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ORIGINAL ARTICLE

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Teachers' knowledge, perceived teaching efficacy, and attitudes regarding students with ADHD: a cross-cultural comparison of teachers in South Korea and Germany

BACKGROUND
The purpose of this study was to investigate cross-cultural similarities and differences between Korean and German teachers in terms of knowledge, perceived teaching efficacy (PTE), and attitudes regarding students with attention deficit hyperactivity disorder (ADHD), as well as to evaluate how teachers' experiences influence their attitudes through knowledge and perceived teaching efficacy, based on three components of attitudes within a culture as well as across cultures.

PARTICIPANTS AND PROCEDURE
Participants were teachers from Korea (n = 639) and Germany (n = 317). Through disproportional stratified sampling, matched samples of 264 Korean and 264 German teachers were obtained. The Kos questionnaire was slightly modified for the two countries due to different cultural backgrounds, by conducting translation/back-translation, item review, and a pilot study. The survey instrument was distributed from September 2012 to December 2013. SPSS 22.0 and AMOS 22.0 were used to analyze the data.

RESULTS
Korean teachers showed higher knowledge than German teachers. German teachers were found to have a greater PTE as well as more favorable attitudes compared to Korean teachers. Both Korean and German teachers' experience led to their attitudes through knowledge and PTE. Also, the ways in which these variables have an influence on teachers' attitudes differ between Korea and Germany.

CONCLUSIONS
This investigation proved the cross-cultural differences of all research variables (experience, knowledge, PTE, attitudes) as well as the research model (knowledge and PTE as mediators) based on attitude theory. This study can be a preliminary resource to develop an *ADHD management manual* based on theoretical and cultural perspectives in both countries, so that both Korean and German teachers can be prepared for students with ADHD in their daily classroom practice.

KEY WORDS
experience; disproportional stratified sampling; culture; Confucianism; SEM

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AUTHORS' CONTRIBUTIONS – A: Study design · B: Data collection · C: Statistical analysis · D: Data interpretation · E: Manuscript preparation · F: Literature search · G: Funds collection

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BACKGROUND

Teachers are significant adults with whom students with attention deficit hyperactivity disorder (ADHD) interact at school. Teachers can be a tremendous help for students with ADHD. For example, adults who had ADHD at a younger age were able to overcome their difficulties through teachers' favorable attitudes, which became a turning point for coping with their disorder (Barkley, 2007). However, having students with ADHD in the classroom poses several challenges for teachers. It has been described by an old Korean expression: "hitting a rock with an egg"[1] (Hong, 2008). The class is often disrupted by students with ADHD due to their behavioral characteristics (Kos, 2004). Teachers often feel frustrated and overwhelmed when managing students with ADHD compared to other typically developing students (Lee & Witruk, 2013). Previous studies have found that teachers hold significantly less favorable attitudes towards students with ADHD (e.g., Jeong & Choi, 2010) and have little information about ADHD (e.g., Schmiedeler, 2013).

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Since the majority of students with ADHD attend regular schools in Korea[2] and in Germany, the success of students with ADHD in the classroom relies on help from the teachers. Therefore, it is imperative that teachers are well prepared and have a comprehensive understanding about ADHD as well as favorable attitudes towards students with ADHD, which can lead to the success of these students. This study investigated the culturally specific teachers' attitudes towards and knowledge of students with ADHD. At present, little research has been conducted on this topic in the cross-cultural context. To our knowledge, this is the first research examining the mediating paths on teachers' attitudes towards students with ADHD, by comparing two samples of teachers from Korea and Germany.

STUDENTS WITH ADHD IN VARIOUS CULTURES

The American Psychiatric Association (APA) (2013) states that ADHD is known to occur in various cultures, and therefore the interpretation of the behavior of students with ADHD varies across different contexts, such as individual vs. collectivism (see in detail: Hofstede, 2001) and Confucianism. Confucianism is a philosophical and ethical doctrine developed by the Chinese philosopher Confucius, who stressed human morality and right action (Hong, 2008). According to Confucius's doctrine, Korean cultural values are in "harmony by morality". In order to maintain harmony within the group, individuals need to know the social order based on hierarchies of age and social status. For example, lower hierarchs (e.g., students) are expected to respect by obeying higher hierarchs (e.g., teachers), and higher hierarchs are expected to have authority in order to care for lower hierarchs. According to Hong (2008), any disruptive behavior which disrupts the harmony is perceived as "abnormal" based on Confucian culture, so these persons often feel shame under a Korean school setting.

In addition, each school has its own way of passing on environmental behavior through its sub-culture and represents a specific and unique way to deal with situations (Singh, 2008). Since schools aim to generate their own cultural knowledge about students' behavior, teachers also have their own ways of interpreting various students' behavior within their cultural circumstances, such as the school system (Moon, 2011). In school, students are affected under the school system and through their culture. They learn "culture" from their surroundings, how they behave, and what they learn from their environment. The school system differs from country to country, so knowledge of a specific school system is essential to understand and compare different countries' schools (see in detail: for the Korean school system, Seoul Metropolitan Office of Education; for the German school system, it differs based on the federal state, e.g., *Sächsische Bildungsagentur* for the Saxony school system).

TEACHERS' ATTITUDES TOWARDS STUDENTS WITH ADHD

ATTITUDE THEORY: THREE COMPONENTS OF ATTITUDES

Allport (1935) developed the first theory of attitude, which has three schematic components as follows (see Figure 1): (a) the *cognitive component* refers to the individual's ideas, thoughts, perceptions, or beliefs about the attitude referent, (b) the *affective component* refers to the emotion that charges the cognitive component of the attitude, and (c) the *behavioral component* refers to the individual's intent or readiness to behave in a certain manner with respect to the attitude object (Rosenberg & Hovland, 1960). This theory has been used in the field of attitude research to date; thus this theory was also applied to this study to assess teachers' attitudes regarding students with ADHD.

