

The Effects of Gender and Academic Backgrounds on the Structural Model of English Achievement^{*}

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The present study examines the causal relationships among factors that directly or indirectly influence English achievement for Korean university students using a structural equation modeling (SEM) approach. In this regard, three SEM models are developed to identify a model of L2 achievement that best explains the structural paths leading to increased English achievement for Korean students. The effects of gender and academic backgrounds on the structural model of English achievement are further gauged by multi-sample analyses. Results of the SEM analyses indicate that motivation and self-confidence were causally related to English achievement, whereas various L2 orientations indirectly influenced English achievement through motivation and self-confidence. Among the many L2 orientations, the intrinsic and extrinsic dichotomy showed a better fit of the model to the data than the integrative and instrumental orientation. Extrinsic motivation, however, was found to have an insignificant influence on self-confidence, thus highlighting the importance of intrinsic motivation for the Korean sample. Results of the multi-sample analyses suggest that there was no gender effect on the proposed model of English achievement. However, the strength of the relation between intrinsic motivation and self-confidence proved to be significantly stronger for the humanities than for the sciences. Pedagogical implications are provided.

I. INTRODUCTION

Considerable attention has been given to the analysis of group or individual differences in L2 achievement. Accordingly, individual factors that are related to L2 achievement have been separately analyzed in reference to L2 achievement. For example, cognitive or attitudinal variables such as motivation, language learning strategies, orientations, or

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self-confidence are known to explain some proportion of the variances associated with L2 achievement. However, a few studies (e.g., Csizér & Dörnyei, 2005; Gardner, Tremblay, & Masgoret, 1997; Tremblay & Gardner, 1995) have performed a simultaneous analysis of the factors influencing L2 achievement. The simultaneous analysis of the L2-related factors is very important because some factors influence L2 achievement only indirectly through mediator variables. Making a causal inference between such a factor and L2 achievement would mask the real relation, hence giving wrong advice for curriculum designers and policy makers. Therefore, specifying the causal relationships among factors affecting the target language achievement is a prerequisite for developing student-centered language curricula and classroom teaching methods. Hence, achievement models, where structural relationships among theoretical factors influencing the target language achievement are causally specified, have received substantial attention from researchers, since achievement models are very useful for the etiology of group or individual differences in academic performances. So far, several achievement models have been proposed (e.g., Atkinson, 1964; Clément, 1980, 1986; Eccles et al., 1983; Gardner, 2001), and some of them were empirically tested.

Regardless, no attempts have been made to examine the structural relationships among individual factors affecting L2 achievement for Korean learners of English. Thus, the direct as well as indirect paths that lead to learners' increased achievement of English are not identified, thereby limiting a scientific design of English curriculum and teaching methods that are closely aligned to the Korean context. Scarcity of a causal analysis of the relevant L2-related factors may be ascribed to the methodological intensiveness, because such a study requires the application of structural equation modeling (SEM).

Therefore, the present study explores an achievement model that best explains the variances associated with English proficiency for Korean learners of English using the SEM procedure. The purpose of the present study is two-fold. As an initial step, the present study identifies a target structural model of English achievement. Then, the present study examines the effects of gender and academic backgrounds on the proposed model of English achievement.

II. RESEARCH BACKGROUND

1. Models of General Academic Achievement

Models of general academic achievement have been suggested in order to explain apparent group differences (e.g., males vs. females) in academic performances, especially in mathematics. For example, a general model of academic behaviors suggested by Eccles

and her colleagues (Eccles et al., 1983) posits causal relationships between achievement behaviors and expectancies for success on the one hand, and achievement behaviors and perceived value on the other. According to the model, expectancies and perceived value are directly influenced by goals, perceived task difficulty, and self-concept of ability, which in turn are formed through individuals' interpretation of past performance and individuals' perception of socializers' attitudes and expectations. The expectancy-value perspective of achievement behaviors was originally derived from Atkinson's theory of motivation (e.g., Atkinson, 1958, 1964), which specified the relationships between motivational factors and achievement behaviors using subjective expectancy and incentive value framework. Building on the original Atkinson's theoretical framework but focusing on cognitive constructs (e.g., causal attributions, self-concept of abilities) instead of motivational factors, Eccles and her colleagues (e.g., 1983) proposed an integrative model of achievement behaviors. The achievement behaviors can be operationally defined as choice of activity, persistence, or actual performance.

