Selection in Teams: An Exploration of the Teamwork Knowledge, Skills, and Ability Test

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In 1994, Stevens and Campion introduced the Teamwork Knowledge, Skills, and Ability test (teamwork KSA test) for selecting employees for team-based organizations. Using experimental data from 57 *ad hoc* student teams (N = 227), we examined this test's relationship with both the behavior of the assigned leader in a team and the behavior of the other team members, respectively. We found that the teamwork KSA test successfully predicted individual team member behavior as indexed by external raters ($r = .31$) and peers ($r = .34$) such that higher scores on the teamwork KSA test related to greater individual effectiveness within the team. The teamwork KSA test was unrelated to the behavior of the assigned leader in the teams studied. Self-efficacy for teamwork was not related to individual behavior in teams, nor did it moderate the relationship between the teamwork KSA test and individual performance in teams. Limitations as well as directions for future research in team selection are discussed.

Introduction

Teams are a popular participative management tool and there is considerable agreement that team structures will play an increasingly prominent role in organizations of the future (Guzzo 1995). Unfortunately, much is still unknown about designing the essential human resource support systems required for managing and supporting the change to team-based organizations (Hoffman and Rogelberg 1998), especially how to select employees for teams. The present study examines a promising new selection measure, the Teamwork Knowledge Skills and Ability test (Stevens and Campion 1994), and attempts to further demonstrate its versatility, generalizablity, and validity.

Selection is a critical issue when forming teams. Most major theoretical models of team performance espouse the key role of member characteristics. Take for instance, the input-process-output models. This theoretical approach has dominated team research (Guzzo and Shea 1992). Although, various forms of input-process-output models exist (e.g., Gladstein 1984; Hackman 1987), each model highlights the critical role of input factors such as member expertise, attributes, abilities, and experience on team processes and performance.

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Selection Measures

Given the important role of team composition, a variety of predictors of individual performance in teams have been proposed and/or researched. Some predictors include preference for teamwork (Campion, Medsker and Higgs 1993), biodata (Buel 1989), assessment center ratings (Kirksey and Zawacki 1994; Prieto 1994; Snow and Snell 1993; Wellins, Byham and Dixon 1994), and personality (Barry and Stewart 1997; Driskell, Hogan and Salas 1987; Hogan and Hogan 1989; Hogan, Raza and Driskell 1988; Jones and White 1985; Smith-Jentsch, Salas and Baker 1996). Specific research with the Big Five personality traits has been especially promising in predicting teamwork performance. Neuman and Wright (1999) recently investigated team members for over a year and found that the personality traits of agreeableness and conscientiousness predicted both team and individual team performance. They also found that personality predicted performance over and above cognitive ability and skills. In addition, some research has proposed that self-efficacy for teamwork and self-monitoring have the potential to impact team effectiveness (Thoms, Moore and Scott 1996; Zaccaro, Foti and Kenny 1991) although relations with individual team performance behaviors have not yet been investigated.

Although meta-analyses and review articles have demonstrated that personality-based selection is useful in general (Barrick and Mount 1991; Hough 1992),

ability-based selection strategies have historically been the most successful in predicting performance (Hunter 1986; Hunter and Hunter 1984; Reilly and Chao 1982; Schmitt, Gooding, Noe and Kirsch 1984). In an effort to explore the specific knowledge and skills that affect individual-level performance in teams, Stevens and Campion (1994) reviewed relevant team research and outlined fourteen probable individual-level KSA requirements for teamwork. The authors focused on formal teams (those that have specific tasks) with the expectation that the teamwork requirements would be especially applicable to semi-autonomous or self-managing teams. Stevens and Campion also focused on the KSAs which are unique to the team-oriented situation itself, regardless of the specific team task, and on knowledge of appropriate behaviors rather than personality or dispositions for teamwork.

Possible teamwork KSAs content was identified through a review of group literature that incorporated several sources including organizational psychology, social psychology, socio-technical theory, and industrial engineering (Stevens and Campion 1994). The proposed teamwork KSAs fell under two main categories, with five subcategories and 14 specific KSAs. The two main categories were *Interpersonal KSAs* (including the subcategories of Conflict Resolution, Collaborative Problem Solving, and Communication) and *Self-management KSAs* (including the subcategories of Goal Setting and Performance Management and Planning & Task Coordination). Interpersonal KSAs (10 out of the 14 KSAs) were generally defined as the skills necessary to maintain healthy working relationships and to react to others with respect for ideas, emotions, and differing viewpoints (e.g., 'the KSA to recognize and encourage desirable, but discourage undesirable, team conflict' and 'the KSA to recognize the obstacles to collaborative group problem solving and implement appropriate corrective actions'). Less emphasis was placed upon self-management KSAs (4 out of the 14 KSAs) which encompassed the abilities team members must possess to perform essential management activities such as goal setting and planning (e.g., 'the KSA to help establish specific, challenging, and accepted team goals' and 'the KSA to help establish task and role expectations of individual team members, and to ensure proper balancing of workload in the team').

