Measuring Team Cohesion: Observations from the Science

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Objective: The aim of this study was to review literature relevant to cohesion measurement, explore developing measurement approaches, and provide theoretical and practical recommendations for optimizing cohesion measurement.

Background: Cohesion is essential for team effectiveness and performance, leading researchers to focus attention on understanding how to enhance it. However, cohesion is inconsistently defined and measured, making it difficult to compare findings across studies and limiting the ability to advance science and practice.

Method: We reviewed empirical research through which we uncovered specific information about cohesion’s conceptualization, measurement, and relationships with performance, culminating in a set of current trends from which we provide suggestions and possible solutions to guide future efforts and help the field converge toward greater consistency.

Results: Cohesion demonstrates more significant relationships with performance when conceptualized using social and task (but not other) dimensions and when analyses are performed at the team level. Cohesion is inherently temporal, yet researchers rarely measure cohesion at multiple points during the life of a team. Finally, cohesion matters in large, dynamic collectives, complicating measurement. However, innovative and unobtrusive methodologies are being used, which we highlight.

Conclusion: Practitioners and researchers are encouraged to define cohesion with task and social subdimensions and to measure with behavioral and attitudinal operationalizations. Individual and team-oriented items are recommended, though team-level analyses are most effective. Innovative/unobtrusive methods should be further researched to enable cohesion measurement longitudinally and in large, dynamic collectives.

Application: By applying our findings and conclusions, researchers and practitioners will be more likely to find consistent, reliable, and significant cohesion-to-performance relationships.

Keywords: organizational behavior/design, organizational psychology, macroergonomics and the environment, group processes, social processes, team dynamics, teams and groups, team collaboration, team communication

INTRODUCTION

Teams are critical for success in today’s organizations (Kozlowsky & Ilgen, 2006), regardless of whether teams operate in an office setting (Simons & Peterson, 2000) or in isolated/confined/extreme environments (Bishop, 2004). Teams are advantageous to individuals in many ways. They pool diverse knowledge and skills, allowing for convergent and divergent thinking, the building blocks of creativity and knowledge generation (Hoegl & Parboteeah, 2007). They also provide a source of backup and assistance for overworked or underskilled team members, and can be a source of positive affect and increased morale (Salas, Sims, & Burke, 2005). To be sure, teams offer many benefits, but in large part these benefits will be realized only in cohesive teams. Cohesion—the shared bond/attraction that drives team members to stay together and to want to work together (Casey-Campbell & Martens, 2009)—is essential for teams (e.g., Beal, Cohen, Burke, & McLendon, 2003; Chiocchio & Essiembre, 2009). Individuals who feel no sense of cohesion with their team (whether due to distrust, dislike, disinterest, or a host of other reasons) are less motivated and less likely to participate in the “teaming” behaviors that enable the many positive effects of teams.

Given the importance of cohesion to team and organizational performance, accurate measurement of this construct is essential; however, several issues complicate effective measurement. First, cohesion is an umbrella term used in many domains, leading to myriad definitions (e.g., Carron, Widmeyer, & Brawley, 1985; Shaw, 1981) and complicating the research process. Second, because cohesion has team and individual components, operationalizing, measuring, and analyzing cohesion at different levels is often difficult. Third, cohesion is thought to emerge over time (Bartone & Adler, 1999), meaning that researchers should incorporate
temporal elements into cohesion research, though longitudinal studies inherently introduce logistical difficulties. Finally, there is a growing interest in measuring cohesion in complex, dynamic collectives (e.g., Thayer, Gregory, Grossman, & Burke, 2014), specifically in space exploration (see Salas et al., in press). Measuring cohesion in these settings presents practical and logistical challenges that must be addressed. In light of these four issues, we discuss possible paths to solving these problems by reviewing empirical research and leveraging theory.

Although the first two issues have been present in the literature for quite some time, the disparate approaches to analyzing cohesion have not yet been reconciled; we thus use the findings from our review to provide initial insights about which approaches should be adopted by both researchers and practitioners going forward. Additionally, because the second two issues are more novel, developing themes in the literature, we place a greater emphasis on discussing them, allowing for a stronger contribution to the literature. Finally, we do not presume to solve all problems associated with cohesion measurement; rather, our review serves to move the state of cohesion research forward.

