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Verification of the structural relationship among athlete Julsil, self-regulation, and flow in adolescent athletes

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Abstract

The purpose of this study was to explore the structural relationship among the perception of athlete Julsil, self-regulation, and flow of adolescent athletes. A total of 425 middle school and high school athletes completed a survey. Structural equation modeling analysis was conducted to verify the research model. The result of verifying the structural relationship among athlete Julsil, self-regulation and flow indicates that self-regulation was found to mediate the relationship between athlete Julsil and flow. In addition, measurement invariance was verified across gender and school that can be applied equally to various groups. Through these results, it was verified that athlete Julsil is an important psychological factor for adolescent athletes. In addition, they need to have a firm mental attitude by themselves and to move them to action for peak performance.

Key words: Adolescent athlete, Athlete Julsil, Self-regulation, flow, Korean athlete

Introduction

Currently, there are about 70,000 adolescent athletes in the Republic of Korea (Korean Sport & Olympic Committee, 2015). However, the probability of becoming a professional athlete is low, at about 3.2% among adolescent soccer players and 4.1% among baseball players (Yoo, 2009). This suggests that adolescents must overcome numerous challenges to become professional athletes.

Especially, adolescent athletes, above all, have a lot of worries about the future and are likely to be affected by many psychological factors (Hill, Hall & Appleton, 2010). Therefore, they need a firm will to strive constantly for their goals and succeed as athletes. Indeed, athletes' attitudes towards playing a sport is a key aspect of psychological preparation for achieving peak performance (i.e., "a state in which the person performs to the maximum of their ability, characterized by subjective feelings of confidence, effortlessness and total concentration on the task"), and is an exceedingly important concern of both coaches and athletes themselves (Kwon, Moon, & Ahn, 2015). The athletes who seek to succeed in competitive situations that can greatly affect their lives, such as tournaments, the Olympic Games, or World Championships, tend to have different attitudes towards achieving success. While researchers have attempted to understand the relations of various psy-

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chological factors with the peak performance of athletes, such as concentration (Wilson, 2012), self-confidence (Fahiminezhad, Khani, & Ghasemi, 2014), and flow (Koehn & Morris, 2012), they have not yet explored the potential driving force or attitude underlying these factors.

In Korea, becoming the champion in professional boxing or earning a medal in the Olympics became an instrument for success among many athletes, raising their economic and social status (Ha & Mangan, 2002). To this end, many athletes began to devote themselves towards achieving success, even under the worst of conditions (Kim, 2011). The “Hungry Spirit,”[1] which is mainly applied to combat sports athletes, at some point in the 1970s and 80s became a factor associated with peak performance among Korean athletes. As South Korea’s national economy grew, “Hungry Spirit” was replaced with the term “*Julsil* (切實).” These two terms were connected by their emphasis on strong motivation. In the backdrop of these improved economic conditions, Korean athletes continued to attain achievements in the Olympics and other global competitions, and these achievements were attributed to their *Julsil* (Ha & Mangan, 2002).

Julsil is not a term used in academia, but it is often used by the Korean media and in everyday life, even outside of sports. Much like the concept of *han*,[2] *Julsil* is a concept specific to Korean culture that is difficult to express as a single English word. Generally, it can be defined as intense feelings or thoughts, or an exceedingly urgent and critical state (National Institute of Korean Language). It is also considered a psychological factor that can enhance mental strength (Kim, 2018; Kwon et al., 2015). For athletes, *Julsil* can be defined as a state of urgent and critical feelings or thoughts about peak performance (Kwon et al., 2015). More specifically, for athletes competing in a match, *Julsil* refers to the adoption of a serious attitude towards engaging in the match; strong psychological skills, which refer to the techniques that allow individuals to maximize their skills in the game or situations of extreme tension through adjustment of their thoughts and emotions in order to overcome stress; and a strong aspiration towards appropriate preparation and competition (Kwon et al., 2015). Thus, *Julsil* not only enables athletes to devote themselves to practice before the match, but also helps them engage in self-management when they are not playing the sport. Furthermore, it enables athletes to apply various psychological skills to their benefit during matches, in particular increasing their interest and aspiration for success in the match (Kwon et al., 2015). Kwon et al. (2015) found that most athletes, including world-renowned Korean Ladies Professional Golf Association (LGPA) athletes, are in close proximity to their peak performance when they reach a state of *Julsil*.

