Cross-Cultural Competence (3C) and Diversity Management Support

Task 1.2.2.2. Technical Report

The Impact of Cultural Values on Team Functioning: A Meta Analysis

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Executive Summary

Purpose

Due to the increasing exposure of U.S. Armed Forces to culturally diverse collaborative settings, it is critical to understand the impact of cultural values on team functioning. Therefore, the primary purpose of the current research is to quantitatively summarize the existing scientific knowledge regarding the relationships between deep-level cultural values, team processes, and team emergent states.

Method

Forty-two independent studies reported in 41 manuscripts examining culture in teams were examined using meta-analytic procedures. Literature was compiled via a comprehensive, multifaceted search of scholarly social science databases, DTIC military reports, and dissertation databases. The relationships between (1) cultural values and team processes and (2) cultural values and team emergent states were coded using a theoretically-driven coding scheme.

Findings

The results of the meta-analysis demonstrate some established relationships between deep-level cultural values and various team processes, such as monitoring, coordination, and interpersonal processes. The relationships between deep-level cultural values and emergent states remain less clear and will require much future research.

Implications

The information presented in this meta-analysis serves as a quantitative summary of the existing scientific knowledge regarding the impact of deep-level cultural values on team processes and emergent states that can be leveraged to diagnose and improve military teams. Specifically, the data presented can be used to pinpoint the processes and emergent states within their operational teams most likely to be affected when working from other individuals from various cultures. When combined with the findings from other scholarly work, such as the LePine and colleagues (2008) meta-analysis that summarizes the impact of team processes on team performance, the information in this report can be used to determine which interventions would be most effective for improving team performance.

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Introduction

Statement of Purpose

U.S. Armed Forces are increasingly exposed to culturally diverse settings when conducting operations in today's world. Forces interact not only with the native populations of the host countries within which they are stationed but also with cooperating military units from various national backgrounds. In a recent post on Army Live, the official blog of the U.S. Army, General Odierno stated "we have learned many lessons over the last 10 years, but one of the most compelling is that - whether you are working among citizens of a country, or working with their government or Armed Forces - nothing is as important to your long term success as understanding the prevailing culture and values" (Odierno, 2012, March 22). In other words, it is absolutely critical for the U.S. Armed Forces to understand the various ways in which cultural values can influence collaboration and interaction overseas.

One of the most common situations in which cultural values will influence behavior is within teams, as many of the operations conducted by U.S. Armed Forces are completed in team-based work structures. Fortunately, a sizeable amount of scholarly research has begun to summarize the influence of diversity (de Wit & Geer, 2008; Horwitz et al., 2007; Joshi & Roh, 2009; Stahl et al., 2010; Webber & Donahue, 2001) and culture (e.g., Taras, Kirkman, & Steel, 2010) on various aspects of team functioning. The meta-analysis recently conducted by Taras and colleagues (2010) provides a particularly good starting point regarding the impact of deep-level cultural values on a wide array of outcomes, including several for teams. However, these existing meta-analyses suffer from several limitations. First, most use a dichotomous approach to diversity and essentially look at the differences between heterogeneous and homogeneous teams without considering the type of diversity present. Second, none use a clearly established model of team functioning to organize the results, making the results difficult to apply.

Therefore, in the currently described meta-analysis, we use the Marks, Mathieu, and Zaccaro (2001) taxonomy of team processes to organize our findings. Additionally, we focus on deep-level cultural values instead of dichotomized diversity and do not limit our sample to only Hofstede's (1991) cultural dimensions. Instead, we organize the cultural variables around the integrative cultural value framework provided in Sutton, Pierce, Burke, and Salas (2006), specifically developed for application in the U.S. military, in order to provide a more comprehensive and inclusive view of the literature. In sum, the primary goal of the current effort is to quantitatively review the research and summarize, for the purposes of informing teams within the U.S. Armed Forces, what is known regarding cultural values and team functioning.

Review of Existing Meta-Analyses

Several meta-analytic investigations examined the impact of diversity and culture on teams. Webber and Donahue (2001) tested the impact of diversity on work group performance and cohesion by separately investigating the impact of high job-related diversity (i.e., diversity amongst the task-related knowledge, skills, and abilities that contribute directly to performance) and low job-related diversity (i.e., variables such as gender, age, and race which less directly impact performance). Results provided no evidence of relationships either between high job-

related diversity and the outcome variables (i.e., performance or cohesion) or between low job-related diversity and the outcome variables. Further analysis failed to support team type as a moderator.

Dividing team diversity into two similar factors, task-related diversity (i.e., functional expertise, organizational tenure, and educational attainment) and bio-diversity (i.e., innate member characteristics such as age, gender, and ethnicity), Horwitz and Horwitz (2007) attempted to parcel out the impact of team diversity on team performance. Their results supported task-related diversity as positively impacting both team performance quality and quantity. In contrast, bio-diversity appeared to impact neither quality nor quantity of performance, although an insufficient number of studies examined performance quantity and bio-diversity for the results to readily interpretable. Seeking to explain the lack of relationship between bio-diversity and performance quality, the authors tested task complexity, team type, and study methodology as potential moderators; none were supported. Lastly, they examined the impact of team diversity on social integration but did not find evidence to support that claim, even accounting for the potential impact of team size and methodology as moderators.