Although the Eccles model was suggested as a general model, it was suggested that the model provided a useful tool particularly for analyzing gender differences in mathematics performance (e.g., Meece, Parsons, Kaczala, Goff, & Futterman, 1982; Meece, Wigfield, & Eccles, 1990). The Eccles model of expectancy-value, as applied to mathematics, postulates that self-concept of abilities is strongly positively correlated with mathematics performance and people with higher self-efficacy expectation generally perform better than people with lower self-efficacy expectation. Moreover, the model assumes that subjective value judgment attached to a specific mathematics task influences achievement behaviors. Thus, the expectancy-value model hypothesizes that self-concept/expectancy and value judgment are two critical factors that directly influence achievement behaviors, and further assumes that gender differences in the two cognitive factors result from differential socialization processes.

In a related manner, Fennema and Peterson (1985) have asserted that external and societal influences affect internal motivation beliefs and students' learning styles, and that these in turn contribute to group differences in academic achievement. The model proposed by Eccles et al. (1985) gives emphasis to the students' decision mechanism to enroll academic courses. They argue that the cultural milieu, the behaviors, attitudes and expectations of socializers, the student's perceptions of these attitudes and expectations, the individual's goals and self-concept, the perceptions of the value of the task, and past success as well as their interpretations are all crucial factors, which lead to inequalities in academic performance. Similarly, Deaux and Major (1987) model focuses on the individual's goals and self-schemata, the experiences and goals of others with whom the individual interacts, and the context in which the interactions occur. The importance of these components is not stable but rather fluctuates with characteristics of the expectancy.

The model proposed by Leder (1986) concerns variables that have the most implications to educators and which must bring about improved classroom practices. Included are factors associated with the environment as well as the learner. Under environmental variables are situational factors such as society, home, school, and classroom issues like teacher-student relationship, curriculum, and instructional issues. Learner-related factors comprise cognitive variables as well as psychosocial variables like achievement motivation, confidence, and self-esteem. The model of Reyes and Stanic (1988) also explores the issues surrounding the teacher and classrooms. According to them, societal influences, teacher attitudes, school curricula, classroom processes, students' attitudes, and achievement-related behaviors are hypothesized to explain not only gender but also race and socioeconomic status-related differences in academic learning.

2. Models of L2 Achievement

The socio-educational model of L2 achievement (Gardner, 1985a) is the first systematic investigation of the factors that are related to L2 achievement. According to the Gardner's socio-educational model, L2 achievement is directly influenced by motivation, which is operationally defined as motivational intensity plus desire to learn an L2 plus attitudes toward learning an L2. The model further posits that L2 orientations (e.g., integrative orientation) and attitudinal variables (e.g., attitudes toward the learning situation) indirectly affect L2 achievement through the mediating power of motivation. Results from several empirical studies lend support to the validity of the socio-educational model (e.g., Gardner et al., 1997; Gardner, Masgoret, Tennant, & Mihic, 2004; Masgoret & Gardner, 2003; Tremblay & Gardner, 1995). Some other studies (e.g., Clément, Dörnyei, & Noels, 1994; Clément & Kruidenier, 1983; Dörnyei, 1990; Oxford, 1996; Oxford & Shearin, 1994), however, question the applicability of Gardner's model to foreign language learning (FLL) contexts, since the socio-educational model is based on data mostly collected from North America. North American countries such as Canada provide an ideal situation of L2 learning, where regular contact with the target language speakers is possible outside the classroom, hence a typical situation of second language learning (SLL). In response to this controversy, Csizér and Dörnyei (2005) reported that integrativeness was directly responsible for Hungarian learners' motivation to learn English. No information is available, however, as to the applicability of the socio-educational model to the FLL situation when the outcome variable is assessed by objective measures of achievement, such as standardized test scores.

Clément's model of L2 achievement (e.g., Clément, 1980, 1986) focuses on self-confidence as a significant determinant of L2 achievement and motivation to learn an L2. It is suggested that positive attitudes toward the target language lead to heightened

motivational behaviors, such as frequent interactions with L2 speakers and increased motivational intensity, which accounts for some parts of the variations in L2 achievement. However, it should be admitted that the Clément's model does not elaborate on the structural specification of the hypothesized factors, and accordingly, no SEM studies have been reported about the validity of the model.

