be a closeness, it's not the correct term and I can't think of what the correct term is, you have got to trust people".

Experiencing a personal bond:

"I think for me it would be chemistry with that person, then the further knowledge around how we would apply the formulation".

Colleagues demonstrating interpersonal skills that make them approachable, for example making themselves available and therefore accessible:

"[X] is very approachable, if I say '[X]' can I speak to you? '[…]', she always has the time to speak to you and she is always approachable and she is always kind and friendly and she is nice".

Finally, how the knowledge holder makes the knowledge seeker feel, as expressed by this participant when asked why they would approach someone for help:

"I don't think she makes you feel inadequate' […]' she is lovely".

The experiences of staff highlight where the relational based perceptions of credibility arise. This includes knowing what the other person knows, valuing that

knowledge, being able to gain timely access and personal interpersonal cost (Borgatti & Cross, 2003). Experiences identified by participants also support ideas based in social tie theory whereby time, affection and interaction underpin social interaction (Krackhardt, 1992).

5.3.3.2 Theme two: I can challenge your credibility (OT2-T2)

The data showed that team members who closely identified with each other were also able to challenge each other's knowledge of the team formulation. For example, in the following excerpt a participant expresses personal ability to challenge a team member within a formulation meeting:

"We were actually asked to do a case presentation in our team meeting so that we could feed that back to the rest of the team '[…]'. if we didn't have a good working relationship, if we didn't identify well with each other, then it would be quite difficult to come back and say 'ahhh you are wrong', so it was good to do that and to show that the formulation is adaptive and not an absolute".

Postmes and colleagues (2011) present a model proposing that teams can engage in team norm-inducing behaviours when they enter into rival understandings of realities, which in turn strengthen their TI. This occurs when a group is able to share their observations with one another (Postmes, Haslam, & Swaab, 2011). In the example above, the participant is sharing personal knowledge about the evolving nature of formulations, and in the process, may be building a team norm around how formulations should be understood to operate.

This participant was also a very experienced team member. Team members with greater team experience, who feel confident of their knowledge sharing role within the team and their ownership of the knowledge are also more able to share

their knowledge. This is particularly the case when sharing is experienced as benefitting personal emotion (rather than at emotional cost) to the sharer (Guan et al., 2018).

5.3.4 Overarching theme three: TI and coordinating knowledge (OT3)

TI and both retrieving and coordinating team formulation knowledge, were highly evident and clearly linked within the data, forming a distinct overarching theme. Within this, three themes were deduced; the experience of the nature of communication for team members within the TMS, the impact of team pride on joint working, and the impact on the united nature of team formulating.

The retrieval of knowledge *is* the transactive process that enables the coordinated use of the TMS, in which knowledge retrieval depends on communication between team members (Hollingshead, 1998; Wagner, 2014; Wegner, 1987). Communication is strengthened when team members identify with one another (Ashforth & Mael, 1989; Morton, Wright, Peters, Reynolds, & Haslam, 2012) and TI and team pride are closely linked (Chang, Kang, Ko, & Connaughton, 2017; Salice & Sanchez, 2016).

This participant expresses the coordination of knowledge clearly:

"so obviously for a formulation it's like gathering each other's information and putting it together. I could sit down and write down what I know, but that would just be one person's knowledge wouldn't it, and it would obviously be better than just thinking it because it would be down on a piece of paper and it would be more clearer… but then when you get everyone's information together and you are bouncing ideas of each other, it makes it a bigger picture doesn't it?".

5.3.4.1 Theme one: The communicating team (OT3-T1)

The data set showed that communication of a helpful nature is a key experience for team members who identify with each other. This happens both formally, through processes willingly adopted by team members, and informally via communication between team members. For example, here a participant gives an example of process driven communication, which they are content to follow because they perceive it is part of getting on with their teammates and moving the service forward;

"we all kind of get on really well '[…]' we just sort of just get on, we are just a cohesive team, '[…]' it is just a very well balanced, cohesive, fun team to work with '[…]' my own experience is if you get on with people then you are more likely to adhere, but kind of go with the process of how the service moves on and things".

This is also an experience expressed by another participant:

"I think it's not just the camaraderie that we have, it's the support we give each other I think. I know we are not talking about team huddles and things (referring to the fact that the participant was asked about team formulation) *but I think these things (huddles) are vital to the successful running of our team. It's where we are offered support and I think the good thing about our team is that we are always willing to offer our support to any of our colleagues".*

And in the following, this participant gives an example of informal coordinating communication:

"There are certain people here that I would definitely just go to, for example '[X]' or '[X]' as well. You just think 'I know I can go and talk to them' and there is no problem about talking to them and the people in the team as well".

Communication is the key transactive process that enables expertise recognition and knowledge coordination, as demonstrated in a number of studies.

For example, a study of expertise coordination in 69 software development teams, concluded that socially shared cognitive processes such as a TMS, develop and evolve through interactions between team members (Faraj & Sproull, 2000). Another study explored the communication ties in 12 organisational work teams, finding that communication was highly related to the ideas people held about others' expertise (Palazzolo, 2011). This was echoed in an overview of TMSs, which concluded that information retrieval is based on communicated knowledge of expertise (Ren & Argote, 2011).

The role of TI in the adoption of formal communication processes linked to the team's desire to do things well and their pride in their team. This is evident in the following linked sub theme.

5.3.4.2 Theme two: Team pride (OT3-T2)

Team pride was evident across the data set. Responses showing the experience of team pride happened particularly when participants were asked about what made their team stand out in the care given by that team:

"I think I would always gravitate towards this team because I really enjoy working in psychosis '[…]', I would say not just from being part of the team as in knowing everyone and getting on with people, I would say that we kind of we are the best because, yeah we are dealing with psychosis, and I think that there are some very experienced people in there. I think a couple of them have been there for 20 something years and they have kind of tried the affective team as well and they have had you know some of them have had a lot of years working on acute wards so there is a lot of good experience in there".

There was a sense that team pride rested on the knowledge of other teams, and their perceived lower status, cohesiveness and effectiveness. One participant expressed this in relation to another team that they had spent time with:

"well I did have three days in '[X team]' which I found extremely scary because it was chaos. So compared to being in there it made me appreciate the team we have, coz especially with the formulation '[…]', but I found that in '[X team]' it was absolutely horrendous".

Identification with particular groups (known as in-groups) enhances perceptions of how people feel they fit in to the social world, in turn enhancing self-esteem. Heightening the status of the in-group, whilst diminishing the status of the groups to which we perceive we do not belong; the out-groups, enhances this sense of self-esteem and belonging (Tajfel, 1981).

There was a sense of pride about team cohesion and communication, about working together in a voluntary way (not because of mandatory team processes instructed by the organisation), and in the knowledge-sharing and cooperative learning that took place. Feelings of admiration for team members were openly expressed, acting to strengthen identification with that team member further. Pride was expressed about how well preparations for team formulation were carried out. In addition, the interplay between team pride and identification appeared to act as a self-reinforcing cycle with each influencing the other.

From a philosophical point of view, it is proposed that hetero-induced pride (group-induced pride) is based on, and occurs through a process of group identification. Feeling pride in others who are in the same group as oneself, strengthens identification as people strive to be like the people whose attributes they admire (Salice & Sanchez, 2016). This was observed in a survey of 540 sports fans

that found that TI had a moderating influence on team pride and that team performance was a predictor of team pride (Chang et al., 2017).

5.3.4.3 Theme three: Smooth operators (OT3-T3)

The impact of knowledge retrieval and its coordination was observed in the smooth operation of task execution. This aspect of a TMS is about the synchronisation of differentiated specialised knowledge retrieved in order to achieve the task (Wegner, 1995). TI and TMSs are reported as linked in the manifestation of coordinated actions. This was demonstrated in a study specifically looking at TMSs in surgical teams, where the coordination component of a TMS was found to predict team affective outcomes, such as team perceptions of effectiveness and TI (Michinov, Olivier-Chiron, Rusch, & Chiron, 2008).

Participants expressed this coordinated action, when asked about the team's ability to perform tasks such as formulation;

"I guess it's if you get a client with a particular set of needs, you are allowed to think for yourself and work out how you can meet those needs along with the clients, (using) autonomy. But you also have the help, support from your co-workers as well, so if you are stuck with something you can always go back and ask and get that support, and maybe they will interject with a good idea, but it's always client focused".

"what usually happens is obviously it will come to me for discussion, and we will have a discussion and then I will say 'well maybe we need just a support worker to go out just to see, to see how they go within 12 weeks' (referring to a 12 week formulation – part of the team process of formulations), *and we put them in for 12 weeks* (formulation discussion) *and then you know it depends on what stage they are at. It really depends on their assessed needs, and I obviously talk to the nursing staff*

or the occupational therapist and we work it out together really you know. If there is just a 'one off' (piece of work) such as like a PIP interview, you know, '[X]' is going with one of her patients because she is best suited….she has done that, but sometimes, it maybe that we need a support worker to do it, or if somebody is at court (more examples of one-off pieces of work assigned to specific teammates) *or '[…]' so obviously with regards to a support worker we might put a support worker in for something like that".*

Functioning TMSs enable the smooth coordination of team member actions by reducing knowledge overlaps and increasing the amount of specialised knowledge used. This coordinated action leads to goals being reached more effectively, and teams can manage who is allocated to hold which specialised information, enabling higher team efficiency (Peltokorpi, 2012; Wegner, 1987).

5.4 General discussion

Study Two aimed to explore the relationship between TI and the TMS for team formulation through the experiences of 30 individual staff from four adult mental health teams who use team formulation. The results show that the experiences of staff can give a clear understanding of this relationship and offer early support for the inclusion of these team processes in the model of team formulation (presented in Chapter Three). The curiosity to explore the relationship between TI and the TMS for team formulation arose from the correlation reported between TI and the TMS for team formulation in Chapter Four, but lack of finding that TI mediated the relationship between CQ and the TMS for team formulation.

The main finding of the study is that the relationship between TI and the TMS for team formulation is closely intertwined, relating to all three aspects of a

TMS as described by Wegner (Wegner, 1987), and for which Lewis set out proxy markers of specialisation, credibility and knowledge coordination (Lewis, 2003).

Findings are discussed below, in relation to theoretical implications and practical applications for teams using team formulation. References are given to where the aspect of the relationship between TI and the TMS under discussion is located in the findings.

5.4.1 Theoretical implications

Study Two contributes to the team formulation literature by providing evidence of team processes, not previously considered in team formulation research, into the research of this clinical practice. It demonstrates how the team process of TI relates to a team TMS for team formulation.