SIGNIFICANT IMPACTS OF TEACHERS' ATTITUDES

Teachers' attitudes are highly important factors not only for students but also for teachers (Bekle, 2004; Blume-D'Ausilio, 2005). Their attitudes will affect the way in which they behave towards students, and their

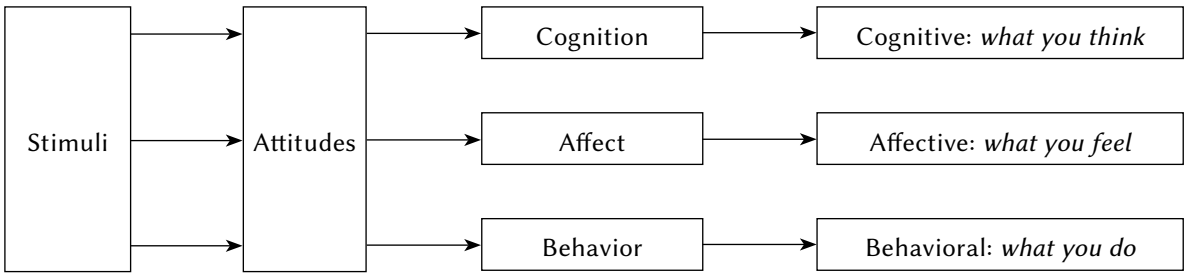


Figure 1. Three components of attitudes (Allport, 1935; Rosenberg & Hovland, 1960).

negative behavior may result in negative outcomes for students (Jung & Choi, 2010; Lee & Witruk, 2013). In addition, studies have found that teachers' attitudes towards ADHD have a powerful impact on students' future achievements, social relationships, and self-esteem (Barkley, 2007; Loe & Feldman, 2007). For example, Barkley (2007) found that adults diagnosed with ADHD at an early age overcame their early childhood problems, because of teachers' favorable attitudes such as extra attention and guidance, which became the turning point for coping with their disorder. Unfortunately, studies have consistently found that teachers hold significantly more unfavorable attitudes towards students with ADHD compared to other students (Bekle, 2004; Lee & Witruk, 2013).

CULTURAL PERSPECTIVES ON TEACHERS' ATTITUDES TOWARDS STUDENTS WITH ADHD

ADHD and behavior associated with it are interpreted differently due to cultural differences (Lee, 2008; Moon 2011). Thus, the way in which students with ADHD are believed, perceived, and understood is unique to each culture (APA, 2013; Singh, 2008). In addition, since Korean culture has been influenced by Confucianism, any disruptive behaviors of students with ADHD are regarded as abnormal behaviors in Korean culture (Hong, 2008; Lee, 2015; Lee & Witruk, 2013; Moon, 2011).

In 2013, Lee and Witruk investigated Korean and German primary school teachers' attitudes towards children with ADHD, and compared these with two previous US findings (Blume-D'Ausilio, 2005; Whitworth, Fossler, & Harbin, 1997). Two open-ended statements were adapted from a study conducted by Whitworth et al. (1997); (a) perceptions: "The most difficult thing about teaching children with ADHD is…" and (b) beliefs: "I believe that I would be more successful teaching children with ADHD if…". The results turned out to be as follows: (a) perceptions: Both Korean and German primary school teachers' perceptions were similar, which is noticeably different to the results from the two US studies. For Korean and German teachers, the most difficult thing about teaching children with ADHD was "*behavior management* (e.g., disruptions to class and other students)" and "*teachers' self-improvement* (e.g., controlling anger and staying calm)", whereas in both US studies it was "*keeping them focused* (e.g., they have a difficult time focusing/paying attention)" and (b) beliefs: Both Korean and German primary school teachers' beliefs are remarkably similar to those from US studies. Teachers in these three countries believe that they would be more successful teaching children with ADHD if they had (a) "*more training/workshops* (e.g., exact knowledge, good quality training)" and "*smaller class sizes* (e.g., fewer students per class)".

SIGNIFICANT IMPACTS OF TEACHERS' PERCEIVED TEACHING EFFICACY

Teachers' perceived competence to manage students with ADHD (i.e., perceived teaching efficacy – PTE) has been consistently found as an important factor which is significantly related to teachers' attitudes (Blume-D'Ausilio, 2005; Jung & Choi, 2010; Sciutto, Terjesen, & Frank, 2000). However, most teachers experience negative feelings about their ability to manage the class due to the negative behavior of students with ADHD (e.g., not listening to teachers instructions, not following rules, frequently fighting with peers) (Jeong & Choi, 2010; Joo & Jeong, 2007), which directly affect their attitudes towards students with ADHD, which in turn directly affect their self-efficacy as well as the actual management strategies for students with ADHD (Blume-D'Ausilio, 2005; Hodge, Davis, Woodard, & Sherrill, 2002; Jones & Chronis-Tuscano, 2008).

CULTURAL PERSPECTIVES ON TEACHERS' PERCEIVED TEACHING EFFICACY

Whereas studies from Western cultures (individualistic cultures, e.g., US and Germany) found that teachers perceived themselves as having sufficient skills and ability to manage students with ADHD (Murray,

2009; Kos, 2004), numerous Eastern studies (collectivistic culture: e.g., Korea and China) found that teachers experience negative feelings about their ability to manage students with ADHD in the classroom (Jeong & Choi, 2010; Joo & Jeong, 2007) (individualistic vs. collectivistic culture; see in detail: Lee, 2015).

For example, Lee (2008) found that American teachers were more concerned about ADHD-related behavior which disrupted the class flow (e.g., constant talking, excessive movement), which in turn reduced their instruction time. On the other hand, Korean teachers are more focused on their own emotional difficulties (e.g., blaming themselves for not being able to manage children with ADHD) more than the behavioral problems of children with ADHD (Jeong & Choi, 2010; Joo & Jeong, 2007; Kang, Kim, & Yang, 2011; Lee & Witruk, 2013).

TEACHERS' KNOWLEDGE OF ADHD

SIGNIFICANT IMPACTS OF TEACHERS' KNOWLEDGE

Since students spend long hours every day at school, teachers are suitable persons to detect ADHD-related behavior and to refer these students with ADHD to professionals for a correct diagnosis and appropriate treatment. Therefore, it is imperative for teachers to have accurate information about ADHD in order to help students who potentially have ADHD as well as provide accurate advice to their parents (Ohan, Cormier, Hepp, Visser, & Strain, 2008). In addition, since teachers' knowledge can influence their attitudes towards students with ADHD (Blume-D'Ausilio, 2005; West, Taylor, Houghton, & Hudyma, 2005), teachers may develop favorable or unfavorable attitudes towards students with ADHD based on what they know precisely about ADHD (Kos, 2004; Lee, 2015).