To directly determine whether *Julsil* is related to athletes’ peak performance, researchers (e.g., Kwon et al., 2015) have measured actual athletes’ performance in their chosen sport. However, this is problematic because performance will vary according to the athlete’s athletic ability. To correct this problem, in the present study, we used the concept of flow as an index of peak performance.

Flow can be defined as a feeling of mind–body unity that occurs when one is completely immersed in an activity (Csikszentmihalyi, 1988). In athletics, flow seems to be a factor of peak performance and the relation of flow wtih peak performance has been observed globally, including South Korea (e.g., Kwon, Lee, & Lee, 2011). Athletic flow can be sequential—progressing from antecedent factors to threshold, experience, and then consequence factors—or simultaneous (Csikszentmihalyi, 1988). In this study, we focused on the experience factor of athletic flow—namely, flow in actual game

1) A “Hungry Spirit” refers to the spirit of pressing through adversity with a strong will, even in situations where it is impossible to obtain sufficient food in daily life.

2) *Han* or *haan* is a unique Korean cultural trait referring to having a heart full of resentment, feelings of being unjustly treated, or sadness, and results from South Korea’s frequent exposure to invasions by overwhelming foreign powers (National Institute of Korean Language).

situations, which is characterized by a sense of control, loss of self-consciousness, and altered feelings of time (Csikszentmihalyi, 1990). Specifically, we referred to Kwon's (2008) concept of flow experience, which is determined by the interaction of behaviors and perceptions in Korean athletes. Researchers have also found that flow directly leads to higher performance and more positive experiences (Stavrou, Jackson, Zervas & Kateroliotis, 2007), and that the peak performance of athletes is related to the characteristics of flow (Jackson & Roberts, 1992). In fact, peak performance in athletes can be considered as an indicator of flow (Csikszentmihalyi & Massimini, 1985), given that the higher the likelihood of flow, the higher the likelihood of reaching peak performance. As a result, many athletes strive to reach a state of flow. Flow is also a major variable of interest among sports psychologists (Stavrou et al., 2007).

Prior to beginning this study, Kwon et al. (2015) conducted preliminary interviews with professional and national sports team athletes currently active in South Korea to predict the relationship between athlete *Julsil* and flow. We were able to determine that athlete *Julsil* might play an important role in athletic flow during the actual game, as evidenced by comments such as, "when feeling *Julsil*, I don't know how time passes while exercising," and "when feeling *Julsil*, I become so immersed in the game that I can hardly hear even if people are talking loudly outside." However, athlete *Julsil* alone is not likely to increase flow—psychological variables are rarely, if ever, explained by a single factor—and thus we expected that there are variables that mediate this relationship.

In general, athletes' ability to engage in flow during a game is the result of a gradual improvement, possibly in relation to the development of their self-regulation (Pintrich, 2004). Self-regulation is defined as an individual's ability to change him/herself by controlling various internal impulses, including cognition, emotion, and behavior, in order to achieve his or her goals (Zimmerman, 2000). We set self-regulation as a potential mediating variable in the relationship between athlete *Julsil* and flow. In particular, we predicted that self-regulation would be strongly related to flow. At present, there are few studies involving athletes that indicate a direct relationship between these two constructs (or even between self-regulation and adolescent athletes' performance; [Toering, Elferink-Gemser, Jordet & Visscher, 2009]); nevertheless, a correlation between the two can be predicted from the findings of previous studies in the field of learning. Specifically, self-regulated learning ability was found to influence academic satisfaction through the mediating variable of learning flow (Cho & Do, 2013). Furthermore, one study demonstrated that self-regulated learning ability set their learning goals through processes exploring the basic conditions required to perform the task through concentrating on that task (Pintrich & Groot, 1990; Schunk & Zimmerman, 1994). Csikszentmihalyi (1997) argues that having a clear goal is a condition of flow, which suggests that flow does not occur when the individual's goal is ambiguous. We might infer, then, that athletes with good self-regulation are better able to set firm goals, which in turn would increase their likelihood of experiencing athletic flow. Self-regulation, as a complex psychological process involving cognitive and emotional regulation (Fernyhough, 2010), also has been found to play an important role in psychological function (Schmeichel & Baumeister, 2004). Self-regulation is more important for adolescent athletes because it allows them to learn effectively in practice situations (Kitsantas & Zimmerman, 2006). In a previous study on self-regulation in athletes, researchers found that athletes with good self-regulation tended to practice more than did those without (Cleary & Zimmerman, 2001; Toering et al., 2009). Furthermore, among adolescent soccer players, elite athletes tended to have better self-regulation than did non-elite athletes (Toering et al., 2009). In other words, it seems that skilled athletes have better self-regulation than do those who are less skilled, and the more self-regulated athletes are, the more likely they will be to maximize their potential (Toering, 2011) and reach peak performance.

