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Longitudinal Effects of Perceived Parental Overprotection on Korean Male Adolescents' Academic Achievement

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This study aimed to investigate the trajectories of academic achievement of male Korean high school students over a period of 3 years and the effects of perceived parental overprotection. 539 Participants completed the Korean Version of the Parental Bonding Instrument at the beginning of the study, and their language and mathematics scores from the National Achievement Test were recorded every semester for 3 years (n = 494 for language and n = 493 for mathematics). Latent growth curve models, latent class growth analysis, and multinomial logistic regression analysis were conducted to evaluate the longitudinal data. The results showed an overall decline in academic scores in both subjects; in addition, three latent classes for language scores and four latent classes for mathematics scores were identified. For language, higher maternal overprotection was negatively associated only with Time 1 scores, collected at the beginning of the first year of high school, while higher paternal overprotection was negatively associated with Time 1 scores, as well as changes over time. Higher maternal or paternal overprotection increased the possibility of having lower language scores at Time 1. For mathematics, only higher paternal overprotection was negatively associated with Time 1 scores and changed over time, in addition to increased chances of having lower mathematics scores at Time 1. The results indicate that parental overprotection, especially that of the father, negatively affected male high school students' academic achievement, suggesting a new perspective of interpreting fathers' role in sons' academic achievement in Korean culture, in which mothers' roles have been emphasized.

Keywords: perceived parental overprotection, academic achievement, male adolescents, growth curve modeling, latent class identification

It is common for parents and students to value and strive for academic success, believing that graduating from high-ranking universities promises socioeconomic success and respect from society (Brewer et al., 1999; Hwang, 2001). Students' race for academic success is more common in societies in which parenting is judged by how well children perform in school (Z. N. Lee, 1999). This is especially true for Korea, in which face-culture is dominated mainly by the influence of Confucian philosophy (S. Choi, 2004), where societal success through education is more valued, and the pressure to become successful is high (Lee, 1999). For example, parents in Korea generally intervene in their children's use of time and daily activities, monitoring or intruding into their children's peer and romantic relationships, or arrange private tutoring and after-school study groups, hoping that parental involvement will enhance their children's academic achievement (Ding, 2014; Lee et al., 2006). As a result, students in Korea go through intense competition, as early as in pre-school, to get high grades and enter high-ranking universities (Kwon, 2004; G. Lee, 1997).

Many overprotective parents have good intentions, but overprotection often results in negative effects on their children's adjustment at school (Georgiou, 2008), mental health (Clarke et al., 2013; Spada et al., 2012; Young et al., 2011), social competence, and self-

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esteem (Doh & Falbo, 1999; Herz & Gullone, 1999). Similar findings have been reported in studies conducted on Asian samples (S. H. Kim & Chung, 2011; K. Otani et al., 2012; Phuong et al., 2013; Yoon & Chung, 2014).

The negative effects of parental overprotection are also apparent in students' academic achievement. Research has shown that overprotection may lead to academic burnout (Shin et al., 2012), and lowered self-assessments of ability in math, social, and sports domains (Yee & Flanagan, 1985). Students experiencing overprotection have lower self-esteem, lower self-confidence, higher dependence, and dysfunctional attitudes toward achievement (Mofrad et al., 2009; K. Otani et al., 2013; Wood et al., 2003). As such, parents influence their children's academic performance through their motivation level (Häfner et al., 2018) and academic status (Johnson & Descartes, 2017), and most of all, through their parenting style (Zahedani et al., 2016).

Korean parents show more overprotective behaviors toward boys than girls in terms of academic activities (S. Lee & Choi, 2006). Consistent with this report, boys reported more pressure and stress for academic success from their parents compared to girls (Kim et al., 2010). Furthermore, factors such as parents' gender, their gender stereotypes, and child's gender influence the interplay of parental behavior and the child's academic performance (Eccles, 2007; Jacobs & Eccles, 1992; E. S. Kim, 1990; H. J. Kim, 2006; H. J. Kim, 2009; Sung et al., 1999; Simpkins et al., 2012). However, only a few studies have investigated the relationship between gender-specific academic achievement and parents' overprotection. For example, a study conducted in Korea found that only paternal overprotection was associated with lower academic achievement (You & Hong, 2010). In another study conducted in Israel, paternal overprotection had no relationship with the adolescents' cognitive abilities or academic achievement for both boys and girls, whereas higher maternal overprotection predicted lower academic achievement among male adolescents (Feldman et al., 1998). Another study conducted in Australia showed that maternal and paternal overprotection and care did not predict students' self-reported grades among adolescents (Heaven et al., 2002).

