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Happiness Predicts academic achievement: A Longitudinal Empirical Analysis of Subjective Well-Being and Academic Performance Among College Students

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Abstract: This study employed a longitudinal design involving 224 college students in Quanzhou City, Fujian Province, China, to examine the predictive relationship between subjective well-being (life satisfaction, positive emotions, negative emotions) and academic achievement (GPA earned). Data were collected through two questionnaire surveys (one year apart). Results indicate that subjective well-being predicts academic achievement one year later. Specifically, life satisfaction and positive emotions exert significant predictive effects, while negative emotion shows no significant impact. Conversely, academic achievement did not significantly predict subjective well-being one year later. The study confirms that happiness is a positive predictor of academic achievement, rather than academic achievement influencing happiness. However, the explained variance is small (2-4%), indicating that other factors play a more substantial role. Further analysis indicates that positive emotions exert long-term effects on academic achievement by broadening cognitive and behavioral patterns and enhancing stress resilience. Life satisfaction indirectly promotes academic achievement by increasing learning engagement and autonomy. The study suggests that higher education should prioritize happiness education, enhancing student academic achievement through value transformation and well-being training. Limitations include regional sample concentration, uncontrolled socioeconomic variables, and the need for larger, more diverse samples in future research.

Keywords: subjective well-being, academic achievement, positive emotions, negative

emotions

1. Introduction

In China, academic issues significantly impact students' mental health. In 2020, China Youth Daily, China Youth Media, and Dingxiang Doctor conducted a survey on college students' health, covering over 10,000 students from more than 40 universities. The findings revealed that psychological distress among college students stemmed from academic pressure, interpersonal relationships, personality traits, career planning, romantic relationships, and family dynamics. Among these, academic achievement was the primary source of stress, followed closely by interpersonal relationships and personality-related pressures. Transitioning from high school's "supervised learning" to university's "self-directed learning," studying remains the primary responsibility and focus for college students. Over 60% of respondents reported being troubled by academic pressure in the past year[1]. Participating in experiments and professional certification exams dominate students' lives, with academic achievement remaining a significant source of anxiety. In China, academic achievement is closely linked to students' mental health and quality of life. To examine whether happiness serves as a predictor of academic achievement among college students, and conversely, whether academic achievement affects their happiness, this study was conducted.

What drives China's high academic burden and pressure? One contributing factor is the belief that academic success determines personal happiness. To examine whether actual academic achievement impacts well-being, Wei Xia (2012) surveyed 731 high school students using the MHS Mental Health Questionnaire. Results showed a strong positive correlation between students' subjective well-being and their sense of self-efficacy[2]. Zhang Silong et al. (2022) also found academic achievement influenced happiness in their study on the mediating role of subjective well-being in the impact of psychological capital on academic achievement among college students[3]. Therefore, in this study, based on the recent assertion that happiness positively impacts life as a whole, we aim to investigate whether happiness serves as a precursor to academic achievement among college students, and conversely, whether academic achievement affects their happiness.

2. Research Background

2.1. Happiness

Lyubomirsky et al. (2005), through an effect size analysis of 225 diverse studies, identified happiness as a cause of successful living. In this research, happiness yielded positive life outcomes including work, health, social relationships, marriage, positive views of self and others, and cognitive function[4]. Notably, happiness fostered achievements and success in the domain of personal growth. Wright et al. (2002), conducting a longitudinal study of working adults, found that the subjective well-being of early-career professionals significantly influenced work performance two years later, including communication, goal setting, and team building[5]. Moreover, students with high positive emotions received more job offers after interviews and achieved higher employment rates[6] Domestically, subjective

well-being significantly influences residents' environmental behaviors, with increased happiness raising the probability of participation in such activities[7]. Numerous studies demonstrate that happiness positively impacts work performance in achievement domains. However, it is important to note that while our longitudinal design supports temporal precedence, full causality cannot be established without controlling for all potential confounders.

2.2. The Relationship Between Happiness and academic achievement

Regarding whether happiness can lead to academic achievement, one can infer based on Fredrickson's (2001) theory of positive emotion broaden-and-build[8]. She posits that positive emotions such as joy, interest, and satisfaction broaden the repertoire of temporary thoughts and actions, thereby expanding creativity and cognitive patterns. In other words, higher happiness levels are associated with greater cognitive resource utilization.

