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MOTIVATION TO LEAD AND ASIAN AMERICAN ENGINEERING MANAGERS

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Abstract
A research effort intended to explain why Asian American engineers are underrepresented in management at American companies is described. Specifically, the literature establishes that Asian Americans generally outperform European Americans in American schools and yet Asian American engineers are underrepresented in leadership roles in American companies. Furthermore, the literature establishes individualism and collectivism as antecedents to motivation-to-lead. Accordingly, a cross-sectional quantitative study was conducted using validated instruments to measure (a) four patterns of individualism and collectivism, and (b) three factors of motivation-to-lead. These data were used to test seven hypotheses which reflected the notion that as Asian American engineers experience their Asian culture in an American context, their overall motivation to lead may be less than their European American coworkers. Furthermore, the data were also used to test three hypotheses relating to how engineers' motivation to lead differs from non-engineers, regardless of culture. Three findings emerged from the analysis. First, Asian American engineers do experience higher levels of vertical collectivism than European American engineers. Second, although differences in vertical collectivism exist, there was no difference between the motivation-to-lead between the Asian American engineers and the European American engineers. Third, regardless of culture and ethnicity, engineers experience less social/normative motivation to lead than non-engineers. Taken together, it is theorized that the perception that Asian American engineers do not want to lead may be rooted in a failure to recognize that observed lower levels of motivation-to-lead may be due to occupation (engineer) rather than culture (Asian).

Keywords
culture, Asian, motivation to lead, engineers

Introduction
An abundance of evidence demonstrates that Asian American students tend to outperform European American students in American elementary schools, secondary schools, and universities (Liu & Xie, 2016; Hsin & Xie, 2014). As such, scholars have gone as far as describing Asian Americans as "those amazing Asians" (Xin, 1997, p. 335) and the "model minority" (Sy et al., 2010, p. 904). One result of the academic excellence of Asian Americans is that Asian Americans are three times more likely to become engineers than European Americans (Tang, 1993). Because of their predisposition toward engineering and their track record of academic superiority, one might reasonably expect Asian Americans to be overrepresented in engineering leadership positions (Sy et al., 2010). However, the same body of data that suggests Asian Americans outperform European Americans in academics demonstrates that Asian Americans are underrepresented in engineering leadership roles (Tang, 1993). In fact, the underrepresentation of Asian Americans in leadership roles extends across all industries in the United States (Xin, 1997; Sy et al., 2010).

At least four explanations for the underrepresentation of Asian Americans in leadership roles have been proposed. First, it may be a simple case of discrimination (Xin, 1997). Second, Xin found that ineffective (and culturally bound) impression management by Asian Americans is a contributing factor. Third, Sy et al. (2010) found that differences in perception of leaders in Asian cultures and Western culture is also a contributing factor. And finally, especially in engineering, Xin (1997) suggested that it may be simply that, within the American context, Asian Americans do not aspire to leadership.

The present research was designed to investigate this last theory, that disinterest in leadership is a contributing factor in the underrepresentation of Asian Americans in American engineering leadership roles. Specifically, the present research is a cross-sectional quantitative study which uses (a) Chan and Drasgow's (2001) Motivation to Lead (MTL) instrument and (b) Triandis and Gelfand's (1998) Culture Orientation Scale instrument for measuring individualism and collectivism. Because Chan and Drasgow (2001) identified individualism and

collectivism as antecedents to motivation to lead, it was expected that the difference would be reflected by the measurements from both instruments.

Literature Review

The literature review covers Asian Americans and their academic performance, Asian Americans and their underrepresentation in engineering leadership, individualism and collectivism, motivation to lead, and the research hypotheses.

Academic Performance and Asian Americans

In general, Asian American students outperform their European American peers in academics at every level (Liu & Xie, 2016; Hsin & Xie, 2014). According to Xin (1997), throughout the United States, all educators "know who will be in the university library on weekend evenings" (p. 336). Consequently, as compared to European Americans, Asian Americans earn higher grades, score higher on standardized exams, and are more likely to attend college, especially elite universities (Hsin & Xie, 2014). Several researchers have attempted to explain this phenomenon. For example, Sanchirico (1991) attributed the phenomenon to high incidences of small-business ownership among Chinese Americans; he argued that the proprietor's attitudes and aspirations communicate to their offspring and translate into educational aspirations.