CULTURAL PERSPECTIVES ON TEACHERS' KNOWLEDGE ABOUT ADHD

Over the past 20 years, studies have been consistently investigating teachers' knowledge about ADHD. The results of ADHD knowledge have been mixed. Jerome, Gordon, and Hustler (1994) and Barbaresi and Olsen (1998) reported the correct information rate of knowledge about ADHD to be 77.50% and 77.00%, respectively (20 items: a *yes/no* format). However, Kos (2004) (Australia), Kang et al. (2011) (Korea), and Schmiedeler (2013) (Germany) reported the correct answer to questions about teachers' knowledge to average 61.00%, 53.30%, and 54.20% respectively (a *yes/no/don't know* format). The differences among studies could be explained by the different answer format. For example, the first two studies used the *yes/no* format enabling teachers a 50.00% chance of guessing the correct answer. However, the latter three studies followed a *yes/no/don't know* format, meaning that teachers are not able to guess the correct answer when they have no information about each item.

FACTORS INFLUENCING TEACHERS' ATTITUDES

Studies have consistently found that teachers' experience (e.g., Jones & Chronis-Tuscano, 2008), knowledge (e.g.,; Schmiedeler, 2013), and their PTE (e.g., Raudenbush, Rowan & Cheong, 1992) are important factors for teachers' attitudes towards students with ADHD in the classroom. Thus, teachers need to have precise knowledge about ADHD, the confidence to teach and manage students with ADHD, and to hold favorable attitudes towards students with ADHD, which in turn will influence students' positive outcomes at school such as academic progress and emotional well-being (DuPaul & Power, 2008; Loe & Feldman, 2007). In addition, since the extent of teachers' experiences and knowledge and their attitudes have been found to be very different across studies (Kang et al., 2011; Kos, 2004; Lee & Witruk, 2013; Schmiedeler, 2013), the way in which these variables influence teachers' attitudes towards students with ADHD differs across cultures.

EXOGENOUS VARIABLE: TEACHERS' EXPERIENCE

Teachers' experience directly affects their attitudes towards students with ADHD. Numerous studies have found that teachers who have more professional experience have more favorable attitudes toward students with ADHD compared to those with less professional experience (Bekle, 2004; Hodge et al., 2002). The most significant factor influencing teachers' attitudes towards students with ADHD was previous additional training (Small, 2003; Lee & Witruk, 2013). With regard to a relationship between teachers' personal experience and their attitudes towards students with ADHD, a small but statistically significant correlation was found (Blume-D'Ausilio, 2005; Lee & Witruk, 2013).

ENDOGENOUS VARIABLE I: TEACHERS' KNOWLEDGE ABOUT ADHD

First, several studies have found that teachers' experience was positively related to teachers' knowledge (Kos, 2004; Schmiedeler, 2013; Sciutto et al., 2000;

Small, 2003). In addition, teachers who have participated in ADHD-related training show a higher level of knowledge in comparison to those who have less or no experience (Blume-D'Ausilio, 2005; Kang et al., 2011; Kos, 2004; Schmiedeler, 2013; Small, 2003). Second, numerous studies have found that teachers' knowledge about ADHD is significantly correlated with their PTE (Raudenbush et al., 1992; Sciutto et al., 2000). For example, Raudenbush et al. (1992) found that the level of confidence in teaching mediates the relation between knowledge and behavior. Third, studies have also consistently found a positive relationship between teachers' knowledge about ADHD and their attitudes towards students with ADHD (Bekle, 2004; Blume-D'Ausilio, 2005; Jerome et al., 1994; Kos, 2004), which in turn affects the performance of students with ADHD in the classroom (Bekle, 2004; Lee, 2015).

ENDOGENOUS VARIABLE II: TEACHERS' PERCEIVED TEACHING EFFICACY

First, teachers' PTE in working with students with ADHD is significantly related to their prior experience in teaching students with ADHD (Kos, 2004; Lee & Witruk, 2013). A significant positive correlation was found between teachers' experience and their PTE (Hodge et al., 2002; Park & Park, 2008). For example, teachers who have more experience teaching students with ADHD and who had previously taught students with ADHD perceive themselves as being more confident than those who have less experience. Second, numerous studies have also shown a positive relationship between training experience and their PTE (Kos, 2004; Small, 2003). For example, teacher education programs about students with ADHD are significantly effective in terms of improving their PTE. And third, the relationship between teachers' experience and their attitudes towards students with a disability are positively mediated by their PTE (Brophy & McCaslin, 1992). More currently, Kos (2004) found that the relation between teachers' experience and their attitudes were mediated by teachers' perceptions of their PTE.

