



Master's Thesis of Psychology

# The Mediating Effect of Growth Mindset in the Relationship between Adolescents' Optimism and Grit

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# The Mediating Effect of Growth Mindset in the Relationship between Adolescents' Optimism and Grit

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## Abstract

The aim of this study was to examine the mediating effect of growth mindset on the relationship between optimism and grit. Most studies have focused on what variable among non-cognitive skills is a more reliable predictor of success rather than identifying the relationship itself between success-related variables. Therefore, the present study investigated the relationship between optimism, growth mindset, and grit among adolescents. In particular, we explored the mediating effect of growth mindset on the relationship between optimism and grit.

Based on a cross-sectional study among 647 Korean adolescents from age 12 to 16 years (M = 14.3; SD = 1.3; 52.9% male), we conducted self-reported questionnaires on optimism, growth mindset, and grit. Optimism was assessed through the Korean version of the Life Orientation Test-Revised (Scheier et al., 1994; Shin et al., 2005). Growth mindset was measured using the Korean version of the Theories of Intelligence scale (Dweck, 1999; Lee & Kwon, 2016). Finally, grit was measured by the Korean version of the Original Grit Scale (Duckworth et al., 2007; Park et al., 2020b). We examined the association between optimism, growth mindset, and grit by using Pearson's correlation analysis. The mediating analysis of growth mindset on the relationship between optimism and grit was investigated through PROCESS macro version 4.1. Also, bootstrapping was performed to verify the statistical significance of the mediating effect.

The main findings were as follows. First, adolescents' optimism significantly predicted grit. Second, growth mindset significantly predicted grit. Finally, growth mindset partially and significantly mediated the relationship between optimism and grit. In other words, as levels of optimism increased, growth mindset enhanced, which in turn improved grit. Additionally, we analyzed the two components of grit, consistency of interest and perseverance of effort, respectively. The results showed that growth mindset partially mediated the association between optimism and perseverance of effort. In contrast, growth mindset has no significant mediating effect on the association between optimism and consistency of interest. The empirical findings in this study provided a psychological mechanism on the path from optimism to grit by demonstrating the mediating effect of growth mindset. To our knowledge, this study is the first empirical study to

investigate the mediating effect of growth mindset on the relationship between optimism and grit in Korean adolescents. Limitations and implications for future research are discussed.

Keywords: optimism, growth mindset, grit, perseverance of effort, adolescence, mediating effect Student Number: 2020-21306

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### Introduction

There has been a long debate about what variable is a more reliable predictor of success over decades (Cox, 1926; Galton, 1870; Terman, 1925; Walberg et al., 1978). Galton (1870) argued that "intellectual ability" alone does not simply guarantee success. Instead, he highlighted that the highest achievers were only possible when "ability combined with zeal and the capacity for hard labour" (Galton, 1870). Another classic study by Cox (1926) examined the relationship between IQ, achieved eminence, and 67 personality traits. As a result, the group who had achieved eminence had not only a higher IQ but also several distinct personality traits (Cox, 1926). Specifically, Cox (1926) explained, "youths who achieve eminence are characterized not only by high intellectual traits, but also by persistence of motive and effort, confidence in their abilities, and great strength or force of character", emphasizing the importance of cognitive factors as well as the non-cognitive factors for achievements. Accordingly, various studies have begun to focus on non-cognitive skills as essential for success in diverse areas of life (Akos & Kretchmar, 2017; Fiorini & Keane, 2014; Heckman et al.,

2006; Steptoe & Jackson, 2020; Liu et al., 2021).

Non-cognitive skills are broadly defined as personality traits or "patterns of thought, feelings, and behavior" (Borghans et al., 2008a). Non-cognitive skills were found to have a significant positive impact on academic achievement, labor market performance, physical health, and reduction of antisocial behaviors and criminal offense even after controlling for cognitive skills (Carneiro et al., 2007; Farruggia et al., 2018; Gabrieli et al., 2015; Heckman et al., 2006; Manning & Patterson, 2006; Stankov et al., 2014).

Optimism is one of the non-cognitive skills that have been extensively studied as a predictor of success over the last 30 years (Matthews et al., 2004; Oh et al., 2022; Rasmussen et al., 2009; Scheier & Carver, 1985; Scheier et al., 2001; Segovia et al., 2012). Optimism is most commonly defined and measured as a dispositional personality trait, meaning the generalized expectation of positive outcomes in the future (Scheier & Carver, 1985). It is well known that optimism is associated with positive outcomes in various domains of life. In a longitudinal study on Korean children by Kim and Kwak (2011), unrealistically optimistic belief at the age 4 was significantly related to their verbal intelligence in middle childhood.

Optimism was found to be correlated with academic achievement (Chemers et al., 2001; Tetzner & Becker, 2018), and to lead to higher engagement and persistence in achieving academic goals (Carver et al., 2010). In addition, optimism can play a buffering role in the negative impact of educational stress on dropout intention (Eicher et al., 2014). With regard to career success, optimism is positively correlated with work-related outcomes such as work performance, coping with occupational stress, and higher income (Luthans & Lebsack, 2008; Medlin & Green, 2009; Reed, 2016; Segerstrom, 2007; Youssef & Luthans, 2007).

Based on the prior studies, optimism can be seen as a key factor to success in life. The question is, how exactly does optimism develop? Dispositional optimism is generally conceptualized as a personality trait that is relatively stable and consistent over time and context (Carver & Scheier, 2014). However, several studies have supported the social-cognitive perspective (Bandura, 1999), in which personality traits such as optimism are not fixed and invariant due to heredity effect, but rather a cognitive process determined by interaction with environmental factors (Atienza et al., 2004; Harper et al., 2007; Hmieleski & Baron, 2009; Nguyen et al., 2018).

Following this perspective, there was evidence that optimism appeared to be less genetically influenced than other personality traits. The heritability of optimism was explained as about 25%, which is regarded as a relatively smaller impact compared to other personality traits that were estimated to be about 30–50% (Plomin et al., 1992; Plomin et al., 2016). Also, the test-retest reliability of dispositional optimism over the periods of a few weeks to several years ranged between .58 to .79 (Atienza et al., 2004; Carver et al., 2010; Lucas et al., 1996; Renaud et al., 2019; Chopik et al., 2015), which implies the possibility that optimism could be changed.

Particularly, optimism may be less stable during transitional periods due to several different environmental changes (Costa & McCrae, 1994; Segerstrom, 2007; Tetzner & Becker, 2018). For example, a study by Tetzner and Becker (2018) reported the stability of optimism was only .33 in early adolescents who had recently transitioned to secondary school. The adolescence period is especially important to understand optimism development and its malleability considering that adolescence is a major transitional period with an onset of rapid changes in physical, cognitive, and psychosocial growth (Eccles et al., 1993; Scherf et al., 2012). For

instance, adolescence is marked to explore psychosocial demands, such as social roles, which can affect personality development (Arnett, 2000; Caspi & Moffit, 1993). Orejudo et al. (2012) reported that relationships with family and peer groups of adolescents who are undergoing personal and socialization development processes can contribute to the development of optimism. Moreover, given that adolescents go through identity development and maturation to set life goals for their future (Tetzner & Becker, 2019), optimism can play an important role, especially in adolescents (Renaud et al., 2019; Zou et al., 2016).

In sum, it has been verified that optimism could predict success across all ages (Bortolotti, 2018; Carver & Scheier, 2014; Daukantaitė & Zukauskiene, 2012; Tetzner & Becker, 2018) and function as a crucial psychological resource. As a personality trait, optimism can be changed by environmental factors and adolescence in which individuals experience substantial life changes is the key period for developing optimism.