By demonstrating a relationship between TI and the TMS for team formulation the findings challenge the inherent assumption within current team formulation research, that it is an activity undertaken in isolation, independent of pre-existing and developing team conditions known to be of crucial importance to team tasks. The findings support other research that reports the importance of team conditions. For example, team communication influences team effectiveness (Baker, Day, & Salas, 2006; Salas et al., 2008; Stout, Cannon-Bowers, Salas, & Milanovich, 1999), TI influences sense-making about team experience, collective team outcomes (Huettermann et al., 2017), team performance (Solansky, 2011) and task motivation (van Knippenberg, 2000). The TMS a team holds for a task has been clearly demonstrated as impacting on task effectiveness (Ren & Argote, 2011).

So far, this discussion has focussed on how the findings of the Study Two support, or are supported by previous TI and TMS research. The next part of the

discussion explores how the findings fit in relation to previous team formulation research (as reviewed in Chapter Two). This may hold implications for the model of team formulation offered in Chapter Three.

The systematic review yielded 10 research studies (Short et al., in press). A key finding of the systematic review was an absence of team formulation research, which considers the team conditions in which team formulating takes place (results are reported in Table 2.2: page 32). For example, the review located research where team members were trained together. However consideration of the team social factors and interactions taking place in training and during subsequent formulating meetings, which may have strengthened the learning was not included (Ingham, 2011; Ingham, Clarke, & James, 2008; Kellett, Wilbram, Davis, & Hardy, 2014; Maguire, 2006; Revolta, Orrell, & Spector, 2016). There is evidence from TMS research that training team members together can result in a more developed TMS, resulting in higher task performance (Liang et al., 1995). This is found to occur when the relationship between the TMS and task performance is mediated by social factors leading to greater knowledge coordination and group trust (Liang et al., 1995). Moreover, social interaction that occurs during joint training, can increase the degree of tacit knowedge acquired by team members (Ryan & O'Connor, 2013). Awareness of this relationship between group training, social interaction and an improved TMS represents a missed opportuntiy for team formulation research which has explored how to increase team formulating ability.

Furthermore, the results of Study Two suggest that the relationship between TI and the TMS for team formulation, enable the expression of positive team attitudes for care giving in relation to the patient. This was evident in a number of the transcripts (See OT1, OT2-T1, and OT3-T2) and was expressed through the

values team members perceived as existing in the team relating to helpful and positive care. A close relationship exists between attitudes and values, in which values predict attitudes and attitudes express values (Maio & Olson, 1995; Woodruff & DiVesta, 1948). Therefore, this finding may support team formulation research identified by the systematic review in Chapter Two, which found the presence of more helpful care-giving attitudes towards patients, after the use of team formulation (Berry, et al., 2009; Revolta et al., 2016).

In summary, the findings of Study Two align to and support previous quantitative research demonstrating links between TI and a TMS. There is also a small degree of alignment to previous team formulation research, however, this suggests that the present study could support some of the team formulation research, rather than being supported by it. This is due to the lack of team condition consideration afforded to team conditions in previous team formulation research. Including team conditions in team formulation research as the present study has, may indicate an additional direction for team formulation research, which if applied would increase the knowledge base and enhance understanding of team formulation.

5.4.2 Practical applications

Study Two explored and showed a relationship between TI and the TMS for team formulation. The relationship suggests that TI enhances the development of the TMS for team formulation (see OT1). This is the first known qualitative study to consider this relationship, therefore caution is required in translating the findings to clinical practice until further research confirms the current findings. However, there is a need for clinical teams to practice as effectively as possible (Mental Health Task Force, 2015). Previous research has demonstrated that, in mental health teams, clinicians with greater experience and expertise generate clinical case formulations

more effectively than less experienced and skilled team members (Dudley, Ingham, Sowerby, & Freeston, 2015). Therefore, teams should purposefully build on activities that enhance TI, and therefore the conditions that support TMS development (Michinov & Juhel, 2018). Strengthening TI improves a team focus on shared goals and values (Solansky, 2011). This can be achieved through activities that help the team to develop a shared history, develop goal interdependence, and reward team-based outcomes rather than individual team member outcomes (Solansky, 2011).

Furthermore, teams should examine the TMS for team formulation operating in their team, with a view to ensuring that the team knows which team members possess experience and skill, in order to enhance directory updating and development of differentiated knowledge within the team, which form part of the TMS (Wegner, 1987). This specific manipulation of team behaviours to develop a TMS has been successful for enhancing task performance previously. For example, Littlepage and colleagues showed enhanced task performance in aviation teams (Littlepage et al., 2016). Research has also demonstrated that a team TMS can be increased through simulation, and this may be a possibility for team formulation. For example, in a study involving 24 emergency trauma teams, the use of trauma simulations was found to significantly develop the TMS trauma situation intervention (Gardner & Ahmed, 2014). This could be translated to team formulation by using current formulation guidelines (Johnstone, 2011) and establishing existing team-differentiated knowledge, to highlight which team members would be best placed to have responsibility for the different aspects of knowledge required for team formulation. Attention to this level of team working is considered as an effective aid to improve TMS within a team (Kozlowski & Ilgen, 2006).

5.4.3 Limitations, strengths and future directions

The rigour of Study Two was increased through a number of actions. The use of a nominal reference group ensured alignment between research question and semi-structured interview questions. Gathering the experiences of 30 team members from four different teams also provided a rich data set, large enough to exhaust potential themes that might arise from the data (Braun & Clarke, 2013). A second independent reviewer was employed to review and discuss researcher-derived codes for consensus. In addition, one of the participants was asked to check research-derived codes applied to parts of their transcript, to establish if interpretation of experience expressed within the codes matched the meaning intended by the participant.

The main limitation of the study is that it does not examine the experiences of team members by distinct team role or discipline. This could limit the study, as a richer exploration of experience may have been possible. However, the decision was intentionally taken to explore and analyse teams as a whole, rather than by role, as this may have given different data, poorly aligned to the research question, which intended to focus on MDTs. Examination of team experience by discipline, or team role, might be more appropriately suited to a study of professional identification and the transactive memory system.

The participants who knew the professional role of the researcher prior to the interviews may have perceived the presence of the researcher during data collection as a hierarchical relationship. The potential for uneven power ratios between interviewee and interviewer is a recognised phenomenon in qualitative research (Ben-Ari & Enosh, 2013; Boucher, 2017), requiring careful consideration. In order to limit any power-imbalance, careful attention was given to the style of

interviewing. This was non-judgemental, and empathic in nature, using active listening, some self-disclosure and non-evaluative, verbal and non-verbal communication (Braun & Clarke, 2013).

The systematic review in Chapter Two highlighted that previous research into team formulation is based on case formulation adopted from one-to-one therapies and theories, which solely underpin case formulation for team use, without a focus on the team conditions and processes that may influence this. Guided by the model of team formulation developed from the evidence of the systematic review, Study Two enriches the understanding of team formulation by exploring team processes and theories. In widening the research focus (and in conjunction with the study reported in Chapter Four), Study Two offers a first examination of team conditions for team formulation, with the team as an emphasis in this practice (as distinct to individual team members). Within Study Two TI is experienced as facilitating the sharing and use of differentiated knowledge across the team, before and during the formulation. The findings give support for inclusion of TI and TMS in the model of team formulation and offer early evidence that team formulation should be underpinned by team theories, in addition to psychological case formulation theory. This begins to expand the theoretical evidence base for team formulation, by including theories that can be applied to teams. This is an early study into the team context, which should remain integral to future team formulation research. This will firmly establish team formulation research that acknowledges and applies team research findings and theories which may influence team formulation practice. Other team qualities that could form next steps for this are suggested within the model in Chapter Three.

Study Two examined the team context in relation to key aspects of one team knowledge sharing mechanism; namely TMS, and has demonstrated the value staff place on this team mechanism, through the experience of staff engaging in team formulation. Other forms of knowledge sharing should be examined in order to understand the influence they have in team formulation. For example, SMMs (Maynard & Gilson, 2014), also included in the proposed model of team formulation, are reported to influence team task performance through the mediating effects of TI (Swaab et al., 2007).

The role of one form of identification, namely TI, which takes place in teams, was examined in Study Two. Another important form is that of PI (studied as a moderator of the relationship between TI and the TMS for team formulation in Study One) (Mitchell & Boyle, 2015). PI occurs when people belonging to the same profession as others, identify closely with that sub-group within a wider team of professionals (Caza & Creary, 2016). The strong influence of PI means that it can occur even in the absence of personal knowledge of others in the sub-group and can compete or override identification with the wider team (Hekman, Steensma, Bigley, & Hereford, 2009). PI, reported to compensate for lack of TI in TMS development (Liao et al., 2015), is therefore of relevance to team formulation, as mental health teams are comprised of team members from a variety of professions (RCPsych, 2013), who hold differing professional models of working (Colombo, Bendelow, Fulford, & Williams, 2003).

5.5. Conclusions

Study Two has provided evidence of the relationship between TI and the TMS for team formulation. This understanding provides support for inclusion of TI and the TMS for team formulation in the model of team formulation proposed in

Chapter Three. TI is perceived as creating the conditions in which the TMS operates. The study demonstrates the bidirectional relationship between TI and the TMS for team formulation. The TMS is manifested through the shared goals and values held by team members as part of their team identification with each other.

The findings of Study Two show a link between team formulation and team conditions, suggesting that future team formulation research should consider team conditions as a legitimate focus for research. Clinical teams should be supported to engage in activities to develop TI which is acknowledged as helpful in creating the team conditions for TMS development. Clinical teams should also be supported to specifically develop the TMS for team formulation operating within the team.

Chapter Six

Summary and general discussion

6.1. Introduction and summary of thesis

The present chapter summarises the thesis and results of the studies. The aim of this thesis was to explore and develop conceptual foundations for team formulation. In order to achieve this aim, team formulation literature was explored via a scoping review (reported in Chapter One). This was followed by a systematic review of research on the definition and theories underpinning team formulation and a review of the impact of team formulation (Chapter Two). Next, a model of team formulation was developed, based on the findings of the scoping and systematic reviews (Chapter Three). This included a wide exploration of team research. From this model two studies were conducted. Study One examined four team conditions involved in knowledge sharing in the proposed model (Chapter Four). Study Two built on Study One by examining two of those conditions in closer detail (Chapter Five). A brief outline of each of the thesis chapters follows, before a general discussion that synthesises and captures the overall impact of this corpus of research on the conceptual foundations of team formulation. This includes a review of methodological considerations. Finally, implications for practice and directions for future research, already outlined in greater detail at the end of each previous chapter are drawn together.

