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The Science (and Practice) of Teamwork: A Commentary on Forty Years of Progress…

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Abstract

Forty years ago, Dyer summarized team science research, finding that in many areas, we lacked theoretical backing and empirical evidence—sometimes to the point of meagerness. This commentary summarizes the last four decades of team research with Dyer's seven leading questions—finding our progress far from scant. We have uncovered groundbreaking theories, moved past understanding teamwork as only the task, researched hundreds of team emergent states, and conducted vast meta-analytic research while continuing to uncover how to make teamwork more effective and what conditions foster greatness. We also find we continue to require work in other areas, from developing better methodological practices to considering teamwork's dynamic nature. This commentary seeks to revisit team science's most significant breakthroughs, such as the vast improvement of team training research, and weak spots, such as our continued lack of longitudinal research. By doing so, we highlight how much progress we can make *together*.

Keywords

teamwork, team science, review, methodology

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Introduction

We start with our conclusion—the science (and practice) of teamwork in organizations is robust, alive, well, and thriving. The principles, discoveries, findings, and evidence-based insights from the science generated over the last four decades are remarkable and unprecedented. Our science has a wealth of information on composing, managing, and developing teams and teamwork. It is not a perfect science, but it is valuable and impactful. Indeed, we submit that we have 40 years of progress.

Why 40 years of progress? We have a marker. The U.S. Navy (now NAWC-TSD) hired the first author in the mid-'80s to develop a team performance and training research portfolio (see personal note at the end of the paper for details on this experience by lead author). One of the first actions taken by the first author was to review Dyer's (1984) chapter—a team performance and training review covering the 1955 to 1980 time frame. We use that review and some of the questions asked by Dyer as our baseline marker for our commentary on the progress of the science in this paper. These are:

1. What theories have been proposed to account for team behavior?
2. What types of tasks do teams perform?
3. How do teams function or work; by what means or processes do teams achieve their goals?
4. What procedures have been developed to measure team performance, processes, and other characteristics?
5. What factors influence team performance?
6. What has been the impact of training programs on team processes and performance?
7. What questions and methodological issues must be examined to improve team training and assessment?

This commentary illustrates team science's comprehensive narrative of evolution and progress. Organizing our commentary around the seven questions (of eight) posed by Dyer (1984) allows us to lay out a guiding framework, highlighting progress relative to our knowledge of teamwork. By selectively reviewing the progress in teamwork theory, measurement, influences, and practice, we reflect on where we are, what we have done as a science, and where we need to go next. We hope to provide a parsimonious overview and our reflection on the current state of the literature that team scientists and practitioners can use to generate practical guidance and drive future work. For this purpose, we rely on recent literature reviews (e.g., J. E. Mathieu et al., 2014; see Table A1), meta-analyses (e.g., Marlow et al., 2018;

see Table A2), and the first author's experience of over 40 years in the field as a researcher and practitioner.

What Theories Have Been Proposed to Account for Team Behavior?

Forty years ago, Dyer (1984) reviewed the theories of team behavior and found the theoretical base to be *meager*. In fact, she states: "There are no comprehensive theories of team/small group behavior that have been developed systematically and tested empirically" (Dyer, 1984, p. 287). She describes how early theoretical work was mostly descriptive (e.g., discussing team structure and group size) and, by today's standards, unidimensional, given its narrow focus on task-level factors. Some work even interpreted group processes as having a negative effect on group output (e.g., Steiner, 1966), and there was little digression on the conditions surrounding effective team performance. However, McGrath's (1964) input-processes-output (I-P-O) model stood out and feathered the interests of team scientists, pointing to the idea that teamwork was more than just a compilation of individual efforts and, instead, an abstraction affected by contexts, behaviors, and results. The I-P-O model was already shaping a plethora of work (e.g., Hackman & Morris, 1975), and particularly, Roby's (1968) piece began to shed light and more questions on how team members made decisions, pointing to the idea that *behavior* in group processes was essential to understanding team functioning. Although formative for the field, she concludes that the theoretical development of teamwork lacked guidance and understanding of how team member interactions influenced collective team-level outcomes.

Significant theoretical progress began in the 2000s. Marks et al. (2001) portrayed teamwork as a temporal process wherein numerous I-P-O relationships are constructed through iterative cycles, beginning to deconstruct the idea that teams worked on one goal at a time. Instead, this temporal framework argued that teams work on multiple goals and processes simultaneously, and the processes during planning and action phases differed. With such knowledge, we began understanding how teamwork emerged and how behaviors differed across a team's lifespan. Most importantly, these developments recognized that different teamwork dimensions occur "sequentially and simultaneously," varying in length and consistency across time (Marks et al., 2001, p. 359). Teamwork was no longer static. Altogether, this shift helped construct a modern understanding of teamwork's complexities and how effective teamwork is a compilation of various behaviors, a fluid process

affected by individual, team, and environmental factors (Salas, Reyes, & McDaniel, 2018).

New theoretical and conceptual models on teamwork blossomed at the turn of the century, leading to several more notable efforts that integrated models on teamwork, team performance, and team effectiveness (e.g., S. W. Kozlowski & Ilgen, 2006). Salas et al. (2007) put forward an integrative framework of team effectiveness that streamlined the literature and combined knowledge on past years, specifying the plethora of factors that contributed to team performance and continuing to push the idea that teamwork was a fluid process. We were beginning to understand the collective processes teamwork gave rise to, an idea hinted at by Roby's (1968) prior work, unlocking concepts at the team level that were more than an aggregation of individual minds and efforts.

More recently, J. E. Mathieu et al. (2017) summarized the field's progress. They described the field's shift from simplistic and streamlined I-P-O models to recognizing a myriad of team concepts affecting team processes (e.g., member centrality, decision-making, trust, virtuality), highlighting the complexity of teamwork. We now understand teamwork does not exist in a vacuum, and it is difficult to study at one point in time. Today, the multidimensionality of teamwork is vastly important to developing research, and we are moving forward in understanding how environments shape teamwork outcomes, as well as frontlining the pivotal role of time in developing team theory (e.g., Devaraj & Jiang, 2019; Harrison et al., 2002).

Each synthesis from the team literature allowed researchers to consider the interplay between the social, technical, and individual factors that affect team performance. Moving 40 years forward from Dyer's (1984) summarization of the *meager* teamwork theories, we now can say that team theory reflects the complexity of teamwork to the level of understanding we have of individual team members. However, while theoretically rich, the literature lacks validity in many of these models and frameworks, highlighting the need for more empirical evidence. We echo sentiments nearly 20 years old (see Ilgen et al., 2005) in stating that we require more theory-driven empirical knowledge to ascertain how teams work.