In the same article that described the teamwork KSAs, Stevens and Campion (1994) reported the development of a 35-item, multiple choice test (hereafter referred to as the teamwork KSA test) designed to assess knowledge of the 14 teamwork KSAs. Item development employed standard test construction procedures including writing situational questions based upon the teamwork KSA content domain, pilot testing the instrument, and eliminating or revising items based on difficulty and discriminability. The test contains 35 situational judgment items and uses a multiple-choice testing format. Examinees are presented with hypothetical team situations and asked to indicate how they would respond to each situation by selecting among the alternatives given. The team situations in the teamwork KSA are focused on behaviors that facilitate group problem solving such as communication and goal setting. They are written in a general enough fashion to be applicable in any industry context where problem-solving is part of the job (e.g., manufacturing, customer-service, sales). A total score across the 35 items is used to represent an individual's teamwork KSAs.

After development of the teamwork KSA test, the authors of the test conducted two validation studies using supervisor and peer ratings of job performance as the criterion (Stevens and Campion 1999). The first validation study investigated pulp processing mill incumbent employees ($n = 70$) who were applying for jobs within a newly constructed mill. The teamwork KSA test was given to employees along with other traditional employment aptitude tests. Ratings of current job performance (teamwork performance, technical performance, and overall performance) were obtained from supervisors. The teamwork KSA test correlated with ratings of teamwork performance ($r = .44$, $p < .05$), with ratings of technical performance ($r = .56$, $p < .05$), and with ratings of overall job performance ($r = .53$, $p < .05$). Although the teamwork KSA test showed high convergence with an employment aptitude test composite ($r = .81$), there was a significant increase in explained variance by the teamwork KSA test beyond the aptitude test composite for both teamwork performance (incremental $R^2 = .08$) and overall job performance (incremental $R^2 = .06$).

In study two, employees from a cardboard processing company ($n = 72$) were given the teamwork KSA test and a reduced aptitude battery (only vocabulary and math problem solving were given). Current supervisor ratings and self-ratings of the job performance dimensions were obtained. In addition, peer nominations were obtained as a measure of peer perceptions of performance. Criterion-related validities were similar to the first study. The teamwork KSA test was correlated with supervisory ratings of teamwork performance ($r = .21$, $p < .05$) and rankings by peers ($r = .23$, $p < .05$). Once again, the teamwork KSA test showed high convergence with the employment aptitude tests ($r = .81$). Unlike the first validation study, the teamwork KSA test did not display incremental validity over the employment aptitude tests.

Besides these promising validation data, two additional characteristics of the teamwork KSA test make it an inviting advance in team member selection. First, the teamwork KSA test appears highly relevant to teams (i.e., possesses face validity). Namely, each test item overtly and directly assesses what the respondent would do in a well defined and fairly common team

scenario. Second, measures of knowledge, skills, and abilities are not readily fakeable (Stevens and Campion 1994). The teamwork KSA should not be an exception to this general rule. Namely, the test items contain correct answers. Without adequate knowledge of teams, an applicant would be unlikely to identify the correct answer among the other set of reasonable answers.

Taken together, the teamwork KSA test is a good step in addressing the team selection needs prevalent in today's organizations. However, additional research is needed to further examine the validity of the KSA test, examine theoretically relevant variables that may moderate the relationship between the teamwork KSA test and individual behavior in teams, and examine the applicability of the test to different types of teams and member roles. The present study begins to address these research needs.

Additional Criteria to Establish Validity

The teamwork KSA test was designed to predict individual behavior within teams. In the Stevens and Campion (1999) validation studies, individual behavior within teams was assessed via global supervisor and peer ratings of teamwork in general. To further establish the validity of the teamwork KSA test it is important to acknowledge and study other operational definitions of individual behavioral within teams. One such index is a direct index of actual behavior within a team meeting. Namely, in an experimental setting, such as the one used in this study, an assessment of each team member's behavior during a specific problem-solving meeting can be conducted by a external evaluator. A direct assessment of behavior in teams such as this, if related to the teamwork KSA test, would add fairly compelling test validity evidence.

> Hypothesis 1: The teamwork KSA test will correlate positively with a measure of observable teamwork behaviors as rated by *independent* raters such that high scores on the teamwork KSA test are related to greater individual effectiveness within a team.