De Wit and Greer's (2008) meta-analysis tested the relationship between team diversity, conflict, and team outcomes. Their results supported positive relationships between informational diversity (e.g., functional background and tenure) and task conflict and relationship conflict, though not between informational diversity and process conflict. Also, they found, despite small effect sizes, a consistent positive relationship between social category diversity (e.g., gender, race) and relationship conflict levels. Furthermore, relationship, process, and task conflict all negatively correlated with performance and morale (i.e., commitment and satisfaction). The authors tested how the impact of task conflict on performance might be moderated by other variables, including relationship conflict, task complexity, and position in the organizational hierarchy. Their results support a reduction of the negative correlation between task conflict and performance when the team is in a higher position in the organizational hierarchy and when the correlation between task conflict and relationship conflict is low. The latter impact actually results in a reversal of the relationship between task conflict and performance, creating a positive relationship between the two variables. This reversal is especially strong for tasks of moderate complexity.

Extending the above work on potential moderators, Joshi and Roh (2009) examine the impact of contextual factors on the relationship between diversity and performance. Replicating past results, they found a negative relationship between relations-oriented diversity (i.e., gender, race/ethnicity, and age) and performance, but a positive one between task-oriented diversity (i.e., function, educational attainment, and tenure) and performance, especially between functional background diversity and performance. Looking at occupational contextual factors, the results supported gender and racial diversity as having an increased impact in occupations that were majority male or white, respectively. Industry type also impacted the relationships; for example, relations-oriented diversity had a positive relationship between diversity for service industries but not manufacturing. However, industry type had a stronger impact on the relationship between relations-oriented diversity and performance than the one between task-oriented diversity and performance. For teams with low interdependence and short-term life-expectancies, relations-oriented diversity was positively related to performance, but this effect was reversed for teams

with medium and high interdependence and long-term teams, such that those teams evidenced a negative relationship between relations-oriented diversity and performance. Results provided partial support for the hypothesis that the task-oriented diversity and performance relationship strengthens as interdependence increases.

Reflecting the increasing awareness of the impact of culture, Stahl, Maznevski, Voigt, and Jonsen (2010) attempted to detangle the impact of cultural, rather than task- or relation-oriented diversity, on performance. They demonstrated that cultural diversity was positively associated with creativity, satisfaction, and conflict (task, not relationship or process); however, it was not related to communication effectiveness, and it was negatively associated with social integration. For moderators, they tested levels of diversity (surface-level vs. deep-level) and types of cultural diversity (cross-national vs. intra-national). The only difference between surface- and deep-level diversity was with its relationship with communication effectiveness, which was positive for deep-level diversity and negative for surface-level. They found no difference between multinational studies compared to intra-national ones in terms of the relationships between those groups of studies and conflict and social integration. Additionally, Stahl and his colleagues demonstrated that task complexity moderates the relationship between cultural diversity and conflict, such that cultural diversity is positively related to conflict when task complexity is high but that it is unrelated when it is low. Their results support cultural diversity causing a reduction in communication and satisfaction for larger teams. Team dispersion seems to increase the impact of culture diversity on social integration and conflict, reducing the former and increasing the latter. Lastly, tenure impacted the relationships between cultural diversity and conflict and communication effectiveness by increasing the amount of conflict and reducing the communication effectiveness in culturally diverse teams with long histories.

In the most recent meta-analytic endeavor, Taras, Kirkman, and Steel (2010) examined the relationships between Hofstede's (1980) original cultural value dimensions and a wide range of variables relevant to organizations, including several pertaining to teams. At the individual level of analysis, uncertainty avoidance was positively associated with team commitment as well as conformity and teamwork preference. Individualism, in contrast, showed the opposite pattern of results. At the group level of analysis, cooperation in groups was negatively related to individualism and masculinity, but positively related to power distance and uncertainty avoidance.

In sum, several meta-analytic studies have examined the impact of diversity, generally conceptualized as homogeneity versus heterogeneity, on teams. Fewer studies have looked at deep-level cultural values. Taken together, the science indicates relatively mixed findings. Some authors found no relationship between diversity and team performance, whereas others found somewhat positive outcomes for task-related diversity such as higher performance and somewhat negative outcomes for surface-level or demographic diversity such as lower performance and increased conflict. These results were sometimes moderated by contextual variables such as task interdependence or industry type. We posit that in order to more fully understand the impact of cultural diversity on teams, there is a need to more deeply explore how the actual values held by members of various cultures impact the processes and emergent states within teams. This should help to explain through what mechanisms cultural diversity may be influencing team

performance. Therefore, the current meta-analysis moves beyond the existing meta-analyses just reviewed to start unpacking the "black box" of team mediators that may explain the influence of culture on team performance.