More recently, Hsin and Xie (2014) proposed that the three most likely causes of Asian American academic success are either (a) socio-demographic factors related to parents who are better educated and provide an affluent and stable, two-parent family, (b) superior cognitive ability, or (c) work ethic. Drawing from two nationwide longitudinal education studies, Hsin and Xie obtained a sample of 2,878 European American students and 745 Asian American students. Their analysis showed work ethic to be the primary factor, however, they also found that cultural orientation and immigration status correlated highly with educational success. Additionally, Hsin and Xie cite other research suggesting that the collectivism and interdependence inherit in Asian culture indirectly influences student performance by creating an environment in which the parents' value on education is more readily communicated to their children.

According to Liu and Xie (2016), socioeconomic status is generally considered the most significant factor in educational outcome. To confirm this, they used data from the Educational Longitudinal Study of 2002 to obtain a sample of data for 8,978 Asian American and European American 10th grade students. Their analysis confirmed that socioeconomic status is a significant factor; however, they found that culture mediates the effect of socioeconomic status on educational success. Specifically, Liu and Xie found that the effect of socioeconomic status on Asian American students is far less than the effect of socioeconomic status on European American students. By creating various plots against socioeconomic status quintiles, Liu and Xie demonstrated the lessened effect of socioeconomic status on Asian American students for math test scores, reading test scores, 10th grade overall GPA, 10th grade academic GPA, work ethic, student expectations, parental expectations, and general math achievement scores. Although Liu and Xie suggest that Confucian culture plays a role in moderating the effects of socioeconomic status, they note that the effect is not limited to East Asian Americans. Other Asians, such as Indian Asians, experience the same effect.

In summary, it is clear Asian Americans perform better at academics than European Americans. Furthermore, clearly culture has a major role in this, in that both cultural values and cultural collectivism play significant roles in this effect. However, this effect may not be limited to East Asian Americans. Additionally, some scholars, such as Rosser (1998) warn against lumping Asians into "a monolithic group" (p. 85).

Asian American Engineers and Promotions

In 1986, the United States National Science Foundation commissioned their massive Survey of Natural and Social Scientists and Engineers (Tang, 1993). Using the results of that survey, Tang obtained demographic, educational, and career data from 12,200 Asian American and European American engineers. By analyzing the data, Tang found some evidence of unequal pay between Asian American and European American engineers as the mean salary of European American engineers was \$44,541 (N=10,874) in comparison to \$43,256 (N=1,326) for Asian American engineers. However, Tang noted that the difference is not large and may be attributable to the common practice of Asian American engineers accepting lower salaries in exchange for their employers helping them obtain permanent residency.

In contrast, Tang (1993) found a sizeable difference in terms of attainment of leadership positions. Specifically, even though the data indicated that Asian American engineers are generally better educated than their European American counterparts, only 25% of Asian American engineers occupy leadership positions in comparison to 40% of European American engineers (Tang, 1993). Furthermore, in the two years prior to the study, 13% of Asian American engineers received promotions in comparison to 17% of European Americans. In her

analysis of the same phenomenon across a wider spectrum of industries (i.e., not just engineering), Xin (1997) noted that, although the behavior and traits of Asian American workers are generally valued and respected, it is still unusual for Asian Americans to occupy top positions. This is unexpected because, as Liu and Xie (2016) note, generally, educational achievement correlates strongly with "labor market outcomes" (p. 210). Furthermore, Sy et al. (2010) note that this condition is the exact opposite of what one would expect given what Asian American workers typically accomplish. That is, given their work ethic and academic excellence, Sy et al. observe that overrepresentation in management seems more fitting. In summarizing the situation, Tang (1993) proposed the metaphors of a "glass ceiling" (p. 468) and a "broken ladder" (p. 486).

Several theories have been proposed to explain this broken ladder. In their study of 131 undergraduate students and 743 workers in Southern California, Sy et al. (2010) found significant differences in how Asian Americans and European Americans conceive of a leader. This misalignment of perceptions of what a leader is, according to Sy et al.'s findings, explains some of the broken ladder. In a similar vein, Xin (1997) studied 144 Asian American managers and 122 European American managers and identified a fundamental difference in how the two groups approach impression management. Interestingly, Xin identified power distance as playing a role in impression management, noting that European Americans often manage impression with their supervisors by asking their supervisors about their life outside of work. To individuals in a high power-distance culture, however, such conversations are unthinkable. Differing approaches to image management, according to Xin, therefore, also explains some of the broken ladder.

However, Xin (1997) also reports that in her qualitative interviews, she found that many Asian Americans simply do not want leadership positions. In this regard, it is important to note that, according to Tang (1993), Asian American engineers' desire to avoid leadership may reflect a desire to focus on their engineering skills. Hence, the desire to avoid leadership is not necessarily a negative. Regardless, this final explanation, that Asian Americans may not desire leadership roles in American companies, is the gap in the existing literature that the proposed study is intended to address.