In order to readily compare this study's findings with the past validation work, we also used a peer assessment of individual effectiveness within the team. In our study, however, the peer assessment was based on individual behavior within one and only one team meeting.

> Hypothesis 2: The teamwork KSA test should correlate positively with peer ratings of teamwork behaviors such that high scores on the teamwork KSA test are related to greater peer ratings of individual effectiveness within a team.

Teamwork Self-Efficacy

Stevens and Campion (1999) did not examine potential moderators of the relationship between teamwork knowledge and teamwork behavior. Moderating variables are critical to examine because they help identify boundary conditions and situations where a test may be most and least useful. The search for moderating variables in selection research is common (e.g., Arvey, Strickland, Drauden and Martin 1990; Schmit and Ryan 1992). The identification of meaningful moderators starts with an examination of extant theory and empirical research.

Behavior is often construed as resulting from some function of a person's ability and his or her motivation (Vroom 1964). According to social learning theory, people integrate diverse sources of information concerning their capabilities and regulate their effort expenditures accordingly (Bandura 1977). Expectations of capability (efficacy) determine how much effort is expended in a certain behavior. Self-efficacy is an individual's belief that he or she will successfully perform the behaviors required for a specific task (Gist 1987). Empirical research on self-efficacy has consistently found that it has a significant impact on performance in a variety of tasks as well as motivation, emotional reactions, and the level of effort a person extends towards persisting on a task (Gist and Mitchell 1992). Two individuals with the same level of expertise may possess different levels of self-efficacy, and this could result in differential performance levels (Ackerman and Kanfer 1993; Eyring, Johnson and Francis 1993).

Because Bandura's (1977) theory proposed that efficacy beliefs are task specific, often a general construct of efficacy must be specified to the task in which a researcher is interested. Self-efficacy for teamwork is a specific type of self-efficacy and can be defined as how confident an individual is in performing the behaviors required in a team setting. Because of the aforementioned relationship between self-efficacy, effort, and performance, it is likely that an individual's self-efficacy for teamwork will affect that individual's actual teamwork behaviors. When an individual is confident in his or her ability to work in teams (high self-efficacy for teamwork), then he or she may be more willing to assert teamwork knowledge, skills and abilities. However, when an individual is not confident in his or her ability to work in teams (low self-efficacy for teamwork), then he or she may be less willing to assert teamwork knowledge, skills and abilities. Therefore, the relationship between teamwork KSA test scores and individual behavior within a team may differ depending on the member's level of self-efficacy for teamwork.

> Hypothesis 3: There will be a significant interaction between self-efficacy for teamwork and teamwork KSA scores in the prediction of teamwork behaviors (as measured with peer and observed ratings) such

that in individuals with high self-efficacy, teamwork behavior will be positively related to teamwork KSA scores and in individuals with low self-efficacy, teamwork behavior will not be related to teamwork KSA scores.

Generalizability

The value of a selection test is predicated, to some extent, on its ability to predict behavior in a myriad of situations and circumstances. We examined the three aforementioned hypotheses in a type of team not studied in the initial validation studies. Many types of teams exist (Sundstrom, De Meuse and Futrell 1990). For example, project teams, focus groups, autonomous work groups, quality circles, multifunction work groups, and executive management teams exist in practice. The teams we studied here are analogous to temporary project teams. Namely, the team is formed to complete a particular task, but which, once the task is completed, disbands unless some other task is found for them (Sundstrom, De Meuse and Futrell 1990). Although the teamwork KSA test was designed for use in the selection of people for self-managed teams, the authors posit that the instrument may also have value in selecting individuals for project teams such as the ones studied here (Stevens and Campion 1994).

We also examined the three hypotheses for two different types of team roles. In the case of teams, members can take on a number of roles (Levine and Moreland 1998). The roles can emerge naturally or the roles can be assigned (Levine and Moreland 1998). For example, in practice, it is not uncommon to assign one team participant to be the leader with the other individuals being team members (Kozlowski, Gully, McHugh, Salas and Cannon-Bowers 1996). The team leader can take on a number of roles beyond those that are expected of typical team members including monitoring, feedback, and providing direction (Bachiochi, Rogelberg, O'Connor and Elder 2000; Kozlowski *et al*. 1996; Morgeson, Aiman-Smith and Campion 1977). Although we do not propose differential hypotheses for Hypotheses 1, 2 and 3, based on the type of assigned role the team member takes, we believe the examination of the hypotheses across these two common roles will provide additional insights into the generalizability of the teamwork KSA test.

Overall this study attempts to make both a practical and theoretical contribution. We hope to inform selection practice by examining the teamwork KSA test in new, but meaningful, ways. At the same time, this study attempts to provide insights into the theoretical connection of teamwork self-efficacy, KSAs, and individual behavior within a team.

