The Impact of Leader Coaching Behavior on Engineers' Motivation to Learn and Voicing Behavior

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Abstract

Notwithstanding its growth in organizational practice and related literature, few studies have explored the impact of leader coaching behavior.* In addition, team participation and leadership have been emphasized in the engineering and engineering education literature. A two-wave study of 291 engineering firm employees and 58 engineering division leaders participated in this study examining the relationships among perceived leader coaching behavior and engineering employees' voicing, affective and learning related reactions. In particular factors influencing employees' perceived ability and willingness to *voice* opinions and perspectives while participating in day-to-day work activities were examined and found to significantly impact engineering employee reactions. These study results have implications for engineering-related leadership, workplace training, management of workplace quality and productivity, and higher education.

Introduction

In recent years, leader/manager coaching behavior has increased in popularity and importance. [1] Leaders and organizations have begun to appreciate the value of leader coaching—defined as an effective one-on-one, leader instigated, interaction and communication practices that improve employee insight, performance and learning. [2] In fact, leader coaching behavior has been described as one of the most desired competencies for successful leadership. [3] An important aspect of problem solving are employee perceptions they can voice concerns, share information, and even disagree about engineering related decisions while maintaining support from leaders in the organization.

In addition, early indications from a limited number of studies supports the connection between leader/manager coaching-related behaviors and employee motivation to learn. [4] Despite the continued emphasis on teaming effectiveness, effective communication and the need for more effective management in engineering and technology, there were no such studies in engineering contexts were identified. Therefore this study has potential import for engineering educators in a variety of roles and for those training for, or currently positioned in, engineering- related leadership roles.

Research Questions, Hypotheses and Related Literature

To investigate potential but unexamined outcomes of leader coaching in engineering contexts, answers to the following research questions were sought: (1) What is the relationship between leader coaching behavior and employee psychological safety? (2) What is the association between employee voice behavior and their leaders' coaching? The following sections outline.

*Note—*This ASEE Conference paper contains original research data not published in any other venue. The model explored and related discussion may have some parallel content and data analysis strategies to a study by Egan and Kim (2013) examining a US-based health care organization employees, managerial coaching and employee voice—a study testing a similar hypothesized model with a different population.*

key literature associated with these research questions and specific hypotheses to be tested.

Leader Coaching

A recent systematic literature review of top refereed journals published in the past ten years from the fields of engineering and technology, organization behavior, management and leadership, industrial and organizational psychology, human resources, and training and development, provided context for the current study. [5] A summary of research related to the hypothesized study is outlined below.

The initial uses of the word *coach* was associated with vehicles that move people. *Coaching*, the verb, was first used in sports when, in the same context *coach* to a leader of athletes. [6] A coach in sporting contexts were provided as a way to influence an athlete's drive and performance. In later years, organizations noticed the potential impact of coaches and coaching on manager and employee behavior. [6] Employees who were "coached" were said to have higher job satisfaction and commitment to career and their organization. Within engineering and technology related companies—leader coaching behavior was associated with high productivity and process improvement. [7]

For those engineering and technology firms integrating leader/manager coaching competency development, coaching has emerged as a leader's obligation. Consultants developed leadership coaching programs, books and related trade publications. [3] Researchers have begun to establish that employees value leader coaching which are viewed as impacting employee personal advancement and achievement. [8]

Coaching most often happens in dyadic, leader-employee exchanges and includes focused listening and interpersonal dialogue. In addition, leader coaching includes constructive feedback toward greater learning and improve performance. Leader/Manager coaching is also understood to be essential to the facilitation of organization development and change. [9] Increasingly dynamic engineering and technology firms are in need of leaders with capacities for supporting employees toward the adaptation of proactive attitudes and productive behaviors. As the impact of leaders on employee attitudes and decision-making gains greater focus, coaching behavior is viewed as a way to influence and guide employees to organizational achievement. [10]

Developmental exchanges in dyads (one-on-one interactions) have been examined in several ways in both applied and scholarly literature. Leader coaching is commonly viewed as different from mentoring. While a mentor may exhibit coaching-related behaviors, mentoring is defined very differently from leader/manager coaching. [11] Informal and formal mentoring is commonly associated with better chances for sponsorship, psychosocial development, career support, and upward mobility, for mentees. [12] Mentoring can be a relationship between an employee and a more experience organizational member as part of a formal mentoring program. Additionally, mentoring can also be defined informal process generated voluntarily by two individuals with positive outcomes for the mentee/protégé. [13] Formal and informal mentoring are less often focused on specific job-related tasks, roles, work knowledge or job-specific skills. Leader/manager coaching is a series of focused, one-on-one exchanges between leaders and their followers. Unlike dyadic goals commonly described in the mentoring literature, leader/manager

coaching behavior is not usually situated along with long-term developmental outcomes.