Having said that, does developing optimism in adolescence ensure unconditional success in personal life? Although there is no doubt that optimism contributes to the increased possibility of

successful personal life, it is hard to claim that there is a specific factor, as a sole predictor of success, that may guarantee success. It is because a person's successful growth and development have complex causal relationships between diverse variables, whether at the biological, psychological, or social levels, in which the individual is embedded (Napolitano et al., 2021). However, most studies on exploring success-related variables focused on what variable is a more reliable predictor of success rather than identifying the relationship itself between the variables. For instance, recent studies proposed several variables that predict success in adolescence such as grit (Duckworth et al., 2011), resilience (Rodríguez-Fernández et al., 2018), self-control (Converse et al., 2018), self-efficacy (Cattelino et al., 2019), and self-esteem (Masselink et al., 2018). There are only a few studies that explored the relationship between success-related variables, especially with optimism, which has been studied as a predictor of success. Therefore, this study aims to clarify the relationship itself between optimism and success-related variables in adolescence.

In the last few years, grit is one of the non-cognitive skills that have been the most focused as a predictor of success in adolescence. Grit refers to "perseverance and passion for long-term goals" (Duckworth et al., 2007, p.1087). Duckworth et al. (2007) investigated why some people achieved better or succeed even though they have a similar level of intelligence. The investigation found that successful people have something in common; they make for and show consistent 'interest' 'effort' persevere in achieving their goals without giving up even if they fail or suffer in the process (Duckworth et al., 2007). Grit is composed of two elements, which are 'perseverance of effort' and 'consistency of interests' (Duckworth et al., 2007). The former indicates the ability to maintain effort toward long-term goals despite hardships and failure. The latter implies the ability to maintain interest in longterm goals despite hardships and failure (Duckworth et al., 2007). It has been demonstrated in several studies that grit can be changed by environmental factors such as proper intervention (Alan et al., 2019; Cross, 2014; Duckworth et al., 2007), and the impact of such factors is especially greater in adolescence, the key period in which people experience substantial life changes.

There is a large body of research on grit in adolescence that especially placed the focus on educational achievement (Duckworth et al., 2007). A seminal work in this field, Duckworth et al. (2011), examined the practice process of students who participated in the National Spelling Bee and investigated which students performed better. The result demonstrated that students who devoted more time to deliberate practice performed better in the final competition (Duckworth et al., 2011). Interestingly, students who participated in deliberate practice spent more time in the practice even though they evaluated the process as more effortful and less enjoyable than other kinds of preparation activity. This characteristic was more likely to be manifest among the students with high grit. This indicated the students with high grit are more likely to adopt deliberate practice despite the hardships and perform better as National Spelling Bee finalists (Duckworth et al., 2011). In a similar vein, students with high grit were more motivated toward long-term goals when faced with challenging tasks (Karlen et al., 2019). Lam and Zhou (2019) systematically reviewed the empirical findings over the past 10 years on the relationship between grit and academic achievement and found that there was a positive association between grit and academic achievement.

Grit is also known as a predictor of outstanding success in other

various and challenging domains. Duckworth et al. (2007) conducted an analysis on cadets enrolled in at the U.S. Military Academy, West Point, to find out which cadets excel in their training. The analysis showed that grit has more incremental predictive validity than other variables like SAT score, high school rank, or self-control of the success of cadets in the initiation training at West Point (Duckworth et al., 2007). Also, a study of Eskreis-Winkler et al. (2014) showed that grit is a superior predictor of retention in workplace sales, high school, and marriage. As indicated above, the previous studies on grit focused on the positive effects that the trait has in various domains of life.

As previous studies demonstrated, optimism and grit are both predictors of success in various domains. Then, how do the two variables associate with each other? Surprisingly, although many studies demonstrated there is a significant association between optimism and grit (Clement et al., 2020; Kim & Ahn, 2018; Kim & Lee, 2021; Oriol et al., 2020; Tuckwiller et al., 2017; Watson, 2013), the theoretical association between optimism and grit is only implicitly indicated (Duckworth & Eskreis-Winkler, 2013), and there are only a few studies that investigated the mechanism of the

relationship between the two variables (Oriol et al., 2020; Tuckwiller et al., 2017). Furthermore, since many previous studies on optimism and grit were biased toward a certain cohort such as adults or specific groups (Kim & Ahn, 2018; Loftus et al., 2020; Steinfort, 2015; Tuckwiller et al., 2017), studies based on various age groups and cohorts are much needed. Considering that adolescence is the key period for developing optimism and grit, the current study sought to explore a mediator in the relationship between optimism and grit among adolescents.

Recently, growth mindset has attracted the most attention as a predictor of grit (Duckworth, 2016; Snipes et al., 2012). This seems quite reasonable considering that it is inevitable to overcome difficulties and hardships in achieving a certain goal and growth mindset, a belief in one' s intelligence, can help that overcoming. In other words, the belief of malleability in one' s abilities may form one' s worldview, objectives, and behaviors (Dweck, 2017). As aforementioned, growth mindset represents personal attributes that can be developed with effort or education which is contrasted by fixed mindset in which one' s abilities are biologically or environmentally fixed so that one cannot change (Dweck, 2006).

Growth mindset also can be an important psychological resource, especially in adolescence. For instance, developing growth mindset in adolescence was positively associated with academic achievement (Costa & Faria, 2018; Romero et al., 2014), recovered from social stress (Schleider & Weisz, 2018; Schleider et al., 2020), alleviated psychological distress and active coping (Burnette et al., 2020), and reduced aggression in adolescents (Yeager et al., 2013).

Based on the previous studies described above, this study aims to explore the association with optimism, growth mindset, and grit. Also, the current study attempted to analyze the mediating effect of growth mindset on the relationship between optimism and grit and discover the psychological mechanism of the association between optimism and grit.

#### The Current Study

Many existing studies have been conducted on optimism, growth mindset, and grit regarding as success-related variables. However, several limitations were found.

First, many studies have sought to unveil predictors of success over the past decades. Among them, non-cognitive skills have received much attention as a predictor of success in many studies due to the following reasons. First, non-cognitive skills can predict a broad range of academic and life outcomes as cognitive skills predict, or even more (Carneiro et al., 2007; Gabrieli et al., 2015; Gutman & Schoon, 2013; Heckman et al., 2006; Stankov et al., 2014). Second, compared to cognitive skills, non-cognitive skills are relatively more malleable over a lifetime, which manifests the possibility to be modified until later years (Borghans et al., 2008a; Brunello & Schlotter, 2011; Kaufman et al., 2013). Also, it was reported that non-cognitive skills can reinforce cognitive skills (Borghans et al., 2008b; Heckman et al., 2013). However, most studies have focused on what variable among non-cognitive skills is a more reliable predictor of success (Blatný et al., 2015; Duckworth

et al., 2007; Mercer et al., 2016) rather than identifying the relationship itself between success-related variables. Therefore, the current study is designed to investigate how predictors of success are related to each other.

Second, optimism is one of the non-cognitive factors and has been extensively studied as a predictor of success across all ages (Carver et al., 2010; Costa & Faria, 2018; Kim & Kwak, 2011; Rasmussen et al., 2009). Also, grit is known to be another noncognitive factor that predicts success in adolescence (Duckworth et al., 2007; Duckworth et al., 2011). However, there are only a few empirical studies that investigated the relationship between optimism and grit (Oriol et al., 2020; Tuckwiller et al., 2017). Although a few studies examined the association between optimism and grit (Oriol et al., 2020), these were biased toward specific groups or undergraduate students (Duckworth & Eskreis-Winkler, 2013; Loftus et al., 2020; Steinfort, 2015). Therefore, it is worthy to be extended to various ages and groups. Specifically, considering adolescents whose optimism could function as an important psychological asset while facing rapid development and environmental changes (Nes & Segerstrom, 2006; Tetzner & Becker,

2019), this study aimed to examine the relationship between optimism and grit among adolescents.