Method

Participants

Some 227 undergraduates (40% male and 60% female) enrolled in an introductory sociology class in a mid-western university were formed into 57 teams. Teams were formed based on the mutual availability of participants for the designated experimental dates and times. Although this facilitated the forming of teams, it did result in teams containing different numbers of members. Namely, of the 57 teams studied, 16 contained three-people, 26 contained four people, and 15 contained five people.

Measures

Teamwork knowledge, skill, and ability. The teamwork Knowledge Skill and Ability Test was used to assess participant interpersonal and self-management knowledge. The instrument included 35 multiple-choice items. An example item follows: 'Suppose you are presented with the following types of goal. You are asked to pick one for your team to work on. Which would you choose?' The four response options for this question are:

A. An easy goal to ensure that the team reaches it, thus creating a feeling of success;
B. A goal of average difficulty so the team will be somewhat challenged, but successful without too much trouble;
C. A difficult and challenging goal that will stretch the team to perform at a high level, but attainable so that effort will not be futile;
D. A very difficult task, or even impossible goal, so that even if the teams falls short, it will at least have a very high target to aim for.

Another sample item follows: Suppose that you find yourself in an argument with several coworkers about who should do a very disagreeable but routine task. Which of the following would likely be the most effective way to resolve this situation? The four response options for this question are:

A. Have your supervisor decide, because this would avoid any personal bias;
B. Arrange for a rotating schedule so everyone shares the chore;
C. Let the workers who show up earliest choose on a first-come, first-served basis;
D. Randomly assign a person to do the task and don't change it.

The test was designed such that participants receive an overall teamwork KSA score (Stevens and Campion 1999). One point is given for every correct answer and a total score is computed by summing across the 35 items.

Scores on the teamwork KSA test could range from a low of 0 to a high of 35. The test authors (Stevens and Campion 1999) have reported internal consistency reliability as high as .80. Internal consistency reliability in the present study was not as high (alpha = .59). While the present study's estimate of reliability seems low, it is important to keep in mind that an internal consistency reliability estimate is not the best estimate of reliability for this type of test. The test was designed to be multidimensional and many situational judgment tests share similar low magnitude estimates of internal consistency reliability (Clevenger, Pereira, Wiechmann, Schmitt and Harvey 2001; McDaniel, Morgeson, Finnegan, Campion and Braverman 2001). Test-retest reliability or alternate-form reliability would provide better estimates, but were not feasible in this study. It is our opinion that the published internal consistency estimate of .80 is likely a high-end estimate.

Self-efficacy for teamwork. A revised version of the Personal Efficacy Beliefs Scale (PEBS; Riggs, Warka, Babasa, Betancourt and Hooker 1994) was used to measure self-efficacy for teamwork. Because Bandura's (1977) theory proposed that self-efficacy beliefs are task-specific, a general version of the PEBS was revised by replacing items referring to 'general work' with wording referring to work in teams. For example, 'I have confidence in my ability to do my job' was replaced with 'I have confidence in my ability to work in teams.' Other sample items include 'I have all the skills needed to perform very well in teams' and 'I feel threatened when others watch me work in a team (reverse coded).' Thus, the self-efficacy for teamwork measure is designed to assess an individual's comfort with and motivation to manifest behaviors, which would facilitate teamwork. It is not designed to assess a general level of agreeableness including empathy, trust, or tolerance. Respondents were instructed to think about their ability to work in teams and rate the items on a five-point Likert-type scale with anchors ranging from 1 ('strongly disagree') to 5 ('strongly agree'). The PEBS has been shown to have an internal consistency reliability of .86 (Riggs *et al*. 1994). Internal consistency reliability in the current study was high (alpha = .84).

Individual teamwork performance-independent evaluation. An individual's behavior within a team was assessed using a newly designed behavioral-based rating scale called the Individual Performance in Teams Scale (IPIT). Individuals extensively familiar with the teamwork literature developed the IPIT. The IPIT consisted of 33 items depicting various aspects of team member behavior related to conflict resolution, collaborative problem solving, communication, performance management, and task coordination. The items reflected issues/topics that previous literature has found to be important for team functioning (Fleishman and Zaccaro 1992; Jarboe 1991; Mabry 1985; Mabry and Attridge 1990; Morgan, Glickman, Woodward, Blaiwes and Salas 1986). Sample behavior items included statements such as 'tried to keep group aware of time issues', 'responded calmly to others', and 'helped resolve any conflicts'. The IPIT was designed to be used by raters viewing videotaped team interactions. Raters were asked to indicate on a seven-point scale of behavior frequency with anchors ranging from 1 (*to no extent*) to 7 (*to a great extent*) the extent to which the behavior was observed. A 'not applicable' was also an option. Items thought to impede team performance (e.g., rudely interrupted other members) were reverse coded. The scale also contained one general item concerning the team member's effectiveness during the team task.