Other promising models of L2 achievement include attribution theory (e.g., Atkinson, 1964; Weiner, 1992; Williams & Burden, 1999; Williams, Burden, & Al-Baharna, 2001), goal theories (Belmechri & Hummel, 1998; Pintrich & Schunk, 2002), neurobiological model of L2 motivation (e.g., Schumann, 1998, 2001), and self-determination theory (e.g., Deci & Ryan, 1985, 2002; Deci, Vallerand, Pelletier, & Ryan, 1991; Ryan, 1995). Among these models, self-determination theory was most extensively utilized in relation to L2 achievement. Self-determination theory proposes a motivational framework based on the degree of self-internalization. To be specific, self-determination theory (SDT) distinguishes extrinsic motivation from intrinsic motivation. According to Deci and Ryan (1985), intrinsic motivation refers to "an activity where a person does the activity in the absence of reward contingency or control," whereas extrinsic motivation takes place when people show "behavior where the reason for doing it is something other than an interest in the activity itself" (pp. 34-35). It should be pointed, however, that motivation used in an SDT context reflects certain orientational tendency. Hence, in SDT perspective, intrinsic motivation is often interchangeable with intrinsic orientation, and the same is true of extrinsic motivation (Harter, 1981; Noels, 2001).

When it comes to the applicability of self-determination theory to Korean situations, it is generally suggested that the SDT perspective may be better than the traditional Gardnerian conceptualization of motivation in explaining variations surrounding L2 achievement (e.g., Dong-Ho Kang, 2001; Sung-Hyun Song, 2002). For instance, Dong-Ho Kang (2001) performed correlation analyses in order to assess the strength of the relationships between various motivational constructs and L2 achievement across two periods using 234 Korean middle school students. Results of the study suggested that the intrinsic and extrinsic dichotomy was more related to L2 achievement than the traditional instrumental and integrative orientation. However, a correlation analysis does not provide information about the causality between variables of interest (e.g., Crocker & Algina, 1986), hence underscoring the need of SEM analysis. Therefore, a third purpose of the present study is to compare different models of L2 achievement each reflecting an independent theoretical positioning (e.g., Gardner, Clément, SDT) through the SEM procedure using two independent samples of 315 Korean learners of English.

III. METHODS

1. Subjects

A total of 630 university students participated in the current study. For the gender comparison, 315 students (i.e., 200 males and 115 females) were sampled. To eliminate potential interaction effect of gender on the subsequent analysis by area of study, an independent sample of 315 students (i.e., 168 humanities and 147 sciences) was collected to examine the effect of academic backgrounds on the targeted structural equation model of English achievement. All the data were collected from a large university in Korea.

2. Instrument

To investigate the effects of gender and academic backgrounds on the structural model of English achievement for Korean university students, a questionnaire consisting of a total of 72 items were developed. Each item was based on a 7-point Likert scale ranging from strongly disagree (1 point) to strongly agree (7 point). All the negative items were recoded so that a higher value represented a more positive response. The questionnaire and related instruction manual were translated into Korean. English achievement for the Korean sample was measured by an institutional version of the TOEIC (Test of English for International Communication). The following is the description of each subscale.