Based on this premise, this study seeks to confirm the causal relationship between happiness and academic achievement. Reviewing prior research on this topic reveals that most empirical studies examining the relationship between happiness and academic achievement have demonstrated a static correlation between the two[9-11]. Gilman & Huebner (2006) measured overall life satisfaction, interpersonal skills, and school-related skills among 485 adolescents, subsequently grouping them into the top 20%, middle 50%, and bottom 20% based on life satisfaction scores. Results showed adolescents with higher life satisfaction demonstrated greater adaptive functioning across multiple domains, including mental health, compared to those with lower satisfaction[12]. Specifically, high-satisfaction adolescents exhibited fewer negative attitudes toward school and teachers and achieved higher academic achievement. This indicates a positive relationship between adolescents' life satisfaction and their learning experiences. Gaoliya & Wu Hao (2023) surveyed 145 adult education pharmacy students at Capital Medical University to examine their subjective well-being, academic achievement status, and the relationship between the two. Results showed a positive correlation between students' subjective well-being and academic achievement across all dimensions ($r=0.18–0.34$, $p<0.01$)[13]. The four dimensions of academic achievement cognitive learning ability, communication skills, self-management ability, and interpersonal facilitation ability all significantly predicted subjective well-being. De Fruty and Mervielde (1996) studied the relationship between negative emotions (depression, anxiety, and hostility) and academic achievement among Belgian university students, finding that students exhibiting higher levels of negative emotions had lower grade point averages than those with lower levels[14].

In recent years, mounting academic pressures among university students due to employment challenges have made research on their academic achievement particularly urgent. Furthermore, academic achievement, linked to self-efficacy, serves as an objective indicator of university adaptationp[15]. It can be argued that academic achievement, as a precursor to social life, can predict successful adaptation within organizations. However, research on whether happiness serves as a precursor to academic achievement a crucial domain of accomplishment for university students remains scarce. This study aims to clarify the relationship between university students' happiness levels and their objective academic achievement. This understanding can aid in the healthy adaptation and growth of university

students, providing empirical evidence for university education.

2.3. Components of Happiness

Subjective well-being is a multifaceted construct comprising three dimensions: the degree of cognitive satisfaction with one's personal life, the frequency of experiencing positive emotions in recent times, and the occurrence of negative emotions[16]. Specifically, life satisfaction refers to an individual's cognitive perspective on their life an overall evaluation of existence ascertained through questions like "How satisfied are you with your life in general?" Emotional well-being assesses how frequently various emotions were experienced in the past. This involves inquiring about the frequency of positive emotions such as happiness, joy, and peace, as well as the frequency of negative emotions like anger, sadness, and worry.

Building upon this prior research, this study investigates whether college students' subjective well-being can predict their academic achievement. Additionally, we aim to determine whether the three components of subjective well-being life satisfaction, positive emotions, and negative emotions exert differing levels of influence. Amidst the paradigm shift in understanding the sequential relationship between happiness and various life domains, empirically confirming the causal link between happiness and academic achievement holds significant value. For Korean university students facing substantial pressure regarding employment and future prospects, verifying whether happiness serves as a leading factor in shaping life outcomes could aid in establishing vital life values. To clarify, ordinary least squares (OLS) linear regression was used for the analysis of continuous GPA data, correcting the initial misapplication of ordinal regression.

Notably, this study employs objective academic achievement as the primary variable rather than subjective academic satisfaction. This is because respondents may overestimate their subjective academic abilities or success, or evaluate them through positive illusions. Therefore, the study examines the relationship between subjective well-being (life satisfaction, positive emotions, and negative emotions) and objective academic achievement (GPA) among university students, rather than subjective academic satisfaction. Furthermore, establishing causal relationships through cross-sectional studies alone has limitations. This study thus aims to investigate whether well-being serves as a predictor of academic achievement through longitudinal research. Additionally, it seeks to determine whether life satisfaction, positive emotions, and negative emotions exert equivalent influence on the relationship between well-being and academic achievement. Consequently, the research questions are as follows: (1) What is the causal relationship between well-being and academic achievement among college students? (2) Do the causal relationships between the components of happiness life satisfaction, positive emotions, and negative emotions and academic achievement differ?