Three independent raters were trained to rate team behaviors using the IPIT. Raters watched videotapes of each team completing a business simulation task and then rated each team member. In order to obtain the highest quality ratings, raters were instructed to watch each tape twice and not give ratings until after the second viewing. In addition, a minimum of two hours was required between viewings of different teams and raters were instructed not to watch more than three teams on any given day. Each rater rated each team member, so this process yielded three different sets of ratings for each team member.

To obtain individual team behavior criterion scores, the dimensional structure of the scale was examined for each of the three raters through factor analysis with principal components extraction. Based upon this analysis, a unidimentional index of individual performance in teams was created. The 33 items and their respective factor loadings are found in Table 1. In general, these items reflect an individual performance in teams with higher scores relating to higher individual performance in teams.

Interrater agreement over the three raters was assessed using the composite scale score (ICC 2,K = .73, Shrout and Fleiss 1979). Sufficient agreement existed between the three raters to justify aggregating across raters to form a composite score for each item. A composite scale score was computed over aggregated items to form each individual's IPIT score (alpha = .96).

Individual teamwork performance-peer ratings. Peer ratings of individual teamwork performance were also gathered. Team members were asked to rate each other on five dimensions (e.g., participation in the group, interpersonal skills). Team members used a five-point Likert-type scale with higher values representing 'more' of the attribute. An individual's peer rating was determined by averaging all the ratings from team members (excluding the self-rating). Internal consistency reliability for the peer ratings was high (alpha = .95).

Table 1: Factor loadings on first component over three raters on the Individual Performance In Teams (IPIT) scale

Items	Rater 1	2	3
1. Presented ideas about the task	74	76	79
2. Tried to get other team members involved	72	69	68
3. Tried to get specific members to participate	50	65	55
4. Was confident	64	63	83
5. Presented ideas about how to work on the task	60	54	43
6. Tried to get other team members to voice their opinions about ideas on the table	63	66	60
7. Was nervous [R]	52	48	33
8. Asked questions	72	75	75
9. Suggested solutions to the task	74	51	86
10. Was comfortable working with others	82	70	87
11. Responded calmly to others	53	12	76
12. Tried to get group to agree	78	69	76
13. Was pleasant	72	56	74
14. Was receptive	72	29	76
15. Enjoyed working on the team	85	75	87
16. Had an open posture (non-verbal)	40	56	70
17. Built upon what others said – 'Piggy-backed'	79	36	72
18. Questioned other's task ideas constructively	66	62	71
19. Tried to raise alternatives that weren't on the table	80	66	83
20. Tried to get group to consider other alternatives	81	72	83
21. Paid attention to other members when they spoke	72	34	68
22. Helped explain other's ideas	52	44	75
23. Explained their own ideas	75	75	84
24. Was friendly	74	65	78
25. Integrated ideas of different members	78	36	80
26. Was warm	72	65	71
27. Was dominating [R]	−74	−79	−87
28. Tried to create a plan for solving the task	58	54	39
29. Was indifferent [R]	85	69	69
30. Responded appropriately to any questions presented in the group	74	70	72
31. Was interested	90	81	92
32. Tried to foster critical decision making	87	76	89
33. Overall, how effective was this team member?	94	86	91

Notes: Loadings are multipled by 100.
[R] represents reversed scored items.

Procedure

Participants individually completed the teamwork KSA instrument, the self-efficacy for teamwork scale, and a demographic questionnaire during a regular class meeting time. Teams met at pre-arranged times and team leaders were chosen randomly to facilitate the team task. To legitimize the leader's position, a team leader responsibility list was read to all team members. Team leaders were asked to introduce the team to the task, make sure that the team understands the task, lead the team discussion, and make sure that the final team ranking reflects the team's decision.

A video camera recorded the participants working on the Project Planning Situation (Lafferty 1993). In this task, participants were asked to imagine they were part of a business team that was planning the development of a new project. Team members were presented with twenty possible action steps (e.g., find qualified people to fill positions, measure progress toward goal, etc.) and asked to discuss and present the best order for the steps. When the team finished the task, the experimenter stopped the videotape.