However, it is an undeniable fact that significant theoretical progress has been made since Dyer (1984). More than 140 models and frameworks were identified in the early 2000s (see Salas et al., 2007), and many more now underscore the complexities of teamwork (e.g., Hartwig et al., 2020). We noted in our review that most models follow the I-P-O framework (more recently depicted as the input-mediator-outcome-input (IMOI) model, see Salas, Reyes, & McDaniel, 2018) but differ in scope and detail, allowing for many different perspectives to be taken toward the difficulties of researching

and theorizing about teams. So today, based on the sequential work of many team scholars, theories are more robust and representative of the complexities of team performance. In reviewing the literature, we found that team theory has grown into a more contextualized, integrated, and increasingly multilevel and temporally based knowledge structure of significant team theoretical constructs that are far from *meager*.

Today, theories abound that are more contextual, complex, dynamic, representative, transportable, multidisciplinary, and yet—practical. We can ascertain that we have a solid theoretical basis for teams, and as noted during the infancy of team research, there is nothing more valuable than a good theory (Lewin, 1951).

What Types of Tasks Do Teams Perform?

Early work on the types of tasks teams performed was incredibly structural. Many authors (e.g., Altmann, 1966; Hackman, 1968; Hackman et al., 1976; Kabanoff & O'brien, 1979; Kent & McGrath, 1969; Sorenson, 1971) focused on developing typographies and schemes that aimed to map out the types of tasks teams conducted. Most research during this time period worked to specify the *what* of these interactions, posing them as mechanistic structures—leaving relatively little theoretical overlap and integration of social psychological variables that describe the process of teamwork. For example, Altmann's (1966) hierarchical scheme for describing group tasks had a series of three levels, where the lowest level involved two group members exchanging information, the next interactions to execute a task, and the top level being the task's intrinsic properties. However, while foundational to later work, this time period saw a relative lack of research in pinning down teamwork components, leaving the question of behaviors, interactions, and collective mechanisms on the backburner. Moreover, while we were beginning to understand structural mechanisms of teamwork, we had yet to develop a systematic understanding of how to interpret different tasks carried out by teams. This made it difficult to understand "which approaches are most fruitful for investigating various team problems" (e.g., team development, training, assessment; Dyer, 1984, p. 294). Overall, this time period advanced knowledge on structural mechanisms, but left significant room to grow for our science to understand how team member behaviors interact within this system to be more effective.

Today, our science is much more comprehensive. The latter eighties and nineties saw a boom in developments, with some authors developing theory on task interdependence (e.g., Saavedra et al., 1993) and others pushing for the incorporation of more cognitive variables. For example, it was during this

time that researchers introduced the idea that teams formed mental models, pivotal to understanding how individual tasks affected team functioning (Cannon-Bowers et al., 1990; Serfaty & Kleinman, 1990). Mental models were initially framed using the cognitive sciences to reflect how individuals make decisions and conceptualize problems; hence, a team's mental model is built around team members' collective decision-making and problem-solving capabilities (Cannon-Bowers et al., 1990). We defined this conceptualization of teamwork as *team cognition*, which has been used as the foundation to discuss shared mental models and transactive memory systems (see Cooke et al., 2000). This era introduced the idea that the *essence* of teamwork was more than the task at hand, that, in order to succeed—teams had to develop together, share ideas, adapt, and act accordingly. Now, we could layer this knowledge with structural advances, and because of this, began to further specify theory on taskwork and teamwork (e.g., Crawford & LePine, 2013).

The mid 2000s saw a refinement on *what* processes made up team performance. For example, Crawford and LePine (2013) continued to advance theory on the structure of taskwork and teamwork, refining understanding on what team members were doing together (i.e., taskwork; e.g., building a rocket) and how they were doing it (i.e., teamwork; e.g., coordinating how to build a rocket). Moreover, our science did not leave types of team tasks behind, with many authors, such as Hollenbeck et al. (2012), developing frameworks for describing teams on a variety of dimensions, from skill differentiation, temporal stability, and authority differentiation. Together, these advances were clarifying not only *what* teams were doing, but *how* they were doing it.

Over the last 20 years, our field has completely redefined what it means to be able to execute a task in a team, or more so—that regardless of the task, effective teamwork has a common core. Research on a variety of teamwork competencies is blooming, because today more than ever, in a work environment that increasingly relies on collaboration (Cross et al., 2019)—we need to understand how teams deal with failure, react to changing circumstances, and adapt. We have researched a variety of these avenues, such as how team tasks change over time (e.g., Harrison et al., 2003) and how team members need to combine diverse expertise, task-relevant knowledge, and refine their ability to work with others (Fisher, 2014; Fleishman & Zaccaro, 1992; Hackman, 1987). Moreover, we now recognize that constructs like *coordination* and *communication* link team members' behaviors to achieve a combined goal, and competencies such as adaptability, described as "one of the few universally effective group strategies" (J. E. Driskell et al., 2018, p. 338)—are critical in getting teams to be as efficient and functional as possible.

In our reflection, Dyer was right; today, we have a much better understanding of how teamwork progresses, and as a result, we know more about the wide variety of tasks team members perform. Similarly, we have addressed the tasks performed through *shared mental models* and *transactive memory systems*, illustrating how knowledge is effectively organized in teams. Thus, as we have progressed as a science, we have transitioned from understanding the tasks teams perform to how certain behaviors interact with other critical stages across a team's lifespan. In connecting our previous discussion on the evolution of teamwork theory, the teamwork dimensions that were defined around this time (e.g., adaptability, shared mental models, coordination) were rooted in the interdependencies of taskwork, serving as a guiding framework on how to overcome task demands that directly affect team performance. Today, this evolving perspective in team research enriches our understanding of team effectiveness. We know from this new understanding that task interdependence matters. It is a driver of team dynamics—a driver for teamwork. Forty years later, we know more about taskwork and teamwork and how these two tracks interact and affect team performance. Progress made, indeed.

How Do Teams Function or Work? By What Means or Processes Do They Achieve Their Goals?

Up until the early eighties, knowledge on what made teams function was lacking. Dyer (1984) goes on to state that "relatively little research has been devoted to carefully examining issues such as how team members interact with each other," going so far as to state work in this area was so scant developments were difficult to summarize (p. 294). Research around this time had centered around communication (i.e., Glaser et al., 1955) with work noting experienced teams communicated less than inexperienced teams (Obermayer et al., 1974), but overall, research lacked direction (and depth) in understanding team processes as a whole and how they contributed to team effectiveness. During this time, we had little understanding of how team members interacted and how these interactions varied over time, making it difficult to ascertain what factors contributed to positive or negative teaming. There was also relatively little discussion about the differences between ineffective and effective teams, and moreover, how variables like *cohesion* contributed to such effectiveness. Therefore, the road to understanding how to improve teams, such as training, was unclear—but this would not be the case for long.

