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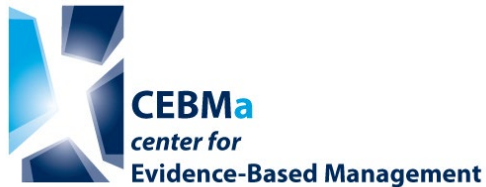May 2023

High-performing teams

An evidence review

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Acknowledgements

About CEBMa

The Center for Evidence-Based Management (CEBMa) is the leading authority on evidence-based practice in the field of management and leadership. It is an independent non-profit foundation providing support and resources to managers, leaders, consultants, facilitators or instructors, academics and others interested in evidence-based practice and decision-making. It enjoys the support of prominent universities including Stanford, Carnegie Mellon, the Australian National University, and the Free University of Amsterdam.

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Contents

1 Introduction

Rationale for this review

Novartis is one of the world's largest pharmaceutical companies, employing more than 100,000 people, and has been involved in several projects to enhance organisational effectiveness and performance. Since the effectiveness of teams and workgroups is a central factor in a company's performance, Novartis approached the Center for Evidence-Based Management (CEBMa) to undertake a rapid evidence assessment of the scientific literature with regard to the attributes of effective teams and workgroups, and the value of interventions to enhance these attributes. This document presents an overview of the findings.

What is a rapid evidence assessment?

Conventional literature reviews offer an overview of the relevant scientific literature on a topic, but their trustworthiness may be low. The criteria for inclusion of studies typically lack clarity and selection is often based on the researcher's personal preferences, bringing a risk of bias. For this reason, rapid evidence assessments (REAs) may be preferred. REAs use a specific research methodology to identify the most relevant studies on a specific topic as comprehensively as possible, and to select appropriate studies based on explicit criteria. Prior to inclusion, the methodological quality of the studies is independently assessed, again using explicit criteria. In contrast to a conventional literature review, an REA is transparent, verifiable and reproducible, significantly reducing the likelihood of bias.

Main question: What does the review answer?

What is known in the scientific literature about the attributes of effective teams?

Other issues raised, which will form the basis of our conclusion regarding the main question, are:

1. What constitutes a team?
2. What is team effectiveness?
3. How can the effectiveness of teams be measured?
4. What are the attributes (eg characteristics, conditions, composition) of effective teams?
5. What interventions influence team effectiveness?
6. What is known about the reliability and validity of team effectiveness models?

2 Methods

Search strategy: How was the research evidence sought?

Three databases were used to identify studies: ABI/INFORM Global, Business Source Premier and PsycINFO. The following generic search filters were applied during the search:

1. scholarly journals, peer-reviewed
2. published in the period 2000 to 2019
3. articles in English.

A search was conducted using combinations of various search terms, including 'performance', 'effectiveness', 'team' and 'group'. We conducted 10 different search queries and screened the titles and abstracts of 993 studies. An overview of all search terms and queries is provided in Appendix 1.

Selection process: How were studies selected?

Study selection took place in two phases. First, the titles and abstracts of the identified studies were screened for relevance. In the case of doubt or lack of information, the study was included. Duplicate publications were removed. This first phase yielded 142 studies. Second, studies were selected based on the full text of the article, using these inclusion criteria:

1. study type: quantitative, empirical studies
2. measurement: studies in which relationships among team attributes, interventions and outcomes were quantitatively measured
3. context: studies related to workplace settings
4. trustworthiness level: only studies graded level C or above (see below).

In addition, the following exclusion criteria were applied:

1. studies of ad hoc teams formed for immediate task performance, such as emergency teams
2. studies of dyadic teams
3. studies measuring the effect of leader attributes on team effectiveness.

This second phase ammended the total to 70 studies. An overview of the selection process is provided in Appendix 2.

Critical appraisal: What is the quality of the studies included?

The overall quality of the included studies was moderate to high. Of the 70 included, 31 were controlled studies and were therefore graded level B or higher. The remainder were uncontrolled, longitudinal studies, and so were classified as level C or lower. An overview of all studies included and their year of publication, research design, sample size, population, main findings, effect sizes and limitations is provided in Appendix 3.

3 Main findings

Question 1: What constitutes a team?

In daily life, a team is simply a group of people working together to achieve a goal. In the domain of social sciences, however, teams have specific characteristics that differentiate them from groups in general. For example, a widely used definition states: "A team is a collection of individuals who are interdependent in their tasks, share responsibility for outcomes, see themselves (and who are seen by others) as a social entity embedded in one or more larger social system (for example, business unit or the corporation), and who manage their relationships across organisational boundaries" (Cohen, 1997). Most researchers, however, summarise a team's basic defining characteristics as: a group of employees who are:

1   formally established
2   assigned (some) autonomy, and
3   interdependent.

Question 2: What is team effectiveness?

A team is not automatically more effective than (a group of) individual employees. Working in teams may impede performance because of the potential conflict between individual and group interests. In addition, a team's performance may decline due to a phenomenon known as social loafing: the tendency of team members to get by with less effort than they would have put in if working alone (also referred to as the free-rider effect).

Although the term 'team effectiveness' is widely used in the research literature, it is rarely defined. In fact, even some of the meta-analyses and high-quality studies included in this review fail to provide a clear definition. Most studies included consider team effectiveness as synonymous with team performance. As such, team effectiveness is broadly defined as task performance, contextual performance, and/or adaptive performance (eg learning, creativity, decision-making). Some scholars differentiate between performance behaviours and performance outcomes (Beal et al, 2003); behaviours are actions that are relevant to achieving goals, whereas outcomes are the consequences or results of performance behaviours (Mathieu et al, 2008). Examples of performance behaviours include feedback-seeking, reflectivity, information-sharing and learning behaviours. Finally, several authors point out that an effective team is not necessarily an efficient team (Beal et al, 2003). Whereas team effectiveness is simply an evaluation of a team's results, team efficiency also takes into account the 'costs' of achieving those results. For this reason, intra-team processes such as communication, information-sharing or conflicts are often considered an essential element of effectiveness (Mathieu et al, 2008).

Question 3: How can team effectiveness be measured?

Whether or not a team is judged as effective depends on the applied criteria. In most of the included studies, the criterium is team (task) performance – that is, the degree to which a team accomplishes its goals, as reflected by performance indicators such as number of units produced, number of items sold, number of clients served, number of innovations, number of errors, number of complaints, and so on. In addition, some studies also measure intra-team processes such as team-member exchange, internal communication and level of information-sharing, as these are considered relevant indicators for team effectiveness. However, there is no generally accepted instrument that measures team effectiveness, and organisations, researchers and consulting firms often create their own. Instruments developed by consulting firms typically ask members to assess their teams on the dimensions that the consulting firm assumes to be most consequential for team effectiveness (Wageman et al, 2005). By contrast, scholar-developed instruments tend to focus on variables that are of (research) interest to the scholars

Question 4: What are the attributes of effective teams?

This review has yielded a large number of studies examining myriad attributes. To facilitate a better understanding, we have grouped the findings into three main categories: team composition, emergent socio-affective states, and emergent cognitive states.

Team composition refers to team-member characteristics such as age, gender, level of education and functional background. Team composition variables and their impact on team outcomes have been incorporated into studies of team effectiveness for nearly 60 years (eg Mann, 1959).

Emergent states are team attitudes that arise from individual team members' experiences. As such, they are different from team processes, such as membership changes, internal communication or conflicts. Whereas team process describes the nature of team-member interaction, emergent states describe conditions that dynamically enable and underpin effective teamwork (DeChurch and Mesmer-Magnus, 2010). Research on teams has identified a range of emergent states assumed to affect a team's performance, such as confidence, efficacy, cohesion, trust and shared mental models. In the scientific literature, two main categories of emergent states are identified: **socio-affective states** and **cognitive states**. While conceptually distinct, socio-affective and cognitive states are correlated and assumed to work in tandem.

It should be noted, however, that team performance is to a large extent a compositional construct – it is a direct result of individual members' performance. As such, drivers of individual performance, such as goal clarity, supervisory support and employee recognition, should be taken into account before considering attributes and interventions at team level (see our evidence review on knowledge work performance).

Team composition

Finding 1: The link between team effectiveness and team diversity dimensions such as age, gender, ethnicity, religion, functional background, educational background, organisational tenure and experience is small and sometimes negative (Level AA)

It is often assumed that team effectiveness can be enhanced by differences between individual members on dimensions such as age, functional background, organisational tenure, gender, race, ethnicity and experience. As such, diversity is one of the most researched attributes of effective teams. This review identified eight meta-analyses, representing a combined sample size of more than 2,000 teams, that measured the correlations between these attributes and team effectiveness or team efficiency (Bell et al, 2011; Bui et al, 2019; Guillaume et al, 2012; Haas, 2010; Horwitz and Horwitz, 2007; Wang et al, 2019; Webber and Donahue, 2001; Zhou and Rosini, 2015). Surprisingly, all meta-analyses demonstrated only small (< .1), zero, or even negative associations, regardless of team size, team type or task type. It is therefore important to consider – and compensate for – potential negative consequences of team diversity on communication, cohesiveness, and consequently performance (*see also Finding 9*).

Finding 2: Of the Big Five personality traits, only agreeableness and conscientiousness are (somewhat) positively related to team performance (Level B)

Several meta-analyses, with a combined sample size of more than 100 studies, found that the higher the level of agreeableness and conscientiousness within teams, the better their performance (Bell, 2007; Hopp and Zenk, 2012; Peeters et al, 2006; Prewett et al, 2009). The effect sizes found, however, were small. Other personality traits, such as emotional stability, extraversion and openness to experience, were not related with team performance.

Socio-affective states

Socio-affective states describe team members' collective reactions to interpersonal aspects of team functioning. Examples of emergent socio-affective states that have received considerable attention during recent decades include team confidence, social cohesion, collective efficacy, shared feelings, psychological safety and intra-team trust (Mathieu et al, 2008).

Below, an overview is provided of the socio-affective states that were found to have the highest impact on team effectiveness.

Finding 3: Intra-team trust is positively related to performance (Level A)

Finding 4: Team trust is most critical when team virtuality, task interdependency, authority differentiation and/or team temporality is high (Level A)

Several meta-analyses and high-quality studies have demonstrated that a high level of intra-team trust is an important attribute of effective teams (Breuer et al, 2016; De Jong et al, 2016; Webber, 2008). Scholars often distinguish two types of trust:

- cognition-based trust – a member's cognitive evaluation of the reliability, integrity and competence of other members
- affect-based trust – a member's emotional feelings/evaluation of the reliability, integrity and competence of other members.

These are regarded as functionally distinct, in that they affect a team's performance through different causal mechanisms (De Jong et al, 2016). In addition, it was found that team trust is even more important under conditions that create challenges for teamwork. These include:

- a high level of task interdependence – the degree to which team members must rely on each other's input and resources to perform their tasks effectively
- a high level of virtuality – the degree to which team members do not work in either the same place and/or at the same time, and therefore cannot collaborate face-to-face all of the time
- low temporal stability – the degree to which team members have a history of working together in the past and an expectation of working together in the future
- high authority differentiation – decision-making responsibility is distributed across the team
- a high level of skill differentiation – the degree to which teams consist of members with specialised knowledge or skills that make them uniquely qualified and therefore difficult to substitute.

In addition, it was found that in virtual teams, team familiarity has a positive effect on the development of team trust (Webber, 2008), whereas negative performance feedback has a substantial negative impact on team trust (Jaakson et al, 2019). Finally, a meta-analysis of controlled studies indicates that teambuilding has a moderate to large positive effect on a team's affect-based trust (Klein et al, 2009).

Finding 5: Group-level psychological safety has a moderate to large positive impact on team performance (Level B)

Psychological safety at the group level refers to a shared belief held by members that the group is safe for 'interpersonal risk-taking' – a sense of confidence that others will not embarrass, reject or punish someone for speaking up (Edmondson, 1999). Psychological safety is related to 'intra-team trust', with the primary difference that psychological safety concerns a belief about a group norm, whereas trust concerns a belief that one person has about another (Edmondson, 2003). A recent large meta-analysis, including 136 studies with a combined sample size of 5,000 teams, indicates that psychological safety has a moderate to large impact on team performance (Frazier et al, 2017).

Finding 6: Team cohesion has a moderate to large impact on team performance (Level B)

Finding 7: The cohesion–performance relationship is moderated by team size, type of team and task interdependence (Level B)

Several meta-analyses demonstrate that cohesion, in particular social cohesion, has a moderate to large impact on a team's (behavioural) performance (Chiocchio and Hélène, 2009; Evans and Dion, 2012; Mathieu, 2015). Social cohesion refers to a shared liking or attraction to the group, emotional bonds of friendship, caring and closeness among group members, and enjoyment of each other's company (Chiocchio and Hélène, 2009). Other constructs related to social cohesion, such as relationship-building, team familiarity, friendship and social network density, have shown a similar impact on team performance (Chung, 2018; De Jong and Fodor, 2017). For example, a meta-analysis involving more than 3,000 teams shows that for newly acquainted team members, informal (social) ties are critical to performance (Balkundi and Harrison, 2006).