Technical Report Overview

Toward that goal, the remainder of this technical report is organized into the following sections. First, we describe the methods used to conduct the current meta-analysis, including the literature search approach and a description of the article coding scheme. Second, we present the results of the meta-analytic investigation regarding the impact of deep-level cultural values on team processes and emergent states. Third, we distill the implications of these findings for team-based work in the U.S. military.

Method

Literature Search

Literature was compiled via a comprehensive, multifaceted search of scholarly social science databases, DTIC military reports, and dissertation databases. An initial search using the search terms "team OR group AND culture" was conducted, but determined insufficient for capturing all articles that may measure deep-level values but not necessarily label those values as culture. Therefore, the search was widened to include "team" and the search terms listed in Table 1. A computerized search using the EBSCOhost research database service was used to search PsycINFO, PsycARTICLES, PsycBOOKS, Academic Search Premier, Business source Premier, Business Abstracts with Full Text, eBook Collection, ERIC, General Science Full Text, Human Resources Abstracts, Military & Government Collection, and OmniFile Full Text Mega literature databases. A search for references included in recently published reviews (Zhou & Shi, 2011) and meta-analyses (Horwitz & Horwitz, 2007; Taras et al., 2010) was also conducted. A separate search was conducted to pull full-text dissertations that were not otherwise published. Finally, a full online search of all literature collections in the defense technical information center (DTIC) was conducted in order to ensure all military relevant studies were included in the database. A total of 304 articles were originally identified as potentially examining culture and teams in some way. All articles were organized into a Mendeley research citation and article database. Of those 304 articles, 240 were excluded after being examining to determine if culture and team process were quantitatively measured, and 64 articles with quantitative data were retained for coding. After coding was completed, a total of 42 independent studies reported in 41 manuscripts examining culture in teams were included in this meta-analysis.

Table 1

List of Search Terms

Cultural Value Category	Search Terms
1. Human Relations	Collectivis*
	Communitarianis*
	Group orientation
	Individualis*
	Collateral
	Lineal
2. Power Relations	Power distance
	Hierarch*
	Egalitarian*
	Vertical
	Horizontal
3. Rules Orientation	Uncertainty avoidance
	Rules
	Tradition

4.	Time Orientation	Monochronic Polychronic Long-term Short-term Sequential Synchronic Past Present Future
5.	Cognitive Style	Analytic Holistic Field depend* Field independ* Hemisphericity Hypothetical Concrete
6.	Gender Role Orientation	Masculin* Feminin*
7.	Activity Orientation	Performance orientation Being Becoming Doing Thinking

Note: The use of an asterisk at the end of search terms results in returns that include any variation of that word. For example, searching masculin* provides resulting include masculine, masculinity, etc.

Coding Scheme

The relationships between (1) deep-level cultural values and team processes and (2) deep-level cultural values and team emergent states were coded using the theoretically-driven coding scheme described in Table 2, which is described in more detail below. All coded relationships were measured and reported at the team level of analysis. Data reported at the individual level of analysis was excluded. Deep-level cultural values represent the mean level of that value within the team.

Cultural Values

In this effort, we limit our understanding of culture to the mean level of various culturally-driven values that can influence the way that people interact with others and the environment. Although we recognize the validity of demographic diversity as another influence on team functioning, we chose not to focus on those variables due to the large amount of existing

work in that area that has already been summarized (e.g., Horwitz & Horwitz, 2007; Webber & Donahue, 2001). Instead, we borrow from the work done by Sutton and colleagues (2006) in which several existing taxonomies and theories of cultural values were combined into one integrative set of overarching cultural value categories deemed relevant to the U.S. military (see Table 2). This approach allowed us to cast a wider net and include more relevant research in the meta-analytic database.

Variables were coded as human relations if they in some way measured values regarding the relationships between individuals in a society. The majority of variables in this category assessed the extent to which individuals value the group over the individual (i.e., collectivism), and given the clear relevance to team-related outcomes, all variables were coded such that values of collectivism were positive and values of individualism were negative. Most variables were explicitly labeled as collectivism, while other similar labels were coded based on similarity to these constructs. For example, preference for teamwork was considered to be synonymous with collectivism. Therefore, "human relations" represents a preference for groups rather than individuals.

Variables were coded as power relations in they in some way measured values regarding the extent to which power and resources should be distributed based on status or rank. Generally, these values can range from high power distance, in which individuals strongly believe that power should be unequally distributed toward those with more status, to low power distance, in which individuals hold a more egalitarian view that power should be equally distributed regardless of status or rank. Therefore, "power relations" represents a preference for inequality in power based on status and deference for authority rather than equality.