To dive deep into understanding how teams work, we needed to study team members' collective interactions. The further development of teamwork theory was pivotal in doing so—and theorizing of *emergent states* was key in

understanding how teamwork arose. *Emergent states* represent dynamic characteristics of teams that vary as a function of team context, inputs, processes, and outcomes (Marks et al., 2001). Though different from teamwork interactions themselves, emergent states were defined as products of team experiences, becoming intertwined in a team's I-P-O/ I-M-O cycles, helping either facilitate or derail teamwork processes, impacting team development and outcomes.

As research progressed, we began understanding what emergent states were critical in fostering team effectiveness. One key development was the introduction of *psychological safety* into the literature (Edmondson, 1999), loosely defined as the ability to take interpersonal risks in one's work team. By exploring concepts like this, we began to understand how a team's ability to overcome challenges was based on how emergent processes had been developed throughout its lifespan. Psychological safety was a perfect illustration of this, displaying how its presence could foster team effectiveness by enabling team members to speak up, communicate better, and learn better, leading to improved performance (Edmonson & Lei, 2014). Psychological safety has been one of the most definitive and influential findings identified in the team and organizational psychological literature, having shown effects on team learning, team member engagement, information sharing, creativity, and task performance (Frazier et al., 2017). From psychological safety, we have learned that other critical teamwork variables improve when team members feel comfortable speaking up, helping the team adapt to more efficient behaviors. The vast amount of research stemming from this development is incalculable, but one thing is definitive: via research like this, we have chipped away at understanding processes that affect a team's iterative cycles, understanding how teams reach goals.

Research in the nineties and 2000s brought the study of team processes and variables to a new light. Psychological safety was far from the only development. Research was finally beginning to look into team-level variables, such as team cohesion, and how these contributed to team effectiveness. For example, Evans and Dion (1991) conducted a meta-analysis of team cohesion where they found a moderate effect on performance, and Gully et al. (2002) refined these findings by pointing out this relationship was moderated by task interdependence. Almost 30 years later, Grossman et al. (2022) would also use meta-analytic techniques to keep teasing these relationships apart, combining findings from a plethora of research uncovering cohesion's multifaceted nature (also see Salas et al., 2015), finding that overall, proximal measures of team cohesion were more predictive of performance, but interestingly—group pride, an aspect of team cohesion—was as prominent of a predictor as task cohesion. All of this to say, research has narrowed in on the

plethora of team states we have uncovered, and today, the amount of research and meta-analytic evidence on a variety of team-level states is unprecedented (see Table A1). Moreover, while widely researched, psychological safety and team cohesion highlight the complexity of studying teams—and we believe we are still far from saturation when it comes to these two concepts (and many others). There continues to be more to explore, and more to understand—especially in light of the ever-changing workplace. Today, we have much more to say on how teams work, as examples: noting expert teams work by creating psychological safety (Frazier et al., 2017), fostering team cohesion (Grossman et al., 2022), developing shared mental models and transactive memory systems (Bachrach et al., 2019), prioritizing communication quality (Marlow et al., 2018), and most importantly, understanding there is always more to improve and more to explore, as the literature on training (e.g., S. W. Kozlowski & Ilgen, 2006) and team development interventions has demonstrated (e.g., Lacerenza et al., 2018; Shuffler et al., 2011; S. I. Tannenbaum & Cerasoli, 2013). So, we submit, we know what effective teams "do, feel and think." Significant progress.

What Procedures Have Been Used to Measure Team Processes, Performance, and Other Team Characteristics?

The team science literature has often been plagued with questions about how teams should be measured, as "the success of a research effort is often determined by the quality of the measurement tools" (Dyer, 1984, p. 299). Early work focused on measuring teamwork via communication content analysis, field observation, early forms of simulation, and interviews. Furthermore, during this time, measuring teamwork was often operationally defined through mathematical indices (i.e., Glaser et al., 1955)—and yet, all these methods were failing to address the relative measurement issues affecting the validity of team research, mostly because they ignored the sequence of team behavior. The struggle with measuring teamwork processes is that interactions compound over time and develop toward effective or ineffective teamwork. However, even 40 years ago, Dyer (1984) was insinuating the key role of *time* in measurement practices, a problem both industrial organizational psychologists, human factors psychologists, and other team scientists continue to wrestle with today. While we are *far* from perfect measurement practices, there have been advances since then—however, in relation to Dyer's (1984) other questions, it is necessary to highlight our science's struggle in measuring teamwork effectively.

Overall, the critical underlying factor beneath the struggle with measurement practices in team science is the multilevel nature of teams. Team processes, emergent states, and outcomes are multilevel phenomena "that emerge, bottom-up from the interactions among team members over time, under the shifting demands of a work context" (S. W. J. Kozlowski & Chao, 2018, p. 576). Given this dynamic and shifting nature, the "golden" question of team science has been *whether*, or *how*, or if we *should* aggregate individual-level data to compose team-level constructs (Chan, 2019). Through the years, we have explored a variety of different methods trying to get at the gold, whether that be through multirater measurement practices (i.e., Brannick et al., 1995), network analysis (see Mohammed et al., 2000), surveys (i.e., Team Diagnostic Survey; Wageman et al., 2005), or the now more popular advanced quantitative big data techniques (see Chan, 2019), such as computational modeling (S. W. J. Kozlowski & Chao, 2018) or multivariate latent growth modeling (Chan, 2019). However, such methods have yet to be broadly accepted to accurately measure teamwork. Yet, given the rapid growth of these data science techniques, the incorporation of these methods is not just promising in uncovering and resolving methodological issues—it might be necessary to keep up with the times (Chan, 2019).

Altogether, in our review of the literature, critiques and recommendations on improving team science are constantly thematic, reiterating concerns from the past. Today, while we have many more ways of modeling teams, teamwork, and studying team performance—we have some of the same concerns as 40 years prior. The need for real-time, unobtrusive measurement still stands (see Fernández Castillo et al., 2024; Salas, Zajac, & Marlow, 2018), and we continue to need empirical work strongly guided by theory (Baker & Salas, 1992; Chan, 2019). Moreover, the need for longitudinal research continues, with many hoping time can illustrate the malleable nature of team concepts (Chan, 2019). Other concerns also remain, such as the need for more transparency and clarity in the specification of constructs, their role in temporal processes, and their part in other higher-level constructs, such as organizational outcomes. Perhaps the solution lies in coming together, and as many have remarked—continuing to transcend boundaries across and within fields (Chan, 2019; Fernández Castillo, 2023). Progress has been made, but much more is needed.

What Factors Influence Team Performance?