In addition, the positive effect of social cohesion was shown to be stronger within large teams, virtual teams, project teams and teams with high task interdependency (Lin et al, 2008; Gully et al, 2012; Chiocchio and Hélène, 2009). Finally, social cohesion is not a stable trait; it can (and most likely does) change over time. More specifically, several studies suggest that it takes time for team cohesion to develop and solidify before it positively affects performance. As such, it may be beneficial to try to accelerate the process by engaging in teambuilding and other activities aimed at enhancing team familiarity, morale and cohesion (Mathieu, 2015).

Finding 8: The emergence of intra-team trust and social cohesion is critical for virtual teams (Level A)

As mentioned above, the positive effect of intra-team trust and social cohesion is stronger within virtual teams. In fact, a meta-analysis of high-quality studies shows that these two attributes are critical to the performance of teams with a high level of virtuality (Lin et al, 2008). This finding is confirmed by several randomised controlled studies that demonstrate that virtual teams with a high level of social cohesion and intra-team trust outperform those in which trust and social cohesion is low (Capiola et al, 2019; Fang and Wen-Ching, 2014; Kennedy et al, 2010). As pointed out by Kennedy et al (2010), this finding suggests that managers, when setting up a computer-supported team, may benefit from an initial face-to-face session (more than just a 'meet and greet') to prepare members to work together in the future.

Finding 9: Team cohesion is strongly associated with team inclusion (Level B)

According to the social inclusion model developed by Shore and colleagues (2011), inclusive teams are expected to be more effective than non-inclusive ones, because inclusion stimulates social cohesion, improves intra-team trust, and reduces the chance of conflict in the team. Findings from a recent longitudinal study confirm the central tenet of the social inclusion model and that, at the team level, perceptions of inclusiveness strongly correlate with team cohesion. In addition, the study's findings suggest that when

a team contains members who all feel included (that is, accepted and valued for their unique characteristics), the team becomes significantly more cohesive, which in turn has a positive impact on its effectiveness (De Cooman, 2016).

Finding 10: Team identification has a positive effect on social cohesion and consequently team performance (Level B)

Finding 11: Turnover has a negative effect on social cohesion and consequently on team performance (Level C)

Team identification refers to the extent to which people acknowledge and value being part of a team, share norms and behaviours, and experience a sense of social cohesion and interdependency (Solansky, 2011). Randomised experimental interventions demonstrate that team identification does lead to increased emotional convergence (the process by which people are affectively influenced by others and become more similar with regard to their socio-affective states), social cohesion and consequently team performance (Tanghe et al, 2010a; Tanghe et al, 2010b). Conversely, turnover of members in a team negatively affects social integration and cohesion and thus negatively impacts team performance (Van der Vegt et al, 2010).

Cognitive states

Team cognition is an emergent state that refers to the way knowledge important to team functioning is cognitively organised, represented and distributed within the team (Kozlowski and Ilgen, 2006). Team cognition is a bottom–up emergent construct, originating from the cognition of individual team members (DeChurch and Mesmer-Magnus, 2010).

Finding 12: Team cognition – in particular information-sharing, transactive memory systems and cognitive consensus – has a large positive impact on team performance (Level AA)

In the past decade, a large number of high-quality studies have consistently demonstrated that team cognition is one of the most important drivers of team effectiveness (DeChurch and Mesmer-Magnus, 2010; Mesmer-Magnus and De Church, 2009; Turner et al, 2014). The research literature distinguishes several constructs of team cognition, such as shared mental models, team mental models, information sharing, transactive memory systems, cognitive consensus and group learning. Of these, information sharing, transactive memory systems and cognitive consensus have the largest impact on team performance.

Information sharing refers to the extent to which a team utilises individual members' knowledge or expertise for the team's benefit. Where complex problems have to be addressed, it is indispensable in that it allows team members to share their knowledge and past experiences, and exchange and discuss ideas, which is particularly important for the generation of new solutions (Hulsheger et al, 2009). In addition, sharing information with teammates promotes team trust and social cohesion, which in turn enhances team

performance. Finally, information sharing has been shown to be a strong predictor of team performance across all kinds of moderators (team size, team type, etc).

An important concept related to information sharing is that of the transactive memory system (TMS). TMS within a team refers to a form of knowledge embedded in the team's collective memory. This collective memory works like an indexing system that tells members who knows what. Results from meta-analyses consistently show that TMS has a large positive effect on team performance (Bachrach, 2019; Mesmer Magnus, 2017, Turner et al, 2014). Surprisingly, a cross-sectional study suggests that trust among team mates is a strong predictor for the emergence of TMS, whereas trust in management is not (Robertson, 2012).

Cognitive consensus refers to similarity among group members regarding how key issues are defined and conceptualised (Mohammed and Dumville, 2001). It is not so much about consensus on final decisions or solutions as on the interpretation of issues. Put differently, cognitive consensus is about whether team members attend to, interpret and communicate about issues in a similar way (Mumford et al, 2008).

Finding 13: Team learning does not automatically lead to team performance improvement (Level AA)

Finding 14: Team reflexivity moderates the effect of team cognition on team performance (Level C)

Team learning involves behaviours such as asking questions, challenging assumptions and discussing errors or unexpected outcomes. Surprisingly, team learning seems to have a rather small impact on team performance (Turner et al, 2014; Santos et al, 2015). However, this does not seem to be the case for team reflexivity, which is often considered an important element of (team) learning. In fact, team reflexivity – the extent to which members overtly reflect on the team's goals, collaboration, decision-making processes, internal communications and so on – seems to moderate the effect of team cognition (Schippers et al, 2013; Konradt et al, 2015; Widmann, 2018). So, if teams don't periodically reflect on how the team is doing, the positive effects of information-sharing, a shared memory system and cognitive consensus on team performance will decrease (*see also Finding 16*).

Question 5: What interventions influence team effectiveness?

In recent decades, numerous studies on the effectiveness of team interventions have been published. Below, an overview is provided of interventions shown to have moderate to large effects.

Finding 15: Teambuilding has a moderate positive effect on team performance (Level A)

Originally designed as a group-process intervention (eg Schein, 1969, 1999) for improving interpersonal relations and social interactions, teambuilding interventions are common

and popular (Klein et al, 2009). Although they encompass a wide range of activities, the term refers to a class of formal and informal team-level interventions that focus on improving social relations and clarifying roles. As such, teambuilding typically does not target skill-based competencies and is often done in settings outside the workplace. A meta-analysis of longitudinal studies shows that, in general, teambuilding interventions have a moderate positive indirect effect on team performance, and a moderate to large positive direct effect on trust, social cohesion and internal communication (Klein et al, 2009). This meta-analysis confirms the findings of a previous meta-analysis that included controlled studies and examined the effect of moderating factors (Svyantec et al, 1999). Results indicate that the effect of teambuilding is larger when:

- the initiator is external (rather than internal) to the team
- the rationale is corrective (rather than preventive)
- team members are not involved in the planning
- the focus is on both the team's goals and interpersonal relations
- teambuilding is planned together with other interventions
- teambuilding is led by both internal and external consultants
- the focus is on the group (rather than on individuals)
- teambuilding is supported by (higher) management.

Finding 16: Teamwork training has a large positive effect on team performance (Level A)

In the scientific literature a distinction is made between 'taskwork' and 'teamwork'. In short, taskwork represents what teams are doing, whereas teamwork describes how they are doing it. Teamwork training involves education of team members about the importance of providing social support within the team or promoting ways to manage conflict among teammates. In some types of training, team members take part in a group activity in which they discuss the team's purposes, goals and performance, or a simulation where they experientially enact various teamwork skills, such as interpersonal communication and coordination. A recent meta-analysis including 51 controlled studies shows that teamwork training, in general, tends to have a large, positive effect on team performance (McEwan et al, 2017). This study confirmed the findings of previous meta-analyses that teamwork training has a large, positive effect not only on team performance but also on a team's affective, social and cognitive state (Delise et al, 2010; Salas et al, 2008).

Finding 17: Debriefing sessions and guided team reflexivity have a moderate to large positive effect on team performance (Level A)

Debriefing sessions lead teams through a series of questions that allow members to reflect on a recent experience, construct their own meaning from their actions and uncover lessons learned in a non-punitive environment (Tannenbaum and Cerasoli, 2013). Debriefing sessions are also referred to as 'guided team reflexivity' (*see also Finding 13*). Meta-analyses and randomised controlled studies have found that, when appropriately conducted, debriefing sessions can lead to substantial improvement of a team's

performance (Tannenbaum and Cerasoli, 2013; Konradt et al, 2015). In addition, it was found that debriefs are most effective when the following requirements are met:

- The focus of the debrief is on learning and improvement, rather than evaluation or judgement. A developmental, non-punitive focus not only yields more honest and accurate feedback, but also enhances experiential learning.
- The debrief focuses on specific activities, episodes or events, rather than performance or results in general.
- The debrief is informed by a variety of perspectives and evidence sources. For example, the review should include input from multiple participants and at least one additional source of evidence (eg organisational data).
- The debrief is facilitated and highly structured rather than non-facilitated or loosely structured.

Finding 18: Setting group goals has a moderate to large positive effect on team performance (Level AA)

Over recent decades, high-quality meta-analyses in a wide range of disciplines (such as management, medicine, sports, rehabilitation and prevention) and populations (patients, athletes, managers, senior adults, children) have demonstrated the positive effects of goal-setting interventions on performance outcomes. Overall, goals that are challenging (in terms of difficulty) and specific (rather than non-specific 'do your best' goals) have a positive effect on performance. Several studies, however, demonstrate that setting goals at the group level may yield even higher performance than individual goals (Kleingeld et al, 2011). In addition, it is assumed that group goals enhance both social and cognitive group processes, such as planning, cooperation, morale-building, communication and collective efficacy. Finally, a recent cross-sectional study indicates that the effect of group goals is mediated by team reflexivity (Açıkgöz and Latham, 2018; *see also Findings 14 and 17*).

Question 6: What is known about the reliability and validity of team-effectiveness models?

In an attempt to understand how effective teams work, a number of authors have developed models for determining a team's performance. Typically, these models contain several variables believed to influence team effectiveness. Some were proposed decades ago, others are more recent. In 2008, there were more than 130 different models of team effectiveness available (Salas et al, 2008). As such, a full review of the evidence supporting these models is beyond the scope of this REA. However, based on the studies included in this review, the following general finding emerged.

Finding 19: For most models of team effectiveness, the underlying research is inadequate to establish reliability and validity

The popular management literature feaures many team-effectiveness models that claim to help teams work together more efficiently. Examples are Lombardo and Eichinger's T7 model, Hackman and Wageman's 6 Conditions model, the Lencioni model, the Katzenbach and Smith model, and the Drexler/Sibbet team performance model. Some of these focus on team composition and structure, while others emphasise intra-team processes such as communication and interaction. Although some models contain factors shown to be strong predictors of team performance (eg social cohesion, goal clarity, trust), the underlying psychometric research is often inadequate to establish the reliability and validity of the model as a whole (Eisele, 2015).

4 Conclusion
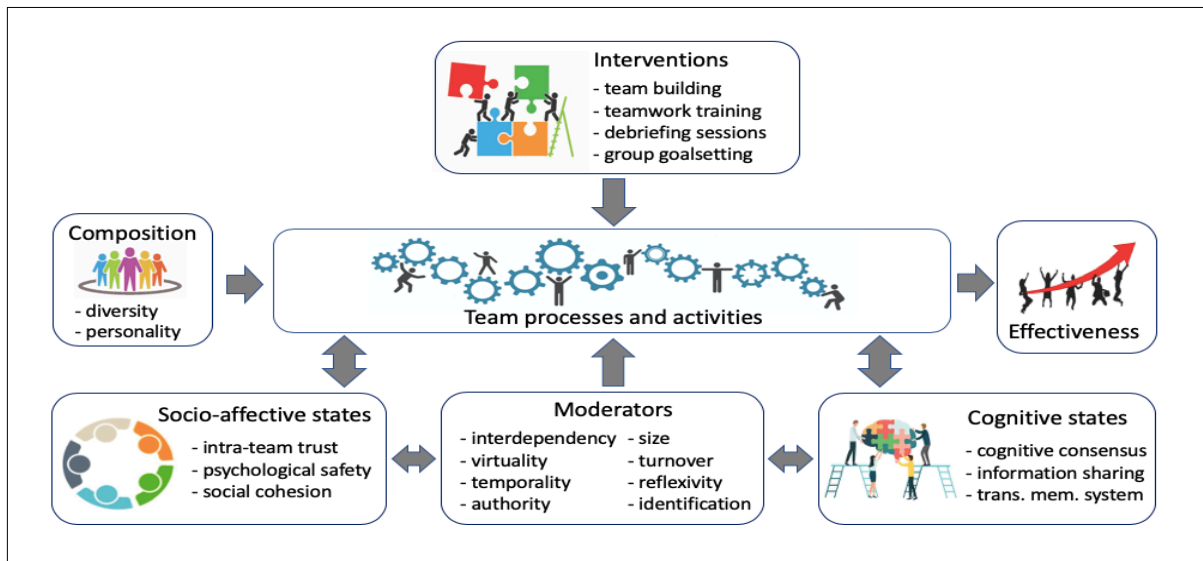
Attributes of effective teams are one of the most widely researched topics in industrial and organisational psychology. This review identified a large number of high-quality studies that indicate that effective teams are not so much determined by their composition, but rather by the emergence of socio-affective (in particular trust, psychological safety and social cohesion) and cognitive states (in particular cognitive consensus, information-sharing and the transactive memory system). An overview of minimal and maximal effect sizes is provided below.