6.1.1 Chapter one. Introduction to team formulation

Chapter One introduced team formulation through an exploration of the routes to its use in present adult mental health and learning disability teams in the UK and by reporting on results from a broad scoping review of literature on team

formulation, undertaken to establish current reporting of team formulation. The scoping review, which included opinion pieces, reports, research (published in non-peer reviewed professional journals, and peer reviewed journals) indicated that team formulation is viewed favourably, increasingly used to strengthen team understanding of patient problems and to guide care. However, the scoping review also identified a number of problems with the current evidence base for team formulation. First, the evidence base is small and research quality is poor in a number of studies. Second, there is a major lack of research examining the outcomes of team formulation, and although many descriptive pieces cite team formulation as important for both clinical and team outcomes, there are a very limited number of good quality studies actually examining outcomes. Third, the way in which team formulation is practiced is varied, including when and how to involve patients. This indicates a level of confusion about the practice, which may prevent teams who use team formulation from knowing what is the most effective or efficient way to practice, and the intended outcomes. Fourth, it is an adopted form of psychological case formulation, without its own distinct definition, conceptualisation or theoretical basis. This fourth issue was viewed (in Chapter One) as the major obstacle in advancing the understanding of team formulation as an evidence based team activity.

In keeping with the overarching aim of the thesis and based on the results of the scoping review, the thesis objectives were reported in subsequent chapters. Chapter Two reported on a systematic review. Development of a model of team formulation was reported in Chapter Three, and exploration of the model through two empirical studies was reported in Chapters Three and Four. These chapters are re-capped below.

6.1.2 Chapter two. Systematic review

The systematic review (Short et al., in press), identified 10 research studies, comprised of five uncontrolled, pre-post studies, three qualitative studies and two randomised control trials (Berry et al., 2009; Berry et al., 2016; Christofides et al., 2012; Ingham, 2011; Ingham et al., 2008; Kellett et al., 2014; Maguire, 2006; Mohtashemi et al., 2016; Revolta et al., 2016; Summers, 2006). Systematic review findings indicated a lack of distinct definition, denoting team formulation as indistinguishable from other types of clinical team meeting. In addition, the review established that team formulation is underpinned by theories relating to case formulation, with insufficient examination of the team's impact on the formulation. However, the review indicated that researchers have begun to examine the impact team formulating has on the team. The implications of the review findings indicated specific research problems as:

a) Little or no acknowledgement of how team formulation differs to case formulation. In particular, the team context in which it is practiced is consistently under reported. These problems arise from the lack of a distinct definition and model of team formulation, from which accurate measurement and systematic examination would be possible. Whilst team formulation remains without a distinct definition, research will continue to evolve under the assumption that team formulation is merely case formulation carried out by teams. This view has led to a number of studies defining team formulation as case formulation, and testing it against this definition. This may account for the under representation of the team context and dynamics in team formulation research. Whilst this aspect is overlooked, the impact on the formulation produced in the

context of interplay between team members, which occurs before, during and after team formulation remains unacknowledged, and may contribute to a weakened team formulation practice.

b) The systematic review reported studies that have started to look at the impact of the formulation on the team. These few studies demonstrate a promising awareness of team influences. Nonetheless, a specific team formulation definition and conceptualisation of team formulation could help establish whether team focused outcomes are an intended or unintended outcome of team formulation.

c) Case formulation theory on which team formulation rests, has received criticism regarding reliability and validity (Bieling & Kuyken, 2003; Kuyken, Fothergill, Musa, & Chadwick, 2005). Such issues inform an ongoing debate for case formulation, and indicate that team formulation is resting on contested theoretical foundations.

The systematic review concluded that despite these specific problems, team formulation continues to grow in use (for example see Johnstone, 2014). In addition, that there is a danger that the reported satisfaction expressed for team formulation by teams (for example see Ingham, 2011), will overtake the reported evidence for its application and outcomes.

The systematic review enabled the development of a proposed definition specific to team formulation. In keeping with the overarching aim of the thesis, the next step was to create a model that combined team-relevant and case formulation theories, to create a model distinct to team formulation. This model, and its development, was presented in Chapter Three of the thesis.

6.1.3 Chapter three. A model for team formulation

The theoretical model of team formulation was formed by synthesising team research with case and team formulation research and theory (see figure 3.1 page 104). The model follows an input-process-output (IPO) flow, with case formulation, organisational and team factors providing input into the process of team formulating. This leads to the output of a shared team understanding, hypothesis about the patient's problems and an agreed plan for addressing these. In turn, formulating impacts on particular team qualities, creating a cyclical flow, where outputs cycle back to influence inputs.

Examination of team research, case and team formulation research all indicated an emphasis on knowledge sharing as a factor integral to team working, and a model of team formulating underpinned by case formulation theory. For this reason, knowledge sharing was chosen as a starting point for team formulation research undertaken within this thesis, and arose from the model of team formulation in keeping with the thesis objectives. The first study (One) examined the social processes of perceived CQ, TI, (a shared team identity) and PI, (a private sub-group identity existing in teams) (Ashforth & Mael, 1989), in relation to team formulation; It examined these social processes alongside the cognitive process of the TMS for team formulation. These are all areas previously unexamined for the task of team formulation.

6.1.4 Chapter four. Social and cognitive processes underpinning team formulation.

The decision to focus Study One on CQ, TI, PI and the TMS for team formulation was due to the involvement of all four variables in knowledge sharing in

the proposed model of team formulation, as supported by research findings (Hollingshead & Brandon, 2003; Kane, 2010; Messenger, 2013). The study was based on the design of another study in which the same variables were examined (Liao et al., 2015). Both studies used a cross sectional survey method across healthcare teams, and the study hypothesis was the same – that CQ predicts the TMS, and that this relationship is mediated by TI, and the relationship between TI and the TMS is moderated by PI. However, the studies differed in sample size and characteristics, the team task under analysis and survey application method (as outlined in Chapter Four).

In the thesis, Study One data collection was carried out via an online survey of 377 staff from 84 teams within adult mental health and learning disability services. The findings of the study indicated that not all hypothesised relationships were supported. Conditional process analysis showed that whilst CQ predicted the level of TMS, TI did not mediate this relationship, nor did PI moderate the relationship between TI and the TMS. However, statistically significant correlations were found between CQ and TMS level, CQ and TI and TI and the TMS. Moreover, whilst PI correlated with CQ it did not significantly correlate with TI and TMS.

The main implication arising from the results of this study was that the level of TMS for team formulation can be predicted by quality of team communication, implying that teams wishing to improve their team performance of team formulation could do so through attending to communication quality in the team. This is in keeping with research that reports a functioning TMS supports the effective performance of team tasks (Akgun, Byrne, Keskin, Lynn, & Imamoglu, 2005; Faraj & Sproull, 2000). Furthermore, by demonstrating the presence of a TMS for team

formulation, the study also gave early support to the inclusion of TMS as a knowledge sharing structure occurring in teams using team formulation.

However, the findings of Study One differed to the findings reported by Liao and colleagues (Liao et al., 2015). In that study, all hypothesised relationships were supported and PI bolstered low TI by bringing additional knowledge resources to the TMS. Reasons for the differences in findings were discussed in Chapter Four as potentially emanating from the direction of causal chain between mediator and predictor variable or differences in study design and sample. However, both studies identified correlations between CQ and TMS, CQ and TI and TI and TMS. This created a curiosity to build on these findings and examine the correlations further, to indicate the nature of the association between the variables and how they might relate to each other in the proposed model of team formulation. This started with an exploration of the relationship between TI and the TMS for team formulation. The relationship between TI and the TMS for team formulation was chosen as a starting point for inquiry, specifically due to its importance in whole teams (a major focus of the thesis).

6.1.5 Chapter five. Team identification and the transactive memory system for team formulation

Building on the previous study, Study Two reported in Chapter Five explored TI and the TMS through a deductive thematic qualitative methodology, using semi-structured interviews with 30 staff from four teams who had taken part in the survey outlined in Chapter Four. This methodology was used in order to reveal more detailed information from study participants and to gain a deeper understanding of the relationship between TI and the TMS for team formulation.

Questions focussed on team members' experiences of identification with other team members from the same team, in the preparation and execution of team formulation and how aspects of the TMS were entwined within this. Study findings demonstrated that there is a close relationship between TI and the TMS for team formulation. The nature of the relationship endorses the positive correlation between TI and the TMS for team formulation found in Study One, by demonstrating the nature of the relationship. This was shown to develop through shared values, goals and behaviours, and quality team communications that were present and enriched by team identification. In addition, TMS development was experienced through relationships between team members and the perceptions they held about one another's knowledge. A major implication arising from Study Two was that TI can be related to a team task such as team formulation, giving support to its inclusion in the model of team formulation. The development of a team identity through values and attitudes endorsed in formulation activity, complements research that has suggested team formulation can help to change team cultures and attitudes towards patients (Berry, Barrowclough, & Wearden, 2009). This indicates that team formulation training could be offered to specifically support team identity development around particular helpful values and attitudes. This may be of relevance to researchers interested in the team outcomes of formulating as a team. Furthermore, Study Two indicated that teams aiming to improve team formulation ability, should be explicit about who carries specific elements of knowledge needed for team formulation, and actively incorporate this into their team formulation practices.

6.2 General discussion and synthesis of findings

This thesis offers a novel operational definition and theoretical model of team formulation, uniting for the first time, the practice of team formulation with relevant theories. The definition and the model were constructed by reviewing and synthesising research literature, which reported and commented on team, case and team formulation theory and research. The definition contains suggestions for who should be involved (a team and the patient for whom the formulation relates to), how the formulation should be enacted (through discussion, drawing on theory), what the formulation should contain (evolving, integrated understanding, personal meaning), and what it should result in (hypothesis and individualised plan of care).

Team formulation has been described as bringing about a shared understanding of the service user and their difficulties (Johnstone, 2011). The strength of the definition offered within this thesis is that it distinguishes the act of team formulating from other types of clinical team meetings, which may also bring about a shared understanding (for example a care-plan review meeting). This distinctiveness in meaning is in keeping with the explanation of what a definition is (Oxford Dictionaries, 2011). Previous definitions of team formulation, employing case formulation definitions, which have omitted the team involvement as a distinctive feature of a team formulation, were therefore insufficient to describe the specific phenomenon of team formulation. However, defining a phenomenon by drawing out comparisons with other phenomena is considered a weak test of a definition (Thouless, 1953). Other aspects that strengthen a definition include the precision of specification of all component parts, stated in a form that facilitates measurement, testing and corroboration from other researchers (Gillespie & Giardino, 1998; Milne, 2007). A potential limitation of the team formulation

definition proposed in the thesis, is that its key elements (team and formulation), carry multiple definitions (for example see Johnstone & Dallos, 2014; Mathieu, Maynard, Rapp, & Gilson, 2008), thereby potentially reducing precision of specification. The application of commonly used definitions of 'team' and 'formulation' addressed this concern. However, future corroboration of the definition remains a key requirement in order to strengthen validity. In addition to the provision of a definition, the model of team formulation supports, extends and challenges theory previously applied to team formulation, and acts as a guide to future systematic investigation.