Dyer (1984) discussed seven factors that could affect a group's output—performance feedback, turnover, group size, work distribution and structure, communication, coordination, and group planning. In the 1960s, performance

feedback initially adhered to traditional reinforcement principles, focusing on individual rewards. However, research at the American Institutes for Research (AIR) shed light on its ability to enhance team performance, unveiling the multilevel nature of teamwork. This era marked a paradigm shift, emphasizing a team as *more than* the sum of its parts. Dyer (1984) also addressed turnover in group membership, noting an awareness of the importance of team member centrality in turnover in affecting team performance (e.g., Miller, 1971; Trow, 1964; Ziller, 1963), but literature on the topic remained limited. Group size, another key factor, saw military research in 1984 suggesting small teams as optimal for superior team performance (e.g., Kidd & Christy, 1961), challenging the notion of a linear relationship between size and productivity. Workload and distribution, the fifth factor, revealed a consistent negative relationship between increasing team workload and performance. Research prior to 1984 recognized workload's capacity to interact with other teamwork variables, such as size (e.g., Kidd & Christy, 1961), backup behaviors, and communication (Johnston & Brigg, 1968). Factors like team coordination and communication were noted with a scarcity of research at the time. Dyer's discussion on group planning and orientation highlighted how early work built on how a group could approach a task, finding that early discussion of the mission at hand could have differential effects on team performance depending on task conditions (Hackman et al., 1976). Overall, research was beginning to bloom, and altogether laid the groundwork for today's pillars of effective team performance.

Through the years, feedback has continuously appeared as an essential player in helping teams self-regulate. Cannon-Bowers et al. (1995) recognized performance monitoring and feedback as a critical team skill. As the temporal properties of team processes became more apparent, we understood them as vital in helping teams adapt for better performance, moving beyond simply reflecting past ones (see C. S. Burke et al., 2006; Dickinson & McIntyre, 1997; Marks et al., 2001). We now understand feedback is necessary to help teams adapt (Salas et al., 2008)—and today, feedback, whether through briefs (Potosky et al., 2022) or debriefs (S. I. Tannenbaum & Cerasoli, 2013), is recognized to influence a multitude of team-level processes, from reflection to socialization (Potosky et al., 2022). However, we continue to find ways to improve the efficacy of feedback and recognize the intricacies of making it work. For instance, we know that combining reflexivity with feedback will enhance its potential (Gabelica et al., 2014) and how it can lead to better results when goals are clear (Gonzalez-Mulé et al., 2016). For the most part, the science of performance feedback is alive and well.

The nineties saw a boom of research in unraveling turnover's relationship to other team-level factors, like Wiersema and Bird (1993), who found

heterogeneity in teams (from age to tenure) correlated with team turnover. Team researchers also found environmental-level variables, such as instability, capable of affecting turnover (Wiersema & Bantel, 1993)—paving the way for the next decades of research in further unraveling antecedents to collective turnover and fluid team membership (e.g., Banks et al., 2014; Heavey et al., 2013). For the most part, research on team turnover and performance has focused on antecedent factors, such as psychological empowerment (Seibert et al., 2011) and creating an organizational climate that reduces turnover and fosters team effectiveness. Exciting research paths remain, especially in the face of newer methods that offer team researchers the capacity to understand how different variables can relate to turnover.

Since the beginning of research on teams, group team and size has been an elusive concept to which team researchers were hoping to find a secret formula for maximized productivity. Unlike other factors discussed, this factor remains under researched. Research in the nineties found overall, larger teams perform better (Haleblian & Finkelstein, 1993) but this was far from a consensus (see Smith et al., 1994, who hypothesized the opposite). With growing recognition that extant interfering factors played too big of a role to determine one perfect team size (see Beal et al., 2003; who found group size did not change existing cohesion estimates), we have shifted gears and focused more on learning about team composition rather than the perfect team size—a shift that may increase in importance as human-autonomy teaming (HATs) becomes the future (see Seeber et al., 2020).

Workload and distribution were listed as the fifth factor related to team performance in Dyer's (1984) piece. In the late eighties and nineties, there was a boom of research in relation to this factor (Cannon-Bowers et al., 1998). Research in this era uncovered that workload's negative relationship to performance could be attributed to a demand in coordination efforts, which decreases a team's ability to allocate resources to other performance factors (Urban et al., 1996). However, the 2000s would recognize a new layer of complexity in workload's relationship to performance, such as the necessity of sufficient workload for effective team performance—as well as not too much, because of its relationship with burnout (e.g., Helfrich et al., 2017). Newer developments are also paving the way in understanding how workload can be manipulated to understand its relationship with interdependence and heterogeneity within teams (see Johnson et al., 2023), and we remain hopeful that newer, innovative methodologies will allow team researchers to further understand how to balance workload and team effectiveness—vital in today's burnout organizations.

Perhaps the biggest shift from Dyer's (1984) review to today is the literature's emphasis on coordination and communication as crucial teamwork

competencies in numerous publications (e.g., Cannon-Bowers et al., 1995; Dickinson & McIntyre, 1997; S. I. Tannenbaum et al., 1992). Today, coordination and communication are no longer on the sidelines of team research; they are pillars of it (Salas et al., 2008; S. I. Tannenbaum & Salas, 2021)—being intricately tied to performance (see Marlow et al., 2018). Research has begun to uncover how coordination works and affects team dynamics, such as its relationships with multiteam systems (Ziegert et al., 2022), healthcare teams (Hysong et al., 2021), HATs (Demir et al., 2020), and more. Communication is also now recognized as a multi-faceted competency (S. I. Tannenbaum & Salas, 2021), with recent meta-analytic evidence finding that quality, not quantity, was more predictive of performance (Marlow et al., 2018).

After the publication of Dyer's (1984) piece, group planning and orientation would take a much larger role in the team landscape. With the introduction of goal-setting theory (Locke & Latham, 1990, 2019) came a plethora of research that discussed how team member goal orientation could pertain to performance—with a growing awareness that a focus on the team (i.e., collective/team orientation) was necessary in enabling members to focus on the team-level goal (Salas et al., 2008). Today, research has, once again, uncovered the complexity of these concepts, with meta-analytic evidence revealing that team orientation is positively correlated with team performance and a multiplicity of other teamwork factors, like trust and backup behaviors (Kilcullen et al., 2022). As for planning, discussing norms and regulations before engaging in a task is recognized as an effective way to lead a team (S. I. Tannenbaum & Salas, 2021) and potentially avoid and overcome conflict (S. Tannenbaum et al., 2023). Considering the evolving nature of work environments, this emphasis on team orientation reflects a growing awareness of the interconnectedness of individuals within a collaborative setting—and statistics reflect this, too, with time spent in collaborative activities increasing by more than 50% (Cross et al., 2019). This underscores the importance of fostering a team culture beyond individual capabilities, recognizing the synergy that arises from collective efforts.

What Has Been the Impact of Training Programs on Team Processes and Performance?