Average minimal and maximal effect sizes					
Team diversity	ρ=−.05 /.10	Social cohesion	ρ=.20/.60	Teambuilding	ρ=.25/.45
Personality	ρ=−.20/.25	Cognitive consensus	ρ=.40	Teamwork training	ρ=.35/.55
Team trust	ρ=.30/.40	Information sharing	ρ=.30/.50	Debriefing/reflection	d=.30/.70
Psychological safety	ρ=.40/.50	Transactive memory system	ρ=.30/.50	Group goal setting	d=.55/1.2

In addition, findings suggest that levels of interdependency, virtuality, team size, team reflexivity, identification, authority, turnover and temporality are important moderators. Finally, team interventions such as teambuilding, team training, debriefing and goal-setting have been shown to positively affect the emergence of socio-affective and cognitive states and consequently team performance. This suggests that team leaders not only have an important role in promoting and stimulating the emergence of socio-affective

and cognitive states, but they can also (proactively) initiate interventions to enhance team effectiveness.

Limitations

This REA aims to provide a balanced assessment of what is known in the scientific literature about the attributes of effective teams and interventions that increase team effectiveness by using the systematic review method to search and critically appraise empirical studies. However, in order to be 'rapid', concessions were made in relation to the breadth and depth of the search process, such as the exclusion of unpublished studies, the use of a limited number of databases, and a focus on empirical research published in the period 2000 to 2019. As a consequence, some relevant studies may have been missed.

A second limitation concerns the critical appraisal of the studies included, which did not incorporate a comprehensive review of the psychometric properties of their tests, scales and questionnaires.

Finally, this REA focused only on high-quality studies, that is, studies with a control group and/or longitudinal studies. Cross-sectional studies were excluded and, as a consequence, newer and potentially relevant findings may have been missed.

Given these limitations, care must be taken not to present the findings presented in this REA as conclusive.

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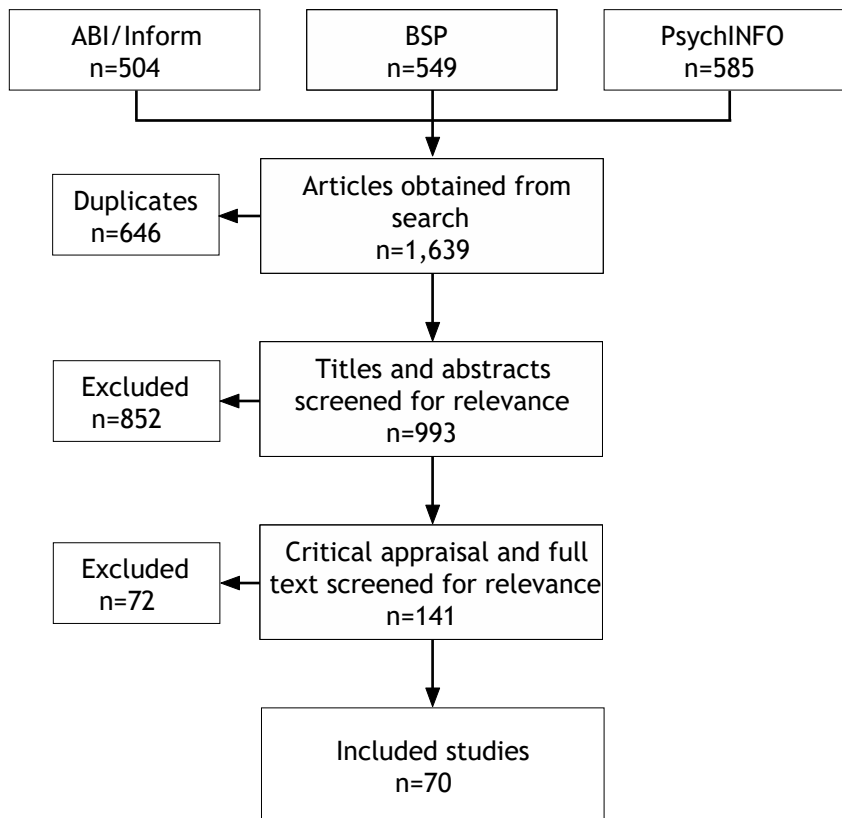
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Appendix 1: Overview of search terms and queries

ABI/Inform Global, Business Source Elite, PsycINFO peer reviewed, scholarly journals, November 2019			
Search terms	ABI	BSP	PSY
S1: ti(team* OR workgroup* OR group*)	27,086	32,959	69,490
S2: ti(effectiv* OR effic* OR perform* OR innovati* OR learn* OR success* OR collaborati* OR cooperati*	191,527	237,841	252,785
S3: S1 AND S2	4,960	5,031	8,659
S4: filter meta-analyses	62	69	140
S5: ti(antecedents OR attributes OR characteristics OR predictor*)	37,217	30,080	77,497
S6: S3 AND S5 limit > 2010	138	77	71
S7: S3 AND filter high quality studies, limit > 2010	371	384	284
S8: S6 OR S7	431	465	344
S9: ti(team*) AND ti(build* OR interven* OR train* OR develop*)	1,288	1,156	1,147
S10: S9 AND (filter meta-analyses* OR high quality studies**)	11*	15*	101**

Appendix 2: Selection of studies for review

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┌──────────────┐   ┌──────────────┐   ┌──────────────┐
│  ABI/Inform  │   │     BSP      │   │  PsychINFO   │
│    n=504     │   │    n=549     │   │    n=585     │
└──────┬───────┘   └──────┬───────┘   └──────┬───────┘
       └──────────────────┼──────────────────┘
                          ▼
┌──────────────┐   ┌──────────────────────┐
│  Duplicates  │◄──│ Articles obtained from│
│    n=646     │   │        search         │
└──────────────┘   │       n=1,639         │
                   └──────────┬───────────┘
                              ▼
┌──────────────┐   ┌──────────────────────┐
│   Excluded   │◄──│  Titles and abstracts │
│    n=852     │   │  screened for relevance│
└──────────────┘   │        n=993          │
                   └──────────┬───────────┘
                              ▼
┌──────────────┐   ┌──────────────────────┐
│   Excluded   │◄──│ Critical appraisal and│
│    n=72      │   │ full text screened for │
└──────────────┘   │      relevance         │
                   │        n=141          │
                   └──────────┬───────────┘
                              ▼
                   ┌──────────────────────┐
                   │   Included studies    │
                   │        n=70           │
                   └──────────────────────┘
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Appendix 3: Appraisal of selected studies

1st Author & year	Design & sample size	Sector/ Population	Main findings	Effect sizes	Limitations	Level
1. Açıkgöz , 2018	cross-sectional study n=194 (78 teams)	product development teams of 43 high-tech firms in the Istanbul region	The results showed that setting a specific, challenging learning goal is associated with team performance (new product success), but that this relationship is mediated by collective team reflection.	R^2=.64	no serious limitations	D
2. Bachrach, 2019	Meta-analysis k=76 N=6,869	various	Research on moderators of TMS to performance relationship. It was found that environmental volatility (market turbulence, technology turbulence, or environmental dynamism), leadership effectiveness, and team human capital (team-level knowledge, skills, abilities) are positively associated with TMS, and informational diversity (heterogeneity of work experience – for example, organisational tenure, job experience, education level, education major, functional background) and gender diversity are negatively associated with TMS development.	All-over team performance r=.45 Task performance r=.44 Affective performance r=.58 Creative performance r=.42 Effect moderators: env volatility r=.12 leader eff r=.60 team h cap r=.12 inf div r=−.08 gender div r=−.13	Design of included studies not specified	C

3. Balkundi, 2006	Meta-analysis of 37 cross-sectional studies; N=3,098 teams	Teams from the following contexts: military, top management, project, production and service	1. Teams with denser social networks tend to perform better (H1) and have greater team viability (H2) in both, team's instrumental* (H1a, H2a) and expressive* (H1b, H2b) social networks. Moreover, team's expressive tie density might have a larger impact than instrumental tie density on team viability (H3b). However, the task performance implications of instrumental ties are no different from those of expressive ties (H3a). 2. Teams whose leaders are central in the team's instrumental social network (H4), as well as teams that are central in an intergroup network (H5), tend to perform better. 3. A more integrative network structure (ease of sharing resources) is likely to benefit future team task performance but is not as likely to reflect past performance (H6). 4. For newly acquainted or inexperienced team members, informal ties seem to be more critical to performance. As team members gained experience with one another and their work, effects of those ties declined (H7). *Two types of ties in social networks can be distinguished: instrumental and expressive. Instrumental ties are pathways of work-related advice. They might emerge from a formal relationship (for example, leader-subordinate), and the primary content exchanged through them is information resources or knowledge that is relevant to completing one's job within a unit. In contrast, expressive ties reflect friendships. They are more affect-laden. These ties are important conduits of social support and values.*	H1a: ρ=.15 H1b: ρ=.22 H2a: ρ=.14 H2b: ρ=.55 H3a: β=−0.08 ns H3b: β=0.63 H4: ρ=.29 H5: ρ=.13 H6: β=0.41 H7: β=−0.40	No serious limitations	C

4. Bayley, 2007	longitudinal study (assessment at 3 points in time: immediately after, 3 months after, 6 months after) 47 people from 11 teams	Health professionals in the UK	Finding: Teambuilding does not have an effect on perceived conditions for successful teamwork (as measured by a team development questionnaire – see below). Team development measure: instrument measuring eight factors relating to successful teamworking: appropriate workload, team capability, association with colleagues, sharing of activities, role security, personal empowerment, self-direction, and focus of approach.	not reported	no serious limitations	B
5. Bell, 2007	Meta-analysis of 37 cross-sectional studies; k=243 correlations	Teams (context is not clear)	Team mean conscientiousness (H1), team minimum agreeableness (H2), extraversion (H3), team average emotional stability (H4), openness to experience (H5), collectivism (H6), and preference for teamwork (H7) were found to be related to team performance in field studies. Only negligible effects were observed in lab settings for the relationship between these factors and team performance. However, in lab settings, team minimum and maximum general mental ability (H8) and team mean emotional intelligence (H9) were related to team performance. Also in the field setting GMA was related to team performance (H8). The relationships between the personality factors and team performance was not related to the team tenure (H12 not supported).	H1: ρ=.30 H2: ρ=.31 H3: ρ=.15 H4: ρ=.21 H5: ρ=.20 H6: ρ=.40 H7: ρ=.22 H8: ρ=.33; ρ=.26 (lab) H9: ρ=.20 (lab)	No serious limitations	B

6. Bell, 2011	meta-analysis, k=92 (274 independent correlations)		1. There is a small positive relationship between functional background diversity in terms of variety and team performance. 2. There is NO relationship between educational background diversity in terms of variety and team performance. 3. The positive relationship between functional background diversity in terms of variety and team performance is (somewhat) stronger when the team performance criterion is creativity or innovation rather than efficiency. 4. The positive relationship between functional background diversity in terms of variety and team performance is (somewhat) stronger when the team is a design team or top management teams (TMT) as compared with another team type. 5. The positive relationship between educational background diversity in terms of variety and team performance is stronger when the team performance criterion is creativity or innovation rather than efficiency. 6. The positive relationship between educational background diversity in terms of variety and team performance is (somewhat) stronger when the team is a design team or TMT as compared with another team type. 7. There is NO relationship between team mean educational level and team performance, regardless of team type. 8. There is a small positive relationship between team mean organisational tenure and team performance when efficiency is the criterion. 9. There is NO relationship between organisational tenure diversity and team performance when innovation is the criterion. 10. Team mean tenure is NOT related to team performance when efficiency is the criterion.	Most ES are very small 1. $\rho=.11$ 2. $\rho=.01$ 3. innovation $\rho=.18$ efficiency $\rho=.03$ 4. design $\rho=.16$ TMT $\rho=.07$ other $\rho=-.01$ 5. crea/inno $\rho=.23$ efficiency $\rho=-.02$ 6. design $\rho=.07$ TMT $\rho=.13$ other $\rho=-.05$ 7. $\rho=.01$ 8. $\rho=.14$ 9. $\rho=.04$ 10. $\rho=.11$ ns and -.04 11. $\rho=.04$ ns	Design of studies included not specified, but the text suggests that RCTs were included.	AA

			11. There is NO relationship between sex or age diversity in terms of separation and team performance.		
7. Breuer (2016)	meta-analysis of cross-sectional and longitudinal studies k=54 N=12,615 (1,850 teams)	various	Team trust facilitates coordination and cooperation in teams, and is therefore positively related with team effectiveness (attitudes, information processing and team performance). The relationship between team trust and team task performance was stronger in virtual teams than in face-to-face teams.	Team effectiveness overall r=.33 Team attitudes r=.64 Team inf. proc r=.54 Team perf r=.27 (task r=.27, contx r=.27) Team performance: virt teams r=.33 ftf teams r=.22	sample size of some effect sizes are rather small	B