The methodological limitations of these studies should be considered when interpreting these findings. First, for some studies, the adolescents' self-reported grades rather than their actual academic achievement (Feldman et al., 1998) were used, questioning the resulting relationship between parental overprotection and adolescents' achievement. Second, the mentioned studies were mostly correlational studies that only provided information on the relationship rather than the directionality between the two variables. Studies with a longitudinal design (e.g., latent growth curve modeling, latent class growth analysis) are preferred in terms of identifying patterns of academic achievement over time and to learn the causal pathways between parental overprotection and achievement. Only a few studies have followed achievement trajectories over time with individual achievement differences in terms of rate, direction, and the parental factors affecting the rate and direction of achievement trajectory using latent growth curve modeling (Fan, 2001; Gutman et al., 2003). For example, one longitudinal study examined how parental factors affected student achievement, using latent class growth analysis along with multinomial logistic regression, by which the authors identified subgroups or latent classes (Suárez-Orozco et al., 2010). Finally, gender-specific differences were not considered, which is worth noting considering that Korean boys observe higher parental overprotection compared to Korean girls (S. Lee & Choi, 2006). The impact of parental overprotection on boys' academic achievement, however, has not been studied in depth.

Thus, this study aimed to (1) investigate the overall trajectory and latent classes of male high school students' academic achievement in language and mathematics over 3 years, and (2) explore the effects of maternal and paternal overprotection on the trajectories and student class membership.

Method

Participants

A total of 522 male high school freshman students were recruited and assessed twice a year for 3 years (six assessments in total). All participants were from a high school for boys, located in the Seoul metropolitan area and following the Korean National Basic Curriculum. At the time of the initial test, the participants were aged 15–17 years ($M = 15.39$, $SD = 0.49$). During their first semester, the Parental Bonding Instrument was administered, and for 3 years, their academic achievement test results for language and mathe-

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Table 1. *Demographic Information of Sample (N = 592)*

Variable	Mother	Father
Parental education		
Elementary school	5 (0.8%)	3 (0.5%)
Middle school	22 (3.7%)	28 (4.7%)
High school	217 (36.7%)	296 (50.0%)
Vocational school	31 (5.2%)	21 (3.5%)
Undergraduate school	239 (40.4%)	192 (32.4%)
Graduate school	49 (8.3%)	24 (4.1%)
No response	29 (4.9%)	28 (4.7%)
Family income		
Low	21 (3.5%)	
Low to mid	54 (9.1%)	
Mid	337 (63.7%)	
Mid to high	101 (17.1%)	
High	9 (1.5%)	
No response	30 (5.1%)	

matics were collected. Demographic information, including parental educational attainment and family income, is provided in Table 1. The total number of students who completed both the maternal and paternal overprotection questionnaires during the first semester was 539, and samples were used to compare maternal and paternal overprotection. For further analysis, only those who completed the overprotection questionnaire and all six academic achievement tests were included. The final sample for language and mathematics were 494 and 493, respectively.

Measures

Parental Bonding Instrument—Korean Version (K–PBI & Song, 1992)

The Parental Bonding Instrument (PBI) was originally developed by Parker, Tupling, and Brown (1979) to evaluate adolescents' perceived maternal and paternal parenting styles. The PBI is a 25-item self-report questionnaire scored on a 4-point Likert scale, ranging from 0 (very unlikely) to 3 (very likely). It consists of two subscales: the care subscale (12 items), which reflects an affectionate, warm, and sensitive parental representation, and the overprotection subscale (13 items), which comprises parental intrusion, control, infantilization, and discouragement of autonomy. The K-PBI has identical constructs as the PBI and has acceptable validity and reliability (Song, 1992). The care subscale's internal consistency for this study was .85 for the mother and .86 for the father. The internal consistency for the overprotection subscale was .75 for both parents. The overprotection subscale was used to measure maternal and paternal overprotection, which ranged from 0 to 33.