Military research provided a launching point for team scientists to understand how team training could be designed effectively. Through these investigations, the military significantly shaped team training programs, as evidenced by Dyer (1984) and later, many others (Bisbey et al., 2019; Goodwin et al.,

2018; Linhardt et al., 2023). In her review, Dyer (1984) remarked how from military research stemmed effective training design, such as using performance feedback, debriefing feedback (e.g., Alexander et al., 1962), and the idea that learning by doing (the roots of simulation-based training, SBT) would get teams to perform better (e.g., George, 1967).

In early years, the military served as a catalyst for team science research, as the need to understand how team members can effectively sustain teamwork under stressful conditions was critical (Briggs & Johnston, 1966; George, 1967). Military research allowed the field to morph into what it is today by providing real-time experimental capabilities, significantly contributing to the overall team science literature (Bisbey et al., 2019; Goodwin et al., 2018). However, up until that point in time (e.g., 1984), training research did not focus on how to better more specific teamwork competencies (e.g., communication). It was not until later that team scientists started to delve into the critical success factors for team effectiveness, and more importantly—how team training could close this gap (Linhardt et al., 2023). Other fields, such as aviation (see Linhardt et al., 2023) and healthcare (see Hughes et al., 2016), have also significantly contributed to bettering team training programs. Altogether, preventable teamwork failures in these three fields are noted as drivers of today's plethora of training research, primarily by illustrating a greater need to solve human error (Linhardt et al., 2023). Today, team training has drastically changed how all these teams are trained (Bisbey et al., 2019), emphasizing the importance of a team's *human factor*.

Team training theory is an extension of theories of shared mental models and is based on theories of group learning and social processes (see Linhardt et al., 2023). Today, *team training* can be defined as using evidence-based strategies to address team performance. More specifically, team training aims to understand what knowledge, skills, and attitudes (KSAs) are required for effective performance, to practice these KSAs in a way that enables transfer of knowledge, and lastly, to provide feedback to better use KSAs (Shuffler et al., 2011). Developments following Dyer (1984) focused on what *types* of training could improve teamwork performance. S. W. J. Kozlowski et al. (1996) wrote on the power of leadership training to improve teamwork performance. In 2002, Marks et al. found that when team members were trained on the tasks of other team members (i.e., cross-training), it enhanced shared team interaction and mental models. Hackman and Wageman (2005) introduced team coaching, a leadership (and process) intervention shown to better effort, interpersonal processes, and team knowledge and learning (see Fernández Castillo & Salas, 2023). Moreover, Salas et al. (2007) noted the

efficacy of adaptive team training—and how a focus on coordination and adaptation yielded potent results.

Through these developments (and an impossible to note many more), meta-analytic evidence has provided a well-rounded answer to the question Dyer (1984) posed 40 years ago: training significantly impacts team processes and performance across fields and training types (Salas et al., 2008). Today, we have taken this assertion and honed in on understanding the *why* of training before its implementation (i.e., a needs analysis, Lacerenza et al., 2018). Moreover, we continue to study the myriad factors that can affect training's effectiveness. For example, more than ever before, factors such as psychological safety (Edmondson, 1999) are considered vital in allowing team members to learn from training experiences (e.g., Roussin et al., 2018). Moreover, scholars are considering a plethora of other factors that affect training's effectiveness, from group conditions to team composition and measurement limitations (Salas, Shuffler et al., 2015).

The evolving landscape of team training research highlights a critical shift from a simplistic view of training as a one-size-fits-all solution to a nuanced understanding of the diverse elements influencing its effectiveness. We now take a more proactive approach to team interventions and address the unique challenges and dynamics of different teams and their goals before the training is implemented (see Lacerenza et al., 2018). Similarly, the growing recognition of psychological safety as a cornerstone in the learning process signifies a departure from traditional models, recognizing that creating an environment where team members feel safe to learn, and experiment is integral to maximizing the benefits of training initiatives—something made exceptionally clear by the debriefing literature. And so, team training works when it follows the science of learning and training (e.g., Hughes et al., 2016; Salas, Shuffler et al., 2015).

What Questions and Methodological Issues Must be Examined to Improve Team Training and Assessment?

In her review, Dyer (1984) offered seven guiding questions for methodological issues worth examining. She suggested researching unique features of teams, how teams developed, characteristics of good teams and relation to training, variables influencing team behavior, determination of skills that should be trained, and training design and evaluation. She noted a lack of adequate theory and a need for more longitudinal research, measuring not what is easy but what is needed, analyzing before intervention, pinning down

superior instructional techniques, and assessing training effectiveness. In these 40 years, we have done a better job at answering some of these questions (e.g., the importance of pre-training analysis) than others (e.g., longitudinal research; see C. Burke et al., 2017)—but our concern with methodological practices remains. We continue to need robust diagnostic measurement techniques (Salas, Zajac, & Marlow, 2018) and still greatly rely on practices like surveys that carry limitations.

The most significant advancement to date to Dyer's (1984) reflection on methodological issues is that we can adamantly affirm that theory is alive and thriving (e.g., Brannick et al., 1997; Cooke et al., 2000; DeShon et al., 2004; Humphrey et al., 2009; S. W. J. Kozlowski & Chao, 2018; J. E. Mathieu et al., 2019). The field has now taken a turn, and for the last few years, we have been focusing on how we can measure teams during real-time performance to improve objectivity (Salas, Reyes, & McDaniel, 2018). We have "embraced complexity" (J. E. Mathieu et al., 2019)—and have taken great strides in making sure we look at teamwork's multidimensional nature (Humphrey & Aime, 2014). Overall, we have also researched a variety of concepts that give rise to effective teamwork, such as team cohesion (Grossman et al., 2022), team resilience (Gucciardi et al., 2018), and team adaptability (Priest et al., 2002)—but continue to need more research to untangle how these arise in a dynamic context. A multiplicity of frameworks have emerged pinning down effective teamwork (e.g., S. I. Tannenbaum & Salas, 2021) and training principles (e.g., Salas et al., 2017)—and we have prolific meta-analytic evidence suggesting team training works when done right (e.g., Hughes et al., 2016; Reyes et al., 2020).

Some Final Thoughts and the Next 40 Years

We conclude as we started. Borrowing from Levine and Moreland (1990), our science and practice is robust, alive, well, thriving, and impactful. We have significant discoveries, evidence-based insights, and a plethora of solid findings that tell us a lot about teams and teamwork. Nevertheless, more are needed. The new workplace demands it. Because teamwork matters. Teamwork prevents error, fosters innovation, generates new knowledge, empowers people, creates inclusion and cohesion, and allows for resilience. When team members effectively work together, the product of collective action is greater than the efforts of the individual, motivating teams to engage in more intricate yet rewarding projects and initiatives that further advance knowledge. Teamwork has become the vessel for going beyond what was initially possible, and the theoretical, methodological, and practical insights

generated from the team literature provide the base for understanding the multidimensional and multifaceted nature of implementing effective teamwork in organizations.