Basing team formulation in theory is crucial, as theory brings meaning, enabling humans to determine and make sense of how components of a phenomenon relate to one another (Klein & Zedeck, 2004). Furthermore, having a theory enables the relationships between such components to be tested (Klein & Zedeck, 2004). Primarily, the proposed model of team formulation extends existing team formulation theory by offering a model against which future research can be employed (Kerlinger, 1969). It supports and extends theory proposed in previous team formulation studies through enhanced specificity to team theory. For example, previous studies theorise that team formulation impacts on staff qualities such as behaviour and attitudes (Berry et al., 2009; Berry et al., 2016; Christofides, Johnstone, & Musa, 2012; Ingham, 2011; Ingham, Clarke, & James, 2008; Kellett, Wilbram, Davis, & Hardy, 2014; Maguire, 2006). The model extends and supports these theories through the addition of team theories of team qualities, such as team climate, team identification, and shared mental models, hypothesised as potential mediators and moderators through which the relationship between team formulation and altered staff qualities may be explained by further investigation. This is based on

previous team studies demonstrating the moderating and mediating relationship between such aspects of team working and staff behavioural change (Cohen & Bailey, 1997; Salas, Sims, & Burke, 2005). Furthermore, Study Two (in Chapter Five), reports that the values and attitudes held jointly by staff, help build team identification, and that team formulation helps the team to articulate such values and attitudes *through* the sharing of knowledge and communication that occurs as part of team formulation.

Other theories mentioned in existing team formulation research centre on the integration of team knowledge (Ingham et al., 2008; Kellett et al., 2014). The team formulation model supports and extends these studies by clearly articulating and proposing the knowledge sharing aspect of team formulation, through team systems such as Shared Mental Models (SMM) and TMSs, and by acknowledging the role of communication, discussion and collaboration in arriving at a team formulation. Moreover, the model strengthens existing team formulation research and opinion, by proposing the explicit role of *case* formulation theory and constructs within team formulation practice.

Synthesising theory from different theoretical bases, in order to develop a new conceptual model, changes the view of an existing phenomena – in this case team formulation, named as such in key national UK documents (see Johnstone, 2011). Conceptual models provide a means for phenomena to be re-examined, and enable testing of previous factors through the lens of the new model (Kuhn, 1996). This new model of team formulation, which has synthesised theories, represents a challenge to existing team formulation research. It challenges previous research that has defined team formulation through the use of a case formulation definition (for example see Ingham, 2011). As this thesis has demonstrated, although team

formulation is adopted from case formulation, it is *not* case formulation per se (see Chapter One – introduction).

The model makes explicit the intended outcomes of team formulation, namely the generation of a hypothesis with treatment decisions based on this, and in addition, the impact that the act of formulating has on team qualities. The impact that team formulation has on the team can arise as an unintended outcome in some instances. This challenges existing research which has not made such outcomes clear, and which measures only the acceptability of team formulation as an outcome, without clarification or agreement on outcomes (for example see Summers, 2006).

Moreover, the new model of team formulation challenges existing research, which explores whether staff can be trained in team formulation, in the absence of a comprehensive theoretical understanding *of* team formulation. Finally, the model contests research that has not taken the full multidisciplinary team context into account, and the impact of this on the formulation and team (for example see Ingham et al., 2008).

6.2.1 Synthesis of findings

This section discusses the findings of both studies (One and Two) against the overall aims of the thesis. Both studies One and Two support the aims of the thesis. Study One explored four team factors in the proposed model. There is no known previous exploration of each factor in relation to team formulation. Therefore, in order to conduct the study, pre-exploration of each factor was required in which research from other kinds of teams (i.e. not health care) and tasks had to be synthesised to enable reflection on how the factor might apply to the task of team formulation conceptually. The findings of Study One support the inclusion of CQ, TI

and a TMS for team formulation in the proposed model, by demonstrating a general relationship to team formulation, but more specifically by reporting the importance of CQ as a predictor of knowledge sharing, proposed as a requirement for team formulation.

Study Two supports the aims of the thesis by exploring TI and the TMS for team formulation in greater depth, the results of which suggest TI and a TMS as integral conceptual components of team formulating activity.

Study Two built on the findings of Study One, by further examination of the correlated relationships found in Study One. The findings showed that TI and the TMS for team formulation are intertwined, and this might offer early evidence for how they are associated to each other. Furthermore, exploring TI and TMS via two different methodological approaches, adds to the strength of evidence that TI and a TMS are relevant in the model.

Jointly, both studies support the inclusion of pre-existing team conditions in team formulation, by demonstrating an influence on formulation activity in three key ways. First, Study One showed that team formulation operates through a TMS as staff answered questions in the survey which were able to capture the levels of a TMS for team formulation. Study Two validated this as answers to questions in semi-structured interviews directly indicated the presence of markers of a TMS, as put forward by Lewis (Lewis, 2003). Second, CQ is involved in the knowledge sharing aspect of team formulation. Study One confirmed this as CQ was reported to predict the TMS for team formulation. Study Two supported this by indicating that CQ is the medium through which TI occurs, creating the conditions for TMS development. Third, TI and the TMS for team formulation are involved in

knowledge sharing as proposed in the model of team formulation. Study One demonstrated a correlation between these two variables and Study Two revealed the nature of this association.

However, Study One found that TI did not mediate the relationship between CQ and the TMS for team formulation. Mediation signifies a causal relationship (Hayes, 2013), and Study Two findings suggest that TI might act in a causal manner (coordinated use of knowledge related to quality of team communications that were experienced as enriched and present due to TI). This suggests that the design limitations discussed in Chapter Four, may have influenced the findings of Study One. Further research which employs a different design to explore the way in which TI might mediate between CQ and the TMS is warranted.

6.2.2 Limitations and directions for future research

This section provides a general reflection of overarching methodological factors including strengths, limitations and opportunities for future research.

A major methodological strength of this thesis is that the research was guided by a proposed conceptual framework - the model of team formulation. The inclusion of the model was of paramount importance to assure conceptually valid research, provide consistency to the topic under examination and ensure that the research was underpinned by abstract and new thinking (Berman & Smyth, 2013). By employing abstract and new thinking, the thesis has synthesised previously disparate concepts into a framework, (organisational and team concepts, with case and team formulation concepts), enabling creation of a scaffold that characterises all of the relevant key concepts and theories to inform and drive the research studies (Wisker, 2012). There are four tests against which the credibility of conceptual frameworks can be

measured (Berman & Smyth, 2013): First, whether the framework provides a common language to describe the phenomenon under scrutiny. The team formulation model does this by applying the terms commonly used in team formulation literature (for example see Hollingworth, 2014; Johnstone, 2014; Lake, 2008). Second, the conceptual framework should foster a set of guiding principles, employed to guide research hypotheses. The description of the team formulation model in Chapter Three is explicit, in that team formulation follows an input, process and output model. It outlines the elements within each of the input, process and output stages and how these relate to one another, thereby acting as a guide to inform team formulation research hypotheses. For example, the flow from team characteristics of TI and PI to knowledge sharing in the model led to the choice of Study One. Third, the conceptual framework should act as a reference point, from which research questions emanate. The two studies reported in the thesis have clear links to the proposed team formulation model, in particular the team knowledge and knowledge sharing, as an input into team formulation. The model also provides a reference point for future research questions (explored below). Finally, the framework should provide structure to the corpus of research and examination. The research within this thesis is heavily reliant on this provision of structural flow, which has moved the understanding of team formulation from an activity carried out by teams that adopts the use of case formulation, to a highly succinct model of formulating activity undertaken by teams.

Limitations to this thesis have been considered in depth at the end of each chapter. Taken as a whole the main limitation of this thesis is that only a small part of the model of team formulation was tested by the studies presented in the thesis, and therefore the model remains largely theoretical. It is not yet established whether

other variables suggested are essential to the model. Nonetheless, this limitation presents opportunities for future research and the provision of a model acts as a guide to the choice of study focus. The model provides numerous areas for this, and the choice may be guided by parts of the model that have received the least attention in previous team formulation research, for example patient involvement, or quality of the team formulation produced, or the clinical outcomes of team formulation. These are major research deficits acknowledged in formulation guidelines, and which form crucial aspects of team formulation practice (Johnstone, 2011).

The results of Studies One and Two have provided directions for future research. For example, a study examining the quality of communication as a predictor for the TMS for team formulation could provide useful knowledge for improving the ability of the team for team formulation.

Building on the findings of Study One (the correlation between TI and the TMS for team formulation), Study Two focused exclusively on the relationship between TI and the TMS for team formulation. However, Study Two acknowledged that a focus on PI is also a crucial area to examine, and a team characteristic within the model reported by previous research to influence knowledge sharing (Liao et al., 2015), team communication (Grice et al., 2006), performance (McNeil et al., 2013; Mitchell et al., 2011), team conflict (Mitchell & Boyle, 2015) and group processes (van Knippenberg & Schippers, 2007). PI is commonly examined by survey method (for example see Grice et al., 2006; Liao et al., 2015; Mitchell & Boyle, 2015; Mitchell et al., 2011). However, examining TI by semi-strucutred interview (in Study Two of this thesis) demonstrated that the use of different methodology can yield rich research results. This may also be the case for a study of PI.

The method by which both studies (One and Two) examined the knowledge sharing involved in the task of team formulation was in a non-dynamic way (not longitudinal or observing practice in-vivo). Hence, the TMS for team formulation was not examined in the dynamic setting of team context in which it really takes place. This is a recognised shortfall within team research, criticised for continuing to overlook the relationship between team dynamism and performance of a task (Wildman et al., 2012). Although this thesis offers only a first examination of knowledge and knowledge sharing involved in team formulation, the survey methodology reported in Chapter Four remains the dominant tradition within research examining TMSs (Wildman et al., 2012). However, methods such as longitudinal or triangulation may provide an alternative approach to capturing the dynamic nature of teams (Wildman et al., 2012). Future research aimed at capturing knowledge sharing as an input into team formulation, should use data triangulation (Robson, 2002). This would employ direct observation of team formulation activity alongside interviews, designed to elicit staff views and scrutinising of patient records, in order to capture the recorded outcome of team formulation meetings. Within this thesis, the addition of subsequent qualitative interviews in the second study, may have overcome some of the shortfalls of the survey method, by attaining team member views through the use of semi-structured interview questions, which can capture unexpected accounts of the phenomenon under study (Braun & Clarke, 2013).

In summary, this section has discussed the ways in which the thesis supports, extends and challenges existing team formulation research. It has synthesised the findings of studies one and two to consider how their individual and combined findings relate to the aims of the thesis. It has evaluated the methodological

limitations of the studies, using these and the proposed model of team formulation as in indication of what the next steps for team formulation research should include.

6.2.1 Implications for practice

This thesis represents an important development for practitioners and trainers of team formulation, as it provides a theory based model that can be used to guide practice (Hafenbradl, Waeger, Marewski, & Gigerenzer, 2016). This could provide assurance to teams, and the health care organisations in which the team operates, that the practice of team formulation is theoretically driven. The use of the process and outcome boxes in the model can guide teams towards how team formulation should be enacted, and the intended outcomes. Use of the model suggests that teams can abandon the unsophisticated conversion of case formulation to team use, in favour of a more sophisticated, considered and theory based model, tailored to team use.