Table 2: Descriptive statistics and correlations between variables for team members

Variable	N	M	SD	1	2	3	4
1. IPIT	170	3.60	.49	.96[1]			
2. Peer Rating	170	3.61	.65	.52*	.90[1]		
3. Teamwork KSA	162	21.22	4.25	.31*	.34*	.59[2]	
4. Self Efficacy for Teamwork	162	3.71	.53	.16*	.23*	.19*	.84[1]

Notes: These scores exclude team leaders.
[1] Internal consistencies computed by Coefficient Alpha
[2] Internal consistencies computed by Kuder-Richardson Reliability (KR-20) due to dichotomous scaling of responses.
* $p < .05$

Results

Data analyses occurred in two major steps. First, the hypotheses were tested using only team member data ($n = 170$). Second, the experimental hypotheses were tested using only the assigned leader data ($n = 57$). We employed an alpha decision rule of .05 for evaluating statistical significance. Due to the extremely high reliability of our criterion measures, no corrections were performed on any of the validity estimates.

Team Members

Descriptive statistics and intercorrelations between teamwork KSA scores, IPIT, peer ratings, and self-efficacy for teamwork are presented in Table 2. Scores on the teamwork KSA test ranged from 8 to 31 ($M = 21.22$, $SD = 4.25$). These scores were similar to the scores obtained in previous validation studies (Stevens and Campion 1999; $M = 19.05$, $SD = 5.65$). Scores on the IPIT ranged from 2.48 to 4.82 ($M = 3.60$, $SD = .49$). Scores on the peer rating criterion ranged from 1.47 to 5.00 ($M = 3.61$, $SD = .65$). There were no differences in any of the predictor or criterion variables due to team size, gender, or race ($p > .05$).

Teamwork KSA and individual performance in teams. To test Hypotheses 1 and 2, a Pearson product moment correlation was performed between teamwork KSA scores and IPIT scores, and teamwork KSA scores and peer ratings. As expected, we found that the teamwork KSA test successfully predicted individual member behavior within teams as indexed by external raters ($r = .31$, $p = .000$) and peers ($r = .34$, $p = .000$) such that higher scores on the teamwork KSA test related to greater individual effectiveness within the team. Exploratory analyses with polynomial regression were conducted to determine whether a curvilinear relationship (e.g., U-shaped) existed between the teamwork KSA scores and the two criteria measures, respectively. No evidence was found to suspect curvilinear relationships between the variable of interest ($p > .05$).

Moderator analysis. Self-efficacy for teamwork and teamwork KSA scores along with their interactive component were entered into a standard linear regression with IPIT as the dependent variable ($F = 6.24$, $p = .000$). The interactive component ($\beta = -.05$, $p = .53$) was not significant, therefore suggesting that self-efficacy for teamwork does not moderate the relationship between teamwork KSA scores and IPIT. The analysis was repeated with peer ratings as the criterion. Self-efficacy for teamwork and teamwork KSA scores along with the interactive component were entered into a standard linear regression with peer ratings as the dependent variable ($F = 9.20$, $p = .000$). Again, the interactive component ($\beta = -.07$, $p = .38$) remained non-significant, therefore suggesting that self-efficacy for teamwork does not moderate the relationship between teamwork KSA scores and peer ratings of teamwork performance. Thus, Hypothesis 3 was not supported for the team members.

Assigned Team Leaders

Teamwork KSA and individual performance in teams. Descriptive statistics and intercorrelations between teamwork KSA scores, IPIT, peer ratings, and self-efficacy for teamwork are presented in Table 3. Scores on the teamwork KSA test ranged from 15 to 30 ($M = 22.25$, $SD = 3.74$). These scores were not different from the scores found in the team member data set ($p > .05$). Scores on the team behavior criterion (IPIT) ranged from 2.89 to 5.14 ($M = 4.15$, $SD = .51$). Scores on the peer rating criterion ranged from 2.33 to 4.70 ($M = 4.09$, $SD = .42$). Unlike in the team member scores, leader IPIT scores and peer scores were higher in the leader sample than in the member sample (IPIT, $t = -7.34$, $p = .000$; peer scores, $t = -5.21$, $p = .000$). There were no

Table 3: Descriptive statistics and correlations between variables for leaders

Variable	N	M	SD	1	2	3
1. IPIT	57	4.15	.51			
2. Peer Rating	57	4.09	.42	.44*		
3. Teamwork KSA	55	22.25	3.74	.03	−.03	
4. Self Efficacy for Teamwork	54	3.69	.50	.15	.06	−.04

Notes: These scores exclude team members.
*$p < .05$

differences in any of the predictor or criterion variables due to team size, gender, or race ($p > .05$).