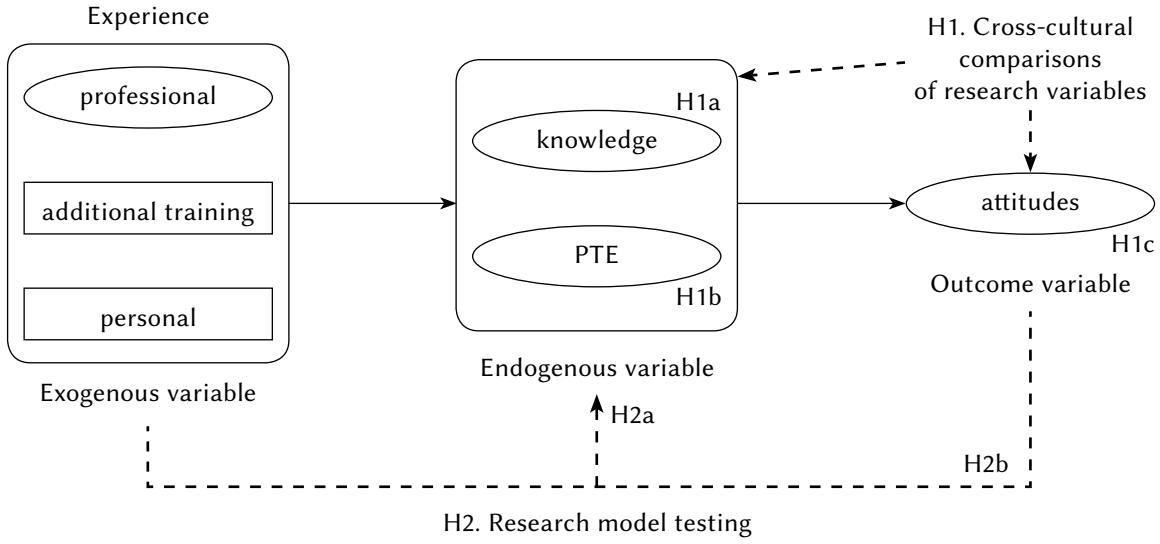
THE CURRENT STUDY

The purpose of this study was to investigate cross-cultural similarities and differences between Korean and German teachers in terms of knowledge, perceived teaching efficacy (PTE), and attitudes regarding students with ADHD. This study designed a mediation model on how Korean and German teachers' experience influences their attitudes through the mediating variables of their knowledge about ADHD and PTE, based on three components of attitudes (Allport, 1935; Rosenberg & Hovland, 1960) (see Figure 2).

RESEARCH QUESTIONS

The following research questions (RQ) were addressed by this study:

1. Are there significant differences between Korean and German teachers in their (a) knowledge (RQ 1a); (b) PTE (RQ 1b); and (c) attitudes (RQ 1c)?
2. How does teachers' experience lead to their attitudes through knowledge and PTE (RQ 2a)? Is it significantly different between Korea and Germany (RQ 2b)?



Note. PTE – perceived teaching efficacy (perceived competence in management of students with ADHD); attitudes – teachers' beliefs about ADHD and having students with ADHD in the classroom.

Figure 2. Conceptual research model.

HYPOTHESES

Specific hypotheses (H) were made for each of the goals of this study:

1. German teachers are more knowledgeable than Korean teachers (H1a); German teachers have higher PTE compared to Korean teachers (H1b); German teachers have more favorable attitudes compared to Korean teachers (H1c).
2. Teachers' experience affects their knowledge and PTE, which in turn affects their attitudes in both countries (H2a); the way in which teachers' experience, knowledge, and PTE have an influence on teachers' attitudes is significantly different between Korea and Germany (H2b).

PARTICIPANTS AND PROCEDURE

PARTICIPANTS

Participants were primary and secondary school teachers from Korea (n = 639) and Germany (n = 317). Through disproportional stratified sampling, matched samples of 264 Korean and 264 German teachers were obtained.

SURVEY INSTRUMENT

The Kos (2004) questionnaire was slightly modified for the two countries due to different cultural backgrounds, by conducting translation/back-translation, item review, and a pilot study. It is divided into four sections: Section A (Attitudes; 21 items, α = .73), Section B (Knowledge; 23 items, α = .74), Section C (Experience; 6 items, α = .73), and Section D (Personal Details; 7 items).[3]

DATA COLLECTION

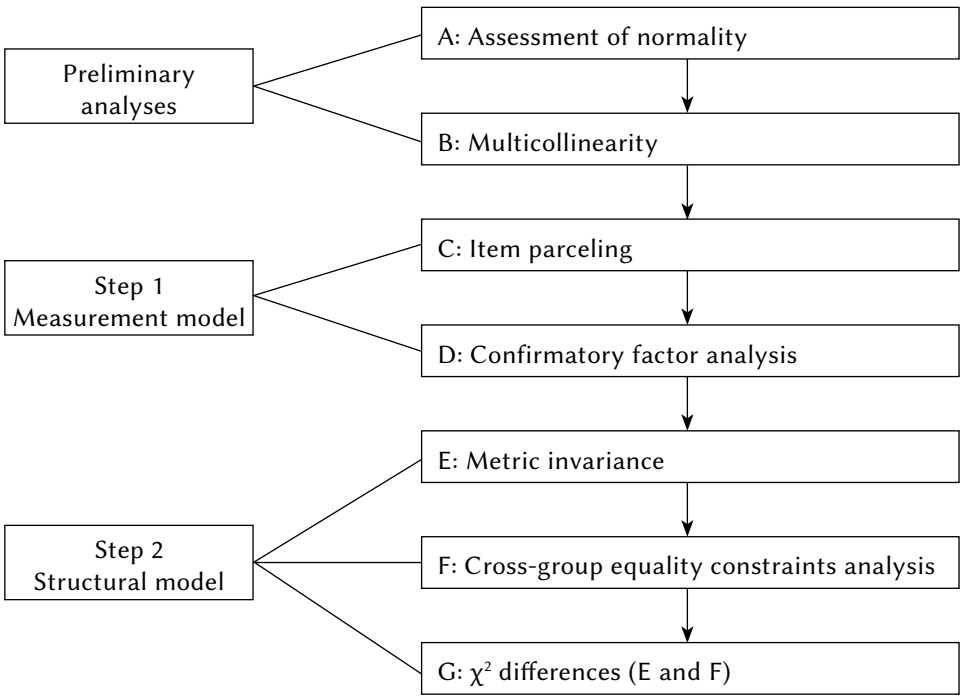
The current study was undertaken in Korea from September to December, 2012, and in Germany from January to December, 2013.

DATA ANALYSIS: STRUCTURAL EQUATION MODELING (SEM)

SPSS 22.0 was used to test hypothesis 1. AMOS 22.0 was then used to test hypothesis 2. SEM, particularly, "the two-step approach-invariance across the group analysis" was conducted. This analysis is essential when the instrument was developed in a country with a different culture beyond the translation/back-translation method for testing the validity of the measurement within a new cultural context (Kim, Hong, & Kim, 2009) (see Figure 3).

PRELIMINARY ANALYSES (PROCEDURES A AND B)

Skewness and kurtosis were confirmed to assess the normality of the data (Procedure A). All variables for this research fulfilled the normality distribution crite-



Note. The two-step approach – invariance across the group analysis was conducted.