We note that there are a number of challenges ahead. Teams are different now. The workplace is different. A transformation has begun. We have teams of teams, hybrid, cross-functional, virtual, self-managed, human-AI teams, and more. Thus, our science must keep progressing as new theoretical developments, methodologies, metrics, and practical insights emerge to impact the workplace and beyond.

A Personal Commentary (Eduardo Salas): The "Navy Days" and More . . .

Now, a personal note. My "Navy days." Those were the best! It was 15 years of a very fulfilling, enriching, challenging, emotional and rewarding experience. An experience where I learned the importance of theory, measurement, data and of applications as we studied teams, crews, units and groups. But, more significantly, I got a deep appreciation for translations. Translation of our science-based yet practical research. It was these "translations" that made our work impactful to sponsors, naval personnel and leaders.

Our journey to study teams in a systematic and meaningful way started with a project labeled—TADMUS (see Cannon-Bowers & Salas, 1998) and an interest of Naval aviation in reducing accidents and mishaps (see Bisbey et al., 2019). We (and my colleagues Jan Cannon-Bowers, Joan Johnston, Kim Smith-Jentsch, Renee Stout, Dan Dwyer, Carolyn Prince, David Baker, Maureen Bergundy, Beth Blickensderfer, Randy Oser and many others) were young, motivated, passionate, bold, eager and naïve (at times) to do "something" to help. That "something" was to have an impact—to make a difference in the lives of our troops; to make them better, better at teamwork and at their mission.

We were all focused and driven by the need to use the science to develop validated team-based interventions that worked. Our driving research question was: how do we turn a team of expert into an expert team? To answer that question, we need to focus on three research buckets. One, to understand the phenomena we were turning the team into, we needed to uncover–what is teamwork. Second, in order to understand teamwork, we needed to have assessment tools—diagnostic measures. Third, if we could measure teamwork and understand it, we could do something about it—team training. Clearly, we needed to balance science with practical developments and applications. But, it became clear to us that we did not have all the expertise nor

depth to accomplish our goal. We needed help. So, we enlisted a set of multidisciplinary research partners from organizational psychology, human factors, cognitive psychology, engineering like Scott Tannenbaum, John Mathieu, Steve Kozlowski, Kurt Kraiger, Mike Brannick, Mike Coovert, Nancy Cooke, Daniel Serfaty, Marv Cohen, Jim Driskell, Bill Rouse, Clint Bowers, Florian Jentsch, Dan Fisk, Alex Kirlik, Steve Fiore and others. Each of them contributed to us building a robust multidisciplinary science and practice of team effectiveness. That is, we sought out to develop and build theory, measurement systems, team development interactions and principles that could be used by the naval training commanders. And we did. I think we made a difference.

In 1999, I left my "Navy days" behind me and joined the University of Central Florida. There, with my colleague, Shawn Burke, we embarked and continued the journey to understand teamwork and develop team training principles for healthcare, military, space exploration and oil and gas teams. We had the help and support from motivated and smart graduate students (now rising academics and practitioners) like Wendy Bedwell, Lauren Benishek, Chris Coultas, Debbie Diaz-Granados, Aaron Dietz, Tripp Driskell, Jenn Feitosa, Megan Gregory, Becky Grossman, Ashley Hughes, Joe Keebler (post-doc), Cameron Klein, Liz Lazzara, Becki Lyons, Davin Pavlas, Heather Priest, Mike Rosen, Marissa Shuffler, Kevin Stagl, Amanda Thayer, Sallie Weaver, Jessie Wildman, Kat Wilson—most of them team scientists! Another great 15 years!

In 2015, an incredible opportunity arose and I joined Rice University. It is really a privilege to be part of Rice University. It is an honor to be in a department with world-class scholars and teachers. And (so far) this journey at Rice has been nothing more than very satisfying. With promising and energetic graduate students (now most of them team scientists in academia) Tiffany Bisbey, Julie Dinh, Chelsea Iwig, Christina Lacerenza, Shannon Marlow, Denise Reyes, Allison Traylor, and Stephanie Zajac, we began to explore teamwork and team training in science and engineering teams. We embarked on researching new topics like team composition, safety culture, team leadership, safety training, reducing human errors and human-automation teaming. Also, we engaged in new partnerships in healthcare to improve patient safety and promote teamwork with Eric Thomas (UT Health) and Philip Greilich (UT Southwestern). A great run at Rice—the adventure continues!

In closing, I've been lucky in my career. Lucky to have been surrounded by friends, colleagues and students that made me a better scientist-practitioner and made the journey to understand team dynamics fun, rewarding, fulfilling and impactful. To all of you—thank you for sharing this journey with me . . . it has been 40 very remarkable years . . .

Appendix

Table A1. Influential Meta-Analyses Reviews Following Dyer (1984).

Citation	Journal	Meta-Analytic Question	Findings
Evans and Dion (1991)	Small Groups Research	What is the relationship between group cohesion and performance?	A significant and moderate effect was found between team cohesion and performance
Benbasat and Lim (1993)	Small Groups Research	What are the effects of group, task, context, and technology variables on group support systems?	Group Support Systems (GSS) was positively related to decision quality, number of alternatives generated, and equality of participation. GSS was negatively related to time to reach decision, consensus, and satisfaction. These effects were moderated by task, group, context, and technology variables.
Gully et al. (1995)	Small Groups Research	How does the relationship between group cohesion and performance change by level of analysis and task interdependence between team members?	The relationship between group cohesion and performance was moderated by level of analysis and the effect was stronger at the team level. At the team level, both team efficacy and potency positively influence performance. Interdependence was moderated for team efficacy and performance relationship but not between potency and performance
Devine and Philips (2001)	Small Groups Research	What is the relationship between dispersion of cognitive ability between team members and team performance?	The meta-analysis yielded no significant results for dispersion of cognitive ability. However, mean cognitive ability was a better predictor of team performance in a laboratory setting than in a field setting.
Gully et al. (2002)	Journal of Applied Psychology	How does the relationship between task-specific team efficacy, generalized potency, and performance change based on level of analysis and interdependence?	Effect sizes were stronger at the team level suggesting moderation of level of analysis. At the team level, team-efficacy and potency had positive relationships with performance. Interdependence significantly moderated the relationship between team-efficacy and performance, but not between potency and performance. The relationship between team-efficacy and performance was stronger when interdependence was high, than when it was low.
De Dreu and Weingart (2003)	Journal of Applied Psychology	What are the associations between relationship conflict, task conflict, team performance, and team member satisfaction?	Results revealed strong and negative correlations between relationship conflict, team performance, and team member satisfaction. Results revealed strong and negative correlations between task conflict, team performance, and team member satisfaction. Conflict had stronger negative relations with team performance in high complexity tasks compared to less complex tasks. Task conflict was less negatively related to team performance when task conflict and relationship conflict were weakly, rather than strongly, correlated.
Beal et al. (2003)	Journal of Applied Psychology	How is the relationship between team cohesion and performance under different performance domains?	There were stronger correlations between team cohesion and performance when it was defined as behavior (rather than outcome), when it was assessed with efficiency measures (as opposed to effectiveness measures), and as patterns of team workflow became more intensive.
C.S. Burke et al. (2006)	The Leadership Quarterly	What type of leadership behaviors are functional in teams?	When leaders' behaviors are more task focused it is moderately related to perceived effectiveness and team productivity. Person-focused behaviors were related to perceived team effectiveness, team productivity, and team learning.
Peeters et al. (2006)	European Journal of Personality	How do the personalities of team members influence team performance?	When the team was composed of more agreeable and conscientiousness team members team performance improved; when teams were more variable in the level of agreeableness and conscientiousness team performance declined.
Salas et al. (2008)	Human Factors	Does team training improve team performance?	There was a significant positive and moderate relationship between team training intervention and team performance. There was significant moderation of the training-performance relationship by training content, team member stability, and team size.
Hülsheger et al. (2009)	Journal of Applied Psychology	What are the team level predictors of innovation?	The team processes variables of support for innovation, vision, task orientation, and external communication improved team innovation. Significant but smaller effects emerged for team composition and structure.
Kleingeld et al. (2011)	Journal of Applied Psychology	What are the effects of team goal setting on team performance and how is that relationship affected by task interdependence, task complexity, and participation?	Goals that were difficult and specific yielded significantly higher group performance compared with nonspecific goals. This relationship was not moderated by task interdependence, task complexity, or participation. Looking at multilevel goals, egocentric individual goals yielded negative group performance whereas group centric goals let to a positive effect
Bell et al. (2011)	Journal of Management	How do demographic diversity variables influence team performance relationships?	Functional background diversity had a small positive relationship with team performance, and with creativity and innovation. This relationship was most prominent in design and product development teams. Educational background variety diversity was related to team creativity and innovation and to team performance for top management.