Very few researchers have explored the impact of leader/manager coaching behavior and employee reactions. Along with the growth of coaching as a leadership development competency there is a miniscule amount of empirical research on leader/manager coaching behavior. There is a need for more research on leader/manager coaching. [4]

Employee Voice

Engineering literature has long emphasized employee voice related constructs as a rationale for teamwork, quality circles, and feedback loops in design, development, and implementation of engineering projects. [7] Constructive voice behavior is similar to helping behavior and should be valued by leaders because work-related problem identification and up-close solutions to such problems are the hallmarks of *employee voice*. It is "promotive behavior that emphasizes expression of constructive challenge intended to improve rather than merely criticize". The employee voice emphasis is on bottom-up approaches by employees to advance novel or innovative suggestions. Those who exhibit voice behavior often respond principally to leader/manager invitations, and contribute added value such as modifications to current procedures. An element of extrarole behavior (i.e., positive and voluntary acts not expected by the organization, but that make essential contributions to organizational effectiveness and performance). [14] Within the specialized roles required by engineering and technology professionals, employee voice is important to information sharing, problem solving, effective communication, quality, and productivity.

Support for employee voice, provide leaders novel perspectives contributing to process improvement and better functioning operations. [15] A leader's use of coaching can be a key aspect in signaling support to an employee. By providing both a response to employee feedback as well as providing specific work-related guidance, the leader endorses employee voice. Contrariwise, the stymying of voice can reinforce barriers to communication and contributions that may propagate unproductive work habits in a manner that leads to lower quality outputs, services and/or products. Based on the above-mentioned, the subsequent hypothesis was formed—

H1: Leader coaching behavior is positively associated with follower/employee voice behavior.

Psychological Safety

Psychological safety involves mutual beliefs between close working co-workers that reasonable, interpersonal risk taking is supported. [16] To Edmondson, psychological safety is more than the experience of a elevated interpersonal trust; psychological safety is also part of a work place where employee comfortably express differences of opinion. [16] Overall, workplaces high in psychological safety are high in mutual respect and leaders vigorously express the meaningfulness of openness and provide assurance that such feedback will not involve negative consequences for individuals or work units. The leader is essential in the removal of constraints that often dissuade employees from expressing their viewpoints and ideas. Facilitators of such psychologically safe work environments are assumed to be acting in alignment with their own fundamental values and beliefs, instead of being seen by employees as overly reactive to

peripheral demands or transient or limited interests. By engaging followers with honesty and openness, mutual respect and trust is fostered interpersonally among followers as well as between followers and the leader.

Leader coaching may be a central signaling in leader-follower exchange—as the leader's investment in dyadic interaction with followers/employees may signal positive engagement even when there are disagreements. Leading psychologically secure environment can be double-edged because while constructive outcomes may develop, leaders/managers are placed in a position of having to recognize employee feedback out of alignment with their plans and/or vision. Despite the pressures and complications it entails, leaders need to support dissent while, concurrently, allaying the temptation to dispatch their power and authority in cases when doing so may encumber perceived psychological safety. Information exchange may provide opportunities for ethical behavior and the formation of interpersonal between leaders and followers and among followers. [17] By role modeling and reassuring followers that individual rent seeking, social undermining, and other obstacles to forming/maintaining trust within a work unit will not be endorsed.

When leaders are viewed by followers as reasonably capable, trustworthy, and considerate, employee trust is elevated. [17] Followers/employees may come to trust that the leader will not unfairly discipline them—should they engage in interpersonal risk taking that leads to a negative result. When able to observe leader behavior, followers develop trusting views of their leaders dyadic/one-on-one exchanges. While many are brief, interpersonal interactions involving leader initiated coaching behavior can often leave a positive imprint regarding the leader's motivation to steer employees toward actions and decisions beneficial to followers and the organization. From this vantage point, psychological safety is proposed to mediate the positive association between leader coaching behavior and employee voice.

H2a: The positive relationship between leader coaching and follower/employee voice is mediated by follower/employee psychological safety.

Motivation to Learn

Motivation to learn is defined as individual desire, effort and time in learning focused activities associated with one's work. Such investment includes participation in training and development activities, the embracing of workplace learning, a willingness to engage in organization-sponsored learning activities, in addition to other developmental actions tied to ones career and job.[18] Noe posited that individual motivation to learn is a marker regarding one's energy and eagerness to engage in workplace learning. Extant research has suggested motivation to learn is influenced by environmental factors as well as individual characteristics. [19] Motivation to learn is commonly framed as a pliable attitude that can be influenced by leaders and peers and managers/leaders have been found to influence employee learning related motivation and motivation to transfer learning to their work. [20, 21] Employees high in motivation to learn participate in learning and training in a focused manner and exhibit commitment to and alignment with work-related learning tasks.