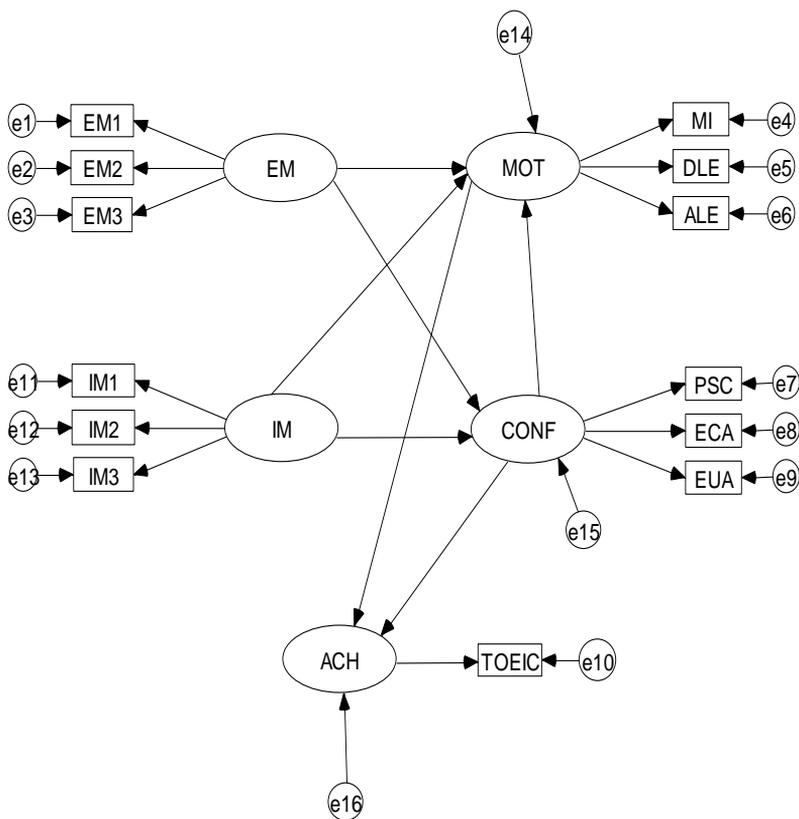
1. Instrumental Orientation (3 items): The Attitude/Motivation Test Battery (AMTB) (Gardner, 1985b)
2. Integrative Orientation (3 items): The AMTB (Gardner, 1985b)
3. Extrinsic Motivation (3 items): Noels, Pelletier, Clément, & Vallerand (2000)
4. Intrinsic Motivation (9 items): Noels et al. (2000). The nine items were factor-analyzed and converted into three factor scores.
5. Motivational Intensity (10 items): The AMTB (Gardner, 1985b). The 10 items were combined to form an aggregate score.
6. Desire to Learn English (10 items): The AMTB (Gardner, 1985b). The 10 items were combined to form an aggregate score.
7. Attitudes toward Learning English (10 items): The AMTB (Gardner, 1985b). The 10 items were combined to form an aggregate score.
8. Self-confidence (4 items): Gardner et al. (1997). The four items were combined to form an aggregate score.
9. English Class Anxiety (10 items): The AMTB (Gardner, 1985b). The 10 items were combined to form an aggregate score.
10. English Use Anxiety (10 items): The AMTB (Gardner, 1985b). The 10 items were

combined to form an aggregate score.

3. Analysis

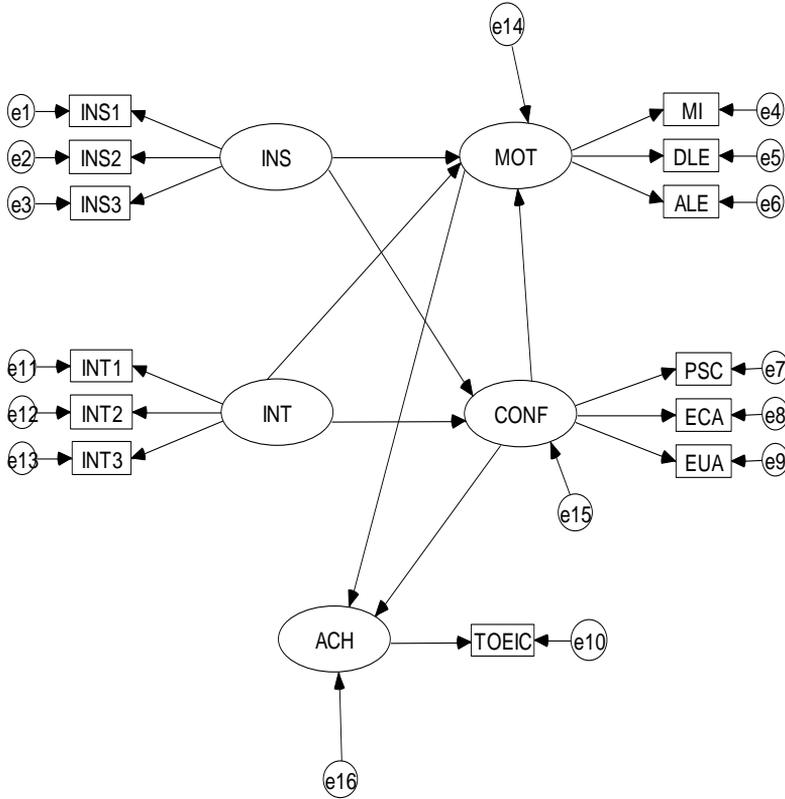
Initially, two separate SEM models were developed. The schematic representation of each model was presented in Figures 1 and 2.