METHOD

We conducted a literature search to uncover trends in the cohesion literature using the terms cohes* and team within peer-reviewed articles in EBSCOhost databases (i.e., PsycINFO [1887–2013], Business Source Premier [1905–2013]). We included articles if (a) they were empirical, (b) cohesion was included in the title, and (c) they explored the relationship between cohesion and performance. Though cohesion demonstrates relationships to other constructs, we limit our review to articles exploring the cohesion–performance link for parsimony and because performance is an outcome of particular importance. We supplemented the search findings with studies from the two most recent cohesion meta-analyses (Beal et al., 2003; Chiocchio & Essiembre, 2009), excluding unpublished studies. This process yielded 210 articles, 70 with information sufficient for coding (note that not all articles are referenced in this work due to space constraints; a list of references is available in the online supplementary materials). Of these 70, various team types were used (n = 20 sports teams, n = 22 student samples, n = 20 adult working samples, n = 6 military samples, and n = 2 from other domains).

We qualitatively coded articles to extract information pertaining to cohesion’s conceptualization, data collection/analysis methodologies, and whether or not studies established relationships between cohesion and performance. We calculated the frequency with which specific measurement practices occurred as well as the ratio of significant to nonsignificant cohesion–performance findings. This calculation was done with the intent that frequency indicates common measurement practice whereas significance suggests efficacious practice. Significance percentages refer to the ratio of measured relationships between cohesion and performance that were statistically significant (p < .05). For example, if cohesion was conceptualized 750 times unidimensionally compared to 250 multidimensionally, that result would indicate common practice is to conceptualize cohesion unidimensionally. However, if 50% of unidimensional conceptualizations were significant whereas 80% were significant when defining cohesion multidimensionally, this result would suggest that multidimensional conceptualizations are more efficacious. To further clarify our coding/analysis strategy, see Table 1.

DEFINITIONAL ISSUES

Clearly, cohesion measurement is inherently complex. Some scholars define cohesion unidimensionally (e.g., members’ attraction to the group or resistance to leaving; Seashore, 1954), whereas others view it as a multidimensional construct (e.g., sum of forces acting on members to remain in a group; Festinger, 1950; for a list of the five most common dimensions and their definitions, see Table 2). Our review revealed that the majority of measured relationships (42%) defined cohesion multidimensionally, though some (16%) defined it unidimensionally (for almost 50% of measured relationships, a definition was not provided). The idea that cohesion is conceptualized in a number of ways is certainly not new. As noted earlier, cohesion has been a topic of interest for decades, but this long and varied history has resulted in a vast, often ambiguous literature that offers little insight about which approaches are most
effective. Indeed, divergent definitions, dimensions, and operationalizations have yielded an array (over 35!) of cohesion measures, not only obfuscating potential cross-study comparisons that would yield stronger research conclusions, but also leaving practitioners, who need to measure cohesion in order to assess and enhance it, at a loss for insight about exactly how to do so.

Specifically, due to logistical constraints in applied settings, it is often necessary to limit attention to only those dimensions of cohesion that are most likely to relate to performance improvements; to maximize utility, such dimensions must be (a) identified, so that team interventions can be designed to enhance them, and (b) effectively measured, so that they can be assessed both before and after interventions are implemented in order to evaluate their effectiveness and to ensure that interventions are linked to cohesion dimensions of interest and not others deemed less critical. Thus, our goal, in part, is to identify patterns in the literature that indicate which approaches to defining and measuring cohesion are most effective in terms of their ability to detect relationships with performance.

With this goal in mind, our review provides suggestions and possible paths for solutions based on the efficacy of measurement strategies.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Conceptualization/definition| How was cohesion defined? Did the definition capture a single dimension or multiple dimensions of cohesion? | • Unidimensional: Individual members’ attraction to the group task  
• Multidimensional: The total field of forces that act on members to remain in the group |
| Dimensionality of measurement| How was cohesion measured? Did the items capture a single dimension or multiple dimensions of cohesion? Which dimension(s) did the items capture? | • Task cohesion: “Our team is united in trying to reach its goals for performance.”  
• Social cohesion: “Our team would like to spend time together outside of work.” |
| Operationalization/focus of measurement| Did the cohesion measure capture attitudes, behaviors, or a mix of both? | • Attitudes: “The members of our team felt proud to be a part of the team.”  
• Behaviors: “Members of our team do not stick together outside of work.” |
| Level of measurement| Did the cohesion measure capture the individual level, the team level, or a mix of both? | • Individual level: “Some of my best friends are on this team.”  
• Team level: “People work well together as a team.” |
| Level of analysis| How was cohesion analyzed: at the individual level or the team level? | • Individual level: A mean across all participants was calculated and utilized in analysis.  
• Team level: Team member responses were aggregated to the team level (e.g., mean); then a mean across all teams was calculated and utilized in analysis. |
present within common cohesion measurement practices. First, we confirm that researchers should adopt a multidimensional definition of cohesion (of the articles that clearly defined cohesion, multidimensional conceptualizations found significant cohesion–performance relationships more frequently [69%] compared to unidimensional conceptualizations [57%]). This finding is largely consistent with prior work on the tripartite view of cohesion, whereby task cohesion, social cohesion, and group pride have each shown significant links with performance (Beal et al., 2003; Mullen & Copper, 1994). Our review, however, did not reveal a consistent group pride–performance link (it was also less frequently studied). Accordingly, we advocate leveraging group pride dimensions when feasible, but prioritizing social and task dimensions, particularly when adapting to logistical constraints. Second, cohesion seems to be neither purely attitudinal (e.g., “Members of this team like each other”) nor purely behavioral (e.g., “Members of this team spend time with each other off the job”): We found that measures including both operationalizations more consistently uncovered the cohesion–performance link (see Table 3). Thus, we suggest that the most effective cohesion measures are those that assess the social and task dimensions while spanning attitudinal and behavioral foci.