Variables were coded as rules orientation if they in some way measured values regarding the extent to which individuals prefer rigid structure and rules over ambiguity. Rules orientation can vary from a preference for extremely rigid, highly structured situations to a preference for complex, unstructured, and ambiguous situations. Tolerance for ambiguity was coded as the opposite of rules orientation. Therefore, "rules orientation" represents a preference for rules rather than ambiguity.

Any variable that referred to a belief or value regarding the use or structure of time was coded as time orientation. The variables that represent time orientation were more varied in definition than the other categories of variables, and therefore, they represent a combination of the extent to which time is considered urgent as well as pacing style and future time orientation. Because of the relative lack of studies examining time orientation in teams, these results are best interpreted at the individual study variable level and cannot be easily interpreted meta-analytically.

Variables were coded as cognitive style if they assessed the style of thinking held by an individual. Most studies examining cognitive style looked at field dependence, or the extent to which individuals pay attention to the dominant properties of a field rather than alternative or less dominant properties. Therefore, "cognitive style" represents a tendency toward field dependence rather than field independence.

Variables were coded as gender role orientation if they assessed values that are regarded as stereotypically masculine, such as achievement, status, and power, or stereotypically feminine, such as caring, quality of life, and benevolence. These two constructs are seen as endpoints of a continuum. Therefore, gender role orientation represents a preference for masculine rather than feminine values.

Finally, variables were coded as activity orientation if they in some way assessed preferences for particular approaches to everyday activities. The most common variable coded into this category was performance orientation. Performance and learning goal orientations are generally related to positive work outcomes whereas avoid orientations are related to negative outcomes, so variables were coded in this manner. Therefore, activity orientation represents a tendency toward performance and learning goal orientation.

Table 2

Overview of Coding Categories for Deep-Level Cultural Values

Category	**Description**	**Example Coded Variables**
1. Human Relations	The extent to which one values the group over individuals	Collectivism Collective orientation Preference for autonomy (reversed)
2. Power Relations	The extent to which one accepts that power is distributed unequally	Power distance
3. Rules Orientation	The extent to which one feels threatened by ambiguity and more comfortable with strict rules for behavior	Uncertainty avoidance Traditionalism
4. Time Orientation	Values regarding the use, flexibility, and meaning of time	Time urgency Long-term orientation
5. Cognitive Style	The extent to which one pays attention to the dominant properties of a field	Field dependence
6. Gender Role Orientation	The extent to which one values stereotypically masculine values, such as power and achievement, compared to stereotypically feminine values, such as caring and quality of life	Masculinity Achievement Benevolence (reversed)
7. Activity Orientation	One's preferred mode of activity or work	Performance orientation Learning orientation

Team Processes and Emergent States

Marks and colleagues (2001) define team processes as the "interdependent team activities that orchestrate taskwork in employees' pursuit of goals" (p. 358) and emergent states as

"properties of the team that are typically dynamic in nature… and describe cognitive, motivational, and affective states of teams" (p. 357). Team processes represent what teams "do," while emergent states represent what teams "think" and "feel." Processes are actionable behaviors that team members engage in that are aimed at orchestrating team members, but not directly accomplishing taskwork, such as goal specification, coordination, and conflict management. Emergent states are distinct from processes in that they are not actionable behavior but instead are higher level constructs that represent the thoughts and feelings of the team members. Recent research has established the validity and structure of the ten team processes (see Table 3) included in the Marks and colleagues taxonomy (LePine, Piccolo, Jackson, Mathieu, & Saul, 2008), making it an ideal framework around which to organize our results. Furthermore, it is emphasized in this framework that team processes should be kept conceptually and empirically separate from emergent states as emergent states are constructs that are causally influenced by processes. Therefore, we utilize a general "ABC" (attitude, behavior, cognition) framework overall, considering team processes as behaviors, and categorizing emergent states into either attitudes or cognitions. It should be noted that N/A in the example coded variable column in Table 3 indicates that none of the coded variables were categorized into this dimension. The coding of variables into this scheme was relatively straightforward. If possible, the actual items included in the measures were examined in order to determine which team processes or emergent state definition they most closely represented. This was done because occasionally the label assigned to a measure does not adequately describe what the measure captured. However, the majority of variables also were labeled using terms that very closely matched the team process and emergent state labels, further ensuring consistent coding decisions. It should be noted that within the emergent states coding, effect sizes for all conflict variables were consistently reverse coded in term of sign so that all emergent states represented positively-valenced constructs. This practice was done so that the composites and higher level meta-analytic estimates represented positive attitudes and emergent states.