While some may intrinsically enjoy work-related learning, others may not. Different amounts of

encouragement and support may be required in relation to employee motivation to learn. Although some studies have been conducted, environmental influences on motivation to learn have yet to be understood. [22] Some motivation to learn research has determined that leaders influence employee learning related attitudes. At the same time, there appears to be no systematic examination of specific leader behavior on employee motivation to learn. While work-related learning and development research supports interaction among antecedents, motivational attitudes, and employee engagement in development and training, there is a low amount of understanding about how leaders influence employee motivation to learn. For the purposes of the current study, voice behavior is hypothesized as mediated by employee motivation to learn. [23]

H2b: The positive relationship between leader coaching behavior and follower/employee voice behavior is mediated by follower/employee motivation to learn.

In a study of 51 work teams, a strong link between psychological safety and learning behavior was established. [16] In particular, psychological safety has been found to influence learning and employee attitudes about learning. In addition, employee psychological safety has been found to impact learning-related motivation. Therefore, it was hypothesized that:

H2c: Psychological safety is positively associated with motivation to learn.

Leader Personality

In general, personality involves elements of an individual's cognition and actions considered to be reasonably constant over time and fairly stable in a variety of environments or contexts. [24] For as long as researchers have been exploring leadership, personality and personality traits are have been attributed to leader success and failure. Researchers have only begun to explore personality related predictors of leadership, leader effectiveness and leader outcomes. [25] Judge stated, "To date, we have very little perspective regarding the traits that contribute to effective leadership" (p. 770). [26] Three leader components of leader personality were examined in this study. Each is a component of the most persistently researched personality inventory available. [27] The alignment of each personality measure to the study context is explained below.

Agreeableness
Agreeableness refers to an individual's tendency toward being honest, considerate, trustworthy, helpful, understanding, decent, and generally likable. [27] Although not yet explored, agreeableness is likely to relate positively to leader coaching behavior as there is some research support linking agreeableness to leadership. Agreeableness has been found to be the personality factor most strongly affiliated with the idealized influence element of transformational leadership and is positively associated with ethical leadership. [28, 29] Individuals exhibiting a propensity for agreeableness more often utilize constructive tactics to assist others. [30] Leaders exihibiting agreeableness can expect to be described as trusting, accommodative, good-natured, cooperative, and pleasant.

H3a: Leader agreeableness is positively associated with leader coaching behavior.

Conscientiousness

Conscientiousness has been one of the most frequently studied traits in work psychology. [31] Individuals exhibiting conscientiousness tend maintain focus and concern regarding their work-related duties and obligations. Conscientious leaders are oriented toward a high degree of moral obligation in the workplace. As such, conscientious individuals value truth and honesty, and are less likely to engage in corruption. Such predispositions connect conscientiousness and the pattern of conduct commonly associated with leader coaching behavior. Judiciousness, reliability, achievement motivated, accountable, deliberate, self-disciplined, persistence, and thoroughness are key aspects of conscientious individuals. [27]

Because individuals exhibiting conscientiousness are oriented toward goals and maintaining details they are commonly well organized. [32] Conscientious leaders may more often tend to communicate standards and clear priciples to followers. Conscientious leaders tend to manage both time toward reflection and feedback to their subordinates. [29] Although effective leadership and conscientiousness have been found to be associated, no identified studies explored coaching behavior as an antecedent of leader/manager coaching behavior. However, related studies provide some support for the formation of a conscientiousness-to-coaching related proposition.

H3b: Leader conscientiousness is positively associated with their coaching behavior.

Neuroticism

Leaders exhibiting neuroticism are unlikely to be effective, are more likely to fail as an effective role model, and tend to be inconsistent regarding work expectations, such as providing meaningful feedback to followers. [29] Neurotic leaders are often more prone to conflict and tend communicate defensively. [33, 34] Anger, anxiety and other negative emotions are more common and may be experienced with greater intensity by individuals high in neuroticism. Because coaching requires communicate capabilities that engage followers/employees, leaders high in neuroticism seem less likely to exhibit leader coaching behavior and would tend to not likely to be self-regulating in terms of the type, quality and consistency of feedback over time. Consistent with extant literature on behaviors associated with leader neuroticism the following is proposed:

H3c: Leader neuroticism is negatively associated with their coaching behavior.