MULTILEVEL ISSUES

Another critical issue to consider when measuring and understanding cohesion is the role of multilevel assessment. Particularly, it has long been unclear whether cohesion should be defined primarily as an individual, team, or multilevel construct (Casey-Campbell & Martens, 2009). Indeed, although cohesion was frequently defined as a team variable (37% of measured relationships), authors of some studies conceptualized cohesion as a multilevel variable (14%) and, further complicating the issue, 40% failed to clarify the level of conceptualization (fortunately, there was agreement that cohesion should not be considered as strictly an individual-level variable [in only 1% of studies was cohesion examined exclusively at the individual level]; see Table 4). As noted, this ambiguity presents an issue for both researchers and practitioners interested in cohesion: Before we can understand how to enhance cohesion or diagnose and improve it in practice, we need to be able to measure it effectively. Our findings provide some insight about how to do so. Despite cohesion being more frequently defined as a team (as opposed to a multilevel) variable, multilevel measures performed better (74% of measured relationships were significant) than those with strictly team (65% of measured relationships were significant) or individual (54%
of measured relationships were significant) operationalizations. Additionally, analytic strategies seem to favor team-level cohesion; aggregating cohesion to the team level more frequently yielded significant findings (76% of measured relationships) than dyadic (50%) or individual-level analyses (53%). We therefore urge future researchers and practitioners to adopt a multi-level view of cohesion—from research design, to measure development, to statistical analyses. That is, cohesion should be measured at both the individual and the team level. This approach will enable greater flexibility while also allowing for analyses to be run at the team level, where cohesion seems to operate the strongest.

### TEMPORAL ISSUES

Cohesion is a relational “emergent state” (Marks, Mathieu, & Zaccaro, 2001), meaning it emerges over time as teammates interact. Despite this inherently temporal component, in only a few studies reviewed was cohesion measured two or more times, likely due to the logistical constraints placed on researchers that often prevent longitudinal measurement. Nonetheless, limited understanding of cohesion

### TABLE 3: Frequency and Significance of Measured Relationships for Each Dimension and Foci of Cohesion Measures

<table>
<thead>
<tr>
<th>Measure Characteristic</th>
<th>% Frequency of Measured Relationships</th>
<th>% Significance of Measured Relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension (n = 116)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task</td>
<td>33</td>
<td>76</td>
</tr>
<tr>
<td>Social</td>
<td>53</td>
<td>69</td>
</tr>
<tr>
<td>Belongingness</td>
<td>10</td>
<td>58</td>
</tr>
<tr>
<td>Group Pride</td>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>Morale</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Focus (n = 217)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitudinal</td>
<td>45</td>
<td>53</td>
</tr>
<tr>
<td>Behavioral</td>
<td>33</td>
<td>60</td>
</tr>
<tr>
<td>Mixed</td>
<td>22</td>
<td>74</td>
</tr>
</tbody>
</table>

Note. n refers to the number of times the specific cohesion–performance relationship was examined across all 70 studies included in the review.

### TABLE 4: Frequency and Significance of Measured Relationships for Each Level of Measurement and Analysis

<table>
<thead>
<tr>
<th>Measure Characteristic</th>
<th>% Frequency of Measured Relationships</th>
<th>% Significance of Measured Relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure/item level (n = 236)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual</td>
<td>48</td>
<td>54</td>
</tr>
<tr>
<td>Team</td>
<td>37</td>
<td>65</td>
</tr>
<tr>
<td>Mixed</td>
<td>14</td>
<td>74</td>
</tr>
<tr>
<td>Level of analysis (n = 202)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual</td>
<td>59</td>
<td>53</td>
</tr>
<tr>
<td>Dyadic</td>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>Team</td>
<td>39</td>
<td>76</td>
</tr>
</tbody>
</table>