Third, growth mindset has received the attention of many studies as a predictor of grit (Duckworth, 2016; Snipes et al., 2012), and also known as a non-cognitive factor predicting academic achievement as well as success in diverse areas of life (Costa & Faria, 2018; Romero et al., 2014; Yeager et al., 2013). However, few studies have been conducted about the complex contribution factors or predictors that would improve growth mindset. For example, Dardick and Tuckwillber (2019) demonstrated a direct path from optimism to growth mindset for undergraduate and graduate students, where optimism was found to be a higher-order factor reflecting broader expectations than growth mindset. Also, a pilot study by Tuckwiller et al. (2017) found a linear relationship between optimism and growth mindset in adolescents with learning disabilities. However, the authors mentioned that the sample size of the pilot study was small (n = 17), so follow-up studies are needed to be replicated with larger samples (Tuckwiller et al., 2017). Therefore, the current study aimed to examine the role of optimism as a potential factor that can contribute to improving growth mindset based on sufficient

sample size.

Considering the limitations of previous studies discussed above, this study was designed to explore the mediating role of growth mindset in the relationship between optimism and grit in adolescence. In doing this, the relations among the major success-related variables can be examined comprehensively and thereby empirically verified the paths among them, which make good contributions to the body of knowledge for future research. In addition, it is expected that the investigation of the effect of optimism as an antecedent factor that can improve growth mindset and grit can be utilized in specific educational programs or intervention plans.

## Theoretical Background

### Optimism and Grit

Optimism can have a positive impact on achieving long-term goals. Optimistic people tend to expect good outcomes from their actions, which helps them focus more on an effort to achieve their goals (Zhang et al., 2014). In relation to achieving goals, Duckworth and Gross (2014) suggested a hierarchical goal framework in which goals are hierarchically organized (Duckworth& Gross, 2014). Within the hierarchical goal framework, higher-order goals, which include long-term goals that a long time should be devoted to, are closely related to grit. On the other hand, lower-order goals are related to self-control, which relates to rather short-term goals that are associated with everyday choices (Duckworth& Gross, 2014). In this case, people with high grit do not always exhibit high self-control, and vice versa (Duckworth, 2016). Oriol et al. (2020) investigated whether grit and self-control could mediate the relationship between optimism and life satisfaction in adolescents. The result showed a mediating effect between grit and life satisfaction and the absence of mediation with self-control (Oriol et al., 2020). In other words, optimism is more associated with the ability to persevere in pursuing long-term goals, which is a component of grit, than self-control one' s rather immediate gratification.

Optimism and grit are conceptually in line with maintaining a positive attitude and belief in a favorable future. Optimism refers to consistently maintaining positive expectations for the future even in the face of inevitable setbacks. Grit also includes sustaining persistence and consistency despite failure or adversity in the process of achieving a goal (Duckworth et al., 2007). As such, optimism and grit have been studied in the way that the two variables can predict success in challenging circumstances. Loftus et al. (2020) reported that cultivating grit and optimism in surgeons, who often faced unavoidable challenges and failures, could lead to growth, toughness, and improved performance. Likewise, Steinfort (2015) showed that improving optimism and grit in professional soccer players predicted consistency and better performance. Clement et al. (2020) investigated optimism, grit, and hope as simultaneous predictors of suicide resilience. As a result, it was found that only

optimism and grit had a buffering effect against suicide risk factors (Clement et al., 2020).

The previous studies reported a significant correlation between optimism and grit. First, in studies with college students, Shishim (2012) found a statistically significant correlation (r = .12) between optimism and grit, and Watson (2013) also reported a significant correlation (r = .385) between the two variables. In a study by Clement et al. (2020), optimism showed a high correlation (r = .44)with grit. In the case of Korea, Jung (2019) reported a significant correlation (r = .27), and Kim and Lee (2021) also found a significant correlation (r = .42) between the two variables in nursing college students. A correlation between the two variables in adolescence was also reported. Tuckwiller et al. (2017) found a correlation (r = .41) between optimism and grit in adolescents with learning disabilities. In a study of Korean adolescents by Kim and Ahn (2018), a correlation between the two variables (r = .42) was significant as well. However, while the correlation between optimism and grit has been demonstrated in diverse previous studies, the causal direction of the correlation between the two variables has not yet been clearly discussed.

Although there are only a few studies, it was found that optimism can lead to grit. Duckworth and Eskreis-Winkler (2013) reported that optimistic teachers were more likely to have a high level of grit and life satisfaction, which subsequently predicted the efficiency of teachers' performance at the end of the semester as well (Duckworth & Eskreis-Winkler, 2013). In a study by Kim and Ahn (2018), the relationship between optimistic self-talk, mindset, and grit was examined in specialized high school students and the result showed that optimistic self-talk partially mediated the relationship between growth mindset and perseverance of effort, which is one of the components of grit. This result revealed that optimism could be a way to improve grit. However, most previous studies focused on adults and specific groups despite the fact that adolescence is the key period for developing optimism and grit functioning as an important psychological resource. Therefore, more studies focused on adolescence seemed to be needed.

The detailed mechanism of how specifically optimism can positively affect grit has not been suggested yet. Instead, it could be possible to indirectly predict the relationship between optimism and grit. Positive thinking is frequently referred to as optimistic thinking

with which one focuses on the positive aspects of the situation (Alshammari & Alboliteeh, 2022). Han et al. (2020) reported a significant correlation between positive thinking and grit in adolescents. In a study by Celik and Saricam (2018), the direct path of positive thinking on grit was found to be significant. That is, the higher the positive thinking ability, the higher the grit (Celik & Sariçam, 2018). A fundamental tenet of positive thinking includes the personal attitude with which an individual approaches all aspects of life expecting positive consequences (Alshammari & Alboliteeh, 2022; Yang & Wu, 2021). This approach is consistent with dispositional optimism, which reflects generalized expectations that positive outcomes will occur in the future. Therefore, based on the results of the previous studies, we hypothesized that optimism would have a positive effect on grit.

#### Growth Mindset and Grit

In previous studies, grit has been focused on an independent variable that predicts success (Duckworth et al., 2007; Duckworth & Quinn, 2009; Suzuki et al., 2015), but recent studies started to have an increased interest in identifying antecedent factors of grit. For example, parenting behavior (Howard et al., 2019; Dunn, 2018), sense of relatedness (Datu, 2017), free will (Li et al., 2018), growth mindset (Duckworth, 2016), purpose commitment and positive affect (Hill et al., 2016), self-regulation strategies (Armstrong et al., 2018), and hope (Vela et al., 2015) were identified as antecedents of grit. Among these variables, growth mindset in adolescents has been frequently discussed as a predictor of grit (Duckworth, 2016; Snipes et al., 2012).