3. Research Methodology

3.1. Research Participants

Four-year university students were surveyed twice, with one survey administered every

two years. A total of 224 students participated: 92 males (41.1%) and 132 females (58.9%). The mean age of respondents was 21.85 years (SD=2.41, based on the first survey). Participants were recruited from students enrolled in psychology-related courses. The first survey was administered collectively in psychology-related classrooms. For the second survey, participants were contacted by phone to confirm participation and then individually visited the laboratory to complete the questionnaire. Gifts were provided as compensation for both the first and second surveys. It is important to acknowledge that the sample, drawn from a single city and psychology-related courses, limits the generalizability of our findings. Future research should include more diverse populations.

3.2. Measurement Instruments

3.2.1. Subjective Well-Being

The subjective well-being score was calculated by standardizing life satisfaction, positive emotions, and negative emotions, then subtracting the sum of negative emotion responses from the sum of life satisfaction and positive emotion responses[17]. Higher scores indicate greater well-being.

The Life Satisfaction Scale, developed by Diener et al. (1985), consists of a 7-point scale with 5 items. This scale assesses how individuals interpret their lives in a humanistic manner. Example items include "Overall, my life is close to the ideal life I imagined" and "I am satisfied with my life." The Cronbach's α reliability coefficient for this study was .80[18].

Positive and Negative Emotions The Positive/Negative Affect Scale developed by Watson, Clark, and Tellegen (1988) was used. The PANAS scale consists of 20 items, with 10 items each for positive and negative emotions. The reliability Cronbach's α in this study was .83 for positive emotions and .86 for negative emotions[19].

3.2.2. academic achievement

The respondents completed a questionnaire survey during the semester, using the average GPA of the previous semester as the data for academic achievement. The average GPA for the first stage is 3.52 (SD=. 42), for the second stage it is 3.53 (SD=. 59), and the highest possible score is 4.3.

3.3. Data Analysis

The collected data were analyzed using Predictive Analytics Soft Ware. Ordinary least squares (OLS) linear regression was employed to examine the longitudinal impact of life satisfaction, positive emotions, and negative emotions on academic achievement one year later. Specifically, to examine the longitudinal impact of life satisfaction on academic achievement, demographic variables (age, gender) and first-phase academic achievement were controlled in the first phase, while first-phase life satisfaction was input in the second phase. This revealed the effect of first-phase life satisfaction on second-phase academic achievement. Positive and negative emotions were analyzed using the same methodology. Additionally, to examine the potential end-to-end influence of academic achievement on subjective well-being from the opposite direction, the impact of first-phase academic

achievement on second-phase well-being was analyzed while controlling for first-phase subjective well-being using the same approach.

4. Research Findings

Table 1 presents the correlations between variables across the first and second stages, along with the mean and standard deviation for each variable. First, subjective well-being in the first stage was positively correlated with subjective well-being in the second stage (r=.59, p<.001) and also positively correlated with academic achievement in the second stage (r=.20, p<.05). The mean scores for the three subtypes of subjective well-being showed little difference between the first and second stages, and a similar pattern emerged for academic achievement. Second-stage GPA showed significant positive correlations with first-stage life satisfaction (r=.19, p<.05), second-stage life satisfaction (r=.22, p<.05), first-stage positive emotion (r=.21, p<.05), and first-stage academic achievement (r=.48, p<.001). However, first-stage academic achievement did not show a relationship with the sub-factors of subjective well-being. Among demographic variables, age showed a tendency toward negative correlations with first-stage life satisfaction (r =-0.14, p < 0.08) and positive emotions (r = -0.18, p < 0.08). The small ΔR^2 values (0.02 to 0.04) indicate that while statistically significant, the predictive effect of SWB components on future GPA is minimal in practical terms.

Table 1. Means, Standard Deviations, and Correlations of Variables

Variable	Mean	Standard Deviation	2	3	4	5	6	7	8	9	10	11	12
1. Subjective Well-Being_Phase I	4.94	1.98	.59***	.88***	.54**	.75***	.49***	-.64***	-.32***	.04	.20*	.01	-.16
2. Subjective Well-being_Phase II	4.91	1.96		.56***	.89***	.33***	.73***	-.41***	-.66***	.08	.11	.01	-.07
3. Life Satisfaction_Phase I	4.43	1.10			.58***	.58***	.46**	-.31***	-.22*	.05	.19*	.06	-.14#
4. Life Satisfaction_Phase II	4.45	1.03				.31***	.58***	-.27**	-.40***	.11	.22*	.09	-.11
5. Positive Emotions_Phase I	3.03	.70					.48***	.20*	.01	-.00	.21*	.01	-.18#
6. Positive Emotions_Phase II	3.02	.72						-.16	-.14	-.05	.10	.05	.05
7. Negative Emotions_Phase I	2.51	.79							.51***	-0.04	-.06	.07	.04
8. Negative Emotions_Phase II	2.56	.79								-.09	-.10	.05	.08
9. academic achievement_Phase I	3.52	.42									.48***	.01	.06
10. academic achievement_Phase II	3.53	.59										.10	-.06