Extending the hypothesized interactions between study constructs detailed above, there are two final hypotheses, regarding relationships between leader personality, employee voice behavior and follower/employee outcomes that extend naturally from H1a thru H3c, including:

H4a: Leader personality (agreeableness, conscientiousness, neuroticism) traits are indirectly related to follower/employee voice behavior via the mediation of leader coaching, and, in turn, follower/employee psychological safety.

H4b: Leader personality (agreeableness, conscientiousness, neuroticism) traits are indirectly realated to follower/employee voice behavior via the mediation of leader coaching, and, in turn, follower/employee motivation to learn.

Methods

A brief description of the sample and its characteristics, data collection procedures, the instrumentation, and data analysis strategy are provided below.

Study Sample

Study participants were from a division of large US-based engineering and technology related firm (110,000 employees)—291 employees (82% response rate) and 58 positional leaders (90% response rate). Organizational leaders/managers and their followers/employees responded to questionnaires at two time periods. Each survey (at Time 1 and Time 2) was collected approximately seven weeks apart.

At least four employees associated with each of the 58 leaders/managers responded to both Time 1 and Time 2 surveys. The mean age for leaders was 38; 44% of leaders were women and 56% were male. These leaders were 68% White/European American; 10% Hispanic/Latino; 10% African American; 5% Asian American; and 7% "Other". The average age of employees was 26; with 49% being male and 51% women. Employees as a group were 65% White/European American; 11% Hispanic/Latino; 11% African American; 10% Asian American; and, 3% "Other". Leaders held a minimum of an undergraduate degree in engineering or technology related fields. More than 45% of leaders held a masters degree. All employees attended a minimum of two years of post-secondary (beyond high school), engineering-related education. More than 70% of employees had a 4-year bachelors degree in engineering or technology related fields.

During Time 1 of data collection, prospective study participants were sent an email message from a top internal executive (a) asking for participation; (b) describing the common human subjects research process; (c) elaborating regarding confidentiality assurances; (d) assuring participant anonymity as part of the aggregate data analysis; (e) reporting steps in research process (f) reinforcing importance of filling out both Time 1 and Time 2 surveys, and (g) providing the open option for both employees and leaders to not participate in the study. Reminder invitations were emailed twice more during Time 1; and a re-invitation and two more reminders were deployed at Time 2.

All respondents at Time 1, (followers/employees and leaders/managers) provided demographic-related items (e.g., age, gender, ethnic/racial identity, education, tenure, work unit). Also at Time 1, leaders/managers provided responses to personality related survey items (e.g., agreeableness, conscientiousness, neuroticism) and followers/employees were asked describe their leader's/manager's coaching behavior, or lack of it. Those followers/employees associated with managers/leaders who completed a Time 1 survey were invited to participate—and least four followers/employees rated each leader/manager. At Time 2, leaders assessed each follower's/employee's voice behavior. Followers/employees were provided questions regarding their psychological safety and motivation to learn. Of the 64 leaders/managers invited to take the surveys, 58 responded during Times 1 and 2 (90% response rate); and of 355 follower/employee invitees, 291 provided complete responses at Times 1 and 2 (82% response rate).

Instrumentation

Aligned with the conceptual model and structural interactions being investigated, the surveys were composed of six assessment instruments. These instruments, with the exception of the coaching measure, were selected because of prior robust validation (both discriminant and convergent) and a solid history of established reliability from prior studies.

Leader Personality. Twenty-one personality items were part of the leader/manager survey were based on the Big Five Inventory [35]—agreeableness (5 items); conscientiousness (8 items); and neuroticism (8 items). A Likert-type scale (5 = *strongly agree;* 1 = *strongly disagree)* consisting of five points was deployed. Sample items include "I am organized" and "I am systematic," (conscientiousness); "I have a soft heart" and "I take time for others," (agreeableness); and "I am envious" and "I am moody" (neuroticism). Cronbach's alpha for these three measures was .87 (conscientiousness); .84 (agreeableness); and .78 (neuroticism)—were consistent results from prior studies. [36]

Leader Coaching Behavior. A six-point Likert-type scale (6 = Very Frequently; 1 = Never) was utilized and reliability was consistent with previous studies (α = .89). Employee perceptions of their manager's coaching behavior was assessed using four items (See Table 1) . Survey respondents named their "direct report leader/manager" and emphasized "one-on-one interactions, if any" as the focus for responses prior to filling out the survey.