Nevertheless, the psychological structure of athletes' self-regulation is still unclear, suggesting the need for a clearer explanation. In the preliminary interviews conducted prior to this study, we found that athlete *Julsil* appeared to be closely related to self-regulation, as with athletic flow. For example, athletes made comments in Kwon et al. (2015) study, such as, "if there is *Julsil*, I do not consume things that harm my body like junk food, alcohol, etc.," and "when there is *Julsil*, I practice the areas I am lacking in by myself outside of practice time." These comments seem to reflect how the planning, self-monitoring, and effort sub-factors of self-regulation can be influenced by athlete *Julsil*.

Therefore, in this study, we examined the effects of athlete *Julsil* and self-regulation on the formation of the athletic flow in Korean adolescent athletes, and examined the relationships among all three variables using a structural model. Through this study, we will be able to explain one of the psychological and cultural factors (i.e., *Julsil*) that lead athletes to employ psychological techniques (i.e., self-regulation) and thereby experience flow in actual matches. Furthermore, we will provide the information on the psychological preparation stage of achieving peak performance.

Hypothesis 1. Self-regulation will mediate the relation between Athlete *Julsil* and Flow of adolescent athletes.

Hypothesis 2. Self-regulation will remain a significant mediator of the relationship between Athlete *Julsil* and Flow even after consideration of group differences (gender, school).

Methods

Participants

In this study, subjects were selected and recruited via cluster sampling of physical education schools in Seoul, including one middle school and one high school. These two schools shared a gym, swimming pool, and other athletic facilities. We administered a questionnaire to 433 athletes in these schools. Among them, eight participants that were deemed unsuitable for research analysis because of inadequate responses were excluded. Thus, we analyzed the data of the remaining 425 participants.

The basic characteristics of the participants were as follows: 262 (61.6%) were male and 163 (38.4%) were female, while 179 (42.1%) were middle school students and 246 (57.9%) were high school students. In terms of athletic career awards, 11 (2.6%) students had won an award in an international competition, 288 (67.8%) in a national competition, and 77 (18.8%) in a competition on the city or provincial level; 49 (11.5%) had not won an award at any level of competition. Participants' sports were classified into closed exercise skills and open exercise skills, according to the extent to which there are changes in the environment during the exercise (Gentile, 1972); 106 (24.9%) students participated in sports that used closed exercise skills, while 319 (75.1%) took part in sports that used open exercise skills.

Methodology

Athlete Julsil

To measure the *Julsil* of adolescent athletes, we restructured the Athlete's *Julsil* Scale by Kwon et al. (2015) according to the purpose of this study. This scale comprises 15 items in three subscales: expectation of success, self-control, and patience and coping. Each item is rated on a 6-point Likert scale (1 = strongly disagree, 6 = strongly agree), with higher scores indicating higher athlete *Julsil*.

We also performed a confirmatory factor analysis on the scale items, which revealed that there were no items with factor loadings of lower than .50; thus, all items were related to the measured variables. However, the goodness-of-fit of the scale, which was used to verify the construct validity, was insufficient. Thus, the model was modified by bundling items with modification indices (MIs) of 10 or more (i.e., items 9 and 10). Following this, the validity of the 15 items and 3 factors was good (χ^2 = 317.555, *df* = 86, $p < .001$, [TLI] = .946, [CFI] = .934, [RMSEA] = .080), and the factor loadings of the items ranged from .57 to .89. The internal consistency coefficients (Cronbach's alpha) were as follows: .931 for the whole scale, .851 for expectation of success, .856 for self-control, and .932 for perseverance and overcoming.