Individualism and Collectivism

According to Hofstede, Hofstede, and Minkov (2010), people in a collectivist society are inclined to submit their personal interests to the interests of the group. Furthermore, group provision and protection is expected "in exchange for unquestioning loyalty" (Hofstede et al., 2010, p. 92). As such, children growing up in collectivist societies tend to (a) think in terms of an in-group, and (b) live with the understanding that disloyalty to the in-group is a serious moral offense (Hofstede et al., 2010, p. 91). In contrast, in individualistic societies, people are inclined to value their personal interests over the group's, and accordingly, they are expected to take care of themselves (Hofstede et al., 2010, p. 92).

Hofstede et al. (2010) further observe that there is some question as to whether individualism and collectivism should be viewed as the two extremes of the same dimension or as two distinct dimensions. In response, Hofstede et al. note that, depending on the level of analysis, both approaches are valid. When analyzing individual people, individualism and collectivism are best viewed as two distinct dimensions or patterns, and, as Hofstede et al.'s data show, individuals can score high on both individualism and collectivism simultaneously (p. 102). In contrast, when viewing societies on average, Hofstede et al.'s data shows that individualism and collectivism ought to be thought of as opposites on a single dimension. Hence, a society high on collectivism always scores low on individualism. Gelfand, Bhawuk, Nishii, and Bechtold (2004) weigh in on this issue and confirm that the project GLOBE data demonstrate the "unidimensionality of the constructs at the societal level" (p. 463) although they admit that some researchers argue that, even at the societal level, the two constructs can be orthogonal.

Individualism and Collectivism as Vertical and Horizontal

Because they observed that American individualism and Swedish individualism differ profoundly, Triandis and Gelfand (1998) conducted a qualitative study of 327 students at Chung-Ang University in South Korea and 217 students at the University of Illinois. In doing so, Triandis and Gelfand demonstrated that individualism and collectivism exist in more than two patterns. Specifically, Triandis and Gelfand found evidence of four patterns: "vertical collectivism, vertical individualism, horizontal collectivism, and horizontal individualism" (p. 118). The underlying logic is that people in either of the two collectivism patterns see themselves primarily as part of a group, whereas those in either of the two individualistic patterns see themselves primarily as individuals irrespective of any group. Furthermore, those in either of the two horizontal patterns perceive people as equal whereas those in either of the two vertical patterns readily accept the notion that some people are more important than others. Combined, these two dimensions, (a) collectivism versus individualism, and (b) vertical versus horizontal, form four distinct patterns. Hence, for Triandis and Gelfand, (a) a vertical collectivist sees him/herself as part of a group and accepts

hierarchical differences within the group, (b) a horizontal collectivist sees him/herself as part of a group of equals, (c) a vertical individualist sees him/herself as an individual among individuals of different rank, and (d) a horizontal individualist sees him/herself as an individual among equals.

Motivation to Lead

According to Amit, Lisak, Popper, and Gal (2007), the motivation to lead (MTL) research stream began with the three-factor empirical model proposed by Chan and Drasgow (2001). The first factor, affective-identity MTL (AI-MTL), refers to the degree to which people lead because they enjoy leading and see leading as part of their self-image (Chan & Drasgow, 2001). The second-factor, non-calculative MTL (NC-MTL), refers to motivation which transcends a mere desire for reward. The third factor, social normative MTL (SN-MTL), refers to the degree to which people lead because they feel either a moral or social obligation to lead. Initially, Chan and Drasgow theorized that the antecedents to MTL would be (a) general mental ability, (b) personality, and (c) values as mediated by leadership self-efficacy and moderated by previous leadership experience. However, by using factor analysis on their data gathered from 1,594 Singaporean soldiers, 274 Singaporean community college students, and 294 American undergraduate students, Chan and Drasgow found MTL had (a) no correlation with general mental ability, (b) moderate correlation with all five personality factors (extraversion, agreeableness, conscientiousness, emotional stability, openness to experience) and (c) moderate correlation with values. Furthermore, Chan and Drasgow found that both leadership self-efficacy and previous leadership experience are actually both mediators between three of the five personality factors and all three factors of MTL. And, most importantly for the present study, Chan and Drasgow also found the complex web of correlations among individualism, collectivism, and motivation presented in Table 1.