Psychological safety. A five-point Likert-type scale (5 = *strongly agree;* 1 = *strongly disagree)* was utilized and yielded a reliability measure (alpha) of .82. Employees responded to Edmondson's (1999) seven survey items emphasizing follower/employee perceptions of their own psychological safety. [16] Sample items include "It is safe to take a risk on this team" and "Members of this team are able to bring up problems and tough issues". An aggregation of individual employee perceptions at the group level and psychological safety measure was utilized in a manner consistent with previous approaches theorizing and testing this construct at the level of the group. [16]

Motivation to learn. A five-point Likert-type scale (5 = *strongly agree;* 1 = *strongly disagree;* α = .80) was used along with previously validated three-item measure of motivation to learn which were slightly modified to fit the participants context. Example items are "In general, I am motivated to learn skills related to my job" and "In general, I exert considerable effort learning job related material". [37]

Voice behavior. Consistant with previous studies, a five-point Likert-type scale (5 = *strongly agree;* 1 = *strongly disagree;* α = .83) was utilized. Six-items were used to measure employees' voice behavior. [38] Sample of the leader/manager assessment of her/his direct report included— this employee "encourages other to get involved in issues that affect this work unit" and "speaks up with ideas for new projects or changes in procedures".

Control variables. Previous studies examining leader influence.[39] emphasized that leader/manager span of influence (defined as a number of direct reports—neither larger than 14, nor smaller than 4) should be measured in studies exploring leader/manager influence and

behavior. These leader/manager study participants had no more than fifteen direct reports, but at least four.

Levels of Analysis and General Analytic Strategy

Along with leader/manager assessment of employee voice behavior, follower/employee perspectives were nested inside of work groups. In order to address this issue for several hypotheses (1, 2a, 2b, and 2c), hierarchical linear modeling (HLM) analysis was performed at three levels. Hierarchical linear modeling (HLM) was used to examine the potential for cross-level and/or nonindependence effects. [40] An intercepts-as-outcomes model was measured for each cross-level hypothesis. Grand mean centering (GMC) emphasizes potential problems accompanying multicolinearity by decreasing covariance between slopes and intercepts. [41] Therefore, GMC was used in all analyses. Hypothesized effects for group-level variables (e. g., personality traits, leader coaching, psychological safety) were related to individual level outcomes (e.g., voice behavior).

Structural equation modeling (SEM) was utilized to explore three hypotheses (3a, 3b, & 3c). SEM allows for a concurrent examination of significance at the group level of analysis (e.g., leader coaching, manager personality, motivation to learn, psychological safety). Within this study, the most appropriate balance of statistical power and Type I error rates can be addressed through the use of SEM.

Hypotheses 4a and 4b required formation of a measure of the mediation effect of leader/manager coaching between leader/manager personality and psychological safety, and personality and motivation to learn constructs across the group (e.g., personality-to-leader coaching-to-motivation to learn and personality-to-leader coaching-to-psychological safety) and at the unit/individual level (e.g., voice behavior). The relationships, for H4a and H4b, was managed using SEM. Analysis of H4a and H4b cross- level effects (e.g., leader personality-to-leader coaching behavior-to-motivation to learn-to-voice behavior and leader personality-to-leader coaching behavior-to-psychological safety-to-voice behavior) where leader/manager personality impacts their own coaching behavior—which, in turn, influences follower/employee sense of safety and learning related motivation. And, as a result, employee voice behavior. HLM was used to explore the group-level effects of the hypothesized model.

Measurement Validity

In order to evaluate the measurement model holistically, a group level confirmatory factor analysis (CFA) was conducted. This CFA included all constructs as latent variables and the group-aggregated item means as observed variables. The measurement model fit the data well $x2=829.83$, p <.01, GFI = .97; AGFI = .95; NNFI = .98; CFI = .94; RMSEA = .05. Because two self-report measures were used——the validities of each measure was also assessed independently. Individual analysis, of motivation to learn and psychological safety, led to a one-factor solution in which each item set had high loadings (average single factor loading for motivation to learn = .83; average single factor loading for psychological safety was .76). The motivation to learn factor explained 30% of the total variance in the items and psychological safety factor explained 58% of the total variance in the items. Given the theoretical framing of

the study, both of these measures were examined closely (psychological safety and motivation to learn) in relationship to other measures in the study that are associated in the theoretical discussion (above). Motivation to learn was significantly correlated with leader coaching, voice behavior, agreeableness, and conscientiousness. Psychological safety was significantly correlated with leader coaching, voice behavior agreeableness, and conscientiousness (Table 2). These findings were consistent with the theoretical frame and study hypotheses.