A second implication derives from the proposition that teams do not operate team formulation in isolation, but rather in an organisational and team context. This suggests that the recommended model could help organisations and team managers to maximise team formulation performance, through attending to organisational influences and team qualities. For example, organisations should support teams to adopt a culture that values knowledge and knowledge sharing in teams and across disciplines.

More specifically, teams can attend to the qualities within their teams, as highlighted by the model, as a blueprint for optimising the knowledge and knowledge sharing occurring between team members, proposed here as fundamental to team formulation. An example of this might be to specifically focus team attention on the TMS for team formulation that exists in the team, in relation to mental illness

and interventions. Knowledge is one of the most vital assets that an organisation has (Palazzolo, 2011). The key area of focus for the thesis has been knowledge sharing involved in team formulation, with positive findings reported across both studies for the presence of a TMS for team formulation. Addressing team tasks through the use of a TMS reduces the cognitive load on individual team members, whilst increasing the overall amount of knowledge held by a team (Palazzolo, 2011). Other areas in healthcare are beginning to test the possibility of TMS development to improve care (Fernandez et al., 2017; Henry et al., 2016). This indicates that it may be possible to specifically manipulate the TMS for team formulation, with the intention of enhancing the performance of team formulation. Teams should also adopt practices that create and engender quality communication and enhance team identification practices. For example, use of daily communication meetings has been shown to improve the quality of team communication (Rodriguez, Meredith, Hamilton, Yano, & Rubenstein, 2015).

A third practical contribution of the definition of team formulation and model, is that both could inform the development of a tool to measure the quality, practice and standards of team formulation. For example, both definition and model clearly signpost teams towards the elements needed for team formulation (as opposed to a case formulation). This will also have practical implications for those who train teams in the use of team formulation. For example, based in the findings of Study Two, team formulation training could be enriched by raising awareness of the TMS and discussing knowledge assignment and coordination in the training. Training could also be enriched by drawing the team's attention to the potential that team formulation has for acting as a vehicle through which team values can be expressed (Study Two findings).

Finally, the common strand to all the above implications is that the model could support consistency in a shared model of understanding of team formulation. SMMs (described in Chapter Three), also known as shared knowledge structures, facilitate team member collaboration. They are reported to mediate a number of team qualities. For example, team learning and planning behaviours, resulting in improved team coordination and performance (Stout, Cannon-Bowers, Salas, & Milanovich, 1999; Van den Bossche, Gijselaers, Segers, Woltjer, & Kirschner, 2011; Wildman, Salas, & Scott, 2014). This is of high importance for a team practice such as team formulation, which is reported to modify staff perceptions of patient behaviours (Berry et al., 2009) and which is used to understand, guide and design individually based interventions in adult mental health and learning disability services (Johnstone, 2014).

6.3 Concluding remarks

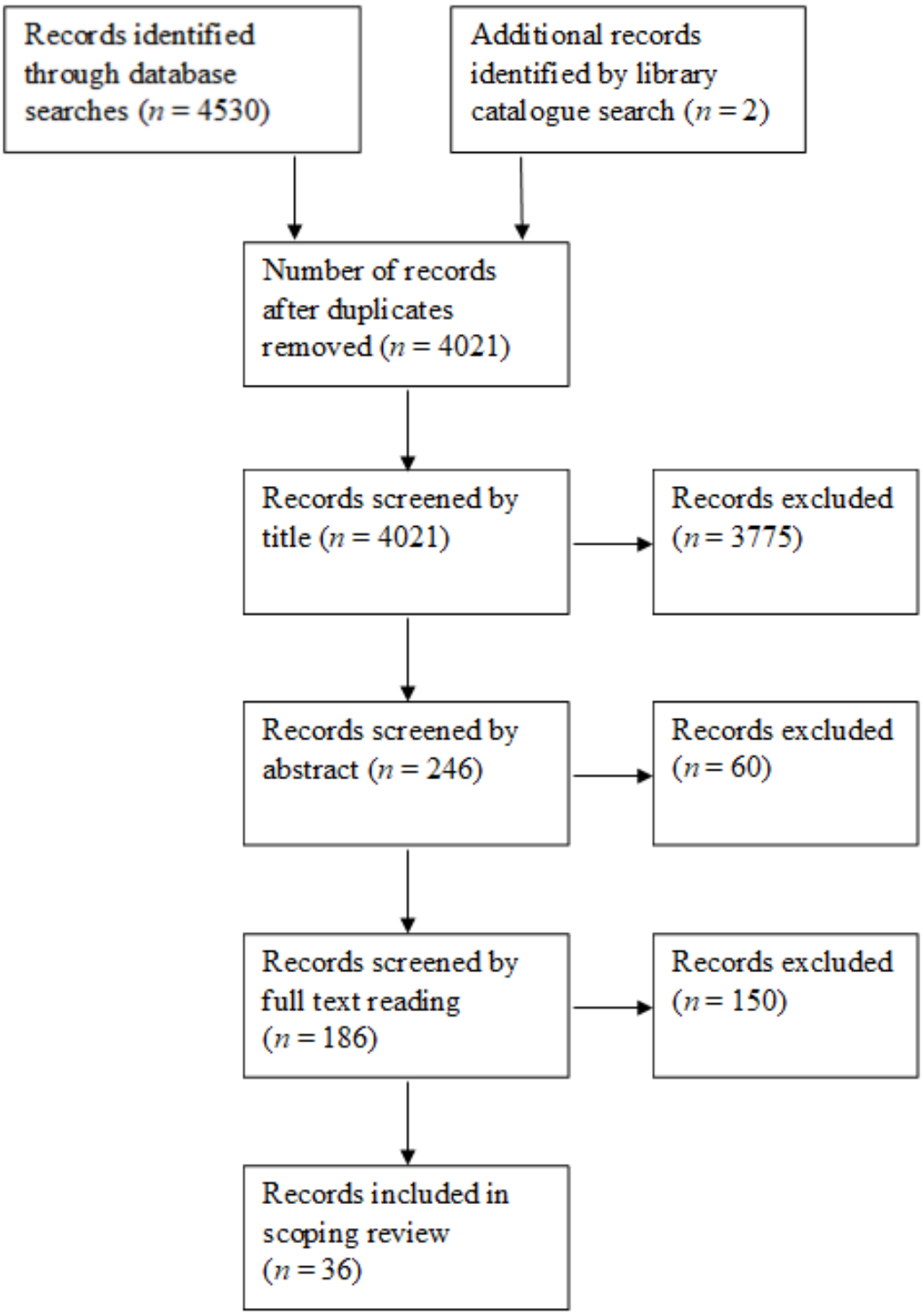
The aim of this thesis was to explore and develop conceptual foundations for team formulation as a distinct clinical practice to case formulation. The objectives to achieve this aim were met through a comprehensive exploration of the literature and research relating to team and case formulation, and organisational and team research and theory. In addition, synthesising this previously unrelated research enabled the development of a unique model of team formulation, from which two studies were conducted as an early test of one part of the model – team knowledge sharing for team formulation.

Through early exploration of ideas crystallised in the model, the thesis challenges current thinking on team formulation that assumes equivalency with case formulation. The thesis advances the understanding and raises ideas by which practice can be improved. A number of key challenges to future team formulation

research areas are highlighted, cited in the model as key to team formulation. Most pressing of these are the clinical outcomes intended by use of team formulation and patient involvement.

Current research into team formulation reports that it offers mental health and learning disability teams a substantial opportunity to offer individualised and useful care, through understanding of the causes and maintenance of mental health problems experienced by patients. In the NHS, it is imperative that teams feel confident that their practice is evidence based. This thesis provides a scaffold through which current limited evidence for team formulation can be strengthened and substantially increased.

Appendix A: Search strategy for scoping review (Cited in Chapter One)



(Appendix A continued) Search terms employed for scoping review (Cited in Chapter One)

1. Team clinical case formulat*
2. Team formulat*
3. Team case meeting
4. Formulat* meeting
5. Case conceptuali$ation
6. Case discussion
7. Team case discussion
8. Case planning
9. Team case planning
10. Clinical case meeting
11. Team clinical case meeting
12. Clinical formulat* meeting
13. Staff focused formulat*
14. Complex case discussion
15. Complex case forum
16. Multi-disciplinary team meeting
17. Cognitive case formulat*
18. Cognitive case conceptuali$ation
19. Cognitive case discussion
20. Cognitive behavio$ral formulat* meeting
21. Cognitive behavio$ral conceptuali$ation meeting
22. Case formulat* meeting
23. Team case conceptuali$ation
24. Team psychiatric formulat*
25. Team psychological formulat*

Appendix B: Poster presented at EABCT Conference (Cited in ChapterOne)

Appendix B. Poster presented at EABCT Conference

Durham University

Tees, Esk and Wear Valleys NHS
NHS Foundation Trust

Team Formulation: A scoping review exploring practice and evidence.

Valentina Short[1,2], Dr Helen Stain[1], Dr Lauren Mawn[1]
and Professor Joe Reilly[1,2]

Background and Aims

Formulation has been defined as "a provisional map of a person's presenting problems that describes the territory of the problems and explains the processes that caused and maintain the problems" (Bieling & Kuyken, 2003). Practices have developed whereby formulation is no longer exclusive to one-to-one psychological therapy sessions between client and therapist: 'Team' formulation is a growing practice across mental health and learning disability services. It initially emerged as a way of helping teams struggling with clients presenting with complex challenging needs, however latterly it is developing into a required practice at service pathway levels (Dexter-Smith 2007). The aim of this review was to explore the practice of team formulation and underpinning evidence base, offering a themed synthesis of literature pertaining to team formulation. It was prompted by a curiosity to understand more about what is happening in team formulation meetings, what happens as a result of such meetings and how the client experiences this formulation if at all. In addition whether formulations arrived at by teams accurately reflect client circumstances, and whether they comply with what a 'good' formulation is considered to be (Butler, 1998; Persons, 2008).

Method

An initial scoping search preceded a more thorough search strategy which included; Web of Knowledge, EbscoHost, (including Cinahl, Medline, PsycARTICLES and PsycINFO), OVID, Cochrane Library, Science Direct, Web of Science, Embase, SCIE and Google Scholar databases. These were searched during April, May and June 2013, without date boundaries.

Study selection: In keeping with the definition of 'formulation' offered by Bieling and Kuyken (2003) and definition of team offered by (Onyett et al, 1995):
Inclusion criteria: a). Qualitative/quantitative studies, service evaluations, audits, descriptive practice accounts, opinions, theses, guidelines, reports, reviews and book chapters. Research quality was not an exclusion factor. b). Teams working from any psychotherapeutically driven stance, e.g. CBT, CAT, psychodynamic psychotherapy, systemic or narrative therapy, from no clearly articulated stance or from within a 'medical model'. c) All client age ranges. d) All types of mental health and learning disability services.
Exclusion criteria: a) Any team literature not about an aspect of mental health or learning disability (for example surgical teams). b) Descriptions of team meetings/discussions that did not fit with the definition of 'formulation' as given earlier.
This resulted in 186 potentially relevant articles filtered further by use of a pro-forma. From this, 36 items of literature were identified as relevant to 'team formulation' in keeping with inclusion criteria.