(continued)

Table A1. (continued)

Citation	Journal	Meta-Analytic Question	Findings
Gully et al. (2012)	Small Groups Research	How does the relationship between group cohesion and performance change by level of analysis and task interdependence between team members? (update from Gully et al., 1995)	Similar to previous findings, level of analysis and task interdependence moderate the cohesion-performance relationship.
de Wit et al. (2012)	Journal of Applied Psychology	What is the relationship between intragroup conflict and group outcomes?	There was a stable negative relationship between relationship and process conflict and group outcomes. Addressing moderation, task conflict and group performance were more positively related when relationship conflict was weak. This relationship was more present in top management teams rather than non-top managements and in studies where performance was measured through financial performance or decision quality rather than overall performance.
S. I. Tannenbaum and Cerasoli (2013)	Human Factors	Do team and individual debriefs enhance team performance?	Debriefs were effective at improving team performance (d = 0.67). Moderation analysis was inconclusive for the facilitation, structure, and multimedia aids and how they impacted team debriefing.
Nicolaides et al. (2014)	The Leadership Quarterly	How does the relationship between shared leadership and teamwork differ under proximal and distal leadership approaches?	Shared leadership explains unique variance over and above vertical leadership in team performance. Moderation for the shared leadership-team performance relationship was found for task interdependence, team tenure, and how performance was measured as hypothesized.
Hughes et al. (2016)	Journal of Applied Psychology	How are healthcare teams impacted by team training?	Based on the Kirkpatrick criteria (reactions, learning, transfer, results), team healthcare training significantly improved team performance. Healthcare training was effective regardless of trainee composition, training strategy, and characteristics of the work environment. The only moderator that negatively impacted healthcare team training was providing feedback to trainees.
Wang et al. (2014)	Journal of Applied Psychology	How does shared leadership affect team effectiveness?	Traditional leadership approaches were less effective that new-genre (e.g., charismatic and transformational leadership) and cumulative, overall shared leadership. Shared leadership was more related to attitudinal outcomes, behavioral processes, and emergent states compared to team performance.
Breuer et al. (2016)	Journal of Applied Psychology	Does trust matter more in virtual effectiveness and how is this relationship affected considering level of virtuality and documentation as moderators?	There was a significant positive relationship between team trust and team effectiveness. This relationship was stronger in virtual teams compared to face-to-face teams.
De Jong et al. (2016)	Journal of Applied Psychology	Is trust positively related to team performance? What are the key factors that influence the magnitude of this relationship and under what conditions is trust important?	Intrateam trust is positively related to team performance. Moderation was found for task interdependence, authority differentiation, and skill differentiation in teams.
Frazier et al. (2017)	Personnel Psychology	What are the antecedents to psychological safety and how do they influence both task performance and organizational citizenship behavior?	Support was found for the relationship between psychological safety and positive leader relations as a broader category. Work design characteristics including interdependence and peer support were the strongest predictors between psychological safety and team performance. Psychological safety is also related to employee engagement, task performance, satisfaction, and commitment.
Lacerenza et al. (2017)	Journal of Applied Psychology	How do leadership development interventions influence team performance?	Leadership training is effective based on the Kirkpatrick typology and differs with respect to various design, delivery, and implementation characteristics. Moderation was found for the use of needs analysis, feedback, multiple delivery methods, spaced training sessions, locations of training that are onsite, and face-to-face delivery methods. Similar effects were also found for content of training, attendance policy, and duration of influences the effectiveness of training programs.
Feitosa et al. (2020)	Journal of Organizational Behavior	How does measurement of trust influence the trust-performance relationship?	Results showed the trust-performance relationship is moderated by time lag and source of measurement. Affective trust is more strongly related to global versus specific team outcomes. Mixed-referent items are effective with intact teams. The trust-performance relationship is constrained when direct consensus items are used in ad hoc teams.
Schmutz et al. (2019)	British Medical Journal	What is the relationship between teamwork and team performance in healthcare teams?	The correlation between teamwork and clinical performance. Teamwork and performance vary depending on different team constellations, team size, and level of acuity of care.
Hughes et al. (2020)	Human Factors	How does the work environment help to sustain team training?	Organizational support, supervisory support, and peer support were medium to strongly related to training transfer. Peer support played the largest role in predicting training transfer, relatively. Trainee motivation to transfer showed an important mediated mechanism between work environment support and training transfer.