Table 1.
Correlations among Individualism, Collectivism, and Motivation to Lead

Individualism/Collectivism	AI-MTL	NC-MTL	SN-MTL
Vertical Individualism	Positive	Negative	Positive
Vertical Collectivism	n/a	Positive	Positive
Horizontal Individualism	n/a	Negative	Negative
Horizontal Collectivism	n/a	Positive	n/a

From Chan and Drasgow (2001, p. 491)

In a study of 231 commissioned and non-commissioned United States Air Force officers, Clemmons and Fields (2011) tested the correlation of Chan and Drasgow's (2001) three-factor MTL model with the values of self-enhancement, which involves a desire to better oneself by accomplishing goals, and self-transcendence, which involves adopting a moral code and living nobly. In doing so, Clemmons and Fields (2011) found a correlation between (a) the officer's inclination to better themselves with AI-MTL and (b) the officer's values and NC-MTL. In other words, with these Air Force officers, both a desire to excel and a desire to be moral correlate positively with MTL. Considering this research, it is tempting to expect that high-performing students have a strong sense of self-enhancement and therefore should have a high AI-MTL.

Culture And Motivation To Lead.

Concurrently with Clemmons and Fields's (2011) research, Hong, Catano and Liao (2011) studied 379 Canadian university students to understand the relationships among (a) leadership emergence, (b) motivation to lead, and (c) Mayer and Salovey's (1995) conception of ability emotional intelligence. Hong et al. found that, as expected, there was a correlation between AI-MTL and SN-MTL and leader emergence. However, they did not find a correlation between NC-MTL and leader emergence. In other words, Hong et al. (2011) found that one of Chan and Drasgow's (2001) MTL factors (NC-MTL) did not correlate with the similar variable of leader emergence. Logically, this seems to suggest either a problem with Chan and Drasgow's model or an effect related to societal culture, as Hong et al.'s (2011) study involved only Canadian students. This is particularly relevant for the present study in that it suggests the possibility that either (a) societal culture interacts with MTL, or (b) a problem exists with Chan and Drasgow's (2001) model.

Amit and Bar-Lev (2013) extended the MTL research by comparing workers in the Israeli technology sector with different cultural backgrounds. Specifically, Amit and Bar-Lev compared native Israelis with workers who immigrated from the former Soviet Union. By gathering both qualitative and quantitative data, Amit and Bar-Lev found that workers' (a) cultural values, (b) perceptions of organizational politics, and (c) mental schemas (scripts) through which they perceive the working environment, all influenced their motivation to lead. Their study is relevant to the present study because it suggests that societal culture influences motivation to lead.

Engineers And Motivation To Lead.

In their study of 81 undergraduate engineering students (66% Caucasian, 14% Asian) at a large public university in the Midwestern United States, Rosch, Collier, and Zehr (2014) studied the relationships among leadership competency, gender, leadership self-efficacy, and MTL. Interestingly, Rosch et al.'s data did not suggest that leadership self-efficacy is an antecedent to MTL, as Chan and Drasgow (2001) found. Furthermore, Rosch et al. (2014) found that only AI-MTL predicted leadership competence. However, logically, the lack of correlation between leadership competence and either SN-MTL or NC-MTL does not necessarily imply a problem with Chan and Drasgow's (2001) model because Chan and Drasgow suggest no link between motivation to lead and competency to lead. Additionally, the data raise the possibility that Chan and Drasgow's model may require modification when applied to engineers.

In a recent phenomenological investigation of how engineers lead and follow, Ulrich (2017) interviewed six senior engineers who exert significant influence on their company but prefer to remain in non-management positions. In general, Ulrich found that as technical experts in a high technology company, these engineers experienced motivation to lead differently than their non-engineering coworkers. Furthermore, these six senior engineers reported no sense of either social or moral obligation to become managers, suggesting that these technical leaders have low SN-MTL.

Basic Needs Satisfaction And Motivation To Lead.

By studying 231 undergraduate students at a large university in the Midwestern United States, Cho, Harrist, Steele, and Murn (2015) extended Chan and Drasgow's (2001) work by incorporating psychological theory related to basic needs satisfaction. In doing so, Cho et al. (2015) had several important findings. First, Cho et al.'s data supported Chan and Drasgow's (2001) notion that leadership self-efficacy is a mediating variable for all three types of MTL. Second, Cho et al. (2015) found that leadership self-efficacy also mediates the effect of basic needs satisfaction. Third, they found that the basic need for relatedness correlates positively with SN-MTL and negatively with NC-MTL. Fourth, Cho et al. found that the basic need of competence correlated positively with AI-MTL. And fifth, they found that male participants tended to have more calculative motivations to lead than females. For the purposes of the present research, Cho et al.'s findings suggest that basic needs satisfaction may be most salient. Specifically, their data suggest that the basic need for competence correlates with AI-MTL. It is reasoned, then, that one way to fulfill the basic competence need is by leading. Perhaps, then, as Asian American engineers excel in their work, their need for competence is fulfilled, thus reducing the need to fulfill that basic need by leading.