National Achievement Test (NAT)

This test is a nationwide mock examination to prepare for the College Scholastic Ability Test, which is the Korean college entrance exam. The NAT is administered by the Korea Institute for Curriculum and Evaluation, as well as the four regional branches of the South Korean Office of Education. These institutions administer the NAT four times per year, and each high school decides when to take the exam. This test evaluates the students' current level of academic achievement, which guides the range of colleges students should apply to. The NAT consists of four subjects: Korean language, mathematics, English, and the choice of a science subject or a social science subject. For this study, the standardized scores[1)] for Korean language, henceforth referred to as language, and mathematics were used in this study. The total raw score for each test ranged from 0 to 100.

Procedure

Upon receiving the school administrators' approval, the purposes and plans for this study were explained to the students and their parents. Those who signed the consent form were given a set of questionnaires. Studies using a part of this data set were published elsewhere (Chung et al., 2013; Guak et al., 2016). The NAT was administered every semester for three years. Language and mathematics scores were obtained from the school at the end of the study, when all six tests were completed. Prior to data collection, this study was approved by the Department of Review Committee and Institutional Review Board (#Psychology-186).

Data Analysis

Statistical analyses were conducted in the following order using SPSS Windows Version 18 and Mplus 5.21 (L. K. Muthén & B. O. Muthén, 1998–2009). First, to compare maternal and paternal

1) Standardized scores were calculated using the following formula: (Z score)*(SD)+(M)

overprotection scores, a paired-sample *t*-test was conducted. Second, latent growth curve models (LGCM) were used to identify students' individual academic growth trajectories in language and mathematics. For the LGCM, fit indices of the linear and quadratic growth models, including Comparative Fit Index (CFI; Bentler, 1990), Tucker–Lewis Index (TLI; Tucker & Lewis, 1973), and root mean square error of approximation (RMSEA; Browne & Cudeck, 1993) were compared to determine the best fitting model. CFI and TLI values >.95 and an RMSEA value <.05 were considered good, while a RMSEA value between .08 and .10 was considered reasonable and mediocre (Hong, 2000; Hu & Bentler, 1999).

Third, latent class growth analysis (LCGA), a type of growth mixture modeling (GMM), was applied to data to explore the heterogeneous latent classes in the achievement trajectories (B. O. Muthén, 2004; L. K. Muthén & B. O. Muthén, 2000; Nagin, 2005). The class indicators entered in LGCA were six test scores assessed over 3 years, and maternal/paternal overprotection measures were also added in a conditional model to identify latent classes. For missing data, we use FIML, which is a method employed when missing data are present. The following five criteria were used to determine the optimal number of latent classes: Bayesian information criteria (BIC), adjusted BIC (Adj BIC), entropy, bootstrap likelihood ratio test (BLRT), and theoretical appropriateness (L. K. Muthén & B. O. Muthén, 2000). The model with the lowest BIC and Adj BIC scores was considered the most favorable. Entropy is a marker of class categorization accuracy, and values >0.8 are considered good (B. O. Muthén, 2004). The BLRT evaluates whether the model with k-1 latent classes should be rejected in favor of one with k latent classes; a significant *p*-value would indicate that one should select the latter model (McLachlan & Peel, 2000). To examine parental overprotection on the trajectories and latent trajectory classes of achievement, the conditional model, which incorporates covariates that influence the intercept and slope values, was established by separately adding maternal and paternal overprotection in the unconditional model. The most appropriate number of latent classes is selected using this model.

Lastly, multinomial logistic regression analyses were conducted to examine the effects of maternal and paternal overprotection on the latent trajectory classes of student academic achievement.

Table 2. *Descriptive Statistics for Parental Overprotection and Academic Achievement*

Variables	*M*	*SD*
Maternal overprotection	13.68	5.81
Paternal overprotection	11.27	5.52
Language achievement		
1st year Mar.	107.02	15.31
1st year Sep.	108.76	14.58
2nd year Mar.	109.36	15.28
2nd year Sep.	108.65	14.62
3rd year Mar.	107.41	15.35
3rd year Oct.	106.84	11.81
Mathematics achievement		
1st year Mar.	111.28	17.87
1st year Sep.	114.01	18.44
2nd year Mar.	110.27	18.37
2nd year Sep.	111.61	18.90
3rd year Mar.	108.30	20.09
3rd year Oct.	109.17	17.27

Note. Correlation of study variables may be provided when requested. Mar. = March; Sep. = September; Oct. = October.