Table 3

Overview of Coding Categories for Team Processes and Emergent States

Category	**Description**	**Example Coded Variables**
Team Processes		
Transition processes		
1. Mission analysis	interpretation and evaluation of the team's mission, including identification of its main tasks as well as the operative environmental conditions and team resources available for mission execution	N/A
2. Goal specification	Identification and prioritization of goals and sub-goals for mission accomplishment	N/A
3. Strategy formulation	Development of alternative courses of action for mission	Reactive strategy adaptation

Category	Description	Example Coded Variables
	accomplishment	
Action processes		
4. Monitoring – progress	Tracking task and progress toward mission accomplishment, interpreting system info in terms of what needs to be accomplished for goal attainment, and transmitting progress to team members	N/A
5. Monitoring – systems	Tracking team resources and environmental conditions as they relate to mission accomplishment, which involves 1) internal systems monitoring (tracking team resources such as personnel, equipment, and other info that is generated or contained within the team, and 2) environmental monitoring (tracking the environmental conditions relevant to the team)	N/A
6. Monitoring – team and backup behavior	Assisting team members to perform their tasks. Assistance may occur by 1) providing teammate verbal feedback or coaching, 2) helping a teammate behaviorally in carrying out actions, or 3) assuming and completing a task for a teammate	Backup behavior Feedback Monitoring
7. Coordination	Orchestrating the sequence and timing of interdependent actions	Coordination Communication
Interpersonal processes		
8. Conflict management	Preemptive conflict management involves establishing conditions to prevent, control, or guide team conflict before it occurs. Reactive conflict management involves working through task and interpersonal disagreements among team members	Cooperative conflict management Competitive conflict management (reversed)
9. Motivation	Generating and preserving a sense of collective confidence, motivation, and task-based cohesion with regard to mission	N/A

Category	Description	Example Coded Variables
	accomplishment	
10. Affect management	regulating member emotions during mission accomplishment, including (but not limited to) social cohesion, frustration, and excitement	Emotional support
Team Emergent States		
Attitudes		
1. Trust	Positive or negative expectations regarding the team's behavior	Trust
2. Cohesion	Interpersonal or task-related attraction to the group	Affective commitment Cohesion Quality of group relations
3. Conflict (reversed)	Feelings of tension, hostility, animosity, or disagreement among group members	Relationship conflict Task conflict
4. Climate	Descriptions of the general team-level atmosphere perceived by the team members	Justice climate Social impairment (reversed)
5. Efficacy	Level of confidence in the team's ability to succeed in goal achievement and remain a team	Collective efficacy Group potency Group viability
6. Satisfaction	The extent to which team members are satisfied with their team experience	Satisfaction
Cognitions		
7. Learning	The extent to which the team gained knowledge, skills, and abilities from previous experiences	Team learning
8. Situation awareness	The team-level moment-to-moment awareness of the environmental situation	Situation awareness
9. Shared mental models	Team-level mental representations of the task, teamwork, goals, etc.	Shared vision Mental models

Potential Moderators

Basic study characteristics and several potential moderators were coded along with the primary study variables. In terms of type of publication, 76.2% of the studies were journal articles, 21.4% dissertations or theses, and 2.4% technical reports. Studies were categorized as true experiments (11.9%), quasi-experiments (2.4%), cross-sectional non-experimental (61.9%), and longitudinal non-experimental (23.8%). In terms of study participants, categories included students (52.4%), military (2.4%), public or private sector employees (38.1%), and volunteer

organization members (2.4%). Unfortunately, there was not enough data within military samples to test any particular generalizability to that context. The region of the sample was also categorized as North America (52.4%), Europe (4.8%), Asia (11.9%), Australia (2.4%), India (2.4%), Israel (2.4%), and Mixed (23.8%). Teams were categorized as either ad-hoc (i.e., temporary; 50%) if they had no discernible past or future beyond the task described in the study, or as intact (i.e., permanent; 50%) if they did have a discernible past and future. For example, most student teams or lab-based teams were categorized as ad hoc, whereas most organizational teams were categorized as intact. Team task type was coded based on the primary type of task or work being performed. For example, teams building transistor radios would be categorized as "psychomotor" action whereas strategic management teams would be categorized as "ill-defined problem-solving." Teams were engaged in defined problem-solving (4.8%), ill-defined problem-solving (69%), human service (4.8%), psychomotor action (11.9%), and mixed tasks (9.5%). Team task interdependence was coded as either low (31%), in which it did not appear that team members depended on one another very much, or high (69%), in which team members could not succeed without one another. Virtuality, the use of computer-mediated communication was coded as fully face-to-face (42.9%), mixed (i.e., teams interacted both face-to-face and via computer-mediated technology such as email, text, and chat; 50%), or fully computer-mediated (7.1%).

Meta-Analytic Procedures

The meta-analytic methods outline by Hunter and Schmidt (2004) were used to analyze this data. Corrections were made for sampling error and measure reliability in both independent and dependent variables. Corrections were made for measure reliability for each individual study as reliability estimates were reported in a majority of the studies.