Like grit, growth mindset was reported to be different depending on the situation where an individual is in, not a stable attribute (Dweck, 2017). Especially, growth mindset can be more variable during adolescence when factors such as social comparison, identity development, increased level of self-assessment, and pressure for grades arise (Blackwell et al., 2007; Gunderson et al., 2017; Kapasi & Pei, 2022). A longitudinal study by Blackwell et al. (2007) examined the relationship between academic achievement and growth mindset, and this was measured again two years later at the time of transition to middle school. The result indicated that the growth mindset had a greater impact on the academic achievement of middle school students (Blackwell et al., 2007). In other words, in a supportive and relatively low-challenging environment, such as elementary school, the effect of growth mindset may be small (Dweck, 2002; Grant & Dweck, 2003), while growth mindset can serve as a buffer during the middle school period in which academic burdens and difficulties increased (Blackwell et al., 2007). Dweck (2008) also mentioned that growth mindset may have a more positive effect on general achievement, especially in adolescence. Likewise, growth mindset may help to deal with challenging situations (Yeager et al., 2016), and can play an important role in adolescence, a critical period for academic and cognitive development (Blakemore, 2008; Nelson et al., 2016).

The concept of growth mindset is based on the implicit theory of intelligence (Bandura & Dweck, 1981; Dweck & Leggett, 1988). In an early study, Dweck observed some children reacted helplessly to difficulties or avoided challenges, while others enjoyed challenges and actively participated (Dweck, 2012). Inspired by these observations, Dweck and her colleagues thought that the meaning of failure depended on the child's view of competence, thereby developing this idea as the implicit theory of intelligence (Bernecker & Job, 2019). The implicit theory of intelligence is defined as a key assumption of the malleability of individual attributes (Dweck & Leggett, 1988). Later, the term, the implicit theory of intelligence, has been interchangeably used as mindsets, which are divided into growth mindset and fixed mindset. According to Dweck (2006), people with growth mindset believe that personal attributes, including their intelligence, can grow through their effort and education. In contrast, people with the fixed mindset believe that personal attributes are biologically or environmentally determined and cannot be changed through their effort and education.

Growth mindset has been mostly studied focusing on academic achievement in adolescence. It was found that students with growth mindset showed higher academic achievement than students with fixed mindset (Blackwell et al., 2007; Gunderson et al., 2017; Wang et al., 2020). Claro et al. (2016) investigated growth mindset and academic achievement of high school students across all of the socioeconomic strata in Chile. The study found that the growth mindset strongly predicted academic achievement, and these findings were found across all socioeconomic classes of the country. In addition, the growth mindset was found to have a significant buffering effect on the negative impact of poverty on achievement (Claro et al., 2016). Beside this, Yeager et al. (2019) reported that in a large sample of US adolescents (n = 12,490), growth mindset intervention improved performance of underachieving students and could lead to an overall increase in enrollment in mathematics courses.

Many studies have shown that growth mindset was related to grit (Ingebrigtsen, 2018; Park et al., 2020a; Zhao et al., 2018). Dweck (2017) insisted that one' s belief in the malleability of personal attributes (mindset) can shape a person' s worldview, goals, and behavior. Thus, holding different beliefs in the same situation can yield huge differences in how an individual reacts (Dweck, 2017). This is because when people believe that their efforts will bring valuable outcomes in various areas, they are more likely to set longterm goals and persist to achieve them (Park et al., 2020a). Duckworth (2016) suggested that growth mindset can lead to grit, Snipes et al. (2012) also reported that growth mindset was one of

the strongest contributors to grit. The correlation between growth mindset and grit has also been proven by studies using brain imaging technology. Both variables appeared to be functionally linked to regions involving cognitive-behavioral control (Myers et al., 2016, Wang et al., 2018). In detail, grit was associated with the brain region related to future rewards, whereas growth mindset was associated with the connectivity between the brain regions including the part related to error monitoring (Myers et al., 2016, Wang et al., 2018). These findings suggested that grit and growth mindset are closely related in a neurological sense, and implying growth mindset might play an essential role in cultivating grit.

Growth mindset and grit are also related in terms of the way to respond to challenges and adversities. According to Dweck (2015), growth mindset does not simply mean trying hard to increase one's abilities. It also includes learning from others and improving one's abilities even when faced with setbacks. Similarly, students with grit interpret obstacles and failures as something that can be overcome and maintain effort and interest for long-term goals without giving up (Luthans et al., 2019). These traits are commonly linked to growth mindset in that they represent how to react when faced with

challenges and setbacks. However, there is a difference in that growth mindset implies implicit belief, and grit represents a behavioral tendency to pursue long-term goals (Duckworth et al., 2007; Zhang et al., 2022).

Growth mindset and grit are closely related to achievement goals. The belief that one can improve one' s intelligence or talents through efforts influences achievement goals (Mangels et al., 2006), which in turn impact one's perceptions, emotions, and behaviors and subsequently lead to achievement outcomes (Dweck & Leggett, 1988; Elliott & Dweck, 1988). Specifically, individuals with fixed mindset tend to focus on performance goals to demonstrate their abilities or avoid looking incompetent by others, whereas students with growth mindset tend to prioritize learning goals aiming to develop their abilities (Bernecker & Job, 2019; Elliott & Dweck, 1988; Robins & Pals, 2002). These results have been supported by neurocognitive studies (Mangels et al., 2006; Schroder et al., 2014). For example, Mangels et al. (2006) found that students with fixed mindset showed reduced activity in brain regions related to persistent memory and encoding when learning-related feedback was given, but that was not the case for students with growth mindset. The result indicated that

compared to the students with fixed mindset, the students with growth mindset were more likely to regard challenges as a chance to learn, be open to failure, show high persistence, and have high consistency for pursuing goals. Importantly, these characteristics can be regarded as reflecting the components of grit. Considering these points, this study hypothesized that growth mindset would have a positive effect on grit in adolescence.
#### Optimism and Growth Mindset

Optimism and growth mindset, respectively, have been extensively studied as non-cognitive factors that predict positive outcomes in various areas, and it has been proven that they can function as important psychological resources, especially in adolescence (Costa & Faria, 2018; Monzani et al., 2014; Tetzner & Becker, 2018; Wang et al., 2020). On the other hand, few studies empirically examined the relationship between the two variables. While the intervention designed to enhance growth mindset has emphasized the important role of optimism (Binning et al., 2019), the correlation between optimism and grit was dealt with in a few previous studies (Duckworth & Eskreis-Winkler, 2013).

Optimism and growth mindset both reflect the expectation for the future. As mentioned, optimism indicates a generalized expectation that positive consequences will occur in the future (Scheier & Carver, 1985). Growth mindset as a belief that one can change one's own intelligence through effort can also be seen as a part of the expectation. Based on the expectancy-value theory, the fundamental mechanism that growth mindset can predict various successes depends on the degree to which individuals expect successful outcomes and regard them as necessary (Thomas et al., 2019). Here, expectation indicates an individual' s level of expectations and confidence for success, and the values reflect inherent values (e.g., achieved value, utility value, and intrinsic value) that individuals attach when pursuing a specific field (Eccles & Wigfield, 2002; Eccles, 2009). For example, Binning et al. (2019) investigated the effectiveness of an intervention program to improve growth mindset targeting American adolescents, and a significant effect was found only for students who have high educational expectations. In other words, having no expectations in the future education can make the belief that one can grow meaningless or insignificant (Binning et al., 2019). This supported not only the belief that successful outcomes can be achieved through one's efforts but also the need for higher expectations to be preceded.