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8. Bui, 2019	meta-analysis, k=35	various	1. Team diversity measured with SC attributes have a positive impact on (a) openness and (b) frequency of communication. 2. Team diversity measured with KSA attributes have a negative impact on (a) openness and (b) frequency of communication. 3. Frequency (a) and high openness (b) of communication have a positive relationship with team performance. *Note 1: social-category (SC) differences = race, ethnicity, gender, age, religion, sexual orientation, and physical abilities; differences in knowledge, skills, and abilities (KSA) = education, functional knowledge, information or expertise, training, experience, and abilities.* *Note 2: Openness of communication is defined in several studies as 'knowledge-sharing'.*	1a: ρ=.13 1b: ρ=.00 ns 2a: ρ=.14 ns 2b: ρ=.11 ns 3a: ρ=.20 3b: ρ=.35	design of included studies not specified	C
9. Capiola, 2019	RCT n=320 (64 teams)	undergraduate students and general public in the US	1. Individual-level trustworthiness perceptions is positively related to team performance in a computer-mediated task. 2. Individual-level trustworthiness perceptions has indirect effects on team performance in a computer-mediated task through group-level collective efficacy across time.	only unstandardised coefficients are reported	artificial setting and tasks (airport simulation)	A
10. Chiocchio, 2009	meta-analysis k=29 (9,416 participants distributed in 1,598 teams)	various	The cohesion–performance relationship is moderated by type of team and setting. Project teams in organisational settings show large effect sizes than other types of teams and teams in different settings. In addition, the cohesion–performance relationship is strongest for social cohesion-behavioural performance. *Note: Outcome performance relates to the end results of tasks and includes measures such as profits, sales, ranks, grades as well as schedule and cost variance. Behavioural performance includes two types of performances: task and contextual.*	proj teams: ρ=.49 prod teams: ρ=.14 service teams ρ=.33 soc coh–behavioural perf: ρ=.65 task coh-outcome perf: ρ=.38 task coh–behavioural perf: ρ=.36 social coh-outcome perf: ρ=.19	design of included studies not specified (includes some longitudinal studies)	B

11. Chung, 2018	meta-analysis k=26 (1,016 groups)	various	Results show that friendship has a significant positive effect on group task performance. Furthermore, this relationship was moderated by group size (that is, the positive effect of friendship on performance increased with group size) and task focus (that is, friendship groups performed better than acquaintance groups on tasks requiring a high quantity of output, whereas there was no performance benefit on tasks requiring a single or high-quality output). Task interdependence did not moderate the effect.	friendship vs acquaintance groups: d=.31	Design of the included studies not specified	C
12. Cordery, 2010	Interrupted time series N=17 teams	wastewater treatment teams	1. Redesigning work to provide teams with increased autonomy results in improved team performance. 2. Increasing levels of task uncertainty is associated with declining levels of team performance. 3. Task uncertainty and team autonomy interact, such that the higher the level of task uncertainty, the stronger the positive impact of team autonomy on team performance.	Not reported	No major weaknesses	B
13. De Cooman, 2016	longitudinal study n=121 (30 teams)	college students participating in a course on strategic management in a large Dutch university	1. Individual-level supplementary fit positively correlated with team cohesion. 2. At the team level, the aggregate of supplementary fit positively correlated with the team average of team cohesion. 3. The aggregate of complementary fit positively correlated with the team average of team cohesion (r=.41).	1 r=.47 2. r=.87 3. r=.41	no serious limitations	C

14. Delise, 2010	meta-analysis of cross-sectional studies (30 studies measured outcomes immediately after training, 11 had a time-lag) K=41 (1413 teams)	various	**Intervention**: Team training is defined as a planned effort designed to improve team performance by assisting individuals in the acquisition of new information, skills, and attitudes essential to effective performance in a team environment. It is administered to an entire team, aimed at enhancing the performance of the team as a unit. It is a planned effort to develop a team's task-specific competencies, thereby improving its ability to perform its tasks effectively. 1. Team training is positively associated with affective, cognitive, subjective task-based skill, objective task-based skill, and teamwork skill. 2. There are no differences in effects of team training in military vs civilian samples, laboratory vs field setting, ad hoc vs intact (existing) teams, team-oriented vs task-oriented training, short vs long training. Team training is associated more strongly with improved cognitive outcomes after a period of time passed from the training than immediately after the training.	1. Affective outcomes: d=.80; cognitive: d=1.37; subjective task-based skill: d=.88; objective task-based skill: d=.76; teamwork skill: d=.64. 2. Military: d=1.05, civilian: d=.80; Lab: d=.87, field: d=.76; Ad-hoc: d=.92, intact: d=.62; no effect size estimates given for team-oriented vs task-oriented training and short vs long training. Immediately after the training: d=1.21; time lag after training: d=2.40	Publication bias is incorrectly analysed (funnel plot only maps positive effect sizes)	C
15. Evans, 2012	meta-analysis k=16 (372 groups)	various	The results indicated a positive relationship, with the average cohesive group performing 18 percentile points above the average non-cohesive group.	r=.42 note: large 95% CI	limited search, relevant studies may have been missed design of included studies not specified	C

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16. Fang, 2014	RCT n=285 (95 teams)	students from Taiwan	1. Compared with teams in which members are familiar with each other, teams in which members are strangers have lower performance. 2. Compared with teams in which task results are visible, teams in which these results are invisible do NOT have lower performance. 3. Compared with teams in which team members are not perceived as engaging in co-worker loafing, teams in which members are perceived as engaging in co-worker loafing do NOT have lower team performance.	no effect sizes reported	artificial setting and tasks (brainstorming)	A
17. Frazier, 2017	Meta-analysis k=136 N=> 22,000, (5,000 groups)	Various	Psychological safety impacts important organisational outcomes. It is positively related to information-sharing, citizenship behaviours and task performance. There are personality traits that are positively related to psychological safety. The results indicate that psychological safety is impacted by positive leader relations (for example transformational leadership), workplace support (for example peer support), and work design (for example interdependence).	Task performance r=.43 Information-sharing r=.52 OCB r=.32	Search terms not specified	B
18. Garrett, 2019	Quasi-experiment N=79 teams (24 intervention, 55 control)	Insurance, US	The study examines the performance and behavioural impact of team design on sales performance. The findings demonstrate improved overall performance for the team and the individual members of the team – the gains were particularly pronounced when members have moderate levels of difference in ability, rather than small or large differences in ability. 1a. Individuals in team tasks perform better than those in individual tasks. 1b; Weaker individuals in team tasks perform better than those in individual tasks; 1c. Stronger individuals in team tasks perform better than those in individual tasks. 2a. Performance gains across individuals in team tasks, relative to those in individual tasks, exhibit an inverted U-shaped relationship with the difference in ability of the team members; 2b. Performance gains for weaker individuals in group tasks, relative to weaker individuals working alone, exhibit an inverted U-shaped relationship with the difference in ability of the group members; 2c. Performance gains for	Not reported	Inconsistent reporting on hypotheses	B

			stronger individuals in group tasks, relative to stronger individuals working alone, exhibit an inverted U-shaped relationship with the difference in ability of the group members. 3. Instrumentality to the team relates positively to the performance gain exhibited by the sales team member. 4. Self-efficacy for the task does not relate positively to the performance gain of the sales team member. 5. Impression management does not relate positively to the performance gain of the sales team member, but negatively. 6. The perception of receiving coaching from a team member negatively moderates the relationship of self-efficacy to the performance gain of the sales team member.			
19. Gino, 2010	Study # 2: RCT n=36 teams N=238 participants	College students	Direct task experience leads to more highly developed transactive memory systems than indirect experience (H4). Transactive memory positively influences the level of creativity of products within teams (H5). Transactive memory mediates the relationship between experience and the level of creativity of products within teams (H6).	H5: η^2=.05 H6: ß=0.33	No serious limitations	A

20. Greer, 2018	Meta-analysis of 54 cross-sectional studies N=13,914 teams	Teams, organisational setting	In general, hierarchy is likely to have a negative impact on team effectiveness (performance and viability); this effect is mediated by increased conflict-enabling states (H2a, H2b). The negative relationship between hierarchy and team performance is exacerbated by aspects of the team structure: membership instability (H4a) and skill differentiation (H4b), and the hierarchy itself: mutability (H5a). The predictions regarding the positive effect of hierarchy on team viability as mediated by coordination-enabling processes (H1b), and of hierarchy on team performance as mediated by coordination-enabling processes (H1a), as well as the moderating roles of several aspects of team tasks: interdependence (H3a) and complexity (H3c), and the hierarchy: form (5b), were not supported, with the exception that task ambiguity enhanced the positive effects of hierarchy (H3b).	Note: all ES low or ns r=−.08 (hierarchy & performance) r=−.11 (hierarchy & viability) H1a: not supported H1b: not supported H2a: unclear H2b: unclear H3a: not supported H3b: not supported H3c: not supported H4a: unclear H4b: unclear H5a: unclear H5b: not supported	No serious limitations	C
21. Guillaume, 2012	Meta-analysis of cross-sectional studies	Work groups from diverse industries	1. Both, surface-level* (H1a) and deep-level** (H1b) dissimilarity are negatively related to social integration. 2. The negative relationship between surface-level dissimilarity and social integration is weaker under high team interdependence than under low team interdependence (H2a). On the other hand, the negative relationship between deep-level dissimilarity and social integration is stronger under high team interdependence than under low team interdependence (H2b). 3. There is a positive relationship between social integration and task performance (H3) and between social integration and contextual performance (H4). Moreover, social integration and turnover are negatively related (H5).	Unclear, only gammas are reported	No serious limitations	C

| | | | 4. Under low team interdependence, social integration mediates the negative relationship between surface-level dissimilarity and task performance (H6a), and between surface-level dissimilarity and contextual performance (H7a).

5. Under high team interdependence, social integration mediates the negative relationship between deep-level dissimilarity and task performance (H6b), and between deep-level dissimilarity and contextual performance (H7b).

6. Under low team interdependence, social integration mediates the positive relationship between surface-level dissimilarity and turnover (H8a). Under high team interdependence, social integration mediates the positive relationship between deep-level dissimilarity and turnover (H8b).

*surface-level dissimilarities: that is, age, race/ethnicity, gender, tenure, ** deep-level dissimilarity: that is, personality, attitudes, and values* | | | |
| 22. Gully, 2002 | Meta-analysis of 67 cross-sectional studies | Context is not clear | The positive relationships between team efficacy and performance, and potency* and performance are stronger at the team level of analysis than at the individual level (H3).

At the team level, both team efficacy (H1) and potency (H2) had positive relationships with performance.

The relationship between team efficacy and performance seems to be stronger when interdependence was high than when it was low. Such moderating effect of interdependence was not found for the relationship between potency and performance.

Potency refers to generalised beliefs about the capabilities of the team across tasks and contexts | H1: ρ=.41

H2: ρ=.37

H3:
ρ=.39 (team level)
ρ=.20 (individual level)

H4 (team efficacy):
ρ=.45 (high interdependence)
ρ=.34 (low interdependence) | No serious limitations | C |

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			(that is, our team will be successful no matter what the task).			
23. Gully, 2012	meta-analysis k=46 (51 effect sizes)	various	Results suggest that level of analysis and task interdependence moderate the cohesion–performance relationship.	low task interd: r=.21 high task interd: r=.46	limited search, relevant studies may have been missed design of included studies not specified	C
24. Haas, 2010	meta-analysis k=30	various (includes non-work settings)	1. Twelve out of the 15 relationships of age diversity to team performance that were tested in regression models did not show any significance. The remaining three were negative. 2. For gender diversity, performance links (18) show weak (positive, negative, and non-significant) correlations. 3. For educational level diversity, regressions (4) are negative or not significant. There is no pattern of context factors that might explain the differences. 4. For ethnic diversity (note: combined with national diversity), four studies showed a negative and three a (weak) positive regression result, leaving 11 non-significant. When considering national diversity alone, there are no significant relationships. An additional finding is that negative effects of ethnic diversity in terms of correlation coefficients occur in teams with more than 12 members. 5. For functional background diversity and organisational tenure diversity, correlations are mixed (size, neg/pos), but mostly non-significant. 6. None of the observed relationships between team tenure diversity and team performance is significantly positive or negative.	close to zero or ns	Very limited search, mainly studies cited in other reviews. Design of studies included not specified, but the text suggests that exp lab studies were included. Uses vote counting	B