FIGURE 1
A Schematic Representation of the SEM Model of English Achievement, Motivation, Self-Confidence, and Extrinsic & Intrinsic Motivation



Note. ACH: English Achievement; MOT: Motivation; CONF: Self-Confidence; IM: Intrinsic Motivation; EM: Extrinsic Motivation; TOEIC: Test of English for International Communication; MI: Motivational Intensity; DLE: Desire to Learn English; ALE: Attitudes toward Learning English; PSC: Perceived Self-Confidence; ECA: English Class Anxiety; EUA: English Use Anxiety

FIGURE 2
A Schematic Representation of the SEM Model of English Achievement, Motivation, Self-Confidence, and Instrumental & Integrative Orientation



Note. ACH: English Achievement; MOT: Motivation; CONF: Self-Confidence; INS: Instrumental Orientation; INT: Integrative Orientation; TOEIC: Test of English for International Communication; MI: Motivational Intensity; DLE: Desire to Learn English; ALE: Attitudes toward Learning English; PSC: Perceived Self-Confidence; ECA: English Class Anxiety; EUA: English Use Anxiety

The causal relationships among factors affecting English achievement for the Korean sample were modeled based on the relevant theories of L2 achievement reviewed in the literature. Specifically, as shown in Figures 1 and 2, a direct path was specified between motivation and English achievement, as per the advice from Gardner (e.g., 1985a, 2001). Another direct path linking self-confidence to English achievement was added in response to the suggestion from Clément (e.g., 1980, 1986). Concerning the relation between motivation and self-confidence, it was specified that self-confidence determines the degree of motivation, as explained by Clément et al. (1994). Finally, various L2 orientations were

allowed to influence English achievement indirectly through two mediator variables (i.e., motivation, self-confidence), which reflects current theorizing in L2 motivation (e.g., Clément et al., 1994; Gardner, 2001; Gardner et al., 1997; Tremblay & Gardner, 1995). Among the various L2 orientations, the intrinsic and extrinsic dichotomy of L2 orientation was modeled in Figure 1, and Figure 2 examines the indirect effect of the Gardnerian conceptualization of L2 orientations (i.e., instrumental and integrative orientation). Comparison between the two structural models will identify an English achievement model that is strongly endorsed by the Korean university students.

All the parameters specified in Figures 1 and 2 were estimated using the AMOS 4.0 program via maximum likelihood procedure. Since latent variables are not directly observed, indeterminacy of the metric was solved by fixing variance of each latent variable to be one. In addition, the error variance of the one single-indicator variable (i.e., TOEIC) was set to a value resulting from an equation, $(1 - \text{reliability}) * \text{variance}$, in order to reflect reliability of the single-indicator variable, following the recommendation from Schumacker and Lomax (1996). After identifying a structural model of English achievement that best reproduces the sample covariance matrix, the effects of gender and academic backgrounds on the targeted structural model was further investigated using the multi-sample analysis (e.g., Jöreskog & Sörbom, 1996). A multi-sample analysis is based on chi-square invariance test, which statistically compares the difference in chi-square values for two nested models. Detailed information of the multi-sample analysis is found in Tae-Il Pae and Dong-Ho Kang (2004) or Tae-Il Pae and Gi-Pyo Park (2006).

IV. RESULTS AND DISCUSSION

1. SEM Analyses

Table 1 presents the results of the SEM analyses. Model 1, which examined the relationships among English achievement, motivation, self-confidence, extrinsic and intrinsic orientation using the 13 observed variables as shown in Figures 1 and 2, produced chi-square value of 157.94 with 54 degrees of freedom ($p=0.00$). Since chi-square statistic tends to be inflated in a larger sample size, other fit indices were also reported.