Figure 3. Structural equation modeling procedure.

ria (skewness ±2, kurtosis ±7) (Kim et al., 2009). A correlation analysis was then conducted to assess the relationship among research variables (Procedure B). All research variables have the absolute value of a correlation coefficient less than .80, which means that there was no problem with multicollinearity. Regression analysis was then conducted to identify the variance inflation factor value (VIF) and tolerance. In this study, the total value of VIF was less than 3, and the tolerance was close to 1; thus there was no problem with multicollinearity.

STEP 1: MEASUREMENT MODEL (PROCEDURES C AND D)

The measurement model was tested to assess whether each of the four latent variables (experience, knowledge, PTE, and attitudes; see Figure 2) were represented by their indicators (Kim et al., 2009). Item parceling (Procedure C) was created for a single latent construct of teachers' knowledge and attitudes. Three item parcels were created for the knowledge and attitudes. As shown in Figure 4, each item parcel for knowledge and attitudes was greater than .60, indicating a reasonable fit (Bentler, 2007).

Confirmatory factor analysis (CFA; Procedure D) was then assessed to evaluate whether the four latent variables were correctly measured (Kim et al., 2009). For the current study, all factor loadings for the total samples (n = 528) were significant at the .01 level, implying that each measurement variable was well represented in the concept of latent variables. The χ^2 was significant due to a large sample size (more than 200 cases: Kim et al., 2009). Therefore, other alternative fit indices which are not sensitive to the sample size (TLI – Tucker-Lewis index; CFI – comparative fit index; RMSEA – root mean square error of approximation) were also considered (Bentler, 2007; Kline, 2010) (Fit indices, see in detail: Lee, 2015). As shown in Figure 5, all alternative fit indices were fulfilled to explain this measurement model for the total samples [χ^2(48, N = 528) = 139.67, p < .001, TLI = .926, CFI = .946, RMSEA = .060]. CFA was also conducted separately in each country. Both Korean and German samples showed fulfilled fit indices (see Figure 5).

STEP 2: STRUCTURAL MODEL (PROCEDURES E, F, AND G)

The structural model invariance across the group analysis was chosen by analyzing (a) metric invariance constraints analysis (Procedure E) to test the equivalence of the measurement model by testing each of the factor loadings, (b) cross-group equality constraints analysis (Procedure F) to test the equivalence of the structural model accordingly, and (c) the chi-square between Procedures E and F was compared (Procedure G), so that each path is interpreted in exactly the same way across the samples (Byrne, 2013; Kline, 2010).

RESULTS

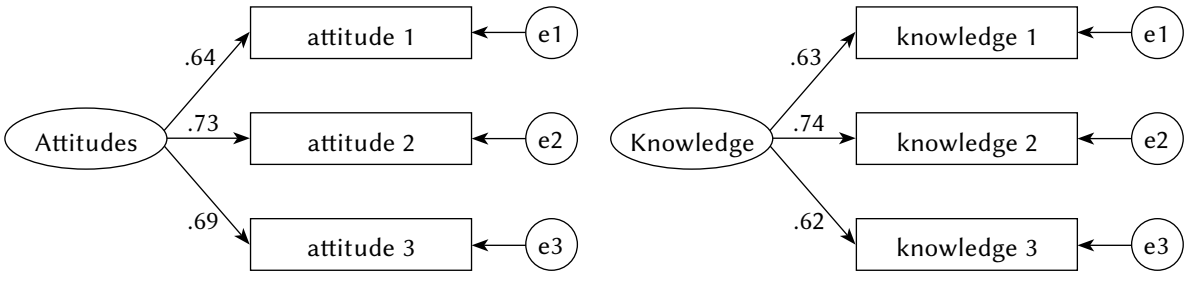
HYPOTHESIS 1 TESTING: CROSS-CULTURAL COMPARISONS OF RESEARCH VARIABLES

Teachers' experience was first analyzed in order to assess each variable's similarity of differences between the two samples at baseline. As shown in Table 1, (a) German teachers have significantly more professional experience than Korean teachers, (b) Korean teachers had more training experience than German teachers; and (c) German teachers had more personal experience than Korean teachers.

Three sub-hypotheses (H1a-H1c) were then analyzed as follows (see Table 1). First, Korean teachers' knowledge about ADHD was significantly greater than German teachers; thus hypothesis 1a was rejected. Second, German teachers had a higher perceived teaching efficacy in the management of students with ADHD than Korean teachers; thus hypothesis 1b was accepted. And third, German teachers' attitudes towards students with AHD were more favorable than Korean teachers; thus hypothesis 1c was accepted.

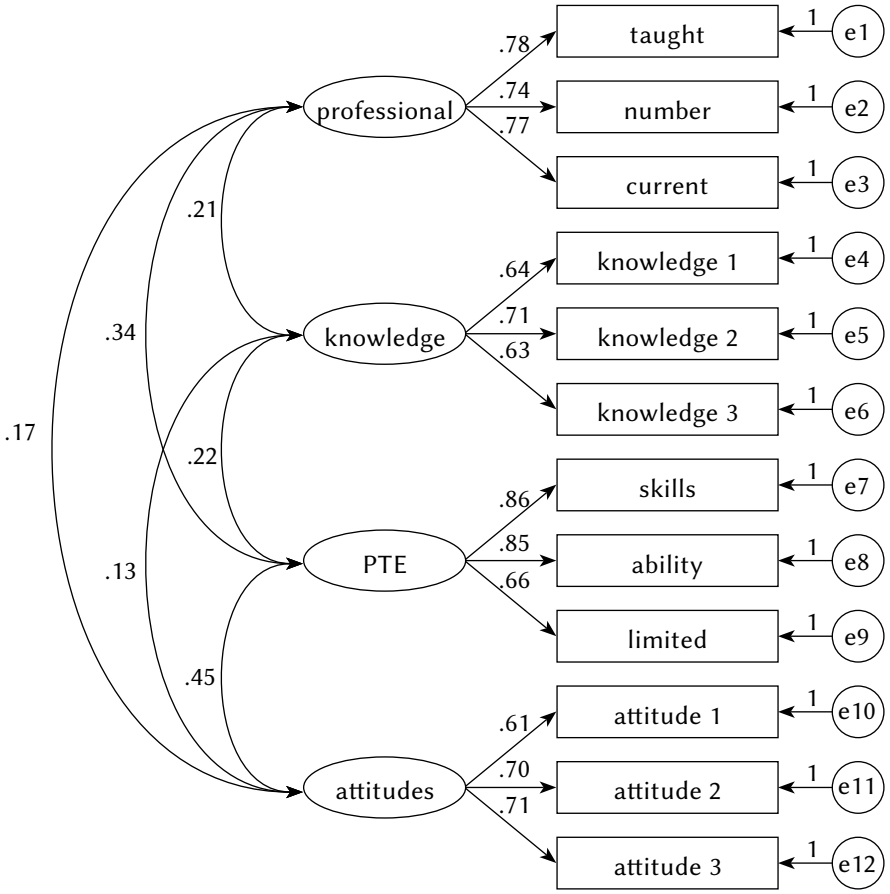
HYPOTHESIS 2 TESTING: RESEARCH MODEL (KNOWLEDGE AND PTE AS MEDIATORS)