Based on the potential correlation between optimism and growth mindset, Dardick and Tuckwillber (2019) investigated the possible effect of optimism and pessimism on growth mindset and fixed mindset respectively by considering optimism to be a factor that encompasses broader expectations than growth mindset. As a result, both directions, from optimism to growth mindset and from

pessimism to fixed mindset, were found to be significant (Dardick & Tuckwillber, 2019). That is, optimism is a factor that reflects broader expectations than growth mindset, demonstrating that expectations for positive future events were a priority factor in shaping growth mindset. Also, a pilot study performed by Tuckwiller et al. (2017) reported a correlation between optimism and growth mindset in adolescents with learning disabilities while the correlation between variables was not statistically significant due to the small sample size. Nevertheless, optimism explained about 16–20% of the variance in growth mindset and grit showing a linear relationship (Tuckwiller et al., 2017). In other words, a high level of optimism can lead to an increase in non-cognitive skills such as grit and growth mindset

Taken all together, several studies have demonstrated that optimism can play an important role as a predictor for cultivating growth mindset. However, the previous studies focused on undergraduate students and graduate students (Dardick & Tuckwillber, 2019), or were conducted with small sample size (Tuckwiller et al., 2017). It is necessary to expand the number of samples and to conduct a study targeting adolescence, the period in which optimism and growth mindset can function as important

resources. Based on that, this study aimed to examine the effect of optimism on growth mindset in adolescents and hypothesized that optimism would have a positive effect on growth mindset during adolescence.

### **Research Questions**

Based on the previous studies discussed above, optimism seemed to be linked to grit and growth mindset could influence the relationship between optimism and grit. On the basis of previous findings, the current study sought to investigate the relationship between optimism, growth mindset, and grit among Korean adolescents. Specifically, this study focused on the mediating effect of growth mindset in the relationship between optimism and grit. The following research questions were explored:

- (1) Does optimism predict grit of adolescents?
- (2) Does growth mindset predict grit of adolescents?
- (3) Does growth mindset mediate the relationship between adolescents' optimism and grit?

Regarding these questions, the research model of the current study is shown in Figure 1.

## Figure 1.

Research Model for Optimism, Growth Mindset, and Grit



# Method

#### Participants

Participants were 647 adolescents (342 male and 305 female; male 52.9%) from South Korea and most of the participants resided in Seoul (48.4%) and Gyeonggi (18.9%) province. The age of participants ranged from 12 to 16 years with an average age of 14.26 (SD = 1.3; 12-year-olds n = 91, 13-year-olds n = 106, 14-yearolds n = 137, 15-year-olds n = 171, 16-year-olds n = 142).

#### Measures

#### Optimism

Optimism was assessed through the Korean version of the Life Orientation Test-Revised (LOT-R; Scheier et al., 1994; Shin et al., 2005), which measures an individual' s generalized sense of future expectations. The LOT-R is composed of 10 items: 3 positively worded items (e.g., "In uncertain times, I usually expect the best"), 3 negatively worded items (e.g., "I hardly ever expect things to go my way"), and 4 filler items not used in scoring. The respondents indicated the extent to which they agreed with each of the items on a 5-point scale from 1 (not at all like me) to 5 (very much like me). A total score was calculated by reverse scoring the negatively worded items and combined with the positively worded item' s scores. The higher the total score, the higher the level of optimism. The Cronbach' s alpha in Shin' s (2005) study was .73, and .69 in the current study.

#### Growth Mindset

Mindset beliefs were measured using the Korean version of the Theories of Intelligence scale (Dweck, 1999; Lee & Kwon, 2016) to assess students' beliefs about the malleability of intelligence. The scale consists of 6 items, which contain two subscales: 3 items for growth mindset (e.g., "I can always greatly change how intelligent I am") and 3 items for fixed mindset ("I have a certain amount of intelligence, and I really cannot do much to change it"). The respondents indicated the extent to which they agreed with each of the items on a 6-point scale from 1 (not at all like me) to 6 (very much like me). To create sum scores, fixed mindset items were reverse-coded and combined with growth mindset items.

Accordingly, higher sum scores were associated with higher level of growth mindset. The reported Cronbach' s alpha for the full scale was .78 (Blackwell et al., 2007). In the current study, the Cronbach's alpha for the full scale was .87.

#### Grit

Grit was measured by the Korean version of the Original Grit Scale (Grit-O; Duckworth et al., 2007; Park et al., 2020b) assessing the ability of individuals to sustain effort and maintain consistency of interests. The Grit-O scale consists of 12 items: 6 items for measuring consistency of interest (e.g., "My interests change from year to year") and 6 items for measuring perseverance of effort (e.g., "I have achieved a goal that took years of work"). The respondents indicated the extent to which they agreed with each of the items on a 5-point scale from 1 (not at all like me) to 5 (very much like me). Items for consistency of interest were reverse calculated so that higher scores represent high levels of grit. The Cronbach' s alpha in Duckworth et al. (2007) was .85 (Consistency of Interests,  $\alpha = .84$ ; Perseverance of Effort,  $\alpha = .78$ ), and .68 (Consistency of Interests,  $\alpha = .62$ ; Perseverance of Effort,  $\alpha$ 

= .70) in the current study.

### Procedures

Before data collection, all procedures were reviewed and approved by Seoul National University's Institutional Review Board (IRB No. 1608/003-012). The study was conducted in the Developmental Psychology Lab at Seoul National University. After participants arrived in the lab at the scheduled time, they were escorted to a quiet room. They were informed about the purpose of the study and the storage of data, and then the participations signed up to participate in the study. Furthermore, directions that there were no right or wrong answers and that responses would remain anonymous were noticed to participants. Participants completed demographic information and self-report questionnaires of optimism, growth mindset, and grit in 20 minutes.

#### Data Analysis

Collected data were statistically analyzed by using SPSS (version 26.0). First of all, we computed the means, standard deviations, and ranges of the variables (optimism, growth mindset, and grit) for

descriptive statistics of the study. Second, to examine the association between optimism, growth mindset, and grit, we conducted Pearson' s correlation analysis. Also, mediating analysis of growth mindset on the relationship between optimism and grit was investigated using model 4 of PROCESS macro version 4.1 developed by Andrew Hayes (2018). Finally, bootstrapping was performed to verify the statistical significance of the mediating effect.

# Results

# Descriptive Statistics of Optimism, Growth Mindset, and Grit

Descriptive statistics of the variables used in the study are shown in Table 1. The results showed that the mean of optimism was 21.4 (SD = 3.4) with the score range of 12 - 30. Moreover, the mean of growth mindset was 23.8 (SD = 5.5) with the score range of 6 -36. Finally, the mean of grit was 36.6 (SD = 5.2), with the score range of 23 - 50. The means of each subscale were as follows: consistency of interest (M = 17.0, SD = 3.3) and perseverance of effort (M = 19.6, SD = 3.4).

Measure	Mean SD	SD	Minimum	Maximum	Skewness		Kurtosis	
					Statistic	Std. Error	Statistic	Std. Error
Optimism	21.4	3.4	12	30	19	.10	28	.19
Growth Mindset	23.8	5.5	6	36	06	.10	42	.19
Grit	36.6	5.2	23	50	.08	.10	32	.19
Consistency of interest	17.0	3.3	9	25	.07	.10	42	.19
Perseverance of effort	19.6	3.4	10	29	.06	.10	20	.19

Table 1. Descriptive Statistics of Optimism, Growth Mindset, and Grit

# Correlations between Optimism, Growth Mindset, and Grit

The correlations between optimism, growth mindset, and grit are provided in Table 2. The results suggest that all variables significantly correlated with each other. Optimism was positively correlated with growth mindset (r = .35, p < .01) and grit (r = .33, p< .01). Also, a significant positive correlation was found between growth mindset and grit (r = .21, p < .01). At the subscale level, consistency of interest (r = .16, p < .01) and perseverance of effort (r = .35, p < .01) both were positively correlated with optimism. Also, growth mindset was positively correlated with consistency of interest (r = .13, p < .01) and perseverance of effort (r = .20, p < .01).