Results

Tables 4 and 5 report results of the meta-analyses of focal study relationships. In each table, we reported the total number of independent samples included in each meta-analysis (*k*), the total number of teams included in each meta-analysis (*N*), the sample size weighted mean observed correlation (*r*), the sample size weighted and reliability corrected mean observed correlation (ρ), the standard deviation of the sample size weighted and reliability corrected mean observed correlation (SDρ), the 95% confidence interval around ρ (95% CI), the 80% credibility interval around ρ (80% CV), and the percent variance due to sampling error (% SEV). Results are reported for all rows with *k* greater than one in order to provide a high-level understanding of what research has been conducted on cultural values in teams, but only analyses with a *k* higher than 3 or a 95% CI that does not include zero will be interpreted. The results are organized hierarchically such that the lower-level processes are included in the estimates for the higher-order categories as described in Table 3.

The 95% confidence interval provides an estimate of the accuracy of our estimation of ρ, in that a 95% confidence interval that excludes zero indicates that if our estimation procedures were repeated many times, 95% of the estimates of ρ would be larger than zero. More simply, a 95% confidence interval can be interpreted as providing a strong indication that there the population estimated relationship is significantly different from zero.

The 80% credibility interval provides very different information from the 95% confidence interval. The 80% CV does not provide an estimate of accuracy, but instead provides an estimate of the variability of corrected correlations across studies. Wide CVs that include zero, suggest the presence of a moderator. It should be noted that some of the higher-order categories have credibility intervals that include zero, but this is expected given the sometimes opposite relationships with various sub-categories within the overall categories. Only credibility intervals that include zero for the lowest level categories will be tested for moderators.

Culture and Team Processes

The results indicate that there are relationships between some cultural values and particular team processes and emergent states, but not others. It appears that human relations has a positive relationship with overall team processes (ρ = .24) and, more specifically, with action processes (ρ = .40) including monitoring of other team members/backup behavior (ρ = .19) and coordination (ρ = .36). Collectivism also has a positive relationship with interpersonal processes (ρ = .27). In other words, teams that are more collectivistic, in terms of team member average, tend to engage in more effective team processes overall, specifically in more effective monitoring of team members and better coordination. In regards to power relations, high power distance within teams is negatively related to overall team processes (ρ = -.11) and specifically negatively related to monitoring (ρ = -.21). Unfortunately, very few studies have been conducted examining rules orientation, time orientation, cognitive orientation, and gender role orientation in teams, and therefore, none of those findings can be interpreted meta-analytically. The effect sizes given can only be interpreted as a summary of several existing single-sample studies. Table 4 does list several single study correlations that consistently indicate a possible negative relationship between rules orientation and various action processes. It is also worth noting that 3 studies were conducted looking at activity orientation, primarily in the form of performance orientation, and it does appear that there is a small positive relationship between performance orientation and team processes. None of the individual process level credibility intervals include zero, so no moderator analyses were necessary for the relationships between deep-level cultural values and team processes.

Table 4

Deep-Level Cultural Values as Antecedents of Team Processes

Meta-analysis	*k*	*N*	*r*	ρ	SD_ρ	95% CI	80% CV	% SEV
Human Relations								
Team processes	12	755	.20	.24	.13	.13/.28	.07/.41	.02
Transition processes	2	119	.21	.29	.11	.06/.37	.14/.43	.01
Strategy formulation	1	74	.09	-	-	-	-	-
Action processes	4	199	.33	.40	0	-	-	.02
Monitoring	4	274	.16	.19	.11	.04/.27	.04/.33	.01
Coordination	3	154	.28	.36	0	-	-	.03
Interpersonal processes	3	207	.24	.27	.18	.04/.44	.04/.50	.03
Conflict management	2	151	.15	.17	.08	.05/.26	.08/.57	.01
Affect management	1	56	.46	-	-	-	-	-
Power Relations								
Team processes	4	440	-.09	-.11	0	-	-	.01
Transition processes	1	45	.12	-	-	-	-	-
Action processes	3	250	-.12	-.16	0	-	-	.02
Monitoring	3	250	-.16	-.21	.06	-.23/-.08	-.29/-.13	.02
Coordination	2	205	-.06	-.08	0	-	-	.02
Interpersonal processes	2	101	-.12	-.19	.18	-.37/.13	-.43/.04	.03
Affect Management	1	56	-.30	-	-	-	-	-
Rules Orientation								
Team processes	-	-	-	-	-	-	-	-
Action processes	1	149	-.23	-	-	-	-	-
Monitoring	1	149	-.20	-	-	-	-	-
Coordination	1	149	-.17	-	-	-	-	-
Time Orientation								
Team processes	2	101	.19	.23	0	-	-	.03
Action processes	-	-	-	-	-	-	-	-
Coordination	1	56	.30	-	-	-	-	-
Cognitive Orientation								