Note. n refers to the number of times the specific cohesion–performance relationship was examined across all 70 studies included in the review.
emergence complicates its measurement and our understanding of its temporal nature. Empirical evidence on cohesion has demonstrated that cohesion within teams varies as a function of time (Carless & De Paola, 2000). This idea is also a matter of common sense; when two teams are characterized by the same quantitative indices of cohesion (means, dispersion, skewness, etc.) but with wildly different tenures (e.g., 1 hr vs. 10 years), should these teams be considered to have equivalent cohesion? Should these teams even be asked the same cohesion-relevant questions? We do not presume that simply emphasizing the importance of time in cohesion measurement will result in more longitudinal studies. Accordingly, we offer a few thoughts for time-conscious and practical measurement.

Team development theories (e.g., Kozlowski, Gully, Nason, & Smith, 1999) and research on emergence over time (e.g., Coultas, Driskell, Burke, & Salas, 2014) offer insights into longitudinal cohesion measurement. Kozlowski et al.’s (1999) process model of team development posits that teams develop through phases consisting of (a) team formation (i.e., members familiarizing with each other at surface levels), (b) task compilation (i.e., members identifying/mastering tasks), and (c) role compilation (i.e., members learning/negotiating details of intrateam relations). These phases have clear implications for cohesion emergence. First, group-level agreement is less likely during team formation (Mullen & Copper, 1994), meaning that group-level cohesion–performance relationships will also be unlikely. Additionally, social cohesion indices are less reliable than task cohesion during early team life (Siebold, 2006).

To address this issue, we encourage researchers to begin developing the construct of “swift cohesion” (Coultas et al., 2014). Research on “swift trust” (Meyerson, Weick, & Kramer, 1996) and “swift psychological safety” (Dufresne, 2007) suggests that when constructs rapidly emerge, they may be conceptually different from their more gradual counterparts (see also transactive memory systems; Kanawattanachai & Yoo, 2007). If swift cohesion emerges under different conditions or has different effects than “traditional” cohesion, expanding on this concept may enable more reliable indices of cohesion at the early phases of team development (Quintane, Pattison, Robins, & Mol, 2013). Furthermore, empirical evidence suggests that cohesion measured later in the team life cycle, as opposed to during its formation or early phases of development, demonstrates stronger links to improved performance (Bradley, Baur, Banford, & Postlethwaite, 2013; Siebold, 2006).

Second, because sustainable/reliable task cohesion typically emerges first (see preceding paragraph), measures of task cohesion should be more reliable at the group level early on, whereas social cohesion indices may take longer to be effective predictors of performance. Accordingly, we suggest that assessing the team’s developmental phase will enable researchers to determine which elements of cohesion are most likely to be reliable, especially if measuring every aspect of cohesion or measuring it longitudinally is infeasible.

LOGISTICAL AND PRACTICAL ISSUES

That cohesion is often assessed in the lab, or in small-scale teams, does not mean that cohesion is unimportant elsewhere. For example, there is interest in assessing cohesion in large organizations (e.g., the military) and fast-paced, dynamic teams (e.g., surgical teams); in these settings, self-report measures may be cumbersome and/or practically impossible to administer. Unfortunately, simply asking fewer questions is often not a solution. In part, this idea is due to the fact that longer, more reliable measures are typically more effective. Indeed, we found that longer measures were likelier to predict (for measures with five or fewer items, 57% of measured relationships were significant; six to 10 items, 74%; ≥11 items, 86%); a similar pattern was found with more reliable measures (when alpha ≥.70, 78% of measured relationships were significant; six to 10 items, 74%; ≥11 items, 86%); a similar pattern was found with more reliable measures (when alpha ≥.70, 78% of measured relationships were significant; alpha < .70, 41%). Obviously, concise, reliable, and content-valid measures are ideal; but in some complex settings, it may be infeasible or even impossible to administer self-report measures of cohesion. Given these logistical constraints, unobtrusive/indirect measures of cohesion are essential. Indeed, we identified several articles that leveraged innovative techniques that may facilitate the collection and analysis of cohesion data in complex team settings (see Table 5).
Big data (i.e., data sets that proliferate with automated updated information), sociometric radio frequency identification (RFID) badges, and certain physiological metrics (e.g., lexical analysis, eye gaze, electroencephalogram readings) have shown promise for capturing teamwork processes and states (e.g., Gonzales, Hancock, & Pennebaker, 2010). We encourage researchers to leverage these techniques (see Table 5) more frequently—especially when studying cohesion in large, fast-paced, dynamic, or high-risk team settings. Before we accomplish the ultimate goal of having reliable and valid unobtrusive measures of cohesion readily available, several things must happen. First, valid unobtrusive indicators of cohesion must be developed. To do so, researchers must supplement unobtrusive collection and analytic methodologies with traditional approaches to assess construct validity (see Bobko, 2001; Hughes et al., 2014). The advantage of developing multiple collection methodologies is it enables researchers to select more effective methods, adaptive to different contexts. For example, in fast-paced and/or high-risk, dynamic teams (e.g., surgery, long-duration space flight), sociometric RFID badges may be especially useful, because they do not draw resources away from task performance and are not subject to recall bias. Current methods of leveraging RFID to assess team performance and teamwork are nascent (Parlak, Sarcevic, Marsic, & Burd, 2012); however, advances in validating RFID metrics with teamwork frameworks is furthering the validity of their use (Rosen, Dietz, Yang, Priebé, & Pronovost, in press). An alternative method for development and validation of unobtrusive metrics is to develop indicators based on a framework that is grounded in the science of assessment to help ensure construct validity (Hughes et al., 2014; Rosen et al., in press). External observations—though not necessarily innovative—may be a
helpful, unobtrusive way to assess cohesion, provided external leaders have sufficient exposure to the team and are able to provide unbiased or trained ratings. Big data may be especially relevant in large, complex systems (e.g., military brigades, multiteam systems), where a wealth of intracollective interactions are available. The strategies provided and discussed help to pave a way in an emerging field of real-time assessment of dynamic team emergence, which has been cited as “possibly the most difficult [measurement] principle to implement” (Rosen et al., 2011, p. 119).