Since the measurement model fit was confirmed, the SEM was analyzed in order to compare each of the



Note. A value above .60 indicates a reasonable fit.

Figure 4. Item parceling for teachers' attitudes and knowledge.



Total samples: $\chi^2(48, N = 528) = 139.67$, $p < .001$, TLI = .926, CFI = .946, RMSEA = .060

Korean samples: $\chi^2(48, n = 264) = 55.07$, $p = .225$, TLI = .988, CFI = .991, RMSEA = .024

German samples: $\chi^2(48, n = 264) = 69.58$, $p = .002$, TLI = .959, CFI = .970, RMSEA = .041

Note. taught – experience of teaching students with ADHD; number – numbers of students with ADHD taught; current – teaching students with ADHD over the last year and this year; PTE – perceived teaching efficacy; skills – skills to deal with students with ADHD in the class; ability – ability to effectively manage students with ADHD; limited – limited in the way to manage students with ADHD; B – unstandardized coefficient; β – standardized coefficient; S.E. – standard error; C.R. – composite reliability; χ^2 = chi-square value; *df* – degrees of freedom; TLI – Tucker-Lewis Index; CFI – comparative fit index; RMSEA – root mean square error of approximation; $^{***}p < .001$; all factor loadings were significant at the $p < .001$ level.

Figure 5. Confirmatory factor analysis (CFA: total samples).

Table 1

Teachers' experience, knowledge, perceived teaching efficacy, and attitudes

Research variables		Score		Korea		Germany		*t*	*d*
		min	*max*	*M*	*SD*	*M*	*SD*		
Exp	Prof	4.00	14.00	6.85	1.79	7.72	1.95	-5.26^{***}	0.46
	Trai	1.00	2.00	1.35	0.47	1.27	0.44	2.07^{*}	0.17
	Pers	1.00	2.00	1.14	0.35	1.21	0.41	-2.26^{*}	0.18
PTE		3.00	12.00	6.47	1.47	7.27	1.46	-6.03^{***}	0.54
Attitudes		21.00	84.00	50.70	5.03	57.59	5.16	-15.53^{***}	1.35

Note. Exp – experience; Prof – professional; Trai – additional training; Pers – personal; PTE – perceived teaching efficacy; Cohen's effect size (*d*) = small 0.20, medium 0.50, large 0.80, $^{***}p < .001$, $^{**}p < .01$, $^{*}p < .05$.

paths between the two groups, by conducting procedures E, F, and G accordingly (see Figure 3). Since procedure G was confirmed, the results can be compared and interpreted at the same level between Korea and Germany. The fit indices for each procedure are as follows:

- Procedure D: $\chi^2(48, N = 528) = 139.67$, $p < .001$, TLI = .926, CFI = .946, RMSEA = .060,

- Procedure E: $\chi^2(138, N = 528) = 185.22$, $p = .003$, TLI = .959, CFI = .969, RMSEA = .026,
- Procedure F: $\chi^2(148, N = 528) = 211.45$, $p = .003$, TLI = .952, CFI = .961, RMSEA = .029,
- Procedure G: $\Delta\chi^2(132, N = 528) = 26.23$, $p < .001$, ΔTLI = −.007, ΔCFI = −.008, ΔRMSEA = .003.

DIRECT EFFECTS

In total, 12 direct paths were analyzed. As shown in Figure 6, teachers' additional training experience has the most direct effects on Korean and German teachers' knowledge compared to professional and personal experience (paths a, b, and c). Also, both Korean and German teachers' professional experience had the most direct effects on PTE compared to additional training and personal experience (paths d, e, and f). In addition, both Korean and German teachers' knowledge as well as their PTE directly affected their attitudes (paths k and l).

On the other hand, teachers' knowledge did not directly affect their PTE (path g), and their experience did not directly affect their attitudes (paths h, i, and j); thus indirect effects were proved accordingly.

HYPOTHESIS 2A: INDIRECT EFFECTS WITHIN A CULTURE

Three indirect paths were tested with the bias-corrected bootstrapping method with a 95% confidence interval. The results of each indirect path for both samples are as follows:

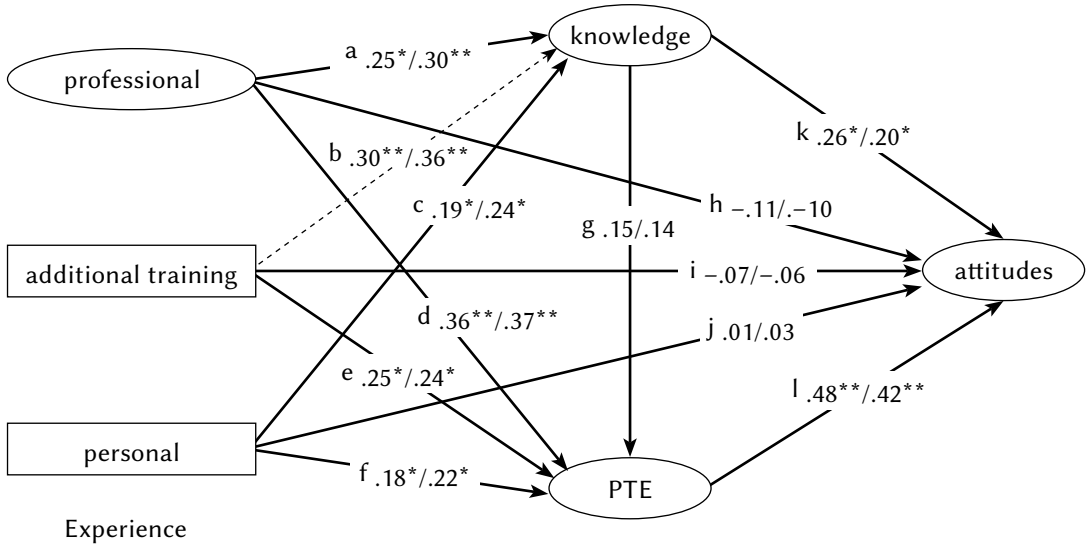
First, both Korean and German teachers' professional experience significantly affects their knowledge and PTE, which in turn affects their attitudes (Korea: $\beta = .23^{**}$, Germany: $\beta = .21^{**}$). Second, both Korean and German teachers' additional training experience significantly affects their knowledge and PTE, which in turn affects their attitudes (Korea: $\beta = .19^{*}$; Germany: $\beta = .18^{*}$). Third, both Korean and German teachers' personal experience significantly affects their knowledge and PTE, which in turn affects their attitudes (Korea: $\beta = .15^{*}$, Germany: $\beta = .14^{*}$). Since all three indirect paths turned out to be significant for both Korean and German samples, hypothesis 2a was accepted.

HYPOTHESIS 2B: PATH DIFFERENCES ACROSS CULTURES

With regard to path comparison of the two countries, all paths except *path b* (the impact of additional training experience on their knowledge) were significantly different between Korea and Germany (see Table 2). It means that the way that ADHD-related experience affects their knowledge about ADHD and their perceived teaching efficacy, which in turn affect their attitudes towards students with ADHD, was significantly different between the two countries. Therefore, hypothesis 2b was accepted.

DISCUSSION

The purpose of this study was to investigate cross-cultural similarities and differences between Korean and Ger-



χ^2 (148, N = 528) = 211.45, p = .001, TLI = .952, CFI = .961, RMSEA = .029

Note. In total, 12 direct paths and 3 indirect paths were analyzed; standardized estimate = β (Korea/Germany); professional – professional experience; personal – personal experience; PTE – perceived teaching efficacy; bold line – significant path differences between Korea and Germany; dotted line – no significant path differences between Korea and Germany; all paths (except path b) showed significant path differences; $^{***}p < .001$, $^{**}p < .01$, $^{*}p < .05$.

Figure 6. Result of the hypothesized research model in Korea and Germany.

Table 2

Summary of the chi-square value differences between Korea and Germany

Path	Chi-square differences ($\Delta\chi^2$)	Path	Chi-square differences ($\Delta\chi^2$)
a	$\Delta\chi^2$ (11, N = 528) = 23.94, p = 013	g	$\Delta\chi^2$ (11, N = 528) = 26.02, p = .006
b	$\Delta\chi^2$ (11, N = 528) = 8.41, p = .676	h	$\Delta\chi^2$ (11, N = 528) = 25.08, p = .009
c	$\Delta\chi^2$ (11, N = 528) = 25.14, p = .009	i	$\Delta\chi^2$ (11, N = 528) = 23.81, p = .014
d	$\Delta\chi^2$ (11, N = 528) = 25.93, p = .007	j	$\Delta\chi^2$ (11, N = 528) = 24.69, p = .010
e	$\Delta\chi^2$ (11, N = 528) = 26.22, p = .006	k	$\Delta\chi^2$ (11, N = 528) = 25.97, p = .007
f	$\Delta\chi^2$ (11, N = 528) = 25.71, p = .007	l	$\Delta\chi^2$ (11, N = 528) = 25.04, p = .009

Note. Δ – differences between two groups; χ^2 – chi-square value; all paths (except *path b*: $\Delta\chi^2$ (11, N = 528) = 8.41, p = .676) found significant differences between Korean and German teachers; $^{***}p < .001$, $^{**}p < .01$, $^{*}p < .05$.

man teachers in terms of knowledge, perceived teaching efficacy, and attitudes regarding students with ADHD, as well as to evaluate how teachers' experience (professional, training, and personal) influences their attitudes through knowledge and PTE, based on three components of attitudes (Allport, 1935; Rosenberg & Hovland, 1960) within a culture as well as across cultures.

Matched samples of 264 Korean and 264 German teachers were obtained. The Kos (2004) questionnaire was modified. SPSS 22.0 and AMOS 22.0 were used to analyze the data.

The brief summary of each hypothesis testing is as follows:

1. Korean teachers showed greater knowledge about ADHD than German teachers. German teachers were found to have a greater PTE as well as to have more favorable attitudes regarding students with ADHD.
2. Both Korean and German teachers' experience led to teachers' attitudes through their knowledge about ADHD and their PTE. The way teachers' experience affects their knowledge and PTE, which in turn affect their attitudes, is significantly different between Korea and Germany.

INTERPRETATION OF THE FINDING 1 (CROSS-CULTURAL COMPARISONS OF RESEARCH VARIABLES)

With regard to hypothesis 1a (knowledge), Korean teachers (77.00%) showed greater knowledge about ADHD than German teachers (74.52%), which does not support previous studies (e.g., Korea: Kang et al., 2011, 53.30%; Germany: Schmiedeler, 2013, 54.20%). Although this study used a *yes/no/don't know* format, where teachers had *no* chance of guessing the correct answer, both Korean and German teachers showed greater knowledge about ADHD (more than 70.00%) compared to previous findings (using a *yes/no/don't know* format: between 47.00% and 55.00%; e.g., Sciutto et al., 2000; Kos, 2004). This result was even similar to previous findings (using a *yes/no* format: between 75.00% and 78.00%; e.g., Jerome et al., 1994; Ohan et al., 2008) where teachers had a 50.00% chance of guessing the correct answer.