Meta-analysis	*k*	*N*	*r*	ρ	SD_ρ	95% CI	80% CV	% SEV
Team processes	1	26	-.27	-	-	-	-	-
Action processes	1	149	-.16	-	-	-	-	-
Monitoring	1	149	-.12	-	-	-	-	-
Coordination	1	149	-.13	-	-	-	-	-
Gender Role Orientation								
Team processes	-	-	-	-	-	-	-	-
Action processes	1	149	-.16	-	-	-	-	-
Monitoring	1	149	-.10	-	-	-	-	-
Coordination	1	149	.09	-	-	-	-	-
Activity Orientation								
Team processes	3	345	.11	.12	0	-	-	.01
Action processes	2	193	.11	.13	0	-	-	.01
Monitoring	2	229	.02	.02	0	-	-	.01
Coordination	1	149	.22	-	-	-	-	-
Interpersonal processes	-	-	-	-	-	-	-	-
Conflict management	1	152	.10	-	-	-	-	-

Note. *k* = number of correlations meta-analyzed; *N* = total number of groups; *r* = sample size weighted mean observed correlation; ρ = sample size weighted mean observed correlation corrected for unreliability in both measures; SD ρ = standard deviation of ρ; an SD ρ equal to zero indicates negative standard deviation not allowing calculation of confidence and credibility intervals; 95% CI = 95% confidence interval around ρ; 80% CV = 80% credibility interval around ρ; % SEV = percent variance due to sampling error.

Culture and Team Emergent States

Similar to team processes, the majority of research examining deep-level cultural values and team emergent states has focused on human relations, generally in the form of collectivism. Table 5 indicates that human relations values (i.e., collectivistic values) have a small negative effect on emergent states overall (ρ = -.06). At a lower level, it appears that the negative relationship between human relations and emergent states is due to the negative effect on cohesion (ρ = -.06). The other confidence intervals with attitudes include zero, indicating those effect size estimates may not be accurate. Power relations is positively related to efficacy in teams (ρ = .15) and activity orientation appears to be negatively related to lack of conflict (ρ = -.19), indicating that teams with higher levels of performance orientation generally experience more conflict.

Based on the 80% credibility intervals, the only relationship that has a potential moderator other is the relationship between human relations and efficacy. Moderator analysis, shown in Table 6, shows that virtuality moderates this relationship, with the relationship being negative for teams that operate face-to-face (ρ = -.29) and positive for teams that operate using mixed methods (i.e., both face-to-face and computer-mediated communication; ρ = .28).

Table 5

Deep-Level Cultural Values as Antecedents of Team Emergent States

Meta-analysis	*k*	*N*	*r*	ρ	SD_ρ	95% CI	80% CV	% SEV
Human Relations								
Emergent states	18	30512	-.06	-.06	.05	-.08/-.03	-.13/.01	.00
Attitudes	16	30289	-.06	-.06	.05	-.08/-.03	-.13/.01	.00
Trust	2	84	.23	.31	0	-	-	.04
Cohesion	9	29633	-.06	-.06	.04	-.09/-.04	-.11/-.02	.00
Lack of Conflict	5	424	.07	.08	0	-	-	.02
Climate	2	112	.32	.38	0	-	-	.02
Efficacy	6	338	-.04	-.08	.28	-.23/.21	-.38/.22	.03
Satisfaction	5	414	.22	.27	0	-	-	.02
Cognitions	4	288	.01	.03	.20	-.19/.21	-.24/.29	.02
Team learning	1	39	.47	-	-	-	-	-
Situation awareness	1	149	-.08	-	-	-	-	-
Shared mental models	1	74	.09	-	-	-	-	-
Strategic consensus	1	26	-.35	-	-	-	-	-
Power Relations								
Emergent states	6	870	.04	.06	.11	-.04/.12	-.08/.19	.01
Attitudes	5	721	.07	.09	.08	.00/.14	-.02/.19	.01
Cohesion	2	217	-.07	-.09	0	-	-	.01
Lack of Conflict	1	148	-.00	-	-	-	-	-
Efficacy	3	383	.11	.15	.05	.06/.17	.08/.21	.01
Satisfaction	1	190	.09	-	-	-	-	-
Cognitions	-	-	-	-	-	-	-	-
Situation awareness	1	149	-.15	-	-	-	-	-
Rules Orientation								
Emergent states	3	315	.02	-.01	.08	-.07/.12	-.12/.09	.02
Attitudes	2	166	.03	-.05	.15	-.18/.24	-.25/.14	.03
Cohesion	1	69	.17	-	-	-	-	-
Lack of Conflict	1	97	-.1	-	-	-	-	-