Self-regulation

To measure adolescent athletes' self-regulation, we adapted and modified the Self-regulation of Learning Self-Report Scale (SRL-SRS; Toering et al., 2011) for the purpose of this study. The modified scale in this study comprised 46 items in 6 subscales: planning, self-monitoring, evaluation, reflection, effort, and self-efficacy. Each item was evaluated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), and a higher score indicated better self-regulation. A confirmatory factor analysis led us to remove items 1, 13, 46, and 39, as they had factor loadings of lower than .50. We then conducted another factor analysis on the 42 remaining items, which still formed 6 factors. The fit of the model was very good (χ^2 = 2038.906, *df* = 804, $p < .001$, TLI = .905, CFI = .911, RMSEA = .060), and the factor loadings of the items ranged from .64 to .85. The internal consistency coefficients (Cronbach's alpha) of the factors were as follows: whole scale, .978; planning, .914; self-monitoring, .871; evaluation, .935; reflection, .878; effort, .923; and self-efficacy, .910.

Flow

To measure athlete flow—an aspect of athletic flow experience that refers to the immersive state of the actual athlete—was measured using Kwon's (2008) Korean version of the Athletic Flow Scale. It was measured as a single factor. Each item in this scale was rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), and a higher score indicated higher athlete flow. A confirmatory factor analysis led to our removal of item 3 because of its low factor loading. Furthermore, the factor analysis revealed that the model had a good fit to the data (χ^2 = 17.842, *df* = 5, $p < .003$; TLI = .977, CFI = .988, RMSEA = .078); the factor loadings of the items ranged from .65 to .85. The internal consistency coefficient of the scale was .878.

Procedure

After conducting a preliminary survey of 100 adolescent athletes at Physical Education High School to confirm their understanding of the items and terms contained therein, the questionnaire was revised and supplemented, and thereafter administered to 433 adolescent athletes. Before the questionnaire was administered, we explained the purpose of this study to participants and advisors of each school and obtained consent for data collection, after which we explained the survey schedule. The researcher then visited the school to inform the participants of the importance of the study, and distributed a small gift(ballpoint pen) to those who completed the questionnaire. The questionnaire took about 15 minutes to complete. This study was approved by the Seoul National University Institutional Review Board (SNUIRB, No. 1508/008-015).

Statistics

In this study, data were analyzed and processed using PASW Statistics 18.0 (SPSS Inc., Chicago, IL) and SPSS AMOS 21.0 (IBM Corp., Armonk, NY). First, descriptive statistics were calculated for all data to verify their normality. Next, confirmatory factor analyses were conducted to verify the construct validity of each scale, and a reliability analysis (Cronbach's α) was conducted for each factor. Then, a correlational analysis was used to determine the relationship between variables, after which structural equation modeling was conducted to verify the relationships among the variables and the fit of the research model. Finally, the measurement invariance of the research model according to different groups was verified. The statistical significance level (α) was set to .05.

Results

Descriptive Statistics and Correlations for Observed Variables

To examine the general tendency of the variables for analysis in this study, descriptive statistics such as the mean, standard deviation, skewness, and kurtosis were calculated (Table 1). First, among the three factors of athlete *Julsil*, perseverance and overcoming ($M = 4.72$, $SD = .89$) had the highest mean score. Next, for self-control, reflection ($M = 3.94$, $SD = .61$) had the highest score among the six factors, while mean athlete flow score was higher than the midpoint of the scale ($M = 3.42$, $SD = .80$). The correlations between the measurement variables indicated a significant relationship between all variables ($r = .375 – .820$; Table 2). However, the correlations between athlete *Julsil* and some of the factors of self-regulation were exceedingly strong (> 0.7); therefore, we examined the possibility of a multicollinearity problem. However, the variance inflation factor values were all less than 10, indicating that there was no problem of multicollinearity in this study.