Self-Perception And Motivation To Lead.

Guillén, Mayo, and Korotov (2015) extended the MTL research by incorporating self-other comparison theory into their study of motivation to lead, proposing that these comparisons directly influence motivation to lead. Specifically, gathering data in four studies with a total of over 400 European business students, Guillén et al. found a correlation between MTL and both (a) the extent to which individuals see themselves as affiliated with outstanding leaders in their organization and (b) the extent to which individuals see themselves as similar to their conception of an ideal leader. It may be, therefore, that because of their cultural differences, Asian American engineers do not perceive themselves as affiliated with the organizational leaders, and therefore have less motivation to lead. This is to say, that it may be that perceptions by Asian American engineers may play a role in propagating the underrepresentation of Asian Americans in engineering leadership roles.

Summary: Asian American Engineers And Motivation To Lead.

Taken together, the body of MTL research seems to hold three primary implications for the present study. First, although some inconsistencies have been identified with Chan and Drasgow's (2001) model and instruments, the majority of studies use their model and their instruments. Second, taken together, societal culture appears to be consistently implicated in attempts to reconcile Chan and Drasgow's (2001) results with more recent studies. Third, collectivism and individualism appear to be the salient dimensions of societal culture. In sum, it appears that the

literature provides ample support for the notion that cultural factors may play a significant role in Asian American engineers' motivation to lead.

Research Hypotheses

The primary objective of the proposed study is to understand if the underrepresentation of Asian American engineers in leadership positions in American companies can be explained by cultural affects. However, as noted by Xin (1997), leadership positions at the large Asian companies (e.g., Toyota) are largely held by Asians, and therefore clearly the issue is not simply that Asians prefer not to lead. Instead, the objective of this study is to investigate the effects of Asian culture on Asian American engineers working in American companies. That is, this study concerns itself primarily with Asian culture as expressed in American companies.

Chan and Drasgow (2001) found that collectivism and individualism are antecedents of motivation to lead. If the present study compared Asian engineers working in Asia with European American engineers working the United States, the literature (e.g., House, Hanges, Javidan, Dorfman, & Gupta, 2004) could be used to estimate the magnitude of the impact of collectivism and individualism on motivation to lead. However, the proposed study concerns transplanted culture, that is Asian Americans who are influenced by both Asian and Anglo culture. For this reason, the proposed study measures collectivism and individualism. Nonetheless, the evidence (e.g., Liu & Xie, 2016) showing that Asian American students outperform European American students suggests that there remains some Asian cultural influence on Asian Americans. Accordingly, it is hypothesized that the individualism and collectivism of Asian American engineers will reflect the same general trends as the data from Gelfand et al. (2014) which suggests that Asians score higher on collectivism and lower on individualism than Anglos. Specifically, using Triandis and Gelfand's (1998) four patterns of individualism and collectivism, the first set of hypotheses for this study are:

H1A: Asian American engineers have higher vertical collectivism than European American engineers.

H1B: Asian American engineers have higher horizontal collectivism than European American engineers.

H1C: Asian American engineers have lower vertical individualism than European American engineers.

H1D: Asian American engineers have lower horizontal individualism than European American engineers.

Chan and Drasgow (2001) describe AI-MTL as reflecting both a desire to lead (hence, affective) and self-perception as a leader (hence, identity). Because Sy et al. (2010) found that Asian Americans and European Americans perceive leadership differently, it is concluded that AI-MTL will likely be different for Asian Americans and European Americans. Furthermore, Chan and Drasgow (2001) found that vertical individualism varies positively with AI-MTL. Since the data from Gelfand et al. (2004) suggests that Asian societies tend to have lower individualism than the United States, it is concluded that Asian American engineers are likely to have lower AI-MTL than their European American coworkers.

H2A: Asian American engineers have lower AI-MTL than European American engineers.

According to Chan and Drasgow (2001), (a) collectivism correlates positively with NC-MTL and (b) individualism correlates negatively with NC-MTL. Since Gelfand et al. (2004) found Asian societies tend to score higher on collectivism and lower on individualism, it is concluded that Asian American engineers are likely to have higher NC-MTL than their European American counterparts.

H2B: Asian American engineers have higher NC-MTL than European American engineers.

Regarding SN-MTL, Chan and Drasgow (2001) found that both vertical individualism and vertical collectivism correlate positively with SN-MTL, hence the vertical patterns of collectivism provide no guidance for predicting SN-MTL. However, Chan and Drasgow also found that horizontal individualism correlates negatively with SN-MTL. Since the data from Gelfand et al. (2004) suggests that the United States scores lower on in-group collectivism practices than all of the Asian countries and lower on institutional collectivism practices than all Asian countries except Thailand, it is concluded that Asian American engineers are likely to score higher on SN-MTL than European American engineers.