25. Hopp, 2012	Non-randomised longitudinal study 18 teams (97 students)	Computer science students	Teams that exhibit a higher variation with respect to conscientiousness (with more people having higher or lower values than other team members) reduces team performance. Having people in the team that deviate on crucial personal characteristics is negative for performance. This effect is supported by the negative coefficient associated with the deviation of aspired points among team members. A wide dispersion is negative for team performance. Having team members who vary in their goals from the rest of the team is detrimental for team performance.	Unclear	no serious limitations	C
26. Horwitz, 2007	meta-analysis k=35 (78 correlations)		1a. There is a positive relationship between task-related diversity and the quality of team performance. 1b: There is no relationship between bio-demographic diversity and the quality of team performance. 2. The relationship between team diversity and team performance is stronger for task-related diversity than bio-demographic diversity. 3a. There is a positive relationship between task-related diversity and the quantity of team performance. 3b. There is a positive relationship between bio-demographic diversity and the quantity of team performance. 4. There is a (very small) negative relationship between team diversity (bio-demographic diversity and task-related diversity) and social integration among team members. 5. Task complexity, team type, and team size do NOT moderate the relationship between team diversity and team performance. *Note: team performance = decision-making, creativity and innovation, problem-solving.*	All ES are very small 1a: ρ=.13 1b: ρ=.00 3a: ρ=.07 3b: ρ=−.02 4: bio ρ=−.04 task ρ=−.02	Design of studies included not specified, but the text suggests that RCTs were included.	A

27. Hu, 2015	1. Longitudinal field study, N=67 teams, 310 team members 2. Randomised 2x2 experiment N=124 4-person teams	1) Work teams, diverse industries, US and China 2) undergraduate business students, US	Study proposed a theoretical model that links team prosocial motivation to team effectiveness as mediated by team processes. 1. Team prosocial motivation is indirectly and positively related to (a) team performance and (b) team OCB, but not negatively related to (c) team voluntary turnover via team cooperation. 2. Team prosocial motivation is indirectly and positively related to (a) team performance, and negatively related to (c) team voluntary turnover via team viability, but not positively related to (b) team OCB via team viability. 3. Task interdependence moderates the indirect effects of team prosocial motivation on (a) team performance, (b) team OCB, but not (c) team voluntary turnover via team cooperation, such that these relationships are stronger when task interdependence is high than when task interdependence is low. 4. Task interdependence did not moderate the indirect effects of team prosocial motivation on (a) team performance, and (b) team OCB, but did moderate (c) team voluntary turnover via team viability, such that these relationships are stronger when task interdependence is high than when task interdependence is low.	Study 1 1a) ß1=.56 ß2=.49 1b) ß1=.56 ß2=.24 1c) ß1=.56 ß2 ns 2a) ß1=.59 ß2=.24 2b) ß1=.59 ß2 ns 2c) ß1=.59 ß2=−.59 3a) high ß=.26 low ß=.02 (ns) 3b) high ß=.21 low ß=.02 (ns) 3c) CI incl 0 4a) CI incl 0 4b) CI incl 0 4c) High ß=−.47 low ß=−.20 Study 2 1a) ß1=.26 ß2=.59 1b) ß1=.26 ß2=.25 1c) ß1=.26 ß2 ns 2a) ß1=.58 ß2=.51 2b) ß1=.58 ß2 ns 2c) ß1=.58 ß2=−.56 3a) ß$_{diff}$=.08 3b) ß$_{diff}$=.07 3c) ß$_{diff}$=ns 4a) CI incl 0 4b) CI incl 0 4c) ß$_{diff}$=−.17	no serious weaknesses	1) C 2) A

28. Hulsheger, 2009	Meta-analysis of 104 cross-sectional studies.	Teams, work context	Results revealed that team process variables of support for innovation (H7), vision (H5), task orientation (H8), and external communication (H10b) displayed the strongest relationships with creativity and innovation. Slightly weaker associations were found for cohesion (H9) and internal communication (H10a). In contrast, participative safety displayed only a weak, non-generalisable positive correlation with innovation (H6 not supported). Moreover, the results did not confirm an association between task and relationship conflict and innovation (H11 not supported). Input variables (that is, team composition and structure): job-relevant diversity (H1a), task (H2a) and goal (H2b) interdependence, team size (H3) and team longevity (H4) showed weaker positive association with creativity and innovation. Background diversity (H1b) appeared to be negatively related to innovation. Moderator analyses confirmed that relationships differ substantially depending on measurement method (self-ratings vs independent ratings of innovation) and measurement level (individual vs team innovation). Team variables displayed considerably stronger relationships with self-report measures of innovation compared with independent ratings and objective criteria. Team process variables were more strongly related to creativity and innovation measured at the team than the individual level.	H1a: $\rho=.16$ H1b: $\rho=-.13$ H2a: $\rho=.04$ H2b: $\rho=.28$ H3: $\rho=.17$ H4: $\rho=.02$ (ns) H5: $\rho=.49$ H6 (not supported): $\rho=.15$ H7: $\rho=.47$ H8: $\rho=.42$ H9: $\rho=.31$ H10a: $\rho=.36$ H10b: $\rho=.48$ H11a (not supported): $\rho=.07$ H11b (not supported): $\rho=-.09$	No serious limitations	C
29. Jaakson, 2019 n=71 teams	Longitudinal study	international virtual student teams working in four universities in Finland, Estonia, Latvia and Russia	Results showed that, in virtual teams, relatively high levels of initial trust did not change over the period of the teams' projects in general, but in teams where feedback on performance was negative, both trust and trustworthiness declined substantially.	not reported (but text suggests large)	no serious limitations	C

30. Jin, 2017	Meta-analysis of 52 cross-sectional studies N=55 independent samples (8,892 observations)	Organisational setting, teams in the context of new ventures (high- and low-tech industry)	Aggregated entrepreneurial team composition characteristics are positively related to new venture performance, such that the greater the aggregated characteristics, the greater the new venture performance (H1). Moreover, contrary to the expectations, the relationship between aggregated entrepreneurial team characteristics and new venture performance is stronger in low-tech industries than in high-tech industries (H4a). The heterogeneity of entrepreneurial team composition characteristics is positively related to new venture performance, such that the greater the heterogeneity, the greater the new venture performance (H2). This relationship is similar in the low-tech and high-tech industries (H4b). Entrepreneurial team size is positively related to new venture performance, such that the greater the team size, the greater the new venture performance (H3).	H1: r=.14 H2: r=.05 H3: r=.08 H4a (not supported): r=.25 (low-tech industries) r=.11 (high-tech industries)	No serious limitations	C
31. De Jong, (2016)	Meta-analysis k=112 N=7.763	various	Intra-team trust is positively related to team performance. To maximise team performance, trust-building initiatives should focus on developing both cognitive and affective bases of trust within the team, and enhance team members' trust both in each other and in the team leader. Team trust will be most critical when team members work in a highly interdependent manner, with other members who possess unique skills and have different levels of authority in the team (see moderators). *Note I: Cognition-based trust: individuals' cognitive evaluations of the reliability, integrity, and competence of others. Affect-based trust: individuals' feelings of emotional involvement and others' genuine care and concern for their welfare. Besides being conceptually distinct, cognition- and affect-based trust are regarded as functionally distinct, in that they affect outcomes through distinct causal mechanisms and thus uniquely contribute to predicting performance.* *Note II: Task interdependence: the degree to which team members must rely on each other's input and resources to perform their tasks effectively; Team*	Team performance overall r=.30 Cognitive-based trust b=.24 Affect-based trust b=.15 Moderators (low vs high): virtuality r=.26 vs .35 task interdependence r=.21 vs .33 temporal stability r=.23vs .32 authority differentiation r=.25 vs .41	Search terms not specified Design included studies not specified (refs suggest some are longitudinal or controlled)	A

			virtuality: the degree to which team members do not work in either the same place and/or at the same time, and therefore cannot collaborate face-to-face all of the time; Temporal stability: the degree to which team members have a history of working together in the past and an expectation of working together in the future; Authority differentiation: how decision-making responsibility is distributed across the team; Skill differentiation: the degree to which teams consist of members with specialised knowledge or skills that make them uniquely qualified and therefore difficult to substitute.	skill differentiation r=.23 vs .36		
32. De Jong, 2017	1. Quasi experiment N=35 teams 2. Field study N=66 teams (255 team members)	1. Mainly female students, Romania 2. Work teams, 3 countries, various sectors	1. Above and beyond team familiarity, transactive memory and friendship network density, cross-attuning (CA) have a positive impact on team performance. 2a. The group-level elevation of social sensitivity (team social sensitivity) is positively related to CA. 2b. CA mediates the relationship between the group-level elevation of social sensitivity (team social sensitivity) and team performance. 2c. Team social sensitivity is more positively related to CA in small teams with low longevity and in large teams with high longevity in comparison with large teams with low longevity but not with small teams with high longevity. *Note: Cross-attuning = having an accurate understanding of and anticipate on one another's work routines.*	1) R^2=.58 vs .35 2a) ß=.14 2b) Indirect effect .16	No major weaknesses	B

			Results indicate computer-mediated teams reported lower participative decision-making than face-to-face teams after the first session and the disparity continued at the second session.			
33. Kennedy, 2010	RCT n=294 (98 teams)	undergradua te business students from a large public university in the northeast United States	Results suggest that practitioners may want to require an initial face-to-face session (that is, more than just a meet and greet) to prepare members to work together in the future. In addition, when setting up a computer-supported team, practitioners need to consider how the duration of the team's existence may impact the team's process development and outputs. Teams that are assembled to complete a specific task in a very short period may not have time to successfully develop processes as would a team working on a project over a much longer duration. In such cases, assigning team members that are well acquainted with each other may be most appropriate.	no effect sizes reported	artificial setting and tasks	A

34. Klein, 2009	meta-analysis of before-and-after studies (some studies are also controlled) 20 studies, 1,562 teams	Adults in non-clinical settings	**Intervention:** teambuilding (a class of formal and informal team-level interventions that focus on improving social relations and clarifying roles, as well as solving task and interpersonal problems that affect team functioning). Teambuilding does not target skill-based competencies, is not systematic in nature, and is typically done in settings that do not approximate the actual performance environment. 1. Teambuilding interventions have a moderate positive effect on team outcomes. 2. Teambuilding has a small positive effect on *cognitive team outcomes* (for example declarative knowledge of teamwork competencies). 3. Teambuilding has a medium–large positive effect on *affective team outcomes* (for example trust, team potency). 4. Teambuilding has a medium–large positive effect on *process team outcomes* (for example coordination, communication). 5. Teambuilding has a small-to-medium positive effect on *team performance*. 6. *Components of teambuilding* (goal-setting, interpersonal relations, problem-solving, and role clarification): each of them individually has a medium effect on team outcomes. *Note*: Team size moderates the effects of teambuilding on team outcomes: the effect is medium for small and medium-sized teams, and large for large teams.	1. ρ=.31 2. ρ=.13 3. ρ=.44 4. ρ=.44 5. ρ=.26 6. goal setting: ρ=.37; interpersonal relations: ρ=26; problem-solving: ρ=.24; role clarification: ρ=.35 small teams (<5 members): ρ=.28; medium (5-10 members): ρ=.27; large (>10 members): ρ=.66	no serious limitations	A
35. Kleingeld, 2011	3/4 lab studies, 1/4 field studies; only studies with pre-test and control group k=49, N(groups)=739;	various	Specific difficult goals yield considerably higher group performance compared with non-specific goals. Moderately difficult and easy goals were also associated with performance benefits relative to non-specific goals, but these effects were smaller. Unexpectedly, task interdependence, task complexity, and participation did NOT moderate the effect of group goals. Our inventory of multilevel goals in interdependent groups indicated that the effect of individual goals in	overall d=.56 specific & difficult d=0.80 group-centric 7. d=1.2	No serious limitations	AA

	N (individuals) =2,954		groups on group performance was contingent upon the focus of the goal: 'Egocentric' individual goals, aimed at maximising individual performance, yielded a particularly negative group-performance effect, whereas 'group-centric' goals, aimed at maximising the individual contribution to the group's performance, showed a positive effect. These findings demonstrate that group goals have a robust effect on group performance. Individual goals can also promote group performance but should be used with caution in interdependent groups.		
36. Knight, 2015	Meta-analysis of 39 studies N=2,799 groups	Context is not clear	Group positive affect has consistent positive effects on social integration and task performance regardless of contextual characteristics (H1). The effects of group negative affect depend on the context. Shared negative feelings promote social integration and task performance when stemming from an exogenous source (H2) or experienced in a one-shot group (H3), but undermine social integration and task performance when stemming from an endogenous source (H2) or experienced in an ongoing group (H3).	Unclear, only B's instead of ß's are reported.	Design of the included studies not reported	C
37. Konradt, 2015	RCT n=294 (98 teams)	university students (Dutch and German?)	1. Reflection is higher in teams (irrespective of virtual or face-to-face) that receive guided reflexivity combined with feedback, as compared with teams who receive either (a) guided reflexivity without feedback or (b) neither guided reflexivity nor feedback. 2. Virtual teams do NOT show lower team reflection than face-to-face teams. *Note: Guided team reflexivity (sometimes referred to as briefing/debriefing) refers to an intervention to induce reflection in groups.*	1. ß=.34 vs ß=.24 2. ß=−.13 ns	artificial setting and tasks	A
38. Lee, 2014	Longitudinal study, n=528 (132 four member teams)	undergraduate business students at a university in the US	Frequent, dyadic information exchanges among team members both help and hinder members learning about the expertise of other members and thus help and hinder the development of a TMS.	small betas	simulation, student population, small teams	C