Table 1. *Descriptive statistics (N = 425)*

Variable		*M* (*SD*)	Skewness	Kurtosis
Athlete's *Julsil*	ES	4.25(1.03)	-.677	.247
	SC	4.17(.91)	-.518	.592
	PO	4.72(.89)	-.828	1.261
Self-regulation	PL	3.86(.67)	-.613	1.069
	SM	3.84(.65)	-.314	.612
	EV	3.74(.70)	-.481	1.081
	RF	3.94(.61)	-.329	.491
	EF	3.88(.65)	-.414	.279
	SE	3.80(.66)	-.462	.608
Athletic flow experience		3.42(.80)	-.082	-.200

ES = Expectation of Success; SC = Self-control; PO = Perseverance and overcoming; PL = Planning; SM = Self-monitoring; EV = Evaluation; RF = Reflection; EF = Effort; SE = Self-efficacy

Testing of Measurement Model

We conducted structural equation modeling with self-regulation as the mediator. This study utilizes the mediation model, therefore, it is possible for the equivalent model (i.e., an alternative model with the same explanatory power as the main model; MacCallum, Wegener, Uchino & Fabrigar, 1993) to exist, hence, it is important to be aware of this fact throughout the interpretations. In this study, we recognized the possibility of an equivalent model and thus sought to verify the research model through comparison of its fit with that of a more constrained "mediation model." More specifically, we compared the fit of the research model, wherein there were no constraints on any paths, and a mediation model, wherein the direct path between athlete *Julsil* and flow was constrained to zero. Due to the lack of research on athlete *Julsil*, we formulated the research model using interviews with athletes (Kwon, Moon, & Ahn, 2015) and an article (Kim, 2015) as follows; "Athlete performance depends on how much the players are *Julsil*." We used the maximum likelihood method to estimate the factor loadings.

All pathways in the model, prior to the final model verification, were significant. Figure 1 is a schematic representation of the research model, and the fit of this model was satisfactory.

Next, we conducted the χ^2 test to examine the difference between the research model and mediation model, and thereby verify the mediating effect of self-regulation in the relationship between athlete *Julsil* and flow. We observed no significant difference in χ^2 value between these two models ($\Delta\chi^2 = .068$, $\Delta df = 1$, $p = .794$), as shown in Table 3. This indicates that self-regulation fully mediates the relationship between athlete *Julsil* and flow.

Then, an indirect effect analysis using the bootstrap-

Table 2. *Correlations between variables*

	1	2	3	4	5	6	7	8	9	10
ES 1	1									
SC 2	.609**	1								
PO 3	.652**	.666**	1							
PL 4	.560**	.608**	.716**	1						
SM 5	.472**	.622**	.674**	.787**	1					
EV 6	.575**	.642**	.691**	.783**	.807**	1				
RF 7	.510**	.566**	.682**	.788**	.783**	.765**	1			
EF 8	.537**	.604**	.731**	.740**	.734**	.727**	.754**	1		
SE 9	.570**	.623**	.759**	.756**	.720**	.745**	.740**	.820**	1	
FE 10	.375**	.490**	.453**	.472**	.527**	.546**	.450**	.497**	.567**	1

ES = Expectation of Success; SC = Self-control; PO = Perseverance and overcoming; PL = Planning; SM = Self-monitoring; EV = Evaluation; RF = Reflection; EF = Effort; SE = Self-efficacy; FE = Flow experience
$^{**}p < .01$, $^{*}p < .05$