Results

The means and standard deviations for parental overprotection and academic achievement are presented in Table 2. A paired sample *t*-test was conducted to compare maternal and paternal overprotection. Results revealed that the level of maternal overprotection was significantly higher than that of paternal overprotection ($N = 539$, $t = 6.990$, $p < .001$, Cohen's $d = 0.425$).

Estimation of the Growth Trajectories of Academic Achievement

The growth trajectories of academic achievement across time were examined by applying the LGCM. The fit indices of the linear and quadratic models were estimated and compared to determine a superior model for language and mathematics. The fit indices for the quadratic language (CFI = .991, TLI = .988, RMSEA = .065) and mathematics (CFI = .972, TLI = .965, RMSEA = .100) models fit the data more closely than the linear model for language (CFI = .959, TLI = .962, RMSEA = .119) and mathematics (CFI = .940, TLI = .944, RMSEA = .127). Thus, in subsequent analyses, a quadratic model was used for both language and mathematics.

The means, variances, and correlations of the intercept, slope,

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Table 3. *Growth Parameter Estimates for Academic Achievement Trajectories and the Effects of Parental Overprotection*

	Intercept	Slope	Quadratic
Language			
Mean	107.35***	1.43***	-0.31***
Variance	161.63***	7.98*	0.35**
I/S correlation coefficient	0.75		
S/Q correlation coefficient	-0.93*		
I/Q correlation coefficient	-0.82***		
Maternal overprotection	-0.28*	-0.01	0.00
Paternal overprotection	-0.37**	-0.08*	0.02*
Mathematics			
Mean	111.74***	0.28	-0.18*
Variance	262.38***	53.13***	1.36***
I/S correlation coefficient	-0.14**		
S/Q correlation coefficient	-0.98***		
I/Q correlation coefficient	0.03		
Maternal overprotection	-0.12	-0.07	0.01
Paternal overprotection	-0.30*	-0.14*	0.02

Note. I = intercept; S = slope; Q = quadratic.
*$p < .05$, **$p < .01$, ***$p < .001$.

and quadratic slope computed from the LGCM of academic achievement are presented in Table 3. For language, the intercept, slope, and quadratic slope were significant; scores increased in the first half of the three-year period and decreased during the latter half. The variances of the intercept and quadratic slope were significant, which suggests that inter-individual differences in the initial score and changes over time exist in student language achievement. Additionally, for language achievement, negative correlations were found between the intercept and the slope, with the quadratic showing students with high initial scores, and those with rapid improvement showed a steeper decline in scores over time.

For mathematics, the scores were steady during the first and decreased during the latter half of the three-year period. Significant variances found in the intercept, slope, and quadratic function suggest that inter-individual differences in the initial score and changes over time exist in student mathematics achievement. Negative correlations between the intercept and the slope and between the slope and quadratic indicate that students with higher initial scores showed slower improvement rates; however, those with faster improvement rates also showed a faster rate of decline over time. Overall, inter-individual differences found in both language and mathematics suggest that heterogeneous subgroups or latent trajectory classes exist within the population.

Effects of Parental Overprotection on Academic Achievement

The effects of maternal and paternal overprotection on student language and mathematics achievement were examined, and the results are presented in Table 3. For language achievement, higher maternal overprotection was associated with lower initial scores (intercept). Higher paternal overprotection was associated with lower initial scores (intercept), slower rate of improvement (slope), and faster rate of decline in the latter half of the three-year period (quadratic slope). For mathematics, paternal overprotection was associated with lower initial scores (intercept) and slower rates of improvement (slope), whereas maternal overprotection was not associated with students' mathematics achievement.

Class Identification for Academic Achievement

The LCGA was conducted to identify latent classes in language and mathematics achievement with maternal and paternal overprotection as predictors for classifying individuals into latent classes. To determine the most appropriate number of classes to fit the data, conditional models with one through five classes were tested and compared (Table 4).