H2C: Asian American engineers have higher SN-MTL than European American engineers.

Both Rosch et al. (2014) and Ulrich (2017) found evidence that engineers may experience motivation to lead differently from their non-engineering coworkers. Regarding AI-MTL, Ulrich found evidence that engineers in technical leadership enjoy providing technical leadership, but prefer to remain in non-managerial roles. This finding suggests that for engineers, AI-MTL may be different from non-engineers, but it does not establish directionality, hence the next hypothesis is formulated as a difference without direction.

H3A: Engineers have different AI-MTL than non-engineers.

The findings from Rosch et al. (2014) suggest that engineers may experience less NC-MTL than non-engineers. Accordingly, the next hypothesis is stated with directionality.

H3B: Engineers have lower NC-MTL than non-engineers.

Ulrich (2017) found that some senior engineers in technical leadership roles experience no sense of SN-MTL. Accordingly, it is hypothesized that engineers will have lower levels of SN-MTL than non-engineers.

H3C: Engineers have lower SN-MTL than non-engineers.

Method

Fundamentally, this study was quantitative and cross-sectional. According to Creswell and Creswell (2018), such research typically involves (a) pre-determined procedures, (b) the use of instruments with a limited range of responses (e.g., Likert-style responses), (c) quantifiable data, (d) statistical analysis, and (e) a statistics-based interpretation and summary. Furthermore, as cross-sectional research, fundamentally, the research design called for correlation of data from multiple surveys. These surveys measured (a) the dependent variables (the three aspects of motivation to lead), (b) the moderators (vertical collectivism, horizontal collectivism, vertical individualism, and horizontal individualism), (c) the independent variable (societal culture: Asian American, European American, other), and (d) the control variables (age, occupation, gender, etc.).

Sampling Procedure

Purposive, nonprobability sampling was used to gather data from two clusters of engineers and other knowledge workers in American companies. First, employees known to the researcher at several aerospace and medical device companies in Southern California were asked to participate. Some of these participants completed paper surveys while others, who were invited via email, completed the online (Survey Monkey) version of the survey. Second, attendees at a large medical device manufacturers conference were asked to complete paper surveys. The proposal for the study also called for gathering data from a professional management society which frequently assists graduate student by sending email invitations to participate in research efforts. However, the society declined the request for assistance citing an unwritten policy to only provide this service in support of doctoral dissertations.

Instrumentation

The data were gathered using a single survey composed of (a) 27 items from Chan and Drasgow (2001) for measuring motivation to lead, (b) 16 items from Triandis and Gelfand's (1998) Culture Orientation Scale, and (c) six demographic items. Furthermore, Chan and Drasgow's (2001) instrument incorporates nine Likert-style questions for each of the three MTL factors, while Triandis and Gelfand's (1998) Culture Orientation Scale incorporates four Likert-style items for each of the four combinations of collectivism/ individualism and horizontal/vertical.

Research Sample

In total, 30 completed paper surveys were obtained at the conference, 91 completed paper surveys were obtained from employees at Southern Californian medical device manufacturers, and 33 completed surveys were collected online. However, two of the paper surveys were discarded because only one side of the survey was completed, hence 152 usable surveys were obtained. Regarding gender, 105 (69.1%) of the participants indicated male, 45 (29.6%) of the participants indicated female, and 2 (1.3%) did not indicate. As for ethnicity, 77 (50.7%) of the participants indicated European American, 27 (17.8%) indicated Asian American, 46 (30.2%) indicated neither European American nor Asian American, and 2 (1.3%) did not indicate. Regarding occupation, 96 (63.2%) of the participants indicated engineering, 53 (34.9%) indicated non-engineering, and 3 (2.0%) did not indicate. The average age of the participants was 37.8 years (SD = 11.4 years). The average undergraduate GPA reported was 3.41 (SD = .40). Regarding undergraduate major, 82 of the participants (53.9%) reported engineering or computer science, 24 (15.8%) reported scientific but not engineering, and 37 (24.3%) reported neither engineering nor science.

Results

Despite the evidence (e.g., Hofstede, Hofstede, & Minkov, 2010) that individualism and collectivism differs between Asians living in Asia and Americans living in America, it was unknown how Asians Americans living in America differ from European Americans in America. The first hypothesis, H1A, predicted Asian American engineers would have higher vertical collectivism than European American engineers. As expected, a single-tail independent samples t-test, $t(75) = 1.78$, $p = .04$, $d = .45$, confirmed that Asian American engineers (M = 7.08, SD = 1.30) have a higher vertical collectivism (mean difference = .63, 95% CI [-.77, 1.33]) than European American engineers (M = 6.46, SD = 1.43). Therefore, H1A was supported.