Teamwork KSA and individual performance in teams. To test Hypotheses 1 and 2, a Pearson product moment correlation was performed between teamwork KSA scores and IPIT ($r = .03$, $p = .81$) and teamwork KSA scores and peer ratings ($r = -.03$, $p = .81$), no significant relationships were found. Thus, Hypotheses 1 and 2 were not supported on the assigned leader data. Exploratory analyses were conducted to determine whether a curvilinear relationship (e.g., U-shaped) existed between the teamwork KSA scores and the two criteria measures. No curvilinear relationships were found ($p > .05$).

Moderator analyses. Self-efficacy for teamwork and teamwork KSA scores along with the interactive component were entered into a standard linear regression with IPIT as the dependent variable ($F = .49$, $p = .69$). The interactive component ($\beta = -.17$, $p = .90$) was not significant, therefore suggesting that self-efficacy for teamwork does not moderate the relationship between teamwork KSA scores and IPIT. The analysis was repeated with peer ratings as the criterion. Self-efficacy for teamwork and teamwork KSA scores along with the interactive component were entered into a standard linear regression with peer ratings as the dependent variable ($F = .09$, $p = .96$). Again, the interactive component ($\beta = -.26$, $p = .85$) remained non-significant, therefore suggesting that self-efficacy for teamwork does not moderate the relationship between teamwork KSA scores and peer ratings of teamwork performance. Thus, Hypothesis 3 was not supported for the leader sample as well as the team member sample.

Discussion

When examining the team member data, a moderately sized relationship was found between teamwork KSA test scores and individual performance in teams, as indexed by both peer and independent raters. This relationship was not found when examining the assigned team leader data. Unexpectedly, self-efficacy was found not to moderate the relationship between the teamwork KSA test and individual performance in teams. Although, at first glance, the pattern of findings appears mixed and only somewhat supportive of the teamwork KSA test, it is our contention that the findings are quite supportive of the teamwork KSA test on a few grounds. First, the teamwork KSA test was able to predict individual team member behavior despite the fact that the team meetings lasted, on average, 30 minutes. Second, it appears as if the teamwork KSA test's effectiveness in predicting team member behavior is not dependent upon members' teamwork self-efficacy. Third, the validity of the teamwork KSA test was found to generalize beyond the type of team it was designed for, self-directed work teams (i.e., *ad hoc* temporary student teams). Finally, in addition to peer ratings, the validity of the teamwork KSA test was established using a new direct and 'objective' index of member behavior (the IPIT).

Besides the practical support this study provides for the teamwork KSA test, our data may also possess theoretical implications for understanding individual behavior in teams. First, our data certainly supports the notion that individual teamwork KSAs affect member behavior. Namely, despite all of the factors that can affect member behavior (other individual difference variables, social/dynamic factors such as norms and conformity pressures, and contextual factors such as time limits), teamwork KSAs accounted for a moderate amount of variance in member behavior. Furthermore, if we corrected for unreliability in the teamwork KSA test and the criteria measures, the correlation between the teamwork KSA test and the two criteria, respectively, would increase quite substantially.[1] Taken together, for theoretical models designed to understand behavior in teams to be complete, they must account for individual member teamwork KSAs.

Another finding of theoretical import is that self-efficacy did not moderate the relationship between KSA scores and behavior. As discussed earlier, self-efficacy is an individual's belief that he or she will successfully perform the behaviors required for a specific task (Gist 1987). Empirical research on self-efficacy has consistently found that it has a significant impact on performance in a variety of tasks as well as motivation, emotional reactions, and the level of effort a person extends

towards persisting on a task (Gist and Mitchell 1992). So although past work would indicate that two individuals with the same level of expertise, but different levels of self-efficacy, would behave differently from one another (Ackerman and Kanfer 1993; Eyring *et al*. 1993), that was not the case in this study. It may be the case that an individual's belief in his/her ability to perform well in a team is less an important factor on member behavior than his/her general assertiveness in team settings. So although self-efficacy can directly affect behavior for an individual task (Gist and Mitchell 1992), for a task requiring group interaction, it may be essential to consider teamwork self-efficacy along with a general willingness to assert oneself in a group setting. In other words, an individual's confidence in his/her abilities, actual KSAs, and willingness to assert him/herself may work together to explain additional variance in member behavior (e.g., the KSA test will predict behavior to a larger extent when the member is confident in his/her abiltiies and assertive in teams).

It is important to acknowledge, however, that the lack of support for Hypothesis 3 may have been attributable to the experimental task. Bandura (1982) noted that judgments of self-efficacy affect how much effort people will expend and how long they will persist in the face of obstacles or aversive experiences. Perhaps the team task question was too short, too simple, or did not have enough obstacles for differences in teamwork self-efficacy to affect actual performance. Therefore, with increased time-together on task, the self-efficacy variable may in fact serve to moderate the KSA test/member behavior relationship after all. In addition, while measurement of team performance is broken down by specific behaviors measurement (e.g., listen non-evaluatively, discourage undesirable team conflict), the measurement of self-efficacy is targeted at a slightly higher conceptual level. Perhaps a more specific index of self-efficacy would still indeed moderate the KSA test/member behavior relationship.

