supplemental material

review

Teamwork doesn't just happen: Policy recommendations from over half a century of team research

Gudela Grote and Steve W. J. Kozlowski

Additional Tables & Sidebar

This supplement expands on the data included in the tables presented in the main text.

Table S1. Summary of key scientific evidence for teamwork processes & team effectiveness

Core team processes	Key citations	Meta-analytic evidence
Team knowledge		
• Information sharing: Team decision-making that involves communicating information known to all (common) and information specific to expertise (unique), such that the combined information set can contribute to an effective decision.		
	Mesmer-Magnus & DeChurch (2009); Lu et al. (2012)	Information sharing is significantly related to team performance overall (ρ = .42) and is particularly important for team performance (ρ = .50) and decision-making (ρ = .47) if the combination of unique information is required. In tasks where team members have both common and unique information that need to be combined for optimal decisions, team members share common information two standard deviations *more* than unique information and, as a result, they are eight times *less likely* to make the correct decision compared to teams with full access to all the information.
• Team cognition: Mental models and transactive memory. Mental models represent shared, organized information held collectively across the team. Transactive memory represents distinct, distributed knowledge connected by a shared understanding of who knows what.		
	DeChurch & Mesmer-Magnus (2010)	Team cognition is related to team behavioral processes (ρ = .43), motivational states (ρ = .43), and performance (ρ = .38). Transactive memory is more strongly related to team performance (ρ = .44) compared with shared team mental models (ρ = .32).
Adaptation		
• Team goals: Goals that are difficult, specific, and collectively held direct attention, task strategies, and effort expenditure.		
	Kleingeld et al. (2011); O'Leary-Kelly et al. (1994)	Twenty-six effect sizes from 10 studies indicate that compared with no goals or low goals, group-level goals exert an increase of one standard deviation in group performance. Seventy-six independent effect sizes from 30 studies indicate a relationship between group-level goals and group performance (d = 0.56 + 0.19, k = 49) that was stronger when group goals were more difficult and specific (compared with nonspecific goals; d = 0.80 + 0.35, k = 23).
• Mechanisms: Team process behaviors that contribute to team adaptation.		
	Christian et al. (2017)	Team behavior is positively related to team adaptive performance (ρ = .34), specific relevant behaviors are communication (ρ = .22), coordination (ρ = .30), stimulus specific actions (ρ = .41), learning behavior (ρ = .27), and plan formulation (ρ = .24). Team cognition is positively related to team adaptive performance (ρ = .19); in particular, mental models (ρ = .13) and transactive memory (ρ = .30) are important.
Motivation		
• Team cohesion: Shared attraction that bonds members socially to the team and its tasks.		
	Beal et al. (2003); Gully et al. (1995)	Group-level cohesion is significantly related to group performance (33 effect sizes; ρ = .317); task interdependence moderated this relationship such that cohesion is more strongly associated with team performance when task interdependence is high (ρ = .464) versus low (ρ = .206). The moderating effect of task interdependence was later replicated, R^2 = .096, F(1, 52) = 5.430, p < .05.
• Team efficacy: A shared belief that the team can collectively overcome uncertainties, difficulties, and challenges.		
	Gully et al. (2002)	There is a significant relationship between team efficacy and team performance (ρ = .41) that is moderated by task interdependence (i.e., low, ρ = .09, versus high, ρ = .47).

Table S2. Summary of key scientific evidence for interventions that support team effectiveness

Interventions	Key citations	Meta-analytic & research evidence
Team training	Salas et al. (2008)	Meta-analysis that indicated that team training improves team cognition (ρ = .42), affect (ρ = .35), process (ρ = .44), and performance (ρ = .39).
	Lacerenza et al. (2017)	Meta-analysis based on effect sizes from 335 independent studies that indicated that leadership training is effective at improving reactions (δ = .63; 95% CI [.12, 1.15]), learning (δ =.73; 95% CI [.62, .85]), transfer (δ =.82; 95% CI [.58, 1.06]), and results (δ =.72; 95% CI [.60, .84]).
	McEwan et al. (2017)	Meta-analysis conducted on 51 articles, comprising 72 (*k*) unique experimental training interventions, 194 effect sizes, and 8,439 participants, which indicated that training had a (significant) medium to large effect on teamwork, $d(0.13) = 0.683$, 95% CI [0.43, 0.94], $Z = 5.23$, $p < .001$; $Q(38) = 660.7$, $I^2 = 94.2$.
	Keiser & Arthur (2021)	Meta-analysis conducted on 61 articles reporting overall 107 effect sizes for after-action reviews as a training intervention used in overall 915 teams with 3,499 participants, which indicated that after-action reviews had sample weighted mean $d = 0.79$, $SD = 0.83$, 95% CI [0.63, 0.95], across attitude, cognitive, process, and performance effects.
Work design	Humphrey et al. (2007)	Meta-analysis based on nine independent samples that indicated that autonomy is related to objective job performance (ρ = .17); based on up to 42 independent samples, there are significant relationships between subjective performance and autonomy (ρ = .23), task identity (ρ = .17), task significance (ρ = .23), and feedback (ρ = .20).
Climate	Carr et al. (2003)	Meta-analytic path analysis that indicated that climate significantly influenced outcomes of job performance, psychological well-being, and withdrawal; the influence of climate operated through perceptions of organizational commitment and job satisfaction.
	Parker et al. (2003)	Meta-analytic structural equation modeling that indicated that psychological climate perceptions were significantly related to work attitudes, psychological well-being, motivation, and performance.