Examining Aggregation

The feasibility of aggregating individual scores of psychological safety, motivation to learn along with leader coaching at the level of the work group. Within group agreement (rwg) was calculated based on guidelines from James, Demaree, and Wolf (1984) and interclass correlations (ICC) and the reliability of means (ICC[2]) were established using guidelines from Bliese (2000). The average rwg for psychological safety was .80 (Mdn = .84), the ICC(1) was .33 and the ICC(2) was .72. The average rwg for motivation to learn was .78 (Mdn = .81), the ICC(1) was .33 and the ICC(2) was .72. For leader coaching, average rwg was .80 (Mdn = .85), the ICC(1) was .34 and the ICC(2) was .76. Also, the group effect was significant (p < .01) based on the analyses of variance—on which ICC(1) values are based. On the whole, these findings indicate analysis of psychological safety, motivation to learn, and leader coaching to have been appropriate to analyze at the work group level.

Hypothesis Testing
Hypothesis 1 predicted positive association between leader/manager coaching behavior and follower/employee voice behavior. Exploration of within and between work group variance involved use of a null model. The sorted total variance into within- and between individual aspects was used to form the null model. Thirty percent of variance in leader/manager voice behavior was within individuals and between individual differences. Average scores were significant and meaningful (p < .01). Table 3, provides HLM results for Hypothesis 1. These findings support, after controlling for number of direct reports as a Level 2 predictor, that leader/manager coaching behavior predicted voice behavior of direct reports. This research outcome supports the cross-level main effect of leader/manager coaching on employee voice behavior. Hypothesis 1 was supported.

Hypotheses 2a and 2b predicted the positive association between leader/manager coaching and follower/employee voice behavior would be mediated by employee perceptions of psychological safety (H2a) and employee perceptions of motivation to learn (H2b). Hypothesis 2c projected a positive association from psychological safety to motivation to learn. Controlling for the number of direct reports as a Level 2 predictor, a four-step procedure for testing mediation was utilized.[42]

The confirmation of Hypothesis 1 (above) addresses Step 1 in the mediation testing process— leader/manager coaching behavior should be related to voice behavior. Confirming leader coaching is related to psychological safety (H2a) and motivation to learn (H2b) is required in Step 2. Ordinary least squares regression analysis was used in Step 2 as leader coaching behavior, psychological safety, and motivation to learn are group level variables. After controlling for number of direct reports, leader coaching behavior predicted psychological safety and motivation to learn. Step 3 necessitates that psychological safety and motivation to learn are

associated with employee voice behavior. As indicated in Table 3 (Model 2) after controlling for number of direct reports (Level 2 predictor) psychological safety (Level 2 predictor) significantly predicted supervisor ratings of employee voice behavior and (Model 3) significantly predicted supervisor ratings of motivation to learn—thus meeting the Step 3 requirement. In meeting the Step 4 requirement, leader coaching behavior, psychological safety and motivation to learn were explored as Level 2 predictors in the same regression model.

Once again, controlling for Level 2 number of direct reports, the results for this model (Table 3, Model 4), indicate that psychological safety and motivation to learn were significantly related to manager ratings of follower/employee voice behavior. The impact of leader/manager coaching behavior on supervisor ratings of follower/employee voice behavior was reduced in magnitude (p < .01) as compared with the same effect in Model 1, but remained significant. These results suggest that perceived psychological safety and motivation to transfer partially mediated the relationship between leader coaching behavior and supervisor ratings of employee voice behavior.

Hypotheses 3a, 3b and 3c predicted relationships between manager personality and leader coaching behavior—specifically leader/manager agreeableness (H3a) and conscientiousness (H3b) would be positively related and neuroticism negatively related to leader coaching behavior. SEM was used to test these hypotheses (Figure 1) $x2=347.29,$ p <.01 , GFI = .97; AGFI = .94; NNFI = .92; RMSEA = .04. The data supported the relationships between each manager agreeableness and conscientiousness (H3a and H3b) and manager coaching behavior in the projected direction, but failed to support the hypothesized inverse relationship between neuroticism and leader/manager coaching behavior (H3c).

Hypotheses 4a and 4b proposed indirect relationships between leader/manager personality (i.e., agreeableness, conscientiousness, and neuroticism) and employee voice behavior. In both cases, mediating effects of leader coaching behavior and one of two employee reported orientations toward psychological safety and motivation to learn were anticipated. The former (H4a) proposed the mediating effect of leader/manager coaching behavior and psychological safety and the later (H4b) the mediating effect of leader coaching behavior and motivation to learn. Table 4 presents the total, direct, and indirect effects of leader personality on psychological safety and motivation to learn. Manager agreeableness and conscientiousness were find to have significant total effects on psychological safety and motivation to transfer, but manager neuroticism was found to neither have a significant total effect on psychological safety, nor on motivation to learn.