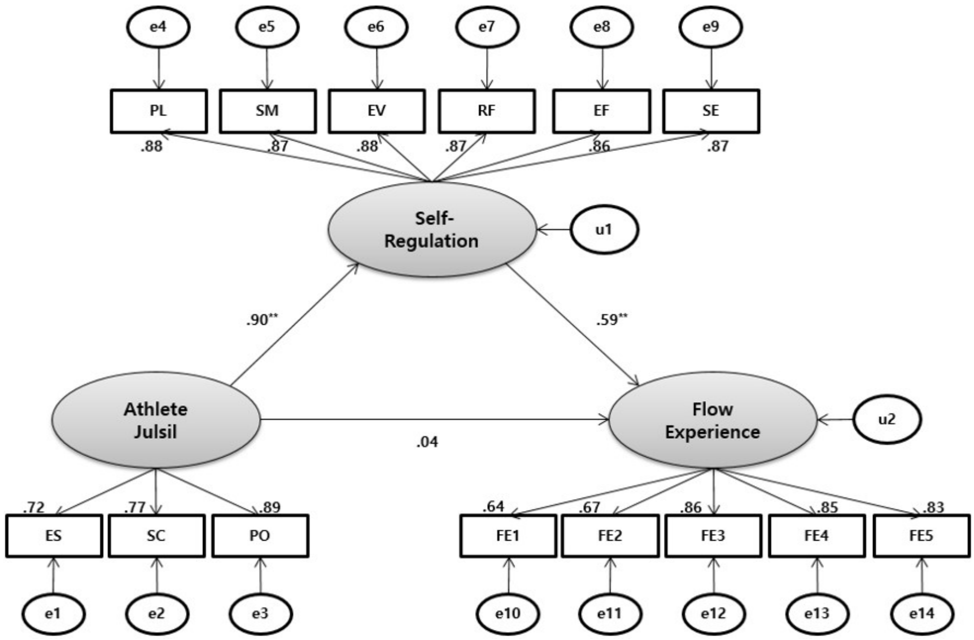

Figure 1. *Results of the structural equation modeling for the study*

Values above/below arrows represent standardized path coefficients and t-values ($^{**}p < .01$). ES = Expectation of Success; SC = Self-control; PO = Perseverance and overcoming; PL = Planning; SM = Self-monitoring; EV = Evaluation; RF = Reflection; EF = Effort; SE = Self-efficacy; FE = flow experience.

ping method with 95% confidence intervals was conducted. As a result, we found that the indirect effect of athlete *Julsil* on flow was $\beta = .534$ ($p = .005$), indicating that the mediating effect of self-regulation was significant at an alpha of .01.

Cross-validity analysis

The statistical verification of the research model revealed that athlete *Julsil* influences self-regulation, which in turn influences flow. However, as there was a dif-

Table 3. *Goodness of fit of models*

	χ^2	*df*	$\Delta\chi^2$ (*p*)	TLI	CFI	RMSEA
Research Model	250.588	74	.068 (.794)	.955	.963	.075
Mediation Model	250.656	75	.956	.963	.074	

Research model: all paths were freely estimated. Mediation model: the direct path from *Julsil* to flow was fixed at zero. $\Delta\chi^2$: chi-square difference. CFI: comparative fit index. TLI = Tucker-Lewis Index. RMSEA = Root mean square error of approximation.

Table 4. *Test of indirect effects through bootstrapping*

Path	Direct Effect (β)	Indirect Effect (β)	Total Effect (β)
Athletic *Julsil* → Athletic Flow	.036	.534**	.570*
Athletic *Julsil* → Self-regulation	.899**	.000	.899**
Self-regulation → Athletic Flow	.594**	.000	.594**

(β): Standardized Effects.
$^{**}p < .01$, $^{*}p < .05$

ference in the means of the constituent variables according to gender (male = 262, female = 163) and school type (middle school = 179, high school = 246), and these group differences were not taken into account in the original model, we conducted a metric invariance test on the research model. The results showed that, although all groups rejected the null hypothesis ($\Delta\chi^2 = 0$) in the configural invariance test, the other fitness indices were satisfactory. Thus, configural invariance was secured. Next, we conducted a measurement invariance test to determine whether the research model worked equally for all groups. As shown in Table 5, the difference between the configural invariance model and the measurement invariance model was non-significant (Gender[$\Delta\chi^2$ =14.407, Δdf = 10, p = .155], School[$\Delta\chi^2$ = 8.737, Δdf = 10, p = .557]). Therefore, the measurement invariance of athlete *Julsil*, self-regulation, and flow by group was secured; thus, the cross-validation of the model was verified.