Table S3. Selected studies providing evidence for core teamwork capabilities

Core teamwork capabilities	Selected support
Develop team strategies and goals	Cannon-Bowers et al. (1995); Chen et al. (2009); Dickinson & McIntyre (1997); Fleishman & Zaccaro (1992); Hackman (1983); Kleingeld et al. (2011); Marks et al. (2001); O'Leary-Kelly et al. (1994); Prince & Salas (1993); Prussia & Kinicki (1996); Saavedra et al. (1993); Stout et al. (1999); Weldon et al. (1991)
Coordinate interdependent tasks	Brannick et al. (1992, 1993); Kozlowski & Bell (2003, 2013); Marks et al. (2001); Zalesny et al. (1995)
Monitor task progress (goals)	Cannon-Bowers et al. (1995); DeShon et al. (2004); Jentsch et al. (1999); Kozlowski et al. (1999, 2009); Marks et al. (2001)
Monitor team processes	Dickinson & McIntyre (1997); Fleishman & Zaccaro (1992); Kozlowski et al. (1999, 2009); Marks et al. (2001)
Provide feedback and support	DeShon et al. (2004); Kozlowski, Gully, McHugh, et al. (1996); Kozlowski, Gully, Salas, & Cannon-Bowers (1996); Kozlowski et al. (2009)
Promote collaborative problem-solving	Bedwell et al. (2012); Bell (2007); Hinsz et al. (1997); Kozlowski & Bell (2003, 2013); Kuljanin (2011); Wilson et al. (2007)
Foster team cohesion and endurance	Beal et al. (2003); Gully et al. (1995); Kozlowski & Ilgen (2006)
Address and resolve conflict	Cannon-Bowers et al. (1995); Gladstein (1984); Jehn (1995); Pace (1990); Marks et al. (2001); Simons et al. (1999); Simons & Peterson (2000); Smolek et al. (1999); Tjosvold (1985); van de Vliert, et al. (1995)

Consequences of Poor Teamwork

Aviation

Although estimates vary, generally between 60% and 80% of aircraft accidents are due to human error, with a substantial proportion of those errors caused by communication, coordination, or collaboration issues, that is, teamwork failures (Helmreich, 1997). In the United States, fatal aircraft accidents have continuously decreased since the federal mandate to introduce team training for flight crews in civil aviation (Flight Safety Foundation, 2019).

Medicine

In medicine, teamwork errors have high costs in human life (James, 2013; Kohn et al., 2000). Indeed, medical errors are the third leading cause of death and may exceed 250,000 deaths per year (Makary & Daniel, 2016). As in aviation, most of those human errors have their roots in poor teamwork (The Joint Commission, 2016; Tomlinson & Wakeling, 2019).

Industry & Organizations

Many industrial accidents with significant loss of life and environmental damage have been attributed to human error and poor teamwork, including the nuclear meltdown at Chernobyl in the former Soviet Union; the toxic chemical release at Bhopal, India; and the Deepwater Horizon explosion and massive oil spill in the Gulf of Mexico.

Data on Poor Teamwork in Organizations More Generally

- "only 26% of employees feel their team works seamlessly together"; https://www.forbes.com/sites/davidsturt/2019/10/02/new-research-what-employees-want-from-leaders-and-their-workplace-culture/
- "86% of employees and executives cite lack of collaboration or ineffective communication for workplace failures"; https://blog.bit.ai/collaboration-statistics/
- "75% of employees rate teamwork and collaboration at work as being very important"; https://www.zippia.com/advice/workplace-collaboration-statistics/

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