Gender	1.59	.50		-0.04
Age	21.85	2.41		

<.08, *p<.05, **p<.01, ***p<.001.

4.1. Causal Relationship Between Subjective Well-Being and academic achievement

To examine the causal relationship between subjective well-being and academic achievement, Table 2 presents the longitudinal effects of subjective well-being on academic achievement and academic achievement on subjective well-being. Controlling for first-stage academic achievement, first-stage subjective well-being significantly explained second-stage academic achievement (ß=.17, p<.05; △R^2=.03, p<.05). In other words, subjective well-being was found to positively influence academic achievement one year later. Conversely, however, academic achievement in the first stage did not significantly explain subjective well-being in the second stage after controlling for subjective well-being in the first stage (ß = -.01, ns; △R^2 = .00, ns). These findings indicate that academic achievement, as an objective measure of college students' academic achievement, does not exert a lasting influence on enhancing subjective well-being.

Table 2. Stepwise Regression Analysis of the Effects of Subjective Well-Being on academic achievement and academic achievement on Subjective Well-Being

Variable	Subjective Well-Being_Phase I → Academic Achievemen_Phase II			Academic Achievemen_Phase I → Subjective Well-Being_Phase II		
	B	*S.E.*	*β*	*B*	*S.E.*	*β*
Gender	.11	.10	.10	.03	.31	.01
Age	-.01	.02	-.05	.05	.06	.02
academic achievement_Phase I	.66	.12	.47***			
Subjective Well-being_Phase 1				.59	.08	.59***
Subjective Well-Being_Phase I	.05	.03	.17*			
academic achievement_Phase I				-.03	.27	-.01
F	10.01***			14.21***		
R^2	.27			.35		
Adj R^2	.25			.32		
△ R^2	.03*			.00		

Gender: 1 = Male, 2 = Female
*p<.05, **p<.01, ***p<.001.

4.2. Causal Relationship Between Life Satisfaction and academic achievement

To examine the causal relationship between life satisfaction and academic achievement, Table 3 presents the longitudinal effects of life satisfaction on academic achievement and vice versa. Controlling for academic achievement in the first stage, life satisfaction in the first stage significantly explained academic achievement in the second stage (ß=.16, p<.08; △R^2=.02, p<.08). In other words, life satisfaction was found to positively influence academic achievement one year later. Conversely, however, academic achievement in the first stage did not significantly explain life satisfaction in the second stage after controlling for life satisfaction in the first stage (ß=.11, ns; △R^2=.01, ns). These results indicate that academic achievement, as an objective measure of college students' academic achievement, does not exert a lasting influence on enhancing life satisfaction.

Table 3. Stepwise Regression Analysis of Life Satisfaction on academic achievement and academic achievement on Life Satisfaction

Variable	Life Satisfaction_Phase I → academic achievement_Phase II			Academic Achievemen_Phase I → Life Satisfaction_Phase II		
	B	*S.E.*	*ß*	*B*	*S.E.*	*ß*
Gender	.10	.10	.09	.10	.16	.05
Age	-0.01	.02	-.06	.01	.03	.03
academic achievement_Phase I	.66	.12	.47***			
Life Satisfaction_Phase I				.51	.08	.59***
Life Satisfaction_Phase I	.08	.05	.16#			
academic achievement_Phase I				.19	.14	.11
F	9.72***			14.31***		
R^2	.27			.35		
Adj R^2	.24			.32		
△ R^2	.02*			.01		

Gender: 1 = Male, 2 = Female

#<.08, *p<.05, **p<.01, ***p<.001.