To examine further the extent to which leader/manager coaching behavior mediated the relationship between leader/manager personality and psychological safety and leader/manager personality and follower/employee motivation to learn, the hypothesized model (Figure 1) was contrasted with an alternative model (Figure 2). The alternative model included direct paths from personality traits to psychological safety and to motivation to transfer. The alternative model fit (Figure 2) was very similar but the chi-square difference test was nonsignficant $x2=661.22,$ p <.01 GFI = .95; AGFI = .94; NNFI = .98; RMSEA = .06. Based on the rules of model parsimony, we that Figure 1 is the most parsimonious—with similar fit levels. Therefore, leader coaching behavior fully mediates leader personality traits-to-psychological safety and leader

personality traits-to-motivation to transfer relationships.

The final examination of Hypothesis 4a (leader personality-to-leader coaching behavior-to-psychological safety-to-voice behavior) and Hypothesis 4b (leader personality-to-leader coaching behavior-to-motivation to learn-to-voice behavior). To address these hypotheses, an HLM model predicting employee voice behavior was assessed (Table 3). Leader/manager personality, leader/manager coaching, psychological safety, motivation to learn, number of direct reports (control variable) and manager organizational status (control variable), all as Level 2 predictors, predicted voice behavior. Leader coaching behavior, psychological safety and motivation to learn were significant predictors of employee voice behavior. These findings indicated that leader personality traits relate indirectly to voice behavior through leader coaching and, in turn, employee psychological safety and motivation to transfer learning—thus supporting Hypotheses 4a and 4b.

Discussion

Although most engineering and technology scholars and practitioners would concur that leader/manager coaching is emerging as an important leadership behavior for successful organizations, thus far, research on leader coaching outcomes has been scare and only a few of limited outcome variables have been investigated. To examine the influence of perceived leader coaching practice on employee attitude and performance relevant outcomes in a comprehensive manner, this empirical investigation involved exploration of employee self-reported reactions to their received leader coaching.

These study findings demonstrated that the hypothesized conceptual model was adequately supported by the empirical data of the study sample. The hypothesized model provided clear and comprehensive illustrations of how coaching practice of leader action affects employee cognitive, affective, and performance outcomes in organizations. Most of all, since there is no widely accepted theory or model for leader coaching outcomes, the current hypothesized model has the potential to make a foundational contribution to leader coaching research in general, as well as in the study of engineering and technology leadership contexts.

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Tables and Figures Below

Table 1
Exploratory Factor Analysis—Leader Coaching Survey Items

Survey Item	EFA Loading	P-value
My leader/manager gives me one-on-one, work-related feedback.	.833	
My leader/manager provides me one-on-one information that helps me to do my job better.	.817	.000/
My leader/manager communicates with me one-on-one.	.801	.000/
My leader/manager coaches me.	.779	.000/

Table 2
Study Variable Means, Standard Deviations, and Correlations

Variable	M	SD	1	2	3	4	5	6
1. Agreeableness	3.71	0.39	-					
2. Conscientiousness	3.77	0.38	.29**	-				
3. Neuroticism	2.38	0.35	-.17*	-.14	-			
4. Management Coaching Behavior	3.47	0.48	.37**	.34**	-.09	-		
5. Motivation to Learn	3.39	0.46	.39**	.37**	-.09	.41**		
6. Psychological Safety	3.30	0.46	.39**	.34**	-.06	.43**	.45**	
7. Voice Behavior	3.56	0.33	.43**	.39**	-.04	.44**	.41**	.44**

Note. Correlations are computed at the level of the work group ($n = 291$)
*p < .05 (two-tailed); p < .01. (two-tailed)

Table 3
Hierarchical Linear Modeling Results for Cross-Level Effects:
Estimations of Level 2 Fixed Effects (γs) with Robust Standard Errors

Variable	Voice Behavior (Model 1)	Voice Behavior (Model 2)	Voice Behavior (Model 3)	Voice Behavior (Model 4)	Voice Behavior (Model 5)
Intercept	4.15**				
Number of direct reports	0.02				
Leader organizational status	0.18**				
Leader coaching behavior	0.35**				
Intercept		4.15**			
Number of direct reports		0.02			
Psychological safety		0.48**			
Intercept			4.15**		
Number of direct reports			0.02		
Motivation to learn			0.38**		
Intercept				4.15**	4.16**
Number of direct reports				-0.02	0.03
Manager organizational status				0.17**	0.07
Agreeableness					0.03
Conscientiousness					0.06
Neuroticism					0.03
Management coaching behavior				0.19**	0.21**
Psychological safety				0.33**	0.12**
Motivation to learn				0.27**	0.13**

**$p < .01$ (two-tailed test)

Table 4
Direct, Indirect, and Total Effects:
Personality Traits on Leader Coaching Behavior, Psychological Safety and Motivation to Learn

	Effect		
Personality traits	Total	Direct	Indirect
Agreeableness			
Leader coaching	0.35**	0.35**	
Psychological safety	0.19**		0.19**
Motivation to learn	0.18**		0.18**
Conscientiousness			
Leader coaching	0.30**	0.30**	
Psychological safety	0.17*		0.17*
Motivation to learn	0.14*		0.14*
Neuroticism			
Leader coaching	-0.08	-0.09	
Psychological safety	-0.05		-0.05
Motivation to learn	-0.02		-0.02

*$p < .05$; **$p < .01$.