For language, the fit indices of conditional language achievement models with maternal overprotection as a predictor showed that the BIC and Adj BIC values of the four- and five-class models were the smallest. However, these models lacked the stability of class membership because of small group sizes (e.g., ranges from 3 to 11). Thus, a three-class solution was selected as the final model. Similar results were found for conditional language achievement models, with paternal overprotection as a predictor. Therefore, the three-class solutions were selected as the final models for language achievement using both maternal and paternal overprotection as predictors; the classes are the mid-rising-curve, low-rising-curve, and low-stable class. Most students were classified in the mid-rising-curve class (83.0%–84.2%), characterized by moderate achievement levels with a significant increase during the first half of the study, followed by a steady decrease during the latter half. Students in the low-rising curve (13.0%–14.2%) showed lower levels of achievement but demonstrated an increase in the beginning and a decrease at the end of the study. A minority of students belonged to the low-

Table 4. *Model Fit Indices for LCGA Models*

Number of class	Log likelihood	Entropy	BIC	Adjusted BIC	BLRT
Language					
Covariate: Maternal overprotection					
1	-12,309.6	N/A	24,780.50	24,697.98	N/A
2	-10,664.3	0.98	21,508.51	21,416.46	-10,741.48***
3	**-10,628.2**	**0.90**	**21,467.38**	**21,359.46**	**-10,664.32*** **
4	-10,607.7	0.92	21,457.29	21,333.50	-10,628.25***
5	-10,596.6	0.93	21,466.08	21,326.43	-10,607.69*
Covariate: Paternal overprotection					
1	-12,290.5	N/A	24,742.18	24,659.66	N/A
2	-10,664.6	0.98	21,509.09	21,417.04	-10,741.48***
3	**-10,628.2**	**0.90**	**21,467.31**	**21,359.39**	**-10,664.61*** **
4	-10,607.0	0.92	21,455.94	21,332.15	-10,628.21***
5	-10,595.3	0.75	21,463.43	21,323.77	-10,607.02***
Mathematics					
Covariate: Maternal overprotection					
1	-13,335.8	N/A	26,832.88	26,750.36	N/A
2	-11,748.3	0.70	23,676.43	23,584.38	-11,771.60***
3	-11,733.0	0.73	23,676.82	23,568.91	-11,748.31***
4	**-11,721.4**	**0.72**	**23,684.69**	**23,560.90**	**-11,733.00*** **
5	-11,718.8	0.82	23,710.60	23,570.94	-11,721.43
Covariate: Paternal overprotection					
1	-13,317.7	N/A	26,796.53	26,714.01	N/A
2	-11,746.1	0.70	23,672.04	23,579.99	-11,771.60***
3	-11,730.3	0.73	23,671.36	23,563.44	-11,746.11***
4	**-11,719.1**	**0.72**	**23,680.03**	**23,556.24**	**-11,730.27*** **
5	-11,710.3	0.73	23,693.38	23,553.72	-11,719.11*

Note. Bolded row denotes the selected model. BIC = Bayesian information criteria; BLRT = Bootstrap likelihood ratio test.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 5. *Distributions and Growth Parameters of Latent Classes*

	N (%)	Intercept mean	Slope mean	Quadratic mean
Language				
Maternal overprotection				
Mid-rising curve	416 (84.2%)	110.87***	1.20**	-0.24***
Low-rising curve	64 (13.0%)	92.24***	3.68**	-0.76***
Low-stable	14 (2.8%)	90.62***	0.03	-0.88
Paternal overprotection				
Mid-rising curve	410 (83.0%)	110.94***	1.21**	-0.24***
Low-rising curve	70 (14.2%)	92.50***	3.54**	-0.73***
Low-stable	14 (2.8%)	90.61***	-0.02	-0.88
Mathematics				
Maternal overprotection				
High-rising curve	88 (17.9%)	128.02***	5.87**	-1.11**
Mid U-shaped	52 (10.5%)	115.22***	-8.08*	1.95**
Mid-decreasing	211 (42.8%)	113.26***	-1.80*	0.20
Low-rising curve	142 (28.8%)	96.90***	3.35*	-1.02*
Paternal overprotection				
High-rising curve	90 (18.3%)	127.97***	5.86*	-1.11***
Mid U-shaped	54 (11.0%)	115.51***	-8.01**	1.93***
Mid-stable	206 (41.8%)	113.15***	-1.78	0.20
Low-decreasing	143 (29.0%)	96.86***	3.42	-1.03**

*$p < .05$, **$p < .01$, ***$p < .001$.

stable group (2.8%), which showed lower achievement levels with a non-significant decrease.