TABLE 1
Results of SEM Analyses

Model	χ^2	<i>d.f.</i>	$\chi^2/d.f.$	NNFI	CFI	GFI	RMSEA
1	157.94	54	2.92	.93	.95	.93	.078
2	214.94	54	3.98	.90	.93	.90	.097
Final	59.05	28	2.10	.97	.98	.96	.059

Generally, a ratio of 2 or below between the chi-square value and corresponding degrees of freedom suggests an acceptable fit of the data to the model. Likewise, a satisfactory fit is signaled by RMSEA (Root Mean Square Error of Approximation) value of 0.05 or below, NNFI (Non Normed Fit Index) value of 0.9 or above, CFI (Comparative Fit Index) value of 0.9 or above, and GFI (General Fit Index) value of 0.9 or above. Fit indices such as NNFI, CFI, and GFI indicated a good fit of model 1 to the data, whereas the chi-square ratio and RMSEA were slightly beyond the recommended cut-off values for these indices.

By comparison, model 2, which tested the relationships among English achievement, motivation, self-confidence, instrumental and integrative orientation using another set of 13 observed variables, resulted in a less satisfactory fit of the model to the data, as indicated by consistently worse fit indices. This demonstrates that the intrinsic and extrinsic dichotomy is a better predictor of students' perceived self-confidence and motivation to learn English than the traditional Gardnerian orientations (i.e., instrumental and integrative orientation), hence highlighting the relative advantage of self-determination theory over the socio-educational model of L2 acquisition in the Korean context.

Results of the present SEM analyses also reveal that motivation and self-confidence mediated the relationships between L2 orientations and L2 achievement for both SDT and the socio-educational model, thereby confirming the findings reported with SLL samples (e.g., Gardner, 2001; Masgoret & Gardner, 2003). In other words, various L2 orientations are indirectly related to L2 achievement via motivation and self-confidence. This implies that promoting various L2-related orientations that are not accompanied by positive perception of self-confidence and enhanced motivation would not lead to the increase of English achievement for Korean university students.

On close investigation of the estimated parameters of model 1, however, it was found that the effect of extrinsic motivation on self-confidence was not statistically significant, as indicated by a non-significant *t*-statistic. This suggests that the strength of the relationship between extrinsic motivation and self-confidence was not different from zero, and thus extrinsic motivation was removed from the model. Therefore, a revised SEM model, which specified the relationships between English achievement, motivation, self-confidence, and intrinsic motivation, was targeted as the final SEM model. As shown in Table 1, the final model produced a chi-square value of 59.05 with 28 degrees of freedom, and this model showed a substantially better model-data fit than the competing models (i.e., models 1 and 2). The final model was utilized for the subsequent multi-sample analyses by gender and specialization.

2. Multi-sample Analyses

Tables 2 and 3 summarize the results of multi-sample analyses. Only structural paths

specifying the relationships among latent variables were subjected to the multi-sample analyses. Group differences in the structural paths were gauged by one degree of freedom chi-square invariance statistics.

TABLE 2
Results of Multi-sample Analysis by Gender

Model	Equality Constraint	χ^2	<i>d.f.</i>	<i>d.f.</i> _{diff}	χ^2 _{diff}
A	Free	141.61	72	-	-
B	MOT-ACH	141.95	73	1	.34
C	CONF-ACH	142.65	73	1	1.04
D	CONF-MOT	142.07	73	1	.46
E	IM-MOT	141.62	73	1	.01
F	IM-CONF	144.61	73	1	3.00

Note. *d.f.*_{diff} = difference in degrees of freedom between the free model and each corresponding model.
 χ^2 _{diff} = difference in chi-square values between the free model and each corresponding model.
 *means significant at 0.05 alpha level. MOT: Motivation; ACH: Achievement; CONF: Self-Confidence; IM: Intrinsic Motivation

As indicated by Table 2, there was no gender effect on the causal relationships between English achievement, motivation, self-confidence, and intrinsic motivation. Imposing equality constraint on each of the structural paths did not make the fit of the model significantly worse than the free model, hence demonstrating that the final achievement model of English works for both gender groups, with the same strength of the relationships among latent variables.

TABLE 3
Results of Multi-sample Analysis by Academic Backgrounds

Model	Equality Constraint	χ^2	<i>d.f.</i>	<i>d.f.</i> _{diff}	χ^2 _{diff}
A	Free	127.16	72	-	-
B	MOT-ACH	127.18	73	1	.02
C	CONF-ACH	127.30	73	1	.14
D	CONF-MOT	127.32	73	1	.16
E	IM-MOT	127.48	73	1	.32
F	IM-CONF	131.85	73	1	4.69*

Note. *d.f.*_{diff} = difference in degrees of freedom between the free model and each corresponding model.
 χ^2 _{diff} = difference in chi-square values between the free model and each corresponding model.
 *means significant at 0.05 alpha level. MOT: Motivation; ACH: Achievement; CONF: Self-Confidence; IM: Intrinsic Motivation

Table 3 suggests that there was a statistical difference in the strength of the relation between intrinsic motivation and self-confidence across the humanities and sciences.