39. Lin, 2008	Meta-analysis (k=50) and RCT (n=200)	MA: various RCT: Australian students	Results show that both social (for example relationship-building and cohesion) and task (for example coordination) factors are crucial for improving the performance and satisfaction of virtual teams. SEM suggest the following paths: 1. communication > relationship-building > coordination > performance 2. communication > cohesion > coordination > performance	Coord – Perf: r=.53 Comm – Perf: r=.32 Coh – Perf: r=.36 Rel Bui – Pef: r=.21 Trust – Perf: r=.29	no serious limitations	AA
40. Marlow, 2018	Meta-analysis of 150 cross-sectional studies N=9,702 teams	Teams of students or employees (fields such as management, sales, research and development, surgical teams, search and rescue teams, and simulated war games	Communication is positively and significantly related to team performance (H1). The relationship between communication and team performance is stronger in familiar teams than in unfamiliar teams (H2), and in face-to-face teams compared with virtual teams (H3, the difference between hybrid teams and face-to-face teams was not significant). Moreover, the relationship between communication quality and performance seems to be stronger than the relationship between communication frequency and performance (H7). The relationship between communication and team performance does not depend on leadership style (shared vs hierarchical leadership, H4), task interdependence (H5), task type (cognitive-based vs action-based, H6), content of communication (task-oriented vs personal communication, H8).	H1: ρ=.31 H2: ß=0.3 H3: ρ=.10 (virtual teams) ρ=.29 (hybrid teams) ρ=.32 (face-to-face teams) H4 (not supported): ρ=.27 (shared leadership) ρ=.33 (hierarchical leadership) H5 (not supported): ρ=.27 (highly independent tasks) ρ=.39 (low independent tasks) H6 (not supported): ρ=.30 (cognitive-based tasks)	No serious limitations	C

				ρ=.26 (action-based tasks) H7: ρ=.36 (quality) ρ=.19 (frequency) H8 (not supported): ρ=.22 (personal communication) ρ=0.35 (task-related communication)		
41. Mathieu (2015)	meta-analysis of longitudinal studies (and two additional single longitudinal studies) k=15 ((N=737 teams)	various	Cohesion and performance were related positively and reciprocally over time (while controlling for previous performance). However, on average, the cohesion > performance relationship exceeded the performance > cohesion relationship. Moreover, the cohesion > performance relationship grew stronger over time whereas the performance > cohesion relationship did not. Results suggest that it takes time for team cohesion, as an emergent state, to develop and solidify before it begins to relate significantly to later performance. Following this logic, one might conclude that it would be beneficial to try and accelerate the process by engaging in teambuilding, chartering exercises, and other activities that are designed to enhance team morale and cohesion.	ρ=.27 (T1) to .35 (T2)	no serious limitations	B

42. McEwan, 2017	meta-analysis of controlled before-and-after studies **Sample size:** 72 studies, 8439 participants	Teams in different settings (laboratory, academia, different sectors: healthcare, aviation, industry)	1. Teamwork training has a medium-to-large positive effect on *teamwork behaviours*. 2. Teamwork training has a large positive effect on *team performance*. Moderators for effect on teamwork behaviours: 3. *Team context*: strongest effect in aviation teams, followed by military teams, followed by healthcare and lab experiments, then industry, and finally academia. 4. *Team tenure*: teamwork training has a larger positive effect on teamwork behaviours in newly formed teams than in existing (intact) teams. 5. *Training method*: simulation-based training has a large positive effect, team reviews a medium-to-large effect, workshop a medium effect, and didactic education a small effect. 6. *The number of dimensions of teambuilding targeted* by the training: targeting three dimensions has the strongest effect, followed by two, four, and one. 7. *The dimensions targeted by the teambuilding*: preparation had the strongest effect, followed by interpersonal dynamics, reflection, and execution. Moderators for effect on team performance: 8. *Team context*: strongest effect in teams in industry, followed by healthcare, military, aviation, lab experiment, and academia. 9. *Team tenure*: teamwork training has a larger positive effect on team performance for existing (intact) teams than for newly formed teams. 10. *Training method*: team reviews have a medium-to-large effect, simulation-based trainings and workshops have a medium effect, and didactic education a small-to-medium effect. 11. *The number of dimensions of teambuilding targeted* by the training: targeting four	1. d=.68 (outliers removed: d=.55) 2. d=.92 (outliers removed: d=.58) 3. ? 4. existing teams: d=.33; new teams: d=.67 5. simulation-based training: d=.78; team reviews: d=.64; workshops: d=.50; didactic education: d=.19 6. three dimensions: d=.98; two dimensions: d=.65; four dimensions: d=.57; one dimension: d=.005 7. Preparation: d=.75; interpersonal dynamics: d=.69; reflection: d=.65; execution: d=.64 8. ? 9. existing teams: d=.99; new teams: d=.54 10.team reviews: d=.69; simulation-	no serious limitations	A

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			dimensions has the strongest effect, followed by two, one and three. *The dimensions targeted by the teambuilding*: preparation had the strongest effect, followed by interpersonal dynamics, reflection, and execution.	based training: d=.57; workshops: d=.55; didactic education: d=.41 11.d between .46 and .67 d between .52 and .60		
43. McLarnon, 2019	RCT n=13,224 (1,839 teams)	individuals who were participating in the X-Culture consulting competition	Results supported a stronger *indirect* effect between communication frequency and performance, via process coordination, when global virtual team members gave and received weekly (peer) feedback.	unclear	artificial setting and tasks	A
44. Mesmer-Magnus, 2009	Meta-analysis, includes RCTs k=72 (4,795 groups, n=17,279)	various	Information-sharing positively predicted team performance across all levels of moderators. However, IS uniqueness predicts team performance more strongly than IS openness. In addition, it was found that teams share more information wherein (a) task demonstrability is high (solve vs judge), (b) discussion structure is high (freeform vs highly focused), and (c) members are more cooperative during discussions.	IS > perf: r=.42 IS un > perf: r=.50 IS op > perf: r=.32 task dem > IS: r=.45 disc struct > IS: r=.41 coop disc > IS: r=.57	no serious limitations	AA

| 45. Mesmer Magnus, 2017 | meta-analysis

k=28 (results from 4,943 teams /19,575 individuals). | various | Results show consistent effects for team cognition in team process and performance. However, whereas originally compilational cognition (TMS) was more strongly related to both team process and team performance than was compositional cognition (SMM), in the updated database, compilational cognition (TMS) is more strongly related to team process and compositional cognition (SMM) is more strongly related to team performance.

In essence, this updated finding suggests that knowing who knows what (TMS) is more important to predicting effective and efficient team process, while having a shared understanding of the problem, task, or team (for example SMMs) is more influential in predicting the extent to which a team will be successful. | overall ρ=.36

compositional (SMM) ρ=.39

compilational (TMS) ρ=.29 | design of the included studies not specified | C |

46. Peetes, 2006	Meta-analysis k=10	Professional and student teams	Meta-analysis on the relationship between team composition in terms of the Big Five personality traits (trait elevation and variability) and team performance. The higher the average level of agreeableness and conscientiousness within teams, and the more similar team members are with respect to agreeableness and conscientiousness, the better their team performs. H1a. Elevation of extraversion is NOT related to team performance. H1b. Variability in extraversion is NOT positively related to team performance. H2a. Elevation of agreeableness is positively related to team performance. H2b. Variability in agreeableness is negatively related to team performance. H3a. Elevation of conscientiousness is positively related to team performance. H3b. Variability in conscientiousness is negatively related to team performance. H4a. Elevation of emotional stability is NOT related to team performance. H4b. Variability in emotional stability is NOT related to team performance. H5a. Elevation of openness to experience is NOT related to team performance. H5b. Variability in openness to experience is not related to team performance. Moderation by type of team was tested for professional teams versus student teams. Moderation results for agreeableness and conscientiousness were in line with the total sample results. However, student and professional teams differed in effects for emotional stability and openness to experience.	1a r=0.04 1b r=0.05 (ns) 2a r=0.24 2b r==−0.12 3a r=0.20 3b r=−0.24 4a r=0.04 4b r=0.02 5a r=0.03 5b r=−0.01	Design of included studies not reported Small number of correlations	C

| 47. Prewett, 2009 | Meta-analysis k=70 | Not reported | Study examined relations between team personality and team performance considering the choice of criterion (behavioural vs outcome) and method of aggregation (mean, minimum, maximum and variance).

1. Conscientiousness acts as a supplementary trait, such that (a) mean and (b) minimum methods of aggregating Conscientiousness positively relates to performance. (c) Variance in Conscientiousness is not negatively related to performance.

2. Extroversion acts as a complementary trait (a) minimum scores did not negatively relate to performance (b) variance in Extroversion positively predicts team performance.

3. Agreeableness acts as a supplementary trait, such that (a) mean and (b) minimum methods of aggregation positively relate to performance, and (c) variance in Agreeableness negatively relates to performance.

4. Emotional Stability did not demonstrate supplementary characteristics, such that (a) mean and (b) minimum methods of aggregation will positively relate to performance, and (c) variance methods will negatively relate to performance.

5. Team Extroversion relates more strongly to (a) team behaviour than to (b) team outcome measures.

6. Team Agreeableness relates more strongly to (a) team behaviour than to (b) team outcome measures.

7. Team Emotional Stability relates more strongly to (a) team behaviour than to (b) team outcome measures. | 1a r=.13
1b r=.13
1c r=−.06 (ns)

2a r=.03 (ns)
2b r=.06

3a r=.10
3b r=.10
3c r=−.07

4a r=.08
4b r=.06 (ns)
4c r=−.03 (ns)

5a r=.20
5b r=.06 (ns)

6a r=.20
6b r=.08

7a r=.17
7b r=.05 (ns) | Design of included studies not reported

Large number of hypotheses | C |

54

48. Rapp, 2014	longitudinal study, n=153 teams	sales teams in a medium-sized high-technology firm	Team goal monitoring moderates the relationship between team efficacy and team performance, such that: (a) there is an inverted U-shaped relationship between these variables among teams that engage in low levels of monitoring, and (b) a positive relationship in teams that engage in high levels of monitoring.	ß=.37	no serious limitations	C
49. Robertson, 2013	cross-sectional study n=383	various	Trust in teammates predicted transactive memory. Trust in management did NOT predict transactive memory.	trust teammates > TMS: ß=.46 trust management > TMS: ß=.08	no serious limitations	D
50. Salas, 2008	meta-analysis of cross-sectional studies k=45 (2,650 teams)	Most subjects either in military domain or students in lab settings	**Intervention:** team training: a set of tools and methods that, in combination with required [team-based] competencies and training objectives, form an instructional strategy. Task-focused team training enables team members to become aware of, learn about, and practise requisite team competencies (that is, KSAs) and performance processes while receiving feedback on their performance. 1. Team training has a moderate positive effect on team outcomes. 2. Team training has a medium-to-large positive effect on cognitive and process outcomes, and a medium positive effect on affective outcomes. 3. Team training has a moderate-to-high positive effect on team performance. Moderators of the effect of team training on team performance: 4. *The content of the training* (taskwork, teamwork, both) results in little differences in the effect size estimates. 5. *The stability of the team*: the effect in intact (existing) teams is higher than in ad hoc teams. *The size of the team*: the effect is greatest in large teams, followed by small teams and then by medium teams.	1. ρ=.34 2. cognitive outcomes: ρ=.42; process outcomes: ρ=.44; affective outcomes: ρ=.35 3. ρ=.39 4. taskwork: ρ=.35; teamwork: ρ=.38; both: ρ=.40. 5. existing teams: ρ=.54; ad-hoc teams: ρ=.38 large teams: ρ=.50; small teams: ρ=.39; medium teams: ρ=.34	no serious limitations	C

			Team learning processes do not automatically lead to performance improvement. In order to achieve an increase in team performance over time, teams need to complement their team learning behaviours with shared task and temporal mental models. 1. The extent to which the team members engage in team learning processes is not positively related to team performance improvement. 2a. The relationship between team learning processes and team performance improvement is moderated by task mental model similarity in such a way that when team members have a similar task mental model, the relationship will be more positive than when they do not have a similar mental model. 2b. The relationship between team learning processes and team performance improvement is not moderated by team mental model similarity in such a way that when team members have a similar mental model the relationship will be more positive than when they do not have a similar mental model. 2c. The relationship between team learning processes and team performance improvement is moderated by temporal mental model similarity in such a way that when team members have a similar temporal mental model, the relationship will be more positive than when they do not have a similar temporal mental model.			
51. Santos, 2015	Longitudinal study N=67 teams, 314 individuals	Company managers, university students		no effect sizes provided	Concerns a simulation, partly with students	C