		1	2	3	4	5
1.	Optimism	1				
2.	Growth Mindset	.35**	1			
3.	Grit	.33**	.21**	1		
4.	Consistency of interest	.16**	.13*	.76**	1	
5.	Perseverance of effort	.35**	.20**	.78**	.20**	1

 Table 2. Correlations between Optimism, Growth Mindset, and Grit

p < .05, p < .01 (two-tailed)

# Growth Mindset as a Mediator of the Relationship between Optimism and Grit

The mediating effect of growth mindset on the relationship between optimism and grit was investigated. As shown in Table 3, all the structural paths were statistically significant. Optimism had a significant and positive impact on growth mindset (B = .57, p < .001). Growth mindset had a significant and positive impact on grit (B = .10, p = .006). Also, the total effect (B = .50, p < .001) of optimism on grit was significant. When including the mediation variable, growth mindset, the direct effect of optimism and grit weakened remaining significant (B = .44, p < .001). These results indicated a mediating role exists, in which growth mindset partially mediated the relationship between optimism and grit. Unstandardized path coefficients are represented in Figure 2.

**Table 3.** Test Result of the Mediating Effect of Growth Mindset in theRelationship between Optimism and Grit

Path	В	β	-SE	t	р	LLCI	ULCI
Optimism → Growth Mindset	.57	.35	.06	9.60	.000	.45	.68
Growth Mindset → Grit	.10	.11	.04	2.76	.006	.03	.18
Optimism → Grit	.44	.29	.06	7.45	.000	.33	.56
Optimism → Growth Mindset → Grit	.50	.33	.06	8.96	.000	.39	.61

*Note.* LLCI = lower limit confidence interval, ULCI = upper limit confidence interval

#### Figure 2.

Mediation Model for Optimism, Growth Mindset, and Grit



p < .05, p < .01, p < .001

To verify the significance of the mediation effect, we used a bootstrapping analysis of PROCESS macro. The bootstrapping procedure was accomplished on 5,000 samples with 95% confidence intervals. As shown in Table 4, the mediating effect of growth mindset on the relationship between optimism and grit was statistically significant (bootstrap 95% CI = .015 - .107).

**Table 4.** Bootstrap Test of the Mediating Effect of Growth Mindset(Grit)

	В	β	Boot. SE	95%	6 CI
Mediating				lower	upper
effect	.06 .04 fect	.02	.015	.107	

Following the same procedure, the study also tested the mediating effect of growth mindset on the relationship between optimism and two components of grit, consistency of interest and perseverance of effort. Firstly, optimism had a positive and significant impact on growth mindset (B = .57, p < .001) and growth mindset had no significant impact on consistency of interest (B = .05, p = .05) as shown in Table 5. Moreover, the total effect (B = .15, p < .001) and the direct effect (B = .12, p = .002) of optimism on consistency of interest were statistically significant. Unstandardized path coefficients are shown in Figure 2. Also, bootstrapping was applied to test the mediation effect. As presented in Table 6, the results showed that there was no significant mediating effect of growth mindset on the relationship between optimism and consistency of interest (bootstrap 95% CI = -.001 - .060).

**Table 5.** Test Result of the Mediating Effect of Growth Mindset in theRelationship between Optimism and Consistency of Interest

Path	В	β	-SE	t	р	LLCI	ULCI
Optimism → Growth Mindset	.57	.35	.06	9.60	.000	.45	.68
Growth Mindset → Consistency of Interest	.05	.08	.03	1.97	.049	.00	.10
Optimism → Consistency of Interest	.12	.13	.04	3.12	.002	.05	.20
Optimism → Growth Mindset → Consistency of Interest	.15	.16	.04	4.07	.000	.08	.22

*Note.* LLCI = lower limit confidence interval, ULCI = upper limit confidence interval

#### Figure 3.

*Mediation Model for Optimism, Growth mindset, and Consistency of Interest* 



p < .05, p < .01, p < .001

(Consistency of Interest)B $\beta$ Boot. SE95% CI

 Table 6. Bootstrap Test of the Mediating Effect of Growth Mindset

	В	β	Boot. SE	95%	6 CI	
Mediating				lower	upper	
effect	.03	.03	.02	001	.060	

In terms of components of grit, we tested the mediating effect of growth mindset on the relationship between optimism and perseverance of effort. As shown in Table 5, all the structural paths were statistically significant. Optimism had a positive and significant impact on growth mindset (B = .57, p < .001) and growth mindset had a positive and significant impact on perseverance of effort (B = .05, p = .028). Total effect (B = .35, p < .001) and direct effect (B = .32, p < .001) of optimism on perseverance of effort was statistically significant. Unstandardized path coefficients are represented in Figure 4. Also, the mediating effect of growth mindset on the relationship between optimism and perseverance of effort was statistically significant (bootstrap 95% CI = .003 - .060) as presented in Table 8.

**Table 7.** Test Result of the Mediating Effect of Growth Mindset in theRelationship between Optimism and Perseverance of Effort

Path	В	β	-SE	t	р	LLCI	ULCI
Optimism → Growth Mindset	.57	.35	.06	9.60	.000	.45	.68
Growth Mindset → Perseverance of Effort	.05	.09	.02	2.21	.028	.01	.10
Optimism→PerseveranceofEffort	.32	.32	.04	8.18	.000	.24	.40
Optimism $\rightarrow$ GrowthMindset $\rightarrow$ PerseveranceofEffort	.35	.35	.04	9.56	.000	.28	.42

*Note.* LLCI = lower limit confidence interval, ULCI = upper limit confidence interval

#### Figure 4.

*Mediation Model for Optimism, Growth mindset, and Perseverance of Effort* 



p < .05, p < .01, p < .001

**Table 8.** Bootstrap Test of the Mediating Effect of Growth Mindset(Perseverance of Effort)

	В	β	Boot. SE	95%	6 CI
Mediating				lower	upper
effect	.03	.03	.02	.003	.060

# Discussion

The present study was designed to examine the relationship among the major non-cognitive variables that predict success. To be more specific, we investigated how optimism is associated with grit and the mediating effect of growth mindset on the relationship between optimism and grit in adolescence. The two components of grit were additionally analyzed. The main results of this study can be summarized as follows.

First, optimism in adolescence directly predicted grit. This indicated that the higher the adolescents' optimism level, the higher their grit turned out to be. The result was consistent with previous studies that reported significant correlations between optimism and grit for adolescent and undergraduate samples (Clement et al., 2020; Jung, 2019; Kim & Ahn, 2018; Kim & Lee, 2021; Shishim, 2012; Watson, 2013), and optimism positively predicted grit (Duckworth & Eskreis-Winkler, 2013; Kim & Ahn, 2018; Oriol et al., 2020). In a similar vein, it was reported that optimistic people were more prone to make an effort and commitment to achieve their goals (Kleiman et al., 2017), which reflects important aspects of grit (Duckworth et al.,

2007). Tang et al. (2019) suggested that promoting goal commitment can strengthen grit in adolescence. Goal commitment refers to a dedication to a certain goal, and higher commitment may well encourage people to adhere to their goals and sustain persistence and consistency in the process of achieving goals. However, it does not mean that optimistic people commit themselves to every goal and value it highly. Rather, they tend to adjust their cognitive behavioral regulation by increasing their engagement in their goals of a higher priority, while diminishing their participation in their goals of a lower priority (Geers et al., 2009). In other words, optimistic people judge objectively where their resources should be invested to pursue their goals leading to higher expectations and values. With regard to this, the hierarchical framework of goal, as mentioned above, provided that grit was associated with superordinate goals, which coupled with exceptional achievements that often require long times (Duckworth & Gross, 2014). Therefore, optimistic people's expectations of the future can serve as a mechanism for achieving long-term goals (Oriol et al., 2020). Taken above together, this study found empirical evidence that adolescents' optimism can affect grit.