Figure 1.
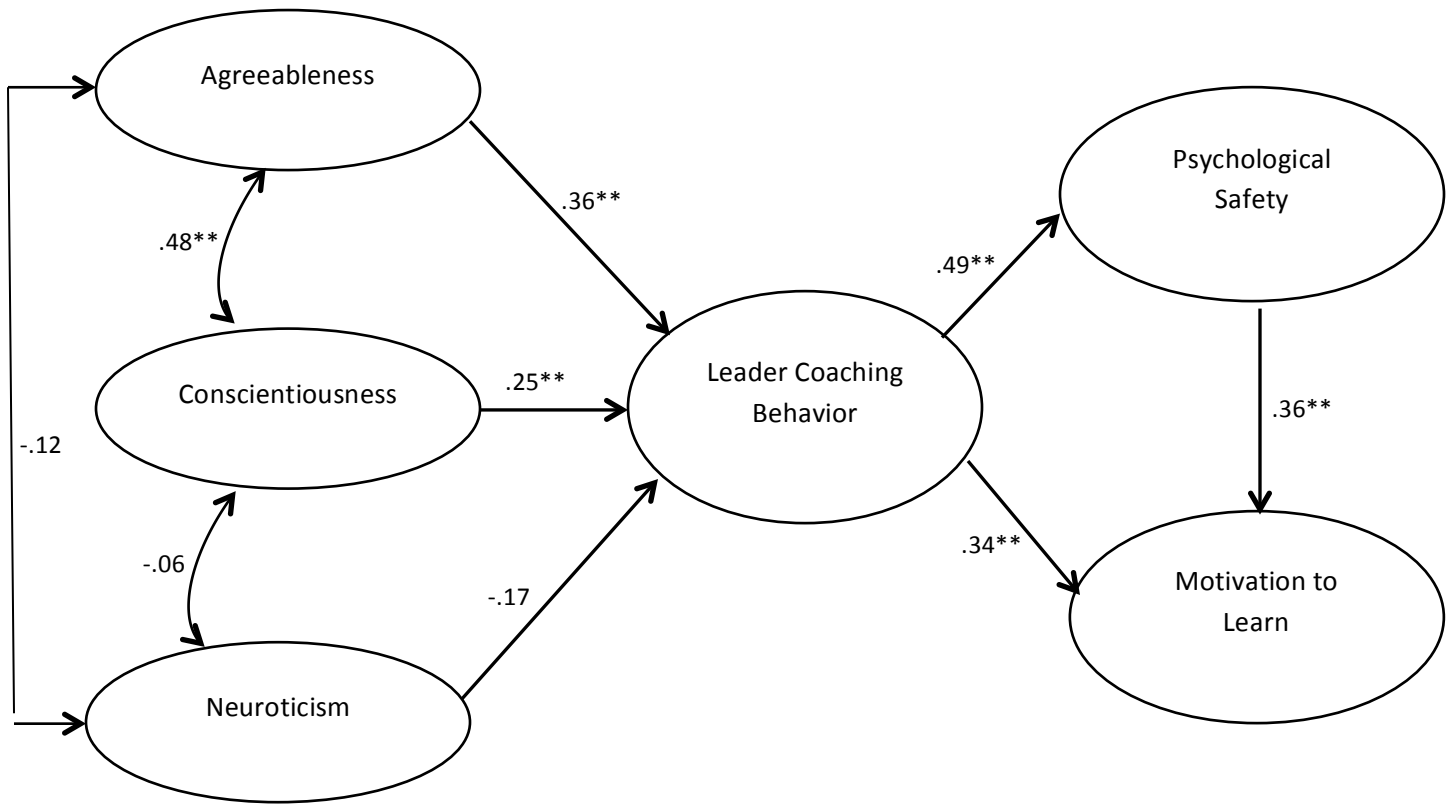Hypothesized Model: Leader Personality-to-Coaching Behavior-to-Employee reactions

Figure 2.
Alternative Model: Leader Personality-to-Coaching Behavior-to-Employee Reactions