52. Schippers, 2013	Longitudinal study N=73 teams (groups of 3 students)	Business students	1. Prior team performance moderates the relationship between team reflexivity and final team performance such that team reflexivity will be positively related to final team performance for (a) teams with relatively low prior performance and unrelated to final team performance for (b) teams with relatively high prior performance. 2. Prior team performance moderates the relationship between team reflexivity and team learning such that (a) team reflexivity will be positively related to team learning for teams with relatively low prior performance and (b) unrelated to final team performance for teams with relatively high prior performance. 3. Team learning mediates the interaction between team reflexivity and prior team performance on final team performance.	1a ß=.25 1b ß=−.16 (ns) 2a ß=.49 2b ß=.09 (ns)	No major weaknesses	C
53. Sivasubra maniam, 2012	Meta-analysis of 38 studies	Organisation al setting, teams from different industries (for example, high-tech, manufacturi ng, software, electronics, healthcare)	Team inputs: team leadership (H4), team ability (H3) and team tenure (H1) are positively related to NPD* team performance. Functional diversity (H2) is unrelated to NPD outcomes. Team process variables: Internal (H5) and external (H6) communication, group cohesiveness (H7) and goal clarity (H8) were found to be positively associated with NPD outcomes. Additionally, NPD effectiveness seems to be predicted by team leadership, internal and external communication, and group cohesiveness (H9, H10). NPD efficiency was predicted by all but team size and team tenure (H9). * NPD = new product development. * team leadership = the extent to which the team leader is charismatic and transformational, and utilises a style characterised as being participative, empowering, facilitative, and communicative.	H1: r=.28 H2: r=.02 H3: r=.29 H4: r=.44 H5: r=.31 H6: r=.18 H7: r=.20 H8: r=.50 H9, H10: R^2=.45 R^2=.34	Design of the included studies not reported	C

54. Solansky, 2011	Study 1 Longitudinal study N1=20 teams (86 students) Study 2 N2a=126 (10 teams) N2b=58 (12 teams)	1. Student teams, US 2. Working teams, US, construction, education	1. Team identification is positively related to performance.	Study 1 r=.63 Study 2 r=.58	no serious weaknesses	1) C 2) D
55. Solansky, 2019	Study 1 Quasi exp study N=86 (20 teams) Study 2 Cross-sect N=126 (10 teams)	1. Students, US 2. Working teams, US, construction	1. Collective mind scores increase over time. 2. Collective mind scores are positively associated with team performance. *Note: collective mind refers to a team or an organisation that acts intelligently as a collection of individuals.*	Study 1 1) Not reported 2) ß=.68 Study 2 2) ß=0.80	Unclear reporting of results	1) C 2) D
56. Stewart, 2006	Meta-analysis of 93 studies	Teams performing real-life tasks in a natural setting (management, production and project teams)	The study examines the relationships between team design features (group composition, task design and leadership) and team performance and reports the following results: 1. Aggregated measures of individual ability and disposition correlate positively with team performance. 2. Team member heterogeneity and performance correlate near zero, but the effect varies somewhat by type of team (project, production and management). 3. Project and management teams have slightly higher performance when they include more members. 4. Team-level task meaningfulness exhibits a modest but inconsistent relationship with performance.	1. ρ=.22 2. ρ=−.04 (general) ρ=.04 (project teams) ρ=−.07 (production teams) ρ=−.03 (management teams) 3. ρ=.04 4. ρ=.16 5. Autonomy: ρ=.25 (general) ρ=.36 (physical work) ρ=.26 (knowledge work) intra-team coordination: ρ=.25 (general)	Design of the included studies not reported	C

			5. Increased autonomy and intra-team coordination correspond with higher performance, but the effect varies depending on task type (teams engaged in physical vs knowledge work). 6. Leadership, particularly transformational and empowering leadership, improves team performance.	ρ=.12 (physical work) ρ=.29 (knowledge work) 6. ρ=.26 (transformational leadership) ρ=.33 (empowering leadership)		

57. Svyantec, 1999	meta analysis of before-after studies and controlled before-after studies
	
	n=11 studies
		Employees in business or government settings	Moderators of teambuilding effect on team productivity:
			A. Factors before teambuilding
			  1. *The initiator of the teambuilding*: when the initiator is external (vs internal to the team), the positive effect is stronger.
			  2. *The rationale for the teambuilding*: when the action is corrective (vs preventive), the effect is stronger.
			  3. *The expectations from teambuilding benefits*: when the expectation is to change both, the effect is strongest, followed by expectations to improve performance, and lastly by expectations to improve attitudes.
			  4. *The involvement of the group in planning the teambuilding*: when the group is involved, the effect is weaker than when it isn't involved.
			B. Factors during teambuilding
			  5. *Focus of teambuilding*: a mixed focus on goal-setting and interpersonal relations has the highest effect, followed by only goal-setting, followed by only interpersonal relationships.
			  6. *The presence of other interventions* together with teambuilding: in the presence of other interventions, the effect of teambuilding is stronger than when it is alone.
			  7. *Who managed the intervention(s)*: for teambuilding with an external and an internal consultant, the effect is strongest, followed by only external consultant, followed lastly by only internal consultant.
				1. Internal initiator: d=.43; external initiator: d=.78
				2. Preventive action: d=.69; corrective action: d=.86)
				3. Expect to change attitudes & performance: d=.86; expect to change performance: d=.79; expect to change attitudes: d=.23
				4. Group involved: d=.50; group not involved: d=1.07
				5. Interpersonal focus: d=.58; goal-setting focus: d=.62; mixed focus: d=.79
				6. Only teambuilding: d=.53; other
					large number of relationships tested	A

			8. *The focus of the teambuilding*: an intragroup focus has a stronger effect than an individual focus. C. Organisational support factors 9. *Supervisory support for the teambuilding*: when support is present, the effect is stronger. 10. *Support for change efforts*: when support from higher levels is present, the effect is strongest, followed by organisations with no evidence for support, and followed lastly by support from different levels. D. Organisational characteristics 11. *Size of organisation*: small organisations have the strongest effect, followed by large organisations, followed by medium ones. 12. *Type of organisation*: in industrial/manufacturing organisations, the effect is stronger than in government organisations. 13. *Team's responsibility for own performance*: when the team is solely responsible for own performance, the effect is stronger than when the team depends on other elements in the organisation. *Management style*: in teams with a participative management style, the effect was stronger than in teams with an autocratic management style.	interventions: d=.82 7. Only internal consultant: d=.35; only external consultant: d=.74; both internal and external: d=1.75 8. Individual focus: d=.48; intragroup focus: d=.79 9. Support present: d=1.02; support missing: d=.49 10. Support from higher levels: d=.90; no evidence of support: d=.64; support from different levels: d=.50 11. (Small organisations: d=.80; medium org: d=.43; large org: d=.56) 12. (Industrial/man. d=.89; government: d=.21) 13. Responsible for performance: d=.92; interdependent: d=.76		

				Participative style: d=2.62; autocratic: d=.18		
58. Tanghe, 2010	Study 1 Cross-sectional N=71 teams Study 2 Scenario experiment 2x2 design N=121	1. Employees, mainly service organisations 2. Students	Team identification leads group members to affectively converge to their fellow group members and that this affective convergence, in turn, explains subsequent team-oriented attitudes. 1. The higher the group identification is, the stronger the affective convergence among team members. 2. Positive group affective (PA) tone is positively associated with team effectiveness and this effect will be stronger for higher levels of group identification. 3. Negative group affective (NA) tone is not negatively associated with team effectiveness and this effect will be stronger for higher levels of group identification.	See article	Measure group affect study 2 somewhat unclear	1) D 2) B

59. Tannenbaum, 2013	meta-analysis of before-and-after studies n=31 studies, 2,136 participants	various	**Intervention**: debriefs. Debriefs lead individuals or teams through a series of questions that allow participants to reflect on a recent experience, construct their own meaning from their actions, and uncover lessons learned in a non-punitive environment. A debrief has four elements: (1) participants reflect on *specific* events; (2) participants are *actively* involved in self-discovery; (3) the environment is *non-judgemental* and focused on learning; (4) both the participants and at least one other external source give *input* regarding the events under review. 1. Debriefs have a medium-to-large positive effect on *team performance*. 2. Debriefs focused on team-level improvement have a larger effect on team performance than on individual performance. Moderators of the effect of debriefs on team performance: 3. *Facilitation in debriefs*: facilitated debriefs have a greater effect on team performance than non-facilitated debriefs. 4. *The degree of structure of debriefs*: highly structured debriefs have a stronger effect than moderately structured debriefs.	1. d=.67 2. team performance: d=1.2; individual performance: d=.41 3. facilitated debriefs: d=.75; non-facilitated debriefs: d=.25 highly structured debriefs: d=.69; moderately structured debriefs: d=.54	no serious weaknesses	B
60. Tekleab, 2016	longitudinal study n=227 (45 teams)	employees pursuing a graduate degree at a large Midwestern US university	1. There is NO curvilinear relationship between functional diversity and team cohesion. 2. Behavioural integration positively influences team cohesion. 3. A high level of behavioural integration attenuates the negative impact of functional diversity on team cohesion such that the relationship will be negative only under a low level of behavioural integration. 4. The relationship between team cohesion and objective team performance is mediated by team learning. Note: Behavioural integration is a meta-construct, which includes the team's information exchange, collaborative behaviour, and joint decision-making.	1. ß=−.12 ns 2. ß=.73 3. ß=−.48 4. coh > learning ß=.45 learning > performance ß=.66	Concerns a capstone simulation	C

61. Turner, 2014	Meta-analysis, includes RCTs k=18 (768 teams, n=13,491)	various	The primary focus of this meta-analysis is to identify which measure of the six team cognition constructs (shared mental models, SMM; team mental models, TMM; information-sharing, IS; transactive memory systems, TMS; cognitive consensus, CC; group learning, GL) produced the best performance outcome results. The one team cognition construct that stood out was that of IS, with statistical findings greater than the constructs of TMM, GL, and TMS. The two shared cognitive constructs that were not statistically different from IS were SMM and CC; neither of these constructs was found to be significantly different from TMM, GL, or TMS. *Note: see discussion and conclusion.*	SMM r=.39 TMM r=.19 ns IS r=.51 TMS r=.30 CC=.42 GL=.15 ns	no serious limitations	AA
62. Van der Vegt, 2010	Longitudinal study N=47 teams (average team size=10)	Truck manufacturing	1. Turnover is negatively associated with social integration within self-managing work teams. 2. Turnover is negatively associated with team learning behaviour within self-managing work teams but is not inverse U-shaped. 3. Team turnover is negatively associated with task flexibility in self-managing work teams. 4. Social integration does not partially mediate a generally negative relationship between team turnover and effectiveness in self-managing work teams. 5. Team learning behaviour partially mediates a generally negative relationship between team turnover and effectiveness in self-managing work teams. 6. Task flexibility partially mediates a generally negative relationship between team turnover and effectiveness in self-managing work teams. 7. Team turnover is negatively related to team effectiveness.	1) ß=−.32 2) ß=−.41 3) ß=−.37 7) ß=−.36	No full use of validated scales	C

63. Wagner, 2012	Randomised experiment N=206 (82 teams)	Students, US	1. For work consisting of a combination of individualised and interdependent tasks, team member performance is higher for individuals possessing a mix of individualism and collectivism than for individuals who lack similar heterogeneity. 2. The relationship between intrapersonal heterogeneity in individualism–collectivism and performance predicted in H1 is moderated by structural interdependence such that the effect is stronger under conditions of loose structural interdependence than under conditions of tight structural interdependence.	See article	no serious weaknesses	A
64. Wang, 2019	meta- analysis k=47 (2,832 teams)	various	1a. Surface-level diversity in culturally diverse teams is not related to team creativity/innovation, (2a) irrespective whether the team is collocated or non-collocated, level of task independency (3a), task complexity (4a), or task intellectiveness (judgemental vs intellective tasks) (5a). 1b. … whereas deep-level diversity in culturally diverse teams is somewhat positively related to team creativity/innovation. 2. This relationship is stronger for collocated teams than for non-collocated teams, 3. stronger for interdependent tasks than for independent tasks, 5. stronger for intellective tasks than for judgemental tasks. Task complexity and intellectiveness did not moderate the effect.	All ES very small 1a) ns and mostly close to zero 1b) r=.16? 2) col: r=.18 non col: r=.02 ns 3) inter: r=.19 indep: r=−.10 ns	Design of included studies not reported Effect sizes reported in text do not correspond with the ES in table 2	C
65. Webber, 2001	meta- analysis k=24 (45 correlations)		Results showed that job-related diversity has NO relationship with cohesion or performance.	close to zero and ns	Design of included studies not reported	C