The next hypothesis, H1B, predicted Asian American engineers would have higher horizontal collectivism than European American engineers. However, a single-tail independent samples t-test, $t(75) = -.27$, $p = .40$, did not

suggest that the horizontal collectivism for Asian American engineers (M = 7.18, SD = 1.11) is higher than for European American engineers (M = 7.25, SD = .98). Hence, H1B was not supported.

Next, H1C predicted that Asian American engineers would have lower vertical individualism than European American engineers. However, a single-tail independent samples t-test, $t(74) = .37$, $p = .36$, did not confirm that vertical individualism for Asian American engineers (M = 4.76, SD = 1.89) is lower than that for European American engineers (M = 4.59, SD = 1.88). Therefore, H1C was not supported.

As for horizontal individualism, H1D predicted that Asian American engineers would have lower horizontal individualism than European American engineers. However, the single-tail independent samples t-test, $t(74) = -.01$, $p = .50$, did not suggest that Asian American engineers (M = 6.28, SD = 1.05) have lower horizontal individualism than European American engineers (M = 6.28, SD = 1.28). As such, H1D was not supported.

Regarding AI-MTL, H2A predicted that Asian American engineers would have lower AI-MTL than European American engineers. However, a single-tail independent samples t-test, $t(75) = -.69$, $p = .25$, did not confirm that Asian American engineers (M = 3.32, SD = .72) have lower AI-MTL than European American engineers (M = 3.45, SD = .70). Therefore, H2A was not supported.

Concerning NC-MTL, H2B predicted that Asian American engineers would have lower NC-MTL than European American engineers. However, a single-tail independent samples t-test, $t(75) = -.10$, $p = .46$, did not suggest that Asian American engineers have NC-MTL higher (M = 2.25, SD = .46) than European American engineers (M = 2.26, SD = .55). As such, H2B was not supported.

As for SN-MTL, H2C predicted that Asian American engineers have higher SN-MTL than European American engineers. Again, the results of a single-tail independent samples t-test, $t(75) = 1.40$, p = .08 failed to show that Asian American engineers (M = 3.58, SD = .49) have higher SN-MTL than European American engineers (M = 3.38, SD = .56). Accordingly, H2C was not supported.

The third group of hypotheses, H3A, H3B, and H3C, predicted different levels of motivations to lead between engineers and non-engineers. H3A predicted a difference of AI-MTL between engineers and non-engineers. However, a two-tail independent samples t-test, $t(147) = 1.40$, $p = .16$ showed no difference between AI-MTL for engineers (M = 3.42, SD = .67) and non-engineers (M = 3.62, SD = .70). Therefore, H3A was not supported.

Regarding NC-MTL, H3B predicted engineers would have lower NC-MTL than non-engineers. However, a one-tail independent samples t-test, $t(147) = .39$, $p = .35$ showed no significant difference between NC-MTL for engineers (M = 2.24, SD = .52) and for non-engineers (M = 2.28, SD = .63). As such, H3B was not supported.

Similarly, H3C predicted than engineers would have lower SN-MTL than non-engineers. And, a one-tail independent samples t-test, $t(147) = 2.02$, $p = .023$, $d = .35$, suggested a statistically significant difference (mean difference = .19, 95% *CI* [.00, .38] .) between SN-MTL for engineers (M = 3.41, SD = .57) and for non-engineers (M = 3.60, SD = .51) . Specifically, as hypothesized, engineers had lower SN-MTL than non-engineers. Therefore, H3C was supported.

Discussion

The present research was designed to provide insight into the disproportionately low percentage of Asian American Engineers promoted to management at American companies. Furthermore, this disproportion is particularly unexpected given that, on average, those same Asian American engineers outperformed their European American coworkers at American universities. Of course, one explanation of this phenomena is discrimination. However, before such claims are made, alternative explanations should be considered. Hence the present study considered one such alternative explanation. Specifically, it was hypothesized that as Asian American engineers experience a blend of both Asian and American culture, either their affective/identity motivation to lead (AI-MTL), non-calculative motivation to lead (NC-MTL) or social/normative motivation to lead (SN-MTL) is reduced. Furthermore, because Chan and Drasgow (2001) found that Triandis and Gelfand's (1998) cultural dimensions of vertical collectivism, horizontal collectivism, vertical individualism, and horizontal individualism were antecedents of AI-MTL, NC-MTL, and SN-MTL, it was reasoned that the effect of the blending of the two cultures should be observable in measurements of those four dimensions. Hence, for the present study, Chan and Drasgow's (2001) three dimensions of motivation to lead (AI-MTL, NC-MTL, SN-MTL) and Triandis and Gelfand's (1998) four dimensions of individualism and collectivism were measured.