For mathematics, based on the BLRT and Adj BIC values of the conditional mathematics achievement models with maternal overprotection as a predictor, the four-class solution was selected as the best fitting model. The first class was the high-rising curve (17.9%), which included students with high initial scores and a subsequent rise followed by a decrease. The second class, the mid-U-shaped class (10.5%), included students with mid-range initial scores and a subsequent decrease followed by an increase. The third class was the mid-decreasing group (42.8%), consisting of students with mid-range initial scores and decreasing scores over time. The final class was the low-rising-curve group (28.8%), and it included students in the lower range of initial scores and showed a subsequent rise and then decrease in scores.

In terms of the conditional mathematics achievement model with paternal overprotection as the predictor, the five-class model had the smallest Adj BIC value. However, because of the instability of class membership (e.g., $N = 7$), the four-class solution was ultimately chosen as the best-fitting model. Similar shapes of classes, namely, high-rising-curve (18.3%), mid-U-shaped (11.0%), and low-decreasing (29.0%), were found except for the mid-stable class (41.8%). The latter included the middle range of initial scores but demonstrated no change over time. Table 5 shows the distributions and estimated means in the latent trajectory classes of the selected language and mathematics achievement models.

Effects of Parental Overprotection on the Latent Trajectory Classes of Academic Achievement

Multinomial logistic regression analysis was conducted to examine how parental overprotection predicted class membership. Each class was set up as a reference group, and the coefficient of students being classified into the comparison group was estimated. The results are presented in Table 6.

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Table 6. *Multinomial Logistic Regression by Reference Group*

Language			
Maternal overprotection	Reference group: Mid-rising curve		
	Low-rising curve	Low-stable	
	0.06 (0.03)*	0.05 (0.05)	
	Low-rising curve		
	Mid-rising curve	Low-stable	
	-0.06 (0.03)*	-0.01 (0.05)	
Paternal overprotection	Reference group: Mid-rising curve		
	Low-rising curve	Low-stable	
	0.06 (0.03)*	0.05 (0.04)	
	Low-rising curve		
	Mid-rising curve	Low-stable	
	-0.06 (0.03)*	-0.02 (0.05)	
Mathematics			
Maternal overprotection	Reference group: High-rising curve		
	Mid U-shaped	Mid-decreasing	Low-rising curve
	0.07 (0.05)	0.03 (0.04)	0.06 (0.03)
		Mid U-shaped	
	High-rising curve	Mid-decreasing	Low-rising curve
	-0.07 (0.05)	-0.03 (0.04)	-0.01 (0.03)
		Mid-decreasing	
	High-rising curve	Mid U-shaped	Low-rising curve
	-0.03 (0.04)	0.03 (0.04)	0.02 (0.03)
Paternal overprotection	Reference group: High-rising curve		
	Mid U-shaped	Mid-stable	Low-decreasing
	0.06 (0.04)	0.03 (0.04)	0.08 (0.03)*
		Mid U-shaped	
	High-rising curve	Mid-stable	Low-decreasing
	-0.06 (0.04)	-0.03 (0.03)	0.02 (0.03)
		Mid-stable	
	High-rising curve	Mid U-shaped	Low-decreasing
	-0.03 (0.04)	0.03 (0.03)	0.05 (0.03)

Note. The values in parentheses are standard errors of coefficients.
*$p < .05$.

For language, higher levels of maternal or paternal overprotection increased the probability that the students would be classified in the low-rising-curve rather than in the mid-rising-curve class. In both cases, the coefficient was 0.06 ($p < .05$), which shows that the log odds of being in the low-rising-curve class relative to the mid-rising-curve class rises by 0.06 for each unit increase in maternal and paternal overprotection levels. For mathematics, maternal overprotection did not predict students' class membership, but higher paternal overprotection levels were associated with the low-decreasing-curve class rather than the high-rising-curve class. The coefficient for the latter was 0.08 ($p < .05$).