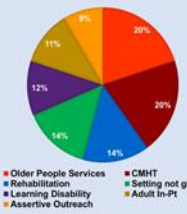
Coding of Studies: Coded in keeping with thematic analysis (Braun and Clarke, 2006) identifying recurrent themes within the literature. Emergent themes were appraised by a local practitioner (Dexter-Smith) who has implemented and studied team formulation.

Study Selection

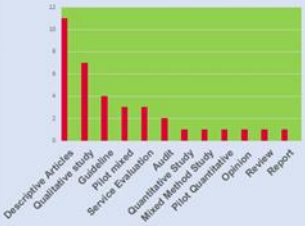
Formulation Model in common use

Results

Settings



Literature Retrieved



Thematic analysis

- **Team Formulation is perceived as improving team functioning:**
  - By promoting the use of a common team language which raises morale
  - By supporting team decision making
  - By reducing team 'splitting'
  - By bringing psychological understanding to teams where there has been no training
- **Team Formulation supports treatment planning**
  - By helping with prioritisation and ordering of interventions
  - By giving the team time to think
  - This has been demonstrated in a variety of clinical settings
  - Therefore considered to have potential for reducing care costs
  - And potentially reducing admissions
- **Team Formulation helps teams to understand the client**
  - By increasing psychological thinking in the team
  - By removing blame for complex behaviours
  - By helping staff to perceive clients with more compassion
  - By giving staff opportunity to reflect
- **Team Formulation promotes hope and recovery**
  - Particularly where the client is presenting with chronic, complex or challenging behaviours
- **Implementing Team Formulation**
  - More likely to be accepted by the team when offered on an informal basis and when staff need help with complexity
  - But using team formulation regularly will help to embed it
  - It can also be embedded as part of a pathway
  - Good leadership and facilitation are required for success
  - There are various processes and models that can be used
- **Training staff to use Team Formulation**
  - Best to train whole teams
  - Training raises ability at descriptive levels, but less so at explanatory levels
  - Training also increases staff empathy and understanding towards clients.
- **Client Involvement in Team Formulation**
  - There is some advice on how to involve clients
  - Clients have mixed feelings about involvement
  - Not all clients can be involved, but the team will still find formulation useful and possible
- **Staff Experience of Team Formulation**
  - There is an impact on staff feelings reducing anxiety, frustration and stress
  - Staff generally find it helpful
  - It improves staff confidence

Discussion

•Team formulation is being adopted increasingly at team and pathway level in the hope of enhancing understanding of clients and influencing treatment planning, particularly for clients with complex problems
•It is reported to have useful benefits such as increased team functioning and positively altered staff perceptions of clients.
•Synthesis of literature suggests many areas of team formulation remain poorly understood; the number of studies is small and a large proportion of literature is descriptive
•This review was aligned to a scoping review process (Arksey & O'Malley, 2005), however, the existing literature on team formulation is very diverse in method and scientific precision, thus limiting evidence-based conclusions.
•While research is growing in this area, our review highlights numerous shortfalls in the evidence for team formulation
•Most concerning is research on quality and accuracy of team formulations, possible links between team formulation and treatment planning, and impact of team formulation on teams themselves.
•Future research should focus on impact of training, definition of specific models being used, implementation and client involvement
•In addition, research is required to determine impact of team formulation on team functioning, positive or otherwise
•At present the practice of team formulation is largely in advance of supporting evidence

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2. Tees, Esk and Wear Valleys NHS Foundation Trust, United Kingdom

Contact: valentina.short@durham.ac.uk

Appendix C: Example definitions of formulation used in team formulation articles (Cited in Chapter One)

Team formulation paper reported in:	**Definition given:**	**Case formulation therapeutic orientation**	**Original source**
(Kennedy, 2009, p. 39)	"an hypothesis which (1) relates all the clients complaints to one another, (2) explains why the individual developed these difficulties, and (3) provides predictions concerning the clients behaviour given any stimulus conditions"	Behavioural analysis	(Meyer & Turkat, 1979)
(Onyett, 2007, p. 22)	"Formulations are detailed descriptions of why this person came to have this problem at this time; they draw on a range of psychological models, and one of their main purposes is to indicate the appropriate interventions. Unlike a diagnosis an individual formulation is unique to a given individual and continuously open to revision in light of experience...will take a systemic view that includes highlighting the circularity binding connected events, where for example the consequences of problematic behaviours, emotions or thoughts are contributing to the conditions that created the events n the first place"	Multi-perspective	(Owens & Ashcroft, 1982)
(Kerr, Dent-Brown, & Parry, 2007, p. 73)	"Reformulations […..] describe recurrent historic patterns of elating with others and of self-management. These represent both a 'joint making sense of' painter problems and their origins and also constitute a 'route-map' for therapy and or management"	CAT	(Ryle, 1990)

Team formulation paper reported in:	Definition given:	Case formulation therapeutic orientation	Original source
(Dunn, 1997, p. 19)	"goal oriented procedures, which fail to meet their [the patient's] goal; they involve circular sequences of thoughts, feelings, intentions and actions".	CAT	(Ryle, 1990)
(Craven-Staines, Dexter-Smith, & Li, 2010, p. 16)	"formulation involves establishing the narrative of a person's life, drawing together disparate information in an attempt to see the person's difficulties from a holistic perspective, viewing their life and situation as a whole"	Case formulation/CBT	(Butler, 1998)
(Lake, 2008, p.18)	"a theoretically informed set of hypotheses about what is going on for a service user".	CBT, CAT, systemic, attachment.	(Beck, 1976; Bowlby, 1997; Hedges, 2005; Ryle, 1990)
(Whomsley, 2010, p. 96)	"a defined provisional explanation or hypothesis of how an individual comes to present with a certain disorder or circumstances at a particular point in time"	Multi-perspective	(Weerasekera, 1996)
(Berry, Barrowclough, & Wearden, 2009, p. 40)	"psychological formulations provide a framework for drawing together a range of different factors that might contribute to the development and maintenance of problems"	Psychological case	(Kinderman, 2005)
(Ingham, Clarke, & James, 2008, p. 41)	"integrate different strands of clinical information, explain the development and maintenance of mental health problems"	Bio-psychosocial	(Kinderman, 2005)

Team formulation paper reported in:	Definition given:	Case formulation therapeutic orientation	Original source
(Summers, 2006, p. 341)	" a psychological case formulation is an attempt to understand a patient's difficulties through a set of hypotheses about what happens in his or her mind, and the links with present and past experience and actions".	Psychodynamic psychotherapy	(Alanen, 2000)
(Christofides, Johnstone, & Musa, 2012, p. 424)	" a hypothesis about a person's difficulties which draws from psychological theory"	Psychological case formulation	(Johnstone & Dallos, 2006)
(Thompson et al., 2008, p. 132)	" a central therapeutic tool, and is an active process in which the client is collaboratively engaged with the therapist, contributing to the creation of a strong working alliance".	CAT	(Ryle & Kerr, 2002)
(Wainwright, 2010, p. 39)	"Formulation is defined as a tentative explanation or hypothesis of the way an individual with a certain disorder or condition comes to present at a particular point in time".	Multi-perspective	(Weerasekera, 1993)

Appendix D. Participant information for on-line survey. Study One. Chapter Four

Individual and group processes involved in Team Formulation.

Information sheet for participants

Information about the survey:

This study aims to examine the processes underpinning team formulation. These processes include communication, how well team members identify with one another and how well they coordinate their knowledge. We are interested in team formulation because it links to treatment planning and supporting clients on their recovery journey through mental health services. If we can understand the team processes that support the task of team formulation, we may be able to suggest ways in which teams can enhance these processes. The study also aims to add to the evidence supporting the practice of team formulation.

Why am I being invited to take part?

You have been chosen to take part in this study as team formulation is a practice within your team and your input is valued. Your participation in this research study is voluntary. If you decide to participate in this research survey, you may withdraw at any time and you don't have to give a reason. If you do withdraw none of your data will be used.

What will I need to do if I take part?

You will be given an on-line survey which takes five to 10 minutes to complete. It includes some questions about your background (for example your job role), and then questions about communication in your team, how you feel about being in your team and where the knowledge is in your team for team formulation.

If I take part will all the information be kept anonymous and confidential?

All data from this survey are anonymised and confidential. We will follow ethical practice and all information will be handled in strict confidence. The researchers will need to know which team you work in as this study is looking at whole teams.

However individual and team data will be de-identified and reporting of findings will not identify an individual or team.

All data is stored on a password protected secure server and in accordance with Qualtrics database privacy and security statements (for further information see http://www.qualtrics.com/privacy-statement/ and http://www.qualtrics.com/security-statement/).

What are the possible benefits of taking part?

By taking part in this survey you are helping provide information that aims to improve the practice and evidence base for team formulation.

What are the possible disadvantages of taking part?

There is no expected risk of harm to taking part in this study.

Who do I contact if I want further information about the survey?

If you have any questions about the research study, before, during or after taking part, please contact Valentina Short (valentina.short@nhs.net).

How will I give my consent to participate?

When you click on the link you will be provided with this information statement and you will be asked the following:

ELECTRONIC CONSENT: Please select your choice below.

Clicking on the 'agree' button, indicates that:

- **you have read the above information sheet**
- **you voluntarily agree to participate**
- **you are at least 18 years of age and you are employed by Tees, Esk and Wear NHS Foundation Trust**

If you do not wish to participate in the research study, please decline participation by clicking on the "disagree" button.

agree disagree

Do I have to take part?

You do not have to take part in this survey if you do not wish to.

What do I do now?

Consider the above information and follow the instructions starting with whether you agree or disagree to take part.

This research has been reviewed by the Ethics Committee of the School of Medicine, Pharmacy & Health Ethics of Durham University and the Tees, Esk and Wear Valleys NHS Foundation Trust Research and Development team. Any complaints about this study should be addressed to Tees, Esk and Wear Valleys NHS Foundation Trust Research and Development team.

THANK YOU IN ADVANCE

Appendix E. On-Line survey questions. Study One. Chapter Four

TEWV and Durham University headers

Title: *Individual and group processes involved in Team Formulation.*

Participant Information Sheet page link

Consent to take part form (and by proceeding with the survey)

Team formulation has been defined as a shared understanding of the patient's problems, their cause and maintenance. It includes deciding on interventions to alleviate the problems (Johnstone, 2011).

1. **Please indicate where you work:**

Directorate (for example MHSOP)	Locality (for example Darlington)	Team name (for example Rowan Ward)

This information will be held confidentially and securely.