Finally, the lack of relationship between the teamwork KSA test scores and the performance of the assigned team leaders was disappointing, but in retrospect potentially predictable. The lack of findings may have been due to the explicit instructions given to assigned leaders concerning their roles and responsibilities during the team interaction. These instructions may have prompted more effort and consciousness regarding individual behaviors, thereby explaining why we experienced range restriction on the performance criteria (assigned leaders generally scored quite high). Consequently, the predictive power of the teamwork KSA test was compromised for assigned leaders in that criteria variability was artificially attenuated due to our explicit instructions to behave in a particular manner. Additional research where instructions on how to behave in the team are not explicit may provide additional insight into this lack of observed findings.

Limitations and Future Research

Although the Project Planning Situation was chosen because of its general applicability to a wide variety of business problems, it was only one type of task. Many other types of tasks exist which teams commonly encounter. The generalizability of the teamwork KSA test should be examined using other tasks (cf. McGrath's 1984, Group Task Circumplex). In addition, it is possible that the situations which form the basis for the teamwork KSA item content could differ by industrial context. More context-specific situations have the potential to improve the usefulness of the test and more likely the applicant reactions to the test. The current research was focused on one version of the test, with one task. A more complex world of work and teamwork situations certainly exists outside of this research setting.

Additional research should also examine the teamwork KSA test along with other predictors such as personality and general cognitive ability. As discussed earlier, investigation of the relationship between personality traits and individual teamwork performance is a promising avenue of research (Hogan *et al*. 1988; Neuman and Wright 1999). This research has been motivated by evidence which suggests that personality increases the prediction of performance above that which is predicted by ability tests alone (Arneson, Millikin-Davies and Hogan 1993; Day and Silverman 1989; Gellatly, Paunonen, Meyer, Jackson and Goffin 1991; McHenry, Hough, Toquam, Hanson and Ashworth 1990; Rosse, Miller and Barnes 1991). Future research should examine the teamwork KSA test along with personality traits that have been useful for understanding individual behavior in teams (e.g., agreeableness and conscientiousness; Neuman and Wright 1999).

Despite the effort taken to develop the teamwork KSA test to tap abilities inherent to teamwork behaviors, it is still quite possible that the teamwork KSA test overlaps significantly with cognitive ability. Of course, the constructs of cognitive ability and teamwork ability may overlap as well. The authors of the teamwork KSA test themselves have made this point in their validation effort and see the KSA as possibly a more face-valid measure of cognitive ability for jobs that rely on teamwork. A limitation of the present study is that we did not include a measure of general cognitive ability that we could use to determine the overlap of the constructs. Finally, although our criteria were generally direct and uncontaminated by knowledge of behavior outside of the team setting, future research would benefit from the assessment of individuals in multiple sessions and multiple teams.

The current study gives insight into the importance of individual KSAs for teamwork settings, but this research does not address the issue of composing optimal work teams for different purposes. The effectiveness of teams is often a function of who is in the team and the

combination of individual-level attributes within a team. For example, Stevens and Campion note that people with high teamwork KSAs

> should probably be spread out if tasks are disjunctive, because performance of each team is determined by the best member. But they should probably be concentrated if tasks are conjunctive, because performance of each team is determined by the worst member. (1994, p. 520)

The focus of the present study was to demonstrate the usefulness of the teamwork KSA test for a personnel selection application. In a selection context, decisions are made at the individual level and affect the individual applicant directly. While it was appropriate that we measured both the predictor and the criterion at the individual level, level of analysis issues remain an important consideration when studying team phenomena and effective selection strategies for teams may not be based on individual difference variables alone (Morgan and Lassiter 1992). Future research needs to integrate the team composition literature and develop insights into finding effective combinations of people for a variety of team situations.

Conclusion

Very little empirical and theoretical efforts have been concerned with team selection issues. The validation of a teamwork KSA test adds valuable information toward addressing the practical team staffing concerns of human resource managers in that it appears that the teamwork KSA test has the potential to be a useful and important selection instrument. At the same time, this study served to provide additional insights into the theoretical connection of teamwork self-efficacy, KSAs, and individual behavior within a team.

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Note

1. When correcting for unreliability in the predictor and criterion, the correlation between teamwork KSA scores and IPIT scores for team members becomes .41, and the correlation between teamwork KSA scores and peer rating of team member behavior adjusts to .47.

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