Discussion

This study aimed to examine the longitudinal effects of perceived parental overprotection on growth trajectories and the latent classes of Korean male adolescents' language and mathematics achievement. Our results showed that (1) students reported a higher level of maternal than paternal overprotection; and (2) for language achievement and maternal overprotection was associated with lower initial scores, whereas paternal overprotection was associated with lower initial scores, a slower improvement rate, and a faster decline rate. For mathematics achievement, only paternal overprotection was associated with lower initial scores and a slower rate of improvement. Both maternal and paternal overprotection increased the possibility of being in a class with lower initial language scores, while only paternal overprotection increased the chances of being in a class with lower initial mathematics scores. The implications of this study are as follows.

First, male adolescents who reported higher levels of parental, especially paternal, overprotection, showed lower academic achievement and less improvement during high school. This finding is inconsistent with few previous studies that covered different cultures, which showed no correlation or negative correlations between maternal overprotection and achievement in male students (Feldman et al., 1998; Heaven et al., 2002). In contrast, this finding is partially consistent with a previous Korean study showing that only paternal overprotection was associated with lower academic achievement in fifth graders (You & Hong, 2010).

Although previous findings that provide possible explanations for the negative impact of parental overprotection on academic performance are limited, few studies have directly investigated how parental overprotection undermines children's academic achievement. First, as schoolwork becomes increasingly rigorous and demanding over time, students are expected to undergo self-directed learning with longer study hours (Kim et al., 2006; H. Park, 2012; Yang & Lee, 2012). Simultaneously, overprotective parents continue to excessively help and control their children, especially in academics. They subsequently limit their children's autonomy, increase their academic exhaustion, reduce their effort to translate abilities into achievement, and eventually lower the level of achievement than could be expected from their abilities (Feldman

et al., 1998; Holmbeck et al., 2002; H. Shin et al., 2012). In addition, another perspective may suggest that children's poor academic outcomes might have triggered parental overprotection. According to McNeal (2012), the reactive hypothesis, which claims that the level of parental involvement is determined by children's academic or behavioral difficulties, was revealed to have little to no empirical support. McNeal (2012) found that reduced achievement reduces the level of parental involvement, concluding that parental overprotection influences children's achievement, rather than vice versa. However, more studies are required to investigate the directionality of these two variables.

This negative impact of paternal overprotection on academic performance can be understood by considering the parent–son interaction style in Korea. Korean parents, especially mothers, are known to be controlling and excessively involved in their children's daily routines and academic activities (B. E. Cho & Shin, 1996), which is culturally considered as caring behavior (Parker, 1990). However, Korean fathers spend significantly less time with their children compared to fathers in Western countries due to their excessive number of working hours (S. Cho, 2005; M. Choi & Cho, 2005), often resulting in distant father–son relationships (Harris et al., 1998). Thus, mothers' overprotective behavior may be more acceptable to children, whereas paternal overprotective behavior could be perceived as excessively intrusive and a violation of the students' independence. This behavior is not restricted to the educational field alone, and further research should also be conducted in the workplace for men in Korea. In the modern Korean family, children commonly live with their parents even after they are married. Even though this tradition is now weakening, parents still do not give complete freedom to a married son, whereas this is the opposite for daughters. Thus, it can be speculated again that in Korea, parental control over sons may be quite different from that over daughters and that the different controls will lead to not only the correlations pointed out in this paper, but may even spill over to the workplace after academics are completed. Further research should be conducted based on these findings.

Our results point out that the overprotection of Korean parents can lower their sons' academic achievement, even if they mean well. In Korea, it is very common for parents to decide which private academic institute their children attend or whether they receive private tutoring after school or on weekends; therefore, parents may consider their control over children's activities and behaviors as normal and do not recognize their control to be excessive. It is important for parents to pay particular attention to their common practices of control or unnecessary help to restrain themselves from overprotecting children. In addition, this study suggests that fathers should be more vigilant about overprotection. As people easily overlook the effects of paternal parenting, there should be more education or intervention for fathers to learn about the effects of their parenting on children. For schoolteachers and school counselors, accurate assessment of family relationships, especially children's perceived parental overprotection, will provide useful information that could be used to help underachieving students and their parents. When necessary, teachers and counselors should provide counseling to parents indulging in excessive overprotection.