Constraining a structural path linking intrinsic motivation to self-confidence to be equal for the humanities and sciences resulted in a significant increase of the chi-square value (i.e., 4.69) at a given degree of freedom difference, whereas putting equality constraint on the other structural paths did not make any significant change in the chi-square values. This means that the structural path that connected intrinsic motivation to self-confidence was differentially working for the two learner groups, while the other structural paths proved to be invariant for the humanities and sciences. Specifically, it was found that the impact of intrinsic motivation to self-confidence was significantly stronger for the humanities than for the sciences, hence indicating that intrinsic motivation was a better predictor of positive self-confidence for the humanity students. By extension, this finding signals the existence of a differential effect of academic backgrounds on students' perceived conception of his or her English ability. Therefore, it is advised that English teachers in charge of science students give more attention to promoting intrinsic motivation in couple with positive perception of English competence. In a classroom setting, this implies that English learning activities should be complemented by more positive feedback, especially for the science students.

V. CONCLUSION

The purpose of the present study is to identify structural factors that directly or indirectly influence English achievement for Korean EFL university students. In this regard, three competing SEM models are generated in order to pinpoint the English achievement model that best explains the various causal paths a Korean university student should go through to achieve his or her English proficiency. The effects of gender and academic backgrounds on the targeted English achievement are also examined through the multi-sample analyses.

The current analyses highlight several important findings. First, results of the SEM analyses confirm that motivation, defined according to Gardner's original conceptualization of the term (i.e., motivational intensity plus desire to learn English plus attitudes toward learning English), was causally related to Korean university students' English achievement, as consistent with the previous literature (e.g., Gardner, 2001; Masgoret & Gardner, 2003). The present SEM analyses also show that Korean students' self-evaluation of their English ability directly affected their English achievement, hence verifying the suggestion from Clément (e.g., 1980, 1986). In addition, various L2 orientations were only indirectly related to English achievement through motivation and self-confidence.

Therefore, imposing a causal relation between L2 orientations and L2 achievement would lead to misspecification of L2 achievement model, which in turn would provide incorrect recommendation to classroom teachers, curriculum designers, and policy makers.

At one step further, this suggests that promoting positive L2 orientations, whatever they are, is not sufficient for enhancing learners' L2 achievement since the influences of L2 orientations are indirectly carried to L2 achievement through mediator variables, such as motivation and self-confidence. Therefore, emphasis should be given to strengthening the tie between L2-related attitudes and these mediator variables.

Among the many L2 orientations, the intrinsic and extrinsic motivation showed a better fit of the model to the data than the traditional integrative and instrumental orientation, hence demonstrating that SDT-based orientations are a better determinant of Korean learners' motivation and self-confidence than the Gardnerian perspective. It is found, however, that extrinsic motivation made an insignificant influence on self-confidence. Further SEM analysis without extrinsic motivation produced a substantially better model-data fit, which proves the superior status of intrinsic motivation among the many L2 orientations in the Korean context of foreign language learning.

With regards to the results of multi-sample analyses, which tests invariance of the structural paths for gender as well as academic groups, it is noted that there was no significant gender effect on the structural paths, as indicated by an insignificant change in chi-square values between the free model and each studied model, where the structural path of interest was successively constrained to be equal for males and females. However, the multi-sample analysis by academic groups reveals that the structural path linking intrinsic motivation to self-confidence was not invariant for the humanities and sciences. Specifically, the effect of intrinsic motivation on students' self-perception of confidence was significantly stronger for the humanities than for the sciences. This suggests that intrinsic motivation was differentially related to self-confidence depending on students' specialized area of study. Therefore, classroom English teachers are encouraged to provide more positive feedback to science students when they are engaged in English learning activities for the sake of inherent pleasure and satisfaction *per se*, rather than contingencies or reinforcements external to the activities.

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