CONCLUSIONS

Though long considered a key contributor to team success, cohesion is perhaps more important than ever. As organizations continue to seek competitive advantage, teams are increasingly looked to in the hopes of facilitating knowledge, morale, and creativity. Researchers have long lamented the inconsistency plaguing the cohesion literature (Casey-Campell & Martens, 2009), much of it revolving around disagreements about cohesion’s conceptualization and measurement. Practitioners interested in monitoring and improving cohesion face a vast, confusing literature with myriad measurement options. Our review offers potential solutions to problems that cohesion researchers frequently face.

First, we reiterate that cohesion is indeed a multidimensional construct and clarify that task and social cohesion should be prioritized when measuring cohesion, but that more research is needed on group pride. Second, we illustrate that cohesion is multilevel, though it seems to operate most consistently at the team level. Researchers should focus cohesion research at the team level; however, they should also be aware there are individual-level components of cohesion that may warrant different analytic techniques. Third, we emphasize that cohesion is inherently temporal but that researchers rarely model cohesion longitudinally. We offer a few suggestions for incorporating time into cohesion research (e.g., developing the swift cohesion construct), but ultimately, more research is needed. Fourth, we acknowledge that cohesion is important in “messy” team settings, too, and we emphasize a few methods, such as the use of RFID badges and social network analysis of big data sources, for circumventing problems inherent to these settings.

And although significant progress has been made over the years, more robust, precise, theoretical-driven, practical, and innovative measures are needed—a tall order that will take time and resources to continue exploring and testing, access to expert team-participants, and a mandate that makes assessment of team cohesion a priority. The science of team effectiveness has this challenge ahead, but it is well suited to succeed. Time will tell.

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KEY POINTS

• Cohesion is critical for team effectiveness, but inconsistencies in how it has been defined and measured limit the ability to advance science and practice.
• On the basis of a qualitative review of a subset of the cohesion literature and our leveraging of theory, we present the following recommendations for improving the measurement of cohesion:
  • A multidimensional approach to defining and measuring cohesion should be adopted with priority given to the social and task cohesion dimensions; group pride should be examined when logistical constraints allow for it.
  • A multilevel approach to measuring cohesion should be adopted, whereby cohesion is assessed at both the individual and the team level. This approach allows for greater flexibility in analysis, but priority should be given to conducting analyses at the team level of analysis.
  • The developing literature on nonobtrusive measurement approaches (e.g., sociometric badges) should be adopted in particularly complex or high-stakes settings (e.g., military contexts); multiple measurement approaches should be utilized initially to ensure the construct validity of nonobtrusive techniques.
• The team’s developmental phase should be considered when making measurement decisions—certain dimensions of cohesion may be more or less salient depending on the life span of the team. Additional research is needed to explore the notion of “swift cohesion” in newly formed teams, which may represent a slightly different construct than cohesion as it applies to teams that are further developed.

SUPPLEMENTARY MATERIAL

The online reference list is available at http://hfs.sagepub.com/supplemental.

REFERENCES


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