Second, this study found that both language and mathematics achievement decreased over time during high school among Korean male adolescents. This decrease is surprising because this is when students generally work the hardest as third-year academic performance has the greatest impact on their college admissions. No significant increase observed in the third year further suggests difficulty in notable academic improvement during this period. A decrease in scores over time was also found in a previous Korean study. According to a study investigating mathematics performance of sixth-, ninth-, tenth-, and twelfth-grade students in the Seoul metropolitan area, students' performance decreased with age (Suh et al., 2011). Since this study used the participants' standardized test scores instead of raw test scores, it is hard to conclude whether this decreasing trend reflects the characteristics of Korean male adolescents as a whole, or a characteristic of male adolescents in the Seoul metropolitan area where the data were collected, or a characteristic of the participants' school. The gradual increase in college admission among female students (Department of Education, 2015) suggests different patterns of school performance over time across genders, although direct investigation is required.

Third, as hypothesized, distinct latent trajectory classes that differed for students' initial scores, changes over time, and class membership were identified. Three classes were found for language. Most students belonged to the mid-rising curve class, which included

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learners with mid-range initial scores that increased in the first half of the study, and then decreased. Although the number of low-stable classes in both fathers and mothers is only 2.5%, it is meaningful in that it shows that there are students who belong to this category. In fact, a similar pattern was found in another study (Finch & Marchant, 2013), which investigated 165,000 middle school students across 20 Organisation for Economic Co-operation and Development (OECD) countries and reported that the low achievement group consisted of 3%–7% of the data. For mathematics, four classes were found for maternal and paternal overprotection; two of each set of classes included 52.8%–53.3% of students. More specifically, the two classes for maternal overprotection were mid-U shaped and mid-decreasing, while two different classes were found for paternal overprotection, mid-U shaped and mid-stable classes. These classes showed mid-range initial scores but different patterns of change over time. The number of classes identified in this study is identical to previous studies that analyzed young children's reading proficiency and mathematics achievement (Geary et al., 2009; Kaplan, 2002). Although further research is needed to identify latent trajectory classes of achievement starting from young childhood to adolescence, the number of classes found in early childhood appears to continue throughout adolescence, with some changes in student membership. These results suggest that early childhood achievement can predict academic achievement in late adolescence. This continuity from early childhood to adolescence suggests the importance of improving children's academic achievement at an early age (Geary et al., 2009; Gutman et al., 2003; Kaplan, 2002).

The limitations and future suggestions are as follows: First, all participants were recruited from a single high school for boys, which limits the generalization of the findings of this study to the Korean population. Prospective studies should expand the recruitment range to both inside and outside the Seoul metropolitan area, as well as increase the sample size. Second, parental overprotection was measured by students' self-reports, demonstrating how students perceived their parents. Thus, parents' and students' actual relationships may have affected the overprotection score to become biased or different from real parenting behaviors. Parents' self-reports and/or direct observation of parent–child relationships would enhance the objectivity of the research. Third, this study measured parental overprotection once at the beginning of the study; therefore, whether the level of parental overprotection is steady over time is unknown. Future studies should explore the stability of parental overprotection scores and how changes in this score affect children's academic achievement trajectory. Fourth, since parental overprotection was the main focus of this study, it did not include other factors such as student motivation, temperament, learning ability, companionship, and school adaptation. To investigate the relative impact of parents and protection, it is necessary to simultaneously consider these variables. Lastly, this study investigated the effects of the overprotection of mothers and fathers on education separately. However, since parental behaviors impact children at the same time, it seems necessary to examine the effects of paternal and maternal overprotection simultaneously.

Author contributions statement

Soohyun Shin, a graduate student at Yonsei University, collected and analyzed the data and prepared the manuscript. Yungjae Suh, a graduate student at Yonsei University, assisted in analyzing the data and writing the discussion part of the manuscript. JooYoung Lee, a professor at Donduk Women's University, provided significant consultation for data analysis. Kyong-mee Chung, professor at Yonsei University, served as the principal investigator of the research grant and supervised the research process. All authors provided critical feedback, participated in the revision of the manuscript, and approved the final submission.

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