2. **Please mark the box that best describes…**

2.1 What is your gender?
Male
Female
Prefer not to say

2.2 What age group do you fit into?
18 to 24 years
25 to 34 years
35 to 44 years
45 to 54 years
55 to 64 years
Age 65 or older

2.3 What is your level of education (relevant to your current job)?
Secondary school qualifications
College of further education
NVQ
Undergraduate Certificate
Undergraduate Diploma
Degree
Post Graduate Certificate
Post Graduate Diploma
Doctorate

2.4 What is your profession?
Nurse
Psychologist
Psychiatrist
Social Worker
Occupational Therapist
Other
None

2.5 How many years qualified in this profession?
Student
Less than one year
1-5 years
6-10 years
11-15 years
16-20 years
Longer

2.6 Your job within the team?
Nurse
Support worker
Associate Practitioner
Psychologist
Psychological Therapist
Psychiatrist
Social Worker
Occupational Therapist
Manager
Other

2.7 How long have you been with this team?
3 months to 1 year
1 year to five years
More than five years

2.8 When did you last take part in a team formulation?
Less than one week ago
Less than one month ago
More than one month ago

3. **In the context of work-related contact how would you describe communication within your team?**

Please tick each box for the answer that you feel most applies:

3.1

Totally useless	Useless	Slightly useless	Neither useless or useful	Slightly useful	Useful	Totally useful

3.2

Totally superficial	Superficial	Slightly superficial	Neither superficial nor meaningful	Slightly meaningful	meaningful	Totally meaningful

3.3

Totally negative	Negative	Slightly negative	Neither negative nor positive	Slightly positive	Positive	Totally positive

3.4

Totally unpleasant	Unpleasant	Slightly unpleasant	Neither unpleasant or pleasant	Slightly pleasant	Pleasant	Totally pleasant

4. Please consider what it is like to be in your team:

4.1 I have strong ties to other team members

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

4.2 I really fit in with other team members

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

4.3 I really feel that I belong to my team

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

5. **Please consider your own peer group (for example if you are a support worker, consider other support workers, if you are a psychiatrist consider other psychiatrists). Your peer group is not restricted to your team.**

5.1 My peer group is important to my self-image

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

5.2 I am proud to be in my peer group

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

5.3 I strongly identify with my peer group

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

6. **Please consider your last team formulation discussion.**

6.1 Each team member has specialised knowledge of some aspect of team formulation.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

6.2 I have knowledge about an aspect of team formulation that no other team member has.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

6.3 Different team members are responsible for expertise in different areas of team formulation.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

6.4 The specialised knowledge of several different team members was needed to complete the team formulation.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

6.5 I know which team members have expertise in specific areas of team formulation.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

6.6 I was comfortable accepting practical suggestions from other team members on how to proceed with the formulation discussion.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

6.7 I trusted that other members' knowledge about team formulation was credible.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

6.8 I was confident relying on the information that other team members brought to the team formulation discussion.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

6.9 I never need to double-check information that others give me regarding team formulations.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

6.10 I have faith in others' expertise in team formulation.

Strongly	Disagree	Somewhat	Neither	Somewhat	Agree	Strongly

disagree		disagree	agree nor disagree	agree		agree

6.11 Our team worked together in a well-coordinated fashion in the last team formulation discussion.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

6.12 Our team had very few misunderstandings about what to do in the last team formulation discussion.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

6.13 Our team hardly ever need to backtrack and start over with a team formulation discussion.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

6.14 We accomplished the team formulation smoothly and efficiently.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

6.15 There was no confusion about how we would accomplish the team formulation.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

Thank you for taking part in this survey

Appendix F. Semi structured Interview schedule questions with question rationale. Study Two. Chapter Five

Question	**Aspect of interest to (i.e. TI, TMS components)**	**Rationale for question**
Tell me about your role in the team?	General opening question	
What makes *your* team stand out in the way care is delivered in general (and why do you think that)?	Communication	Teams with strong identification have pride and respect in their work. Teams with strong TI more likely to communicate. Communication needed for TMS development (Solansky, 2011).
How close are you as a team, and how does that impact on how you communicate information needed for the team formulation? Can you give me some examples?	Communication, TI and TMS	This links TI to CQ and the TMS for TF, as teams with TI share norms and behaviours that develop into a sense of cohesion and interdependency (Henry, Arrow, & Carini, 1999; Solansky, 2011; Tajfel, 1981; Wheelan, 2004)

Question	**Aspect of interest to (i.e. TI, TMS components)**	**Rationale for question**
What is communication like in this team for getting the team formulation done? What would happen to the communication for needed to get the TF done if you didn't identify with your colleagues?	Communication to TMS via TI	As a task the TF will get done via the use of a TMS. This question links communication to the TMS via TI (underpinning research model) (Liao, Jimmieson, O'Brien, & Restubog, 2012; Liao, O'Brien, Jimmieson, & Restubog, 2015)
How do you generally coordinate tasks in your team	TMS/task coordination/ coordination of knowledge/communication	TI encourages members to engage in collective goal building of a TMS. More likely to work together with strong TI (Jackson, 2011).
How does the team work together to develop the team formulation for a service user? What are the stages?	Expertise coordination Location of specialist knowledge Relational building of credibility	Team identification impacts on this aspect of TMS because as teams work together they get to know what others know (valuing expertise, knowledge location) and value who knows what in a relational way (Borgatti & Cross, 2003). Strong team ties are better for transferring tacit, complex knowledge (Hansen, 1999).

Question	**Aspect of interest to (i.e. TI, TMS components)**	**Rationale for question**
How alike are you to other members in your team? What are the similarities (or differences?)	General TI question looking out for all aspects of TMS in answer	Looking out for evidence of TMS factors within answers; e.g. shared values/attitudes/credibility of other team members/slick coordination/good source of knowledge. Research that links TMS to TI: (Liao et al., 2012; Liao et al., 2015). This is about shared goals.
What in particular makes you identify with other people in this team?	General TI question looking out for all aspects of TMS in answer	Looking out for evidence of TMS factors within answers; e.g. shared values/attitudes/ credibility of other team members/ slick coordination/good source of knowledge. Research that links TMS to TI: (Liao et al., 2012; Liao et al., 2015)
What would happen to this (last question) if you didn't identify with your team mates?	Coordination Location of specialist knowledge Relational building of credibility	Look out for evidence of impact on TMS factors within answers; e.g. coordination affected /not knowing who to get knowledge from or valuing colleagues input. Research that links TMS to TI: (Liao et al., 2012; Liao et al., 2015)

Question	**Aspect of interest to (i.e. TI, TMS components)**	**Rationale for question**
What training have you had in TF? Was this with the rest of the team? If yes what difference do you think that makes to the team and how you work together (as opposed to individual training) If no joint training, then what do you think the difference would have been to the team if it had been done jointly?	Supports building of credibility and location of specialist knowledge	Teams that train together identify together better. Joint training also helps team members to locate knowledge in the other team members and build up their ideas about who is credible (Liang, Moreland, & Argote, 1995).
How are responsibilities divided in the team for TF?	Expertise coordination. credibility	Coordination is a marker of TI (Morton, Wright, Peters, Reynolds, & Haslam, 2012). Again this question just shows the presence of TI, and not about its impact on TMS. But teams that can coordinate activities and cognitive load have a better TMS.

Question	**Aspect of interest to (i.e. TI, TMS components)**	**Rationale for question**
What pieces of knowledge are needed by the team to carry out a team formulation and who has that type of knowledge in this team (discipline)?	Credibility, knowledge location.	Team identification impacts on this aspect of TMS because in a group it's not just about having the knowledge, it's about who knows you have it and is willing to approach and listen to you. This is more likely to happen in teams with good TI (Morton et al., 2012)
If you have a question about a client's formulation, who is the most knowledgeable person in the team to turn to for help?	General TI question. Credibility, knowledge location.	Turning to others to help resolve problems is a marker of TI. Shows the team would use internal rather than external dialogues (Morton et al., 2012). Also shows positive evaluation of others' knowledge (Borgatti & Cross, 2003). Turning to others is a sign that the team member thinks the other team member is credible enough to turn to. A marker of TMS (Liao et al., 2015)

Question	**Aspect of interest to (i.e. TI, TMS components)**	**Rationale for question**
What do you value about their knowledge of TF?	Specialist knowledge. Credibility.	TI impacts on credibility and knowledge location as communication practices develop and increase when colleagues increasingly work together and identify more through shared goals, values and behaviours (Liao et al., 2015). In-group better than out-group? (TI)
What would your colleagues do if they were stuck with aspects of a TF?	Coordination. Knowledge re where specialist knowledge is.	TI has a positive effect on cooperation through normative expectations e.g. knowing what other team members would do in the same situation. Need to cooperate to coordinate (Jackson, 2011)
What happens in the team when there is disagreement about clinical care, how is it usually resolved?	General TMS development	As team identification increases so do social identities over personal identities. When this happens reaching team goals becomes more important than reaching personal goals. This happens especially with strong TI. When shared team goals exist in the minds of team members then the TMS for them can be developed (Morton et al., 2012; Solansky, 2011). TMS evident through shared goals.

Question	**Aspect of interest to (i.e. TI, TMS components)**	**Rationale for question**
What do you think would happen to the teams overall ability to do the team formulation if everyone just worked on their own, instead of involving team colleagues?	General TI question looking out for all aspects of TMS in answer	Looking out for evidence of impact on TMS factors within answers; e.g. coordination affected /not knowing who to get knowledge from or valuing colleagues input. Research that links TMS to TI: (Liao et al., 2012; Liao et al., 2015). Also looking out for increased personal cognitive load and reduced collective knowledge (Hollingshead, 1998). Could also link to credibility and lack of access to specialist knowledge.
I've asked you about everything I need to ask you about; is there anything you'd like to add…any final thoughts?		Closing question

Appendix G: Details of expert panel members used to evaluate interview schedule. Study Two. Chapter Five

Panel member	TC	PC	PR	TR	PK
Criteria					
Qualifications and relevant professional body membership	Doctorate in Clinical Psychology. HCPC*/BABCP* membership	Registered Mental Health Nurse. BABCP member	Doctorate in Clinical Psychology. HCPC*	Registered Mental Health Nurse. BABCP member	Consultant Psychiatrist.
Senior clinical team member for more than 10 years	Yes	Yes	Yes	Yes	Yes
Case formulation expertise	Trainer, supervisor, practitioner. Psychological formulation.	Accredited BABCP trainer, supervisor, practitioner. Researcher and author. Psychological formulation.	Trainer, supervisor, practitioner. Psychological formulation.	Trainer, Accredited BABCP supervisor, practitioner. Psychological formulation.	Trainer, practitioner. Case formulation leading to medical diagnosis and psychological understanding.
Involvement in team formulation	Practitioner, Team formulation group facilitator	Practitioner, Team formulation group facilitator	Practitioner, trainer, group facilitator, author.	Practitioner, group facilitator.	Practitioner, Team formulation group facilitator

*HCPC = Health Care Professions Council

*BABCP = British Association of Behavioural and Cognitive Psychotherapies

Appendix H. Participant information for semi-structured interviews. Study Two. Chapter Five

Adult mental health team members' reports of their experiences of team identification in relation to team formulation.