Second, growth mindset in adolescence significantly predicted grit. This finding supported the second hypothesis of the current study, which means that the higher the level of optimism, the higher the level of grit. It is also in line with previous findings that growth mindset and grit are significantly related to each other (Kench et al., 2016; Park et al., 2020a; Tucker-Drob et al., 2016; West et al., 2016; Yeager et al., 2016; Zhao et al., 2018), and growth mindset plays an important role in developing grit levels in adolescence (Dweck, 2017; Snipes et al., 2012). The result of this study was also supported by the previous theoretical proposition that the belief in the malleability of individual attributes would determine their subsequent behaviors (Dweck, 2017). This is because when people believe they can improve their abilities through their efforts could encourage them to sustain their passion despite difficulties (Park et al., 2020a). In addition, growth mindset was related to goal setting, goal operation, and goal monitoring which had a positive effect on the perseverance of effort and goal achievement (Leondari & Gialamas, 2002; Ahmavaara & Houston, 2007). Otherwise, Park et al. (2020a) and Zhang et al. (2022) conducted cross-lagged analysis of the relationship between growth mindset and grit in American

adolescents and a large sample of Chinese elementary school students, respectively. It was found that grit predicted rank-order increase in growth mindset and higher growth mindset also predicted rank-order increase in grit, mutually reinforcing each other (Park et al., 2020a; Zhang et al., 2022). The present study confirms previous findings and contributes additional evidence that suggests growth mindset can positively affect grit.

In addition, the current study examined the relationship between growth mindset and both components of grit, consistency of interest and perseverance of effort, respectively. As a result, growth mindset positively predicted perseverance of effort but did not positively predict consistency of interest. This result could be interpreted in relation with several studies that confirmed consistency of interest and perseverance of effort may have different outcomes (Bowman et al., 2015; Credé et al., 2017; Datu et al., 2016; Disabato et al., 2019; Wolters & Hussain, 2015). Recently, Disabato et al. (2019) found perseverance of effort was positively and strongly correlated with subjective well-being, beliefs about well-being, and personality strengths, while consistency of interest was weakly and negatively correlated with them. In the same context, Datu et al. (2016)

reported that perseverance of effort predicted positive affect and life satisfaction, but consistency of interest did not. The result of this study contributes to providing additional evidence of the role of growth mindset as a predictor of perseverance of effort, expanding existing knowledge of previous studies with the two components of grit that focused on the predictive effects thereof.

Third, growth mindset partially mediated the relationship between optimism and grit. This finding showed that as levels of optimism increased, growth mindset enhanced, which in turn improved grit that is perseverance and passion for long-term goals. The results of our study coincide with previous findings that optimism can lead to an increase in growth mindset and grit (Tuckwiller et al., 2017). However, the previous study on adolescents with learning disabilities conducted by Tuckwiller et al. (2017) had a small sample size (n = 17), so the finding seems to be difficult to generalize. Taking this into account, the current study offered valuable insights with a large sample of adolescents. Our study also found empirical evidence on direct effects in which both pathways, from optimism to grit and from optimism to growth mindset, were significant. In other words, one's expectation of a positive

future can increase the belief in which intelligence can grow and improve through their effort. This result has confirmed the findings of Dardick and Tuckwillber (2019) which found a direct pathway from optimism to growth mindset among college and graduate students, and that of Binning et al. (2019) which reported the effect of interventions to improve growth mindset was significant only for students with high educational expectations. As discussed above, according to the expectancy-value theory, the fundamental mechanism of growth mindset predicting diverse successes depends on the degree to which an individual' s expectations of successful results and evaluation of value (Thomas et al., 2019). Therefore, students' positive expectations for a specific task would affect successful outcomes through growth mindset. The current study sheds light on the role of optimism by confirming the result that optimism may well function to develop growth mindset as well as grit.

Additionally, we analyzed the mediation effect of growth mindset in the relationship between optimism and the two components of grit, consistency of interest and perseverance of effort, respectively. Our findings showed that growth mindset partially mediated optimism and perseverance of effort. In contrast, growth mindset has no significant

mediating effect on optimism and consistency of interest. This indicates adolescents' optimism would enhance growth mindset which might subsequently lead to the perseverance of effort rather than the consistency of interest. It is because growth mindset and grit are conceptually related in terms of the way to react to challenges and setbacks by maintaining an effort toward long-term goals rather than maintaining an interest toward long-term goals. As reviewed earlier, our results supported the previous findings that the two components of grit were found to generate different outcomes (Bowman et al., 2015; Credé et al., 2017; Datu et al., 2016; Disabato et al., 2019; Wolters & Hussain, 2015).

This study has mainly three limitations. First, this study used self-reported questionnaires to measure optimism, growth mindset, and grit. The responses may be affected by participants' social desirability, response biases, and other factors. Second, this study is limited by its research design, cross-sectional analysis, by which the causal relations among variables may not be clearly revealed. Previously, optimism was regarded as a stable personality trait (Scheier & Carver, 1992), but it was also discussed that optimism could be changed by environmental factors. For instance, childhood adversities were associated with decreasing optimism (Korkeila et al., 2004). Thus, our cross-sectional exploration of the impact of optimism in adolescence, a period with many physical, psychological, and environmental changes, may not be insufficient. Therefore, follow-up studies are needed to verify whether the causal relationship between each variable is supported by using longitudinal data. Third, variables not considered in our study might have some influence on the results. For example, optimism may be affected by gender, adversities during childhood, parental-child relationship, and peer group (Boehm et al., 2015; Korkeila et al., 2004; Tetzner & Becker, 2019; Ek et al., 2004), and growth mindset may also have different outcomes by gender (Dweck, 2006). Considering that, further studies need to be carried out to systematically examine the relevance among variables in consideration of more diversified personal and environmental factors.

Despite the limitations, the findings of this study have a number of important implications for future research. First, our findings in the present study examined the relations among the major predictors of success and thereby empirically verified the paths among them which is a step further approach prior studies that mainly explored

success-related variables focusing on what variable is a more reliable predictor of success. In particular, this study offered valuable insights by conducting analysis on nationally representative Korean adolescents. It is because prior studies on optimism, growth mindset, and grit had low generalizability due to the focus on rather narrow subjects such as surgeons (Loftus et al., 2020), professional soccer players (Steinfort, 2015), novice teachers (Duckworth & Eskreis-2013), and adolescents Winkler, with learning disabilities (Tuckwiller et al., 2017). Accordingly, the present study verified the mediating effects of the growth mindset in the path from optimism to grit, with nationally representative Korean adolescents and this result is more generalizable. Moreover, adolescence is an important period to build various psychological skills for a positive and constructive life. Our findings shed new light on promoting optimism in adolescence and can be a starting point leading to improvement in various success-related variables. Therefore, developing optimism needs to be included as a key factor in education and intervention programs targeting adolescents. Lastly, to our knowledge, this study is the first empirical study to investigate the mediating effect of growth mindset on optimism and grit in Korean adolescents with a

large number of samples and to analyze both components of grit respectively, and thereby identify specific mechanisms.