As such, confirmation of cultural differences was the foundation of study. Arguing from the literature, it was hypothesized that the two dimensions of collectivism (vertical, horizontal) would be higher for the Asian American engineers than for the European American engineers. Conversely, it was hypothesized that the two dimensions of individualism (vertical, horizontal) would be higher for the European American engineers than for the Asian American engineers. As it turns out, the statistical analysis of the data suggest that the difference exists only in vertical collectivism. Specifically, the data suggest that Asian American engineers experience higher levels of

vertical collectivism than European American engineers. Hence, it may be that as Asian American engineers blend their Asian and American cultures, the most significant difference between their culture and the dominate European American culture is vertical collectivism.

Although the cultural measurements were the foundation of the study, the measurements of motivation to lead were the overall purpose of the study. Based on the societal culture literature in general, and project GLOBE (House et al., 2004) in specific, it was hypothesized that the Asian American engineers would experience lower AI-MTL than their European American coworkers but higher NC-MTL and SN-MTL. However, the analysis of the data provided no evidence to support any of these hypotheses. Although at a superficial level, finding no support for any of these three core hypotheses is disappointing, this is a significant finding. Specifically, this finding of no support provides empirical evidence that lack of motivation to lead cannot be used to explain the disproportionately low percentage of Asian American engineering managers in American companies. Simply put, this finding undermines the myth that Asian American engineers do not want to be managers. Accordingly, senior managers at American companies are encouraged to consider the possibility they are discriminating against Asian American engineers when selecting new engineering managers.

In addition to the central finding that no difference exists between the motivations to lead of Asian American engineers and European American engineers, another interesting finding emerged while comparing engineers to non-engineers. Specifically, these results suggest that engineers experience less social/normative motivation to lead than non-engineers. This finding is consistent with a recent qualitative investigation of engineers and their motivation to lead and follow. Specifically, Ulrich (2017) interviewed six senior engineers who provide technical leadership at their companies yet prefer to remain in non-management positions. These six senior engineers likewise reported no sense of either social or moral obligation to become managers. When combined with the results from the present study, evidence is mounting that engineers may experience less social/normative motivation to lead than their non-engineering co-workers.

As these three findings are combined, a scenario emerges which may explain the acceptance of the myth that Asian American engineers do not want to lead. When observing Asian American engineers, senior managers correctly observe two facts. First, as evidenced by the differences in vertical collectivism, Asian American engineers do think differently than European American engineers. Second, when comparing Asian American engineers to European American non-engineers, an Asian American engineer may have lower motivation to lead than a European American non-engineer. It is proposed, therefore, that one enabling mechanism for the myth may be that observers incorrectly attribute the lower motivation to lead to Asian culture. In other words, when senior managers observe an Asian American engineer who does not want to lead, they fail to realize that an Asian American engineer may not want to lead because he/she is an engineer, and not because he/she is Asian.

As with all research, this effort had limitations. Most importantly, the sample size is small, comprised of only 152 usable surveys. Additionally, the sample was drawn from knowledge workers at medical device manufacturers and aerospace companies, which are both heavily regulated environments, and potentially quite different from environments such as Microsoft and General Motors. As such, there may be value in replicating this study with a larger and broader research sample. Furthermore, the results of this study discredit the myth that Asian American engineers do not want to be managers. Accordingly, there may be value in conducting research aimed at determining if the senior managers who select engineers for promotion to management accept this myth.

Conclusion

Three important findings emerged from a research effort designed to explain why Asian American engineers are underrepresented in management at American companies. First, Asian American engineers do experience higher levels of vertical collectivism than European American engineers. In other words, Asian culture has some influence on Asian American engineers at work. Second, although differences in vertical collectivism exist, differences were not observed between the motivation to lead of Asian American engineers and European American engineers. As such, this finding discredits the myth that Asian American engineers do not want to be managers. Third, regardless of culture and ethnicity, engineers experience less social/normative motivation to lead than non-engineers. Taken together, it is proposed that attributing observed lower motivation to lead to ethnicity (Asian) rather than occupation (engineer) may explain the propagation of the myth that Asian American engineers do not want to lead. However, there may be value in (a) replicating the study with a larger and broader sample, and (b) studying the degree to which senior managers accept the myth that Asian American engineers have less desire to lead than their European American coworkers.

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