Table 5. *Test of measurement invariance*

Groups	Model	χ^2	*df*	$\Delta\chi^2$ (*p*)	TLI	CFI	RMSEA
Gender	Configural model	345.203	148	14.407 (.155)	.950	.959	.056
	Metric invariance model	359.610	158		.952	.958	.055
School	Configural model	329.061	148	8.737 (.557)	.954	.963	.054
	Metric invariance model	337.798	158		.957	.963	.052

Discussion

The path for adolescent athletes to become a member of a national team is very narrow (Yoo, 2009); they must endure strenuous training in order to enter into international competitions, colleges, and commercial teams (Han, Chung, & Seo, 2010). Famous South Korean athletes have described that *Julsil* was the psychological state most contributed to setting goals, and also has operated as a motivation since their adolescence that has perpetuated them to achieve their current positions as athletes (Sung, 2012). Based on these athletes' statements, we sought to identify whether the *Julsil* of adolescent athletes can contribute to athlete flow. In addition, we found in the preliminary interviews of professional and national team athletes that excellent performance was achieved not only by *Julsil* but also by adequate self-regulation in actual practice and training situations. Thus, we sought to predict the relationship among athlete *Julsil*, self-regulation, and flow, in order to provide information on the psychological factors that help adolescent athletes achieve peak performance.

The results showed that the relationships among athlete *Julsil*, self-regulation, and flow were all positive. In other words, athlete *Julsil* is associated with increased self-regulation and flow, and self-regulation is associated with increased flow. In addition, self-regulation ability of adolescent athletes during practice and training is an important factor, which is applied to flow and peak performance in actual competition. Our findings show consistent results to that of Aherne, Moran, and Lonsdale (2011) related to the association between self-regulation and increased flow, which highlight how mindfulness training is a catalyst to increase athletes' self-regulation ability, later allowing athletes to experience flow. Furthermore, Kee and Wang (2008) explained the dimension of flow in relation to self-regulation. Thus, with heightened self-regulation, athletes can experience the flow state. Therefore, self-regulation might be interpreted as one method of achieving peak performance among adolescent athletes (Toering, Elferink-Gemser, Jordet, Pepping, & Visscher, 2012). Our study is meaningful in that it identified the influence of athlete *Julsil*, which has received little attention in past research on flow in adolescent athletes. The results suggest that athletes with *Julsil* l cannot be easily dissuaded from their goals, which in turn may lead to improved self-regulation, thus allowing athletes to better control their emotions, feelings, and behaviors in practice and training situations.

In summary, athletes with *Julsil* tend to exercise greater self-regulation in their practice and training situations, which in turn may help them to reach flow. This flow, in turn, increases their likelihood of achieving peak performance. Therefore, athletes must be able to secure their own mindsets (*Julsil*) to ensure optimal performance, although they require further qualities that motivate them to act (i.e., self-regulation). In addition, coaches who are directing adolescent athletes should also consider what situations will increase athlete *Julsil* —which is highly likely to be caused by external circumstances—as well as instruct athletes on how to develop a habit of self-regulation in actual practice and training situations. In other words, we expect that athletes' own efforts and the aid of the coach together will have a positive effect on baseline peak performance.

Propositions

This study has several limitations in terms of the planning and methodology that should be addressed in future studies. First, although we included 425 subjects as participants, all of them were adolescent athletes in physical education middle and high schools. Therefore, in future studies, it would be necessary to expand the sampling units to professional athletes, group sports, etc., to minimize the tendency for selection bias.

Second, because the self-regulation scale was developed with a focus on Western sports, some of its content is inadequate for use in South Korea (e.g., redundant linguistic expressions). In particular, as reported in the study of Pitkethly & Lau (2015), which verified the validity of this self-regulation scale for Asians, there are strong correlations between the effort, self-efficacy, and planning subscales, which are likely due to cultural factors. The same was observed in this study, which suggests that a self-regulation scale for athletes suitable for domestic or Asian sports situations should be developed with consideration of the possible cultural differences.

Third, we did not directly examine the relationship between athlete *Julsil* and peak performance directly; instead, we used flow as an indicator of peak performance. Thus, in the future, longitudinal studies should be conducted to examine the causal relationships between athlete *Julsil* and peak performance.

Finally, our results have limited comparison with previous studies because there is a relative lack of research on athlete *Julsil*. Therefore, we relied on actual sports situations or we relied on Kwon et al.(2015)'s study to support our results. Nevertheless, this study is meaningful in that it provided basic data on the relationship among the above variables. In the future, research should delve further into the structure of these variables, in particular by verifying what other variables are related to athlete *Julsil* and self-regulation. Research should also identify other ways of improving athlete flow.

Conflict of Interest

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