Meta-analysis	*k*	*N*	*r*	ρ	SD_ρ	95% CI	80% CV	% SEV
Efficacy	1	69	.21	-	-	-	-	-
Cognitions	-	-	-	-	-	-	-	-
Situation awareness	1	149	.02	-	-	-	-	-
Time Orientation								
Emergent states	-	-	-	-	-	-	-	-
Attitudes	-	-	-	-	-		-	-
Lack of Conflict	1	45	-.11	-	-	-	-	-
Cognitive Orientation								
Emergent states	3	235	-.09	-.11	0	-	-	.02
Attitudes	2	86	-.14	.15	0	-	-	.03
Efficacy	1	60	-.11	-	-	-	-	-
Satisfaction	1	26	-.2	-	-	-	-	-
Cognitions	2	175	-.09	-.13	0	-	-	.02
Team learning	1	26	-.29	-	-	-	-	-
Situation awareness	1	149	-.05	-	-	-	-	-
Gender Role Orientation								
Emergent states	-	-	-	-	-	-	-	-
Cognitions	-	-	-	-	-		-	-
Situation awareness	1	149	-.07	-	-	-	-	-
Activity Orientation								
Emergent states	5	541	.03	.02	.22	-.17/.22	-.26/.30	.01
Attitudes	4	392	.00	.00	.25	-.24/.25	-.32/.31	.01
Lack of Conflict	2	244	-.18	-.19	.03	-.23/-.13	-.24/-.15	.01
Efficacy	1	80	.28	-	-	-	-	-
Cognitions	-	-	-	-	-	-	-	-
Situation awareness	1	149	.08	-	-	-	-	-

Note. *k* = number of correlations meta-analyzed; *N* = total number of groups; *r* = sample size weighted mean observed correlation; ρ = sample size weighted mean observed correlation corrected for unreliability in both measures; SD ρ = standard deviation of ρ; an SD ρ equal to zero indicates negative standard deviation not allowing calculation of confidence and credibility intervals; 95% CI = 95% confidence interval around ρ; 80% CV = 80% credibility interval around ρ; % SEV = percent variance due to sampling error.

Table 6

Virtuality as a Moderator of the Relationship between Human Relations and Team Efficacy

Meta-analysis	*k*	*N*	*r*	ρ	SD_ρ	95% CI	80% CV	% SEV
Human Relations								
Efficacy								
Face to face	3	186	-.24	-.29	0	-	-	.02
Mixed modes	2	113	.23	.28	0	-	-	.02

Note. *k* = number of correlations meta-analyzed; *N* = total number of groups; *r* = sample size weighted mean observed correlation; ρ = sample size weighted mean observed correlation corrected for unreliability in both measures; SD ρ = standard deviation of ρ; an SD ρ equal to zero indicates negative standard deviation not allowing calculation of confidence and credibility intervals; 95% CI = 95% confidence interval around ρ; 80% CV = 80% credibility interval around ρ; % SEV = percent variance due to sampling error.

Implications

The information presented in this meta-analysis will help the U.S. military in several ways. First, it serves as a high-level quantitative summary of the existing scientific knowledge regarding the impact of deep-level cultural values on team processes and emergent states. The findings presented in Tables 4 and 5 provide some answers but also many questions that may stimulate future research. Second, it will help the U.S. military to pinpoint the processes and emergent states within their operational teams most likely to be affected when working from other individuals from various cultures. When combined with the findings from other scholarly work, such as the LePine and colleagues (2008) meta-analysis which summarizes the impact of team processes on team performance, this knowledge can be used to determine what interventions would be most effective for improving team performance. For example, our results indicate that high power distance has a significant negative impact on monitoring processes in teams, and the LePine and colleagues (2008) meta-analysis indicates that monitoring has a significant positive impact on team performance. Therefore, if a multicultural team that has a high proportion of individuals from a high power distance culture is performing poorly, it may be due to the lack of monitoring behavior. In another example, the results indicate that human relations have a positive relationship with a variety of team processes, and therefore, composing teams with high level of collectivism may be beneficial for team process and performance.

Regarding team emergent states, the findings are a bit more difficult to interpret. Small numbers of correlations combined with relatively mixed findings result in a less clear story regarding how cultural values influence attitudes and cognitions in teams. One interesting finding from Table 5 is that power relations are positively related to team efficacy, or the belief that the team will succeed. Compared to the finding in Table 4 which indicate that power relations values generally have a negative impact on team processes, this is surprising. It seems there is a possibility that teams that have high level of power distance values simultaneously believe they will succeed but actually engage in less effective team processes. These results represent a potential problem that the U.S. military may need to diagnose and mitigate within operational teams. Furthermore, the finding that team virtuality moderates the relationship between human relations and team efficacy suggests that the extent to which teams operate either in face-to-face or virtual modes may change the way cultural values impact team-related attitudes. Thus, virtuality is something the U.S. military should consider when diagnosing and assessing team performance.

Conclusion

The current technical report has described the results of a meta-analytic investigation examining the relationship between deep-level cultural values, as categorized by Sutton and colleagues (2006), and team processes and emergent states, as categorized by Marks and colleagues (2001). The results of this analysis represent a quantitative assessment of the current state of the literature and reveal several gaps in the literature as well as existing knowledge. The U.S. military should be able to use the information presented in this report as a reference tool when questions arise regarding the impact of deep-level cultural values on specific mediating mechanisms within teams. It should also help to illuminate the gaps in the scientific knowledge regarding culture and teams that require future research.

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