66. Webber, 2008	Longitudinal study n=69 (9 teams)	Undergraduate students, Canadian University	Note: direct effect sizes incorporated in De Jong 2016. 1. Early trust emerges as a one-dimensional factor early in the lifespan of a team. 2. Cognitive and affective trust emerge as separate components over time. 3. Familiarity with team members is positively related to early trust. 4. Interaction frequency is NOT related to (affective or cognitive) trust. 5. Monitoring behaviours by team members (eg tracking the work of others, creating backup plans, or working around team members to get tasks done) somewhat negatively affects the development of cognitive and affective trust in teams (even after controlling for familiarity and early trust).	3) R^2=.06, ß=.24 4) Aff: R^2=.01, ß=.09 Cogn: R^2=.00, ß=.03, 5) small	artificial setting	C
67. Weer, 2016	longitudinal study with 3 measurement points over 4, 5 years n= 714 teams	Employees of a large, multinational technology-driven firm	**Intervention**: coaching by team leader: facilitative coaching (providing guidance by aligning team member aspirations with organisational goals and facilitate the achievement of both individual and team objectives) and pressure-based coaching (providing direction by applying extensive pressure to get results). These managers communicate expectations by becoming visibly upset and complaining vigorously if goals are not met, and may challenge employees to improve by reprimanding poor performance and/or publicly criticising mistakes. Team leader's facilitative coaching predicts team effectiveness (as rated by the team leader). Team leader's pressure-based coaching negatively predicts team effectiveness.	Low effect sizes 1. r=.14 at time 1; r=.0 at time 2; r=.02 and ß=.02 at time 3. r=−.05 at time 1; r=−.11 at time 2; r=−.06 and ß=−.24 at time 3	no serious weaknesses	B

68. Wildman, 2016	Systematic review of 31 cross-sectional (28) and longitudinal (3) studies	Work teams, different industries	Concerning specific team learning behaviours, sharing, team reflection, and team activity tend to have the strongest impact on teams' engagement in innovation development. Learning and innovation development are mutually dependent aspects of teamwork and fostering one aspect will also be beneficial for the other.	Unclear	It seems that the authors pretend to estimate causal inference basing on correlational studies	B
69. Wildman, 2018	Cross-sectional study N=117 teams (593 respondents)	Vocational educators in vocational colleges	Team learning behaviours (TLBs), especially team reflexivity and boundary-spanning, relate positively to innovative work behaviour (IWB). Furthermore, team structure, task interdependence and group potency relate positively to TLBs. TLBs can be fostered by establishing these team learning conditions. 1a. Knowledge-sharing is not related to IWB. 1b. Team reflexivity relates positively to IWB. 1c. Boundary-spanning relates positively to IWB. 1d. Storage and retrieval is not related to IWB. 2. Team structure relates positively to (a) knowledge-sharing, (b) team reflexivity, (c) boundary-spanning, (d) storage and retrieval. 3. Task interdependence relates positively to (a) knowledge-sharing, (b) team reflexivity, (c) boundary-spanning. It does not positively relate to (d) storage and retrieval. 4. Group potency relates positively to (b) team reflexivity, but not to (a) knowledge-sharing, (c) boundary-spanning, (d) storage and retrieval.	1a ns 1b ß=0.54 1c ß=0.61 1d ns 2a ß=0.73 2b ß=0.44 2c ß=0.49 2d ß=0.29 3a ß=0.24 3b ß=0.25 3c ß=0.26 3d ns 4a ns 4b ß=.28 4c ns 4d ns	no serious limitations	D

70. Zhou, 2015	meta-analysis k=31	entrepreneurial teams	1. No conclusion could be drawn regarding the relationship between age diversity and entrepreneurial team performance due to inconsistent research results. 2. No conclusion could be drawn regarding the relationship between race diversity and entrepreneurial team performance due to inconsistent research results. 3. The association between educational-level diversity and entrepreneurial team performance remains inconclusive. 4. Overall, the usually hypothesised positive relationship between educational-background diversity and entrepreneurial team performance was not supported by empirical studies. 5. Empirical findings regarding relationships between functional diversity and entrepreneurial team performance may be described as divergent and inconsistent. 6. Although informational diversity has often been assumed to be beneficial for firm-level as well as team-level entrepreneurial team performance, here again empirical evidence is inconsistent and therefore inconclusive.	ns	Design of included studies not reported	C

Excluded studies

Author & year	Reason for exclusion
1. Barczak, 2010	Cross-sectional study, partly focuses on EI, confirms findings from recent MAs
2. Beal, 2003	Included in Chiocchio and Hélène (2009)
3. Budworth, 2011	Concerns the assessment of a specific training (employee selection methods)
4. Buljac, 2010	Literature review, narrative summary of findings (including of individual studies included)
5. Buvik, 2016	Cross-sectional study, small sample, Norwegian construction teams, confirms findings from recent MAs
6. Carboni, 2013	Cross-sectional study, sales teams. Results indicated that individuals close to the core of a team outperformed more peripheral individuals, but only to the extent that teams were high-performing or had been together longer as a team.
7. Chen, 2018	Limited generalisability (undergraduate students in Singapore). Experiment comparing different methods of team formation: (1) random assignment; (2) self-selection; and (3) algorithm assignment designed to maximise skill complementarity. The study found that self-selection creates high-performing teams.
8. Cheng, 2016	Study with several weaknesses, artificial setting and artificial tasks, findings are inconclusive
9. Chi, 2012	Paper cannot be retrieved
10. Curseau, 2014	Concerns the effect of individual goals rather than group goals
11. DeChurch, 2010	Incorporated in Mesmer-Magnus et al (2017)
12. de Pillis, 2015	Concerns student teams in an educational setting
13. Devine, 2001	Focuses only on differences between field and lab studies
14. Ehrhardt, 2014	Cross-sectional study, mainly confirms findings from meta-analyses
15. Eisele, 2013	Assessment of feedback sessions based on the Team Diagnostic Survey, lacks detailed information regarding the effect
16. Eisele, 2015	The study doesn't examine an intervention. It is focused only on the predictive validity of the Team Diagnostic Survey.
17. Espinosa, 2015	Concerns dyadic teams

18. Farh, 2017	Concerns TMX, findings rather hard to apply: strong TMX produces obligations to utilise resources provided by one's teammates, and these obligations enhance performance when (a) teammates provide resources of high quality or (b) the quality of resources available from individuals outside of the TMX relationship (that is, the leader) are low, purportedly because TMX-based obligations protect individuals from over-utilising low-quality resources from the leader.
19. Gaggioli, 2015	Longitudinal study, concerns social network indices and experience of flow
20. Gilley, 2010	The study doesn't examine an intervention. It is focused only on the managerial skills that predict the manager's ability to facilitate and build teams.
21. Hasa, 2019	Limited generalisability (startups in India). The findings highlight how prior social connections, which are often a source of knowledge and influence, can limit new interactions and thus the ability of organisations to leverage peer effects to improve the performance of their members.
22. Harty, 2016	No estimate of effect sizes is given, only significance levels. Furthermore, data is analysed at individual level, and the groups might not be teams.
23. Huang, 2013	Cross-sectional study, mainly confirms findings from meta-analyses (Bachrach et al 2019, Mesmer-Magnus et al 2017)
24. Jarrett, 2016	The study is included in the McEwan (2017) meta-analysis, with another reference (Jarrett et al 2012) – this is a dissertation that the article from 2016 was based on (the same sample & data).
25. Kaymak, 2011	The effect of positive past experiences working on group cohesion and group performance was only indirectly measured (SEM).
26. Kuipers, 2009	The study doesn't examine an intervention. It examines whether three team processes predict
27. Lee, 2013	Limited generalisability (operational service teams in Hong Kong en Macao. In this study, operational service teams' attribute patterns and their associated performance levels were examined using a configuration approach.
28. Liu, 2011	Cross-sectional study, Taiwanese companies, confirms findings from recent MA's
29. Marques-Quinteiro, 2019	Cross-setional study, confitms findings from recent MA's
30. Matta, 2018	The meta-analysis doesn't focus on an intervention, but on leader-member exchange (team leader's behaviour)
31. McHaney, 2018	Off topic, study about whether groups with prior history of interaction outperform individuals in deception detection. Results indicated that groups which exhibited higher levels of relational links, that is, established groups, were more accurate in deception detection than ad hoc groups.
32. McNeese, 2017	Not relevant, laboratory-based study of collocated student teams undertaking information retrieval tasks
33. Mell, 2014	Effect sizes are incorporated in Bachrach et al (2019). In addition, the central hypothesis ("Teams with a centralised TMS structure perform better than teams with a decentralised TMS structure when there is a disconnected distribution of interdependent task information, but not when there is a connected distribution of interdependent task information") is too detailed and too academic for this REA.
34. Meneghel, 2016	Cross-sectional study

35. Mertins, 2015	Simulation game, no hypotheses, methods section rather unclear
36. Moser, 2019	Cross-sectional study, confirms findings from recent MAs
37. Muhlberger, 2015	The study doesn't measure team effectiveness, but the effectiveness of several types of coaching (including group coaching) interventions for individual goal attainment.
38. Mullen, 1994	Included in Chiocchio and Hélène (2009)
39. Naidoo, 2011	(included in Matta 2018) The study doesn't focus on an intervention, but on leader-member exchange (team leader's behaviour)
40. Nielsen, 2010	Concerns training of managers rather than teams
41. Nielsen, 2012	The study doesn't measure team effectiveness, but individual-level variables such as autonomy, social support, job satisfaction, and affective wellbeing.
42. Nielsen, 2017	Only marginally relevant, most of the findings are incorporated in recent MAs (eg McEwan et al 2017)
43. Nisula, 2016	Cross-sectional study, focuses on individual creative self-efficacy and several other constructs measured at the individual level
44. Nouri, 2013	Nice study, but unfortunately concerns dyads
45. Oertel, 2015	Partly incorporated in Bachrach et al (2019). In addition, hypotheses tested mostly descriptive and fairly self-evident (eg "During the formation phase of teams, knowledge-based team learning behaviours (storing and retrieving task- and teamwork-relevant knowledge) are positively related to the emergence of transactive memory").
46. O' Leary, 1994	Included in Kleingeld et al (2011)
47. Pierro, 2015	Cross-sectional study on the relationship between need for cognitive closure and employee performance
48. Rapp, 2007	Included in Delise et al (2010), McEwan et al (2017), and Salas et al (2008)
49. Revilla, 2012	Cross-sectional study, very small sample, confirms findings from recent MAs
50. Rico, 2011	Examined the effects of person-focused organisational citizenship behaviours on the performance of teams characterised by different levels of virtuality and task interdependence
51. Rodriguez-Sanchez, 2016	Longitudinal study, outcomes are incorporated in recent MAs
52. Rousseau, 2013	Cross-sectional study on team coaching by team leaders, uses a self-constructed five-item questionnaire that takes a very broad approach to coaching (eg "Our team leader points out the areas we need to improve"; "Our team leader suggests means to improve our performance").
53. Salanova, 2015	Off-topic study about collective efficacy and collective flow. No performance measure.
54. Salas, 1999	Rather old MA of cross-sectional studies, outcome is partly refuted by more recent, high-quality MAs (eg Klein et al, 2009)

55. Shazi, 2015	Cross-sectional study, small sample, confirms findings from recent MAs
56. Staats, 2012	Off-topic. Study about 'team scaling fallacy'. As team size increases, people increasingly underestimate the number of labour hours required to complete projects.
57. Sonnentag, 2010	Focuses on individual performance (findings suggest that team members can improve their individual performance when engaging in teamwork processes that are relevant for the team as a whole)
58. Stevens, 2003	Participants were all female and from sports teams.
59. Tanghe, 2010	Experimental lab study with students, very artificial. Concerns the effect of team members' affective state on propensity to trust. People who are less trusting will show more cooperative behaviours when confronted with group members displaying high activation affective states than when confronted with group members displaying low activation affective states.
60. Tindale, 2012	Unclear framework, hypotheses and methods, limited generalisability
61. Troster, 2014	Concerns only self-managed teams and the effect of nationality. Outcomes are potency (the team's confidence in its ability to perform) and its performance as rated by expert judges.
62. Unger-Aviram, 2015	Lab setting and artificial task (bridge planning task), focuses mainly on the effect of goal orientation on adaption to change.
63. van der Haar, 2015	Concerns on-scene command teams that coordinate the interdisciplinary aid efforts of fire departments, the police, and disaster medicine in case of natural or man-made emergencies, such as floods, fire breakouts, or car accidents.
64. Van Mierlo, 2010	Lab setting and artificial task (tower-building task), very academic, implications for practice somewhat unclear
65. Vora, 2012	Longitudinal study, simulation with undergraduate students, effects unclear
66. Woehr, 2013	Concerns an RCT with students in an artificial setting and an artificial task (building a replica of a real bridge, using 33 plastic pipes of three different sizes and 20 rubber bands). Note: Results indicated that value diversity among team members had NO significant impact on task performance.
67. Wu, 2016	Cross-sectional study, student population (undergraduates), confirms findings from recent MAs
68. Xu, 2019	Longitudinal study, only marginally relevant to the REA question
69. Yee-Young, 2015	Concerns whether social category (gender and age) and informational diversity (education and work experience) in work teams may affect a team's perceived fit, which in turn may influence leader-rated group performance.
70. Zhang, 2015	Cross-sectional study of Chinese teams. The statistical technique (support vector machine) that is used to build the model is rather unclear.
71. Zhang, 2016	Population concerns Chinese employees and students. However, in China group members may differ from their American and European counterparts in terms of group diversity effects. In addition, most betas found were practically irrelevant.
72. Zhu, 2018	Longitudinal survey, confirms findings from recent MAs (Bachrach et al 2019, Mesmer-Magnus et al 2017)

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