Participant Information Sheet

Information about the study:

This study aims to explore team identification in teams who use team formulation. Team identification is defined as the part of a person's self-concept in which they recognise and value being part of a team, sharing customs and behaviours which develop into a sense of unity and reliance on each other. It is a sense of belonging within a team. Team Formulation is a team task carried out by multi-disciplinary teams and is defined as development of a shared understanding of a patient's problems, their cause and maintenance. It includes deciding on interventions to alleviate the problems. We are interested in staff experiences of team identification and team formulation because research evidence suggests that strong team identification leads to better task performance. If we can understand the team processes that support the task of team formulation, we may be able to suggest ways in which teams can improve these processes.

Why have I been asked to take part?

This study is a follow up to a previous study that you or your team colleagues may have taken part in regarding team formulation. No information that could identify individuals was collected in the previous study however, your team has been identified from that study as a team that uses team formulation. You are being asked to take part in this study as your input is valued. Your participation in this research study is voluntary. If you decide to participate, you may withdraw your consent up to one month after you have taken part and you don't have to give a reason. If you do withdraw none of your data will be used.

What will I need to do if I take part?

You will be asked to take part in a 45 minute face-to-face interview. This will take place during your working day and at a meeting place convenient to you. This will be audio recorded and will include questions about your background (for example your job role), and then questions about how you experience being part of your team in relation to the task of team formulation.

If I take part will all the information be kept anonymous and confidential?

All information from your interview will be anonymised and confidential. Data from this study will only be accessible by the researcher and their supervisor. A Durham University approved confidential transcribing service will also have access to data for purposes of transcription. Ethical practice will be followed at all times by the researcher and all information will be handled in strict confidence. Information that identifies individuals or team names will be removed from the data analysis (e.g. names, places). If you would like to see a copy of the final research report you can do so by contacting valentina.short@durham.ac.uk.

All data will be stored on a password protected secure server and in accordance with Tees, Esk and Wear Valleys NHS Foundation Trust Research and Development policy and Durham University research policy. Data will be stored for up to five years.

Any issues which might be disclosed during the interview, which are beyond the scope of this research study, and which may relate to ensuring safe and effective patient care will be handled sensitively. Where necessary such issues will be communicated to the Trust in a way which will not compromise subject anonymity or the absolute duty of care.

What are the possible benefits of taking part?

By taking part in this survey you are helping provide information that aims to improve the practice and evidence base for team formulation.

What are the possible disadvantages of taking part?

There is no expected disadvantage or risk of harm to taking part in this study.

Who do I contact if I want further information about the research?

If you have any questions about the research study, before, during or after taking part, please contact Valentina Short (valentina.short@nhs.net).

How will I give my consent to participate?

One week after you have read this Participant Information Sheet the researcher (Valentina Short) will contact you by telephone to ask you if you are happy to take part. If you are, an appointment will be organised for your interview. You will be asked to sign a consent form before the interview. You can view the interview questions before you agree to take part if you wish.

Do I have to take part?

You do not have to take part in this research if you do not wish to. You can also withdraw your information for up to one month after the interview by emailing valentina.short@nhs.net.

Who has reviewed and approved this study?

This research has been reviewed by the Ethics Committee of the Department of Psychology at Durham University and the Tees, Esk and Wear Valleys NHS Foundation Trust Research and Development team.

THANK YOU IN ADVANCE

Appendix I. Example of Researcher codes and transcript examples for specialisation, credibility and coordination. Study Two. Chapter Five

Example relating to specialisation	
Overarching theme one: team identifications and directory updating and specialisation (OT1)	
Theme one: Conditions that enhance knowledge sharing (OT1-T1).	
DESCRIPTION OF THEME. Not only do people want to share their knowledge, they expect others to share and feel safe in sharing, even if this means exposing what they don't know. Communication is the norm in these teams. They communicate freely and widely, and will discuss rather than argue because of their bind with each other and will bring new team members into this way of working. As well as informal communication the teams are happy with processes that also aid communication and thus knowledge sharing opportunities. Communication helps to bring on individual TMs which when combined strengthen the overall TMS.	
Sub-theme 1: We want to communicate (OT1-T1-ST1).	
Because people are cohesive/bonded they communicate and therefore know where the knowledge resides. Teams that identify can place team goals ahead of own goals, adopting common values, goals, attitudes and behaviours. This is about the attitude to sharing in teams who are bonded. Team pride. The team have adopted processes which become the norm and which serve to bolster team identification as people fall into regular ways of working with each other. Also regular behavioural standards for how things are done help the team members to know where the team formulation knowledge is consistently. Communication is enhanced through these processes.	
RESEARCHER DERIVED CODES	MATCHING TRANSCRIPT SECTION (with ref)
GP1	
43. Team bonding fosters open communication of knowledge held (think about chipping in)	P17r5 X – yes like if you need to say something you feel comfortable saying it rather than trying to beat around the bush and things getting misinterpreted or you know it gets dragged out there is no need so you can just go in and say well no I am afraid that because of, as long as you can back up what you are saying then they listen
13. A sense of belonging/cohesion enhances understanding of who knows what in the team	P5r2 J – I think when we are all together and the experience of working in little offices, when we are all together you pick up things even if it's not kind of in formulations or team huddles or anything, you pick up, you listen to peoples conversations and you know what's going on. We do have some nursing assistants who are further up the corridor and they miss out, their

	offices up there and it is difficult to get them in because as you see we are running out of computers.
15. Team bonding means people are more likely to share their knowledge of formulating– team	P7r15 J – well yeah knowledge of the patient sometimes we've known them before and experience working with people with psychosis I have worked with them for a long time em I think local knowledge is quite useful knowing what's available and what resources we can use and how you can access them em and em commitment to do things like model lines I think that is important as well, being on board with that and like wanting it to work em and that's it

Example relating to credibility	
Overarching theme two: Team identification and credibility (OT2)	
Theme one: Interpersonal relationships (OT2-T1	
DESCRIPTION OF THEME. Many other factors are in play which indicate to a team member whether another team member is a credible person to seek information from. This theme is about implicit information which makes a person seem credible.	
Sub theme one: Relational aspects (OT2-T1-ST1)	
'Our bond makes you credible'	
SUB THEME DESCRIPTION. The bond that team members have with each other overrides what knowledge they may possess.	
RESEARCHER DERIVED CODES	MATCHING TRANSCRIPT SECTION (with ref)
GP1	
D. Credibility encourages contact with the knowledge holder for team formulation	P2r11 H – but XXX* is very good at kind of supporting you through that and if she has met the person she will prompt you and it does help and then other people inputting sort of triggers things.
H. A deep cognitive and emotional bond	P4r23 H – em one because I do identify that that's her, a lot of her role and she does she is

creates trust which promotes the idea of others credibility	happy for that to be part of her role and because I trust her judgement and I think she is exceptional so why would I go anywhere else
M. Team bonding gives credibility to others knowledge, even when it is limited	P13r15 M – or anyone, anyone who is more, you see some of the more junior members than myself know a lot more than me you can just throw it open to the floor and people will give you advice I keep on reiterating this and I hope I don't sound a bit, mm but it's a very good team
N. Trust/bonding/closeness overrides queries about the extent of the others knowledge	P13r16 M – it's absolutely vital it's absolutely vital it's got to be, what is the word I am searching for em there's got to be a closeness, it's not the correct term and I can't think of what the correct term is em you have got to trust people you got to trust peoples professional opinion you have got to make sure that there isn't somewhere underling or undercurrent of em, I am struggling em

Example relating to coordination	
Overarching theme three: Team identification and coordinating knowledge (OT3)	
Theme one: The communicating team (OT3-T1).	
DESCRIPTION OF THEME. Teams who identify communicate well in order to coordinate their knowledge for team formulation. This can be spoken, unspoken or straight talking communication.	
RESEARCHER DERIVED CODES	MATCHING TRANSCRIPT SECTION (with ref)
GP1	
xiii. Cognitive and social bond leads to working well together – smooth operations	P10r1 M – I think it's the kind of its not just the camaraderie that we have it's the support we give each other I think, I know we are not talking about team huddles and things but I think these things are vital to the successful running of our team, em its where we are offered support and I think the good thing about our team is that we are always willing to offer our

	support to any of our colleagues.
xiv. Closer more open communication about formulation within teams that bond leads to better work coordination	P16r15 X – em I think it depends who that person is involved with and who has got the most relevant and current involvement so I know someone's working with XXX* at the moment I would probably go to her em and also its maybe dependant on where the referral for OT has come from coz the referral could come from XXX it could come from the care coordinator so if they have referred to me and I am having difficulty or em …….. I am not part of the formulation coz it might be …… so I might go back to the referrer and say this is what we want to look at these are the problems, how long, what's been going on em I feel comfortable to approach anyone but maybe just depends who's
xv. Team bonding means others work is more accepted and this aids formulation coordination through easier communication	P17r17 X – if no team ID it would impact on the client coz I don't think, I think we would all be working at different paces, maybe not accept each other's information we have got to share em maybe not be so recovery focused as well I think that would probably fall by the wayside a little bit
xvi. Bonding developed over time enables unspoken coordination	P18r7 X – what does the team do to prepare for that discussion that formulation, that formulation discussion who does what I don't know, I think we work just together for quite a long period of time so you just kind of slot into your particular role
xvii. Team cohesion developed over time means unspoken formulation task knowledge coordination	P18r8 X – yeah its quite hard to em break down, try and explain to people what my role is and its quite hard to explain because I have done it for so long that if you break it down in bits component pieces you are like yeah well actually yeah, and I do do it in a certain way familiarise what you doing coz you've been doing it for that long I think it's the same thing with the team formulations em you kind of been working together for that long and you gel as a team it's hard to break down what it is

Appendix J. Outputs from this thesis

Year	Output
July 2013	Symposium convenor and presenter for scoping review reported in Chapter One. European Association for Behavioural and Cognitive Therapies. Marrakesh Conference.
March 2014	Poster presentation. Scoping review. Durham University research conference. School of Medicine, Pharmacy and Health.
July 2014	Poster presentation. Scoping review. British Association of Behavioural and Cognitive Therapies national conference.
Oct 2016	Poster presentation. PhD overview presented at PGR conference Durham University
Nov 2017	Verbal presentation to National Institute of Health Research conference for Nurses, Midwives and Allied Health Professionals. North East and Cumbria Network.
Feb 2019	Publication in Mental Health Review Journal for systematic review (Chapter Two). Manuscript reporting findings of Chapter Four is under review with Archives of Psychiatric Nursing journal.

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