(continued)

Table A1. (continued)

Citation	Journal	Meta-Analytic Question	Findings
Grossman et al. (2022)	Organizational Psychology Review	How is the cohesion-team performance relationship affected by measurement and team characteristic moderators?	The cohesion-performance relationship is stronger using more proximal measures (i.e., task cohesion, referent-shift, and behaviorally-focused) than distal measures (i.e., social cohesion, direct consensus, attitudinally-focused).
Triana et al. (2021)	Journal of Management Studies	What are the significant moderators and mediators between team deep-level diversity and team performance?	Deep-level diversity is associated with fewer positive emergent states and positive team processes and more team conflict. There was an indirect relationship between team deep-level diversity and team performance through each of the mediators: positive emergent states, positive team processes, and team conflict.
Bernerth et al. (2023)	Journal of Organizational Behavior	What is the relationship between team size and team effectiveness?	Team size was more strongly associated with performance when tasks are complex, consistent with a human capital perspective, but less strongly associated with performance when high coordination requirements are coupled with low task complexity, consistent with a process loss perspective. The relationship between team size and team task performance did not vary as a function of national culture. The results also revealed team size and other team-level effectiveness indicators revealed connections with deviant behaviors, passive withdrawal, and small negative relationships with team attitudes.
Kilcullen et al. (2022)	Journal of Organizational Behavior	Does team orientation matter for team effectiveness?	Team orientation was a significant predictor of teamwork and team-based outcomes. The authors found a significant and positive relationship with communication, coordination, trust, shared mental models, backup behaviors, cohesion, innovation, satisfaction, leadership, and team performance. Team orientation was also negatively correlated with conflict.
Bell (2007)	Journal of Applied Psychology	What is the relationship between deep-level composition variables (i.e., personality, values, abilities) and team performance?	The strength of the team composition variable and team performance relationship was moderated by study setting (lab or field) and the operationalization of the team composition variable. In a lab setting, team minimum and maximum general mental ability and emotional intelligence were related to team performance. Team minimal agreeableness and mean team conscientiousness, openness, collectivism, and preference for teamwork emerged as strong predictors of team performance in field studies.
Mesmer-Magnus and Dechurch (2009)	Journal of Applied Psychology	To what extent does information sharing impact team performance? What role do moderators play in this relationship? Which factors promote and suppress information sharing?	The information sharing-team performance relationship positively predicted team performance and was moderated by the representation of information sharing, performance criteria, task type, and discussion structure by uniqueness. Task demonstrability, discussion structure, and cooperation were three factors that enhanced team information sharing. Information distribution, informational interdependence, and member heterogeneity decreased the degree of redundancy in information sharing in teams.
DeChurch and Mesmer-Magnus (2010)	Journal of Applied Psychology	How important is cognition to team performance? Which aspects of cognition are most pivotal to team processes and performance? Which types of teams most benefit from team cognition?	Team cognition has a strong positive relationship to team behavioral processes, motivational states, and team performance. The nature of emergence, form of cognition, and content of cognition moderate relationships among cognition, process, and performance, and do task interdependence and team type.
Marlow et al. (2018)	Organizational Behavior and Human Decision Processes	Does team communication represent a one-size-fits all approach?	Communication quality had a stronger relationship with team performance than communication frequency. Information elaboration has the strongest relationship with performance while self-report frequency and objective frequency have the weakest relationship.
Keiser and Arthur (2021)	Journal of Applied Psychology	How do after-action reviews (or debriefs) influence team effectiveness?	After-action reviews (AAR) were consistently impacted alignment to the individual or the team and objective performance review media. The most effective combinations of types of AAR were self-led facilitation coupled with a team-aligned AAR, and the self-led approach coupled with objective media. AAR that are highlighted structure is more effective than less structured AAR in the military, but high and low structured AARs display comparable effectiveness in healthcare.

Table A2. Influential Literature Reviews Following Dyer (1984).

Citation	Title	Key Points
Guzzo and Dickson (1996)	Teams in organizations: Recent research on performance and effectiveness	• Team cohesion, group composition, leadership, and group goals affect team effectiveness. • Different types of groups require different considerations, such as computer-assisted groups, which necessitate more research. • There is a need to investigate how diversity in groups and team boundaries affect team effectiveness.
Brannick et al. (1997)	An overview of team performance measurement	• To successfully measure teams, it is important to consider the purpose of the measurement, the choice of stimuli, the attributes and behaviors measured, quantification of responses, time of responses, and expenses of measurement.
Cohen and Bailey (1997)	What makes teams work: Group effectiveness research from the shop floor to the executive suite	• Different teams (e.g., project teams) require different considerations. • Team cohesion is imperative for performance. • Diversity is related to team performance.
Ilgen et al. (2005)	Teams in organizations: From input-process-output models to IMOI models	• Teams are viewed as complex and adaptive systems. • Empirical research necessitates cohesiveness and lacks consideration of time-level variables.
S. W. Kozlowski and Ilgen (2006)	Enhancing the effectiveness of work groups and teams	• Team cohesion, collective efficacy, and group potency support team effectiveness • Coordination, cooperation, and communication are well supported in the literature as improving teamwork.
Lemieux-Charles and McGuire (2006)	What do we know about health care team effectiveness? A review of the literature	• Diverse clinical experience accounts for better patient care and organizational effectiveness. • Collaboration, conflict resolution, participation, and cohesion influence team effectiveness.
Delgado Piña et al. (2008)	Teams in organizations: A review on team effectiveness	• Effectiveness is made up of performance, attitudinal outcomes, and behavioral outcomes. • Use a variety of data sources and different methods for assessing effectiveness
J. Mathieu et al. (2008)	Team effectiveness 1997–2007: A review of recent advancements and a glimpse into the future	• The IPO and IMOI models have guided the field's developments. • Given the complexity of modern organizations, research needs to keep up and reflect developments
Salas et al. (2008)	On teams, teamwork, and team performance: Discoveries and developments	• Shared cognition is a driver of effective team performance, and it can be measured. • Team training enhances team performance. • Simulated/synthetic task environments allow for better research. • Team performance can be modeled using techniques such as hierarchical linear modeling (HLM), and is affected by a variety of factors (e.g., work structure).
Buljac-Samardzic et al. (2010)	Interventions to improve team effectiveness: A systematic review	• A vast majority of team training interventions are associated with better non-technical team skills. • A small percentage of research included presented evidence-based findings. Evidence-based findings included simulation-based training (SBT), CRM training, and team-based intervention training.
J. E. Mathieu et al. (2014)	A review and integration of team composition models: Moving toward a dynamic and temporal framework	• Team composition should be viewed as a dynamic variable to understand team change over time and the extent to which shared mental models, transactive memory systems, and other factors are disrupted or improved. • Longitudinal criteria are necessary in order to actually understand dynamic effects.
J. E. Mathieu et al. (2017)	A century of work teams in the Journal of Applied Psychology	• From the 1950s to now, we have shifted to understand teams as distinct from individual level variables. • Complexity is being acknowledged in the literature, and a multitude of research domains have emerged.
T. Driskell et al. (2017)	Team roles: A review and integration	• Role behavior in groups can be understood by three dimensions: task orientation (i.e., oriented towards task vs. away from task), level of dominance (i.e., dominant vs. submissive), and level of sociability (i.e., sociable vs. withdrawn).

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