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#### 국문초록

본 연구의 목적은 청소년들의 낙관성과 그릿 간 관계에서 성장 마인 드셋의 매개 효과를 조사하는 것이었다. 대부분의 선행 연구들은 삶의 다양한 영역에서 성공을 예측하는 핵심 변인을 찾는 데 관심을 두었으며, 낙관성, 성장 마인드셋, 그릿은 성공을 예측하는 대표적인 비인지적 요 인으로 알려져 있다. 그러나 성공을 예측하는 대표적인 변인들 간의 심 리적 메커니즘을 탐색한 실증적 연구는 아직까지 부족한 실정이다. 따라 서, 본 연구에서는 청소년을 대상으로 낙관성, 성장 마인드셋, 그릿 간 관계를 살펴보았다. 특히 낙관성과 그릿의 관계에서 성장 마인드셋의 매 개 효과를 탐색하였다.

본 연구는 만 12세에서 16세(평균 연령=14.3세)의 한국 청소년 647명을 대상으로 낙관성, 성장 마인드셋, 그릿을 측정하는 설문지를 실 시하였다. 낙관성은 Life Orientation Test-Revised를 번안한 척도 (Scheier et al., 1994; Shinet al., 2005)를 사용하였으며, 성장 마인드셋 은 Theories of Intelligence scale의 번안된 척도(Dweck, 1999; Lee & Kwon, 2016)로 측정하였다. 마지막으로, 그릿은 Original Grit Scale의 번안된 척도(Duckworth et al., 2007; Park et al., 2020b)로 측정하였다. 수집된 자료는 SPSS 26.0 프로그램을 사용하여 분석하였다. 먼저 낙관 성, 성장 마인드셋, 그릿 간의 상관 관계를 알아보기 위해 Pearson의

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상관분석을 실시하였다. 또한 낙관성과 그릿 간의 관계에서 성장 마인드 셋의 매개 효과를 검증하기 위해 Hayes (2018)의 PROCESS macro를 실시하였고, 매개 효과의 유의성을 검증하기 위해 부트스트래핑 (Bootstrapping)을 실시하였다.

본 연구의 주요 연구 결과는 다음과 같다. 첫째, 청소년의 낙관성은 그릿을 유의미하게 예측했다. 둘째, 청소년의 성장 마인드셋은 그릿을 유의미하게 예측했다. 마지막으로, 성장 마인드셋은 낙관성과 그릿의 관 계를 부분 매개하는 것으로 나타났다. 즉, 성장 마인드셋이 높을수록 낙 관성이 증가하고, 이는 그릿을 높이는 경향이 있었다. 더불어 그릿의 두 구성 요소(노력 지속과 흥미 유지)를 나누어 분석한 결과, 성장 마인드 셋은 낙관성과 노력 지속에 대해서는 유의미한 부분 매개 효과를 나타냈 다. 반면, 성장 마인드셋은 낙관성과 흥미 유지 간 관계에 대해 유의미 한 매개 효과가 없는 것으로 나타났다. 이러한 결과는 청소년의 낙관성 이 그릿과 노력 지속을 향상시키는 예측 요인이 될 수 있다는 것을 의미 한다.

본 연구의 결과는 낙관성과 그릿의 관계에서 성장 마인드셋의 매개 역할을 입중함으로써 낙관성에서 그릿으로 이어지는 심리적 메커니즘을 밝혔다. 이러한 결과는 삶의 주요한 변화를 경험하는 청소년기에 낙관성 증진이 다양한 성공 관련 변인들을 증진시키는 데 있어서 중요한 방법일 수 있다는 가능성을 제시한다. 더불어, 현재 연구는 한국 청소년의 낙관

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성과 그릿 간 관계에서 성장 마인드셋의 매개 역할을 살펴본 첫 번째 실 증적 연구라는 점에서 중요한 의의가 있다. 논의에서는 본 연구의 한계 점과 추후 연구 방향에 대해 제언하였다.

**주요어**: 낙관성, 성장 마인드셋, 그릿, 노력 지속, 청소년기, 매개효과 **학번**: 2020-21306

## Appendix

Appendix 1. 낙관성 척도

Appendix 2. 성장 마인드셋 척도

Appendix 3. 그릿 척도

## Appendix 1. 낙관성 척도

*	평상시	여러분	자신과	가장	비슷하다고	생각하는	곳에	$\vee$	표시를 해	주세요.	
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		전혀 그렇지 않다	그렇지 않다	보통 이다	그렇다	매우 그렇다
1	불안한 상황에서도, 나는 보통 최선의 결과가 나타나리라고 기대한다	1	2	3	4	5
2	나는 쉽게 긴장을 풀 수 있다	1	2	3	4	5
3	나에게 나쁜 일이 일어날 것 같을 때는 나쁜 일이 일어난다	1	2	3	4	5
4	나는 항상 내 미래에 대해 낙관적이다	1	2	3	4	5
5	나는 친구들과 함께 있는 것을 무척 좋아한다	1	2	3	4	5
6	나에게는 바쁘게 지내는 것이 중요하다	1	2	3	4	5
7	내 뜻대로 일이 진행되리라고 거의 기대하지 않는다	1	2	3	4	5
8	나는 쉽게 당황하지 않는다	1	2	3	4	5
9	나에게 좋은 일이 일어나리라는 기대를 걸지 않는다	1	2	3	4	5
10	전반적으로 볼 때 나에게 나쁜 일보다는 좋은 일이 더 일어날 것이라고 기대한다	1	2	3	4	5

### Appendix 2. 성장 마인드셋 척도

		전혀 그렇지 않다	그렇지 않다	약간 그렇지 않다	약간 그렇다	그렇다	매우 그렇다
1	지능은 어느 정도 결정되어 있어 바꾸기 어렵다	1	2	3	4	5	6
2	지능은 타고나는 거라 변화시키기 어렵 다	1	2	3	4	5	6
3	새로운 것을 배울 수는 있지만 그것으로 타고난 지능을 바꾸기는 어렵다	1	2	3	4	5	6
4	타고난 지능이 어떻든지 나는 내 지능을 변화시킬 수 있다	1	2	3	4	5	6
5	나는 내 지능을 많이 변화시킬 수 있다	1	2	3	4	5	6
6	내가 가진 지능의 정도와 관계없이 나는 언제든지 지능을 변화시킬 수 있다	1	2	3	4	5	6

※ 다음을 읽고 자신의 생각이나 모습과 일치하는 정도를 골라 표시해 주세요.

# Appendix 3. 그릿 척도

*	다음을	잘	읽고	각	문항에	대해서	자신과	얼마나	비슷한지를	표시해	주세요.	
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		전혀 그렇지 않다	그렇지 않다	보통 이다	그렇다	매우 그렇다
1	나는 종종 목표를 세우지만, 나중에 그것과는 다른 일을 하곤 한다	1	2	3	4	5
2	나는 부지런하다	1	2	3	4	5
3	나의 관심사는 매년 바뀐다	1	2	3	4	5
4	좌절은 나의 의욕을 꺾지 못한다	1	2	3	4	5
5	나는 몇 개월마다 새로운 목표나 관심사에 흥미를 갖게 된다	1	2	3	4	5
6	나는 수년의 노력을 요구하는 목표를 달성해 본 적이 있다	1	2	3	4	5
7	때때로 새로운 생각이나 일 때문에 기존에 하고 있는 생각이나 일이 방해를 받는다	1	2	3	4	5
8	나는 내가 시작한 것은 무엇이든 끝낸다	1	2	3	4	5
9	나는 열심히 하는 사람이다	1	2	3	4	5
10	나는 한동안 새로운 생각이나 계획에 사로잡히지만 곧 관심을 잃게 된다	1	2	3	4	5
11	나는 중요한 도전을 위해 좌절을 극복해 왔다	1	2	3	4	5
12	나는 달성하는데 몇 개월이 걸리는 일에 꾸준히 집중하기 어렵다	1	2	3	4	5