In terms of hypothesis 1b (PTE), German teachers (60.58%) were found to have a higher PTE compared to Korean teachers (53.91%). This confirmed previous studies from Western cultures which found that teachers perceived themselves as having sufficient skills and the ability to manage students with ADHD (Kos, 2004; Murray, 2009) as well as from Eastern cultures which showed that teachers perceived themselves as having less competence to manage these students (Jeong & Choi, 2010; Joo & Jeong, 2007). This implies that German teachers' negative attitudes regarding students with ADHD did not influence their perception as being competent to manage them, whereas Korean teachers' negative attitudes had an effect on their ability to manage these students.

With respect to hypothesis 1c (attitudes), German teachers (68.56%) have more favorable attitudes towards students with ADHD (60.35%) compared to Korean teachers. Lee and Witruk (2013) found that both Korean and German teachers were concerned about the disruptive behavior of students with ADHD in the classroom. Whereas Korean teachers believe that these students disrupt the entire flow of the class as well as other students' learning, German teachers were more concerned about the balance between students with and without ADHD. This implies that the same disruptive behavior of students with ADHD can be perceived as breaking social harmony within a group in the Korean classroom, whereas this behavior is understood as unique and independent in the German classroom.

Confucianism could be invoked to explain different perceived teaching efficacy (hypothesis 1b: PTE) as well as attitudes towards students with ADHD (hypothesis 1c: attitudes) between the two countries. In Korea with its typical Confucianism culture, lower hierarchs are expected to show respect by obeying higher hierarchs. For example, new teachers (as lower hierarchs) should listen to expert teachers' advice (as higher hierarchs), which could affect their confidence to manage students with ADHD (from hypothesis 1b). In a similar vein, students with ADHD (as lower hierarchs) often have problems with people of authority (i.e., teachers as hierarchs). They appear to show a lack of respect by not listening to teachers, which may lead to teachers having unfavorable attitudes towards students with ADHD. Thus, the disruptive behavior of Korean students with ADHD can be perceived as more abnormal behavior, whereas German students with ADHD seem to be more accepted and understood by their teachers (from hypothesis 1c).

To summarize, the findings from the three sub-hypotheses raise some important questions: (a) why are Korean and German teachers' levels of knowledge higher than previous findings (H1a)? Since approximately 50.00% of teachers in both countries have professional, training, and personal experiences with ADHD, this may increase both Korean and German teachers' knowledge about ADHD; (b) can this result only be explained with regard to cultural differences between Korea and Germany? Or do other environmental factors (e.g., class size and/or school type) lead to different levels of teachers' PTE (H1b)?; (c) are there other teachers' characteristics (e.g., job satisfactions, teachers' personal psychological factors) which can explain these different teachers' attitudes towards students with ADHD (H1c)? These questions are worth further investigation in the future to gain a clearer picture of teachers' knowledge as well as attitudes in both countries. Qualitative methodology (e.g., ground theory, Q-methodology) could be an alternative method to investigate these questions.

INTERPRETATION OF THE FINDING 2 (RESEARCH MODEL: KNOWLEDGE AND PTE AS MEDIATORS)

With regard to hypothesis 2a (indirect effects within a culture), the relationship between teachers' experience and their attitudes towards students with ADHD was mediated by teachers' knowledge about ADHD and their PTE in both countries, which confirmed several previous studies (Bekle, 2004; Brophy & McCaslin, 1992; Lee & Witruk, 2013; Sciutto et al., 2000). This implies that teachers' factual and correct information about this disorder as well as their perceived competence in the management of students with ADHD are important factors for teachers in both countries to have more favorable attitudes towards students with ADHD.

However, unlike the findings from previous studies (Blume-D'Ausilio, 2005; Perold, Louw, & Kleynhans, 2010), *no* significant relation was found between teachers' knowledge about ADHD and their PTE in both countries. This could mean that when teachers have more theoretical information about ADHD, but are not able to transfer their knowledge into the practical setting of a classroom, it could even reduce their level of PTE (Blume-D'Ausilio, 2005; Sciutto et al., 2000). This issue is worth clarifying by investigations in the future to identify a clearer answer. The first step will be to check the content of the current ADHD-related training programs, whether they involve theoretical information about ADHD as well as how to apply their understanding of ADHD to specific classroom management strategies (CMS) to enhance both Korean and German teachers' confidence to manage students with ADHD.

With regard to hypothesis 2b (path differences across cultures), the test of the structural model invariance across group analysis was conducted to make a comparison between two culturally different countries. As a result, 11 directs paths out of 12 paths as well as all three indirect paths were significantly different between the two countries, reflecting a significant difference between how Korean and German teachers' experience affects their knowledge and their perceived teaching efficacy, which in turn affect their attitudes.

Only the path of additional training for teachers' knowledge about ADHD showed no significant differences between the two countries. This result stresses the importance of ADHD-related additional training to increase Korean and German teachers' level of knowledge, which has consistently been emphasized in numerous studies in the past (e.g., Lee & Witruk, 2013; Schmiedeler, 2013). Since both Korean and German students spend long hours every day at school, teachers are suitable persons to detect ADHD-related behavior and to refer these students with ADHD to professionals for a correct diagnosis as well as appropriate treatments. Thus, specialized ADHD-related training needs to be provided more frequently for both Korean and German teachers, so that they can gain correct information about ADHD to help students who potentially have ADHD as well as provide the right advice to those students' parents.

CONCLUSIONS

This investigation proved the cross-cultural differences of all research variables as well as the mediation research model based on attitude theory. This

study is an important step towards understanding teachers' knowledge, perceived teaching efficacy, and attitudes in the cultural context between Korea and Germany. This study can be the preliminary resource to develop an *ADHD management manual* based on theoretical and cultural perspectives in both countries, so that both Korean and German teachers can be prepared for students with ADHD in their daily classroom practice.

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Endnotes

1 It is like "banging your head against a brick wall", to use the English expression.
2 From here on, Korea represents South Korea.
3 If you wish to access this survey instrument (Korean, German, and/or English version), contact the first author: yumi.lee@uni-leipzig.de.

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