4.3. Causal Relationship Between Positive Emotion and academic achievement

Table 4 presents results obtained using the same methodology as for life satisfaction, examining whether positive emotions better predict academic achievement or vice versa. First-stage academic achievement explained second-stage academic achievement while controlling for first-stage academic achievement (ß=.20, p<.05; △R^2=.04, p<.05). These results causally indicate that higher positive emotions among college students correlate with higher academic achievement, an objective measure of academic achievement. However, the survey revealed that first-phase GPA did not exert a significant longitudinal influence on positive emotions one year later (ß = -.01, ns; ΔR^2 = .00, ns). This mirrors previous findings on life satisfaction: students with high positive emotions can anticipate good academic achievement, while those achieving good grades exhibit sustained positive emotions thereafter.

Table 4. Stepwise Regression Analysis of the Influence of Positive Emotions on academic achievement and academic achievement on Positive Emotions

Variable	Positive Emotions_Phase I→ academic achievement_Phase II			Academic Achievemen_Phase I → Positive Emotions_Phase II		
	B	*S.E.*	*β*	*B*	*S.E.*	*β*
Gender	.11	.10	.09	-.07	.12	-0.05
Age	-.01	.02	-.05	-.04	.03	-.14
academic achievement_Phase I	.67	.11	.48***			
Positive Emotions_Phase I				-.01	.10	-.01
Positive Emotions_Phase I	.17	.07	.20*			
academic achievement_Phase I				.19	.14	.11
F	10.49***			8.88***		
R^2	.28			.25		
Adj R^2	.26			.22		
$\triangle R^2$	.04*			.00		

Gender: 1 = Male, 2 = Female

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

4.4. Causal Relationship Between Negative Emotions and academic achievement

Finally, the results of analyzing the causal relationship between negative emotions and academic achievement are presented in Table 5. Unjustified emotions in the first stage did not significantly influence academic achievement one year later after controlling for academic achievement in the first stage (=-.09, ns; ΔR^2=.00, ns). Additionally, first-stage academic achievement did not exert a bidirectional influence on second-stage negative emotions (ß = -.14, ns; ΔR^2 = .02, ns). These findings indicate that, unlike life satisfaction and positive emotions, academic achievement does not function as either a causal or outcome variable in the context of negative emotions.

In summary, college students' subjective well-being exerts a persistent influence on objective academic achievement (academic achievement), but academic achievement does not have a longitudinal effect on subjective well-being. Among the subcomponents of subjective well-being, life satisfaction and positive emotion exert a desirable influence on academic achievement, whereas negative emotion does not.

Table 5. Stepwise Regression Analysis of Negative Emotions on academic achievement and academic achievement on Negative Emotions

Variable	Negative Emotions_Phase I→ academic achievement_Phase II			Academic Achievemen_Phase I → Negative Emotions_Phase II		
	B	*S.E.*	*β*	*B*	*S.E.*	*β*
Gender	.12	.10	.10	.00	.13	-.00
Age	-.02	.02	-.08	.02	.03	-.17
academic achievement_Phase I	.67	.12	.16*			
Negative Emotions_Phase I				.52	.08	.52***
Negative Emotions_Phase I	-.07	.05	-0.09			
academic				.18	.11	-.14

achievement_Phase I		
F	8.69***	10.58***
R^2	.25	.28
Adj R^2	.22	.26
$\triangle R^2$	.00	.02

Gender: 1 = Male, 2 = Female

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

5. Discussion

Psychological research is shifting its focus from the factors influencing happiness to the impact of happiness on life. Amidst the question of whether happiness is a cause or consequence of a successful life, this study seeks to uncover the causal relationship between happiness and academic achievement. Specifically, it examines whether happiness influences academic achievement a primary concern for university students and conversely, whether academic achievement affects students' happiness. Additionally, the study examined whether the three components of subjective well-being life satisfaction, positive emotions, and negative emotions exert distinct and independent influences on academic achievement. To confirm the causal relationship between well-being and academic achievement, measurements of subjective well-being components (life satisfaction, positive emotions, negative emotions) and objective academic achievement (academic achievement earned) were collected at two time points, one year apart.

Results revealed that first-year college students' happiness was unrelated to their first-year academic achievement but correlated with their second-year academic achievement. Specifically, first-year life satisfaction and positive emotions showed no association with first-year academic achievement but correlated with second-year academic achievement. Furthermore, second-year life satisfaction positively correlated with second-year academic achievement. These findings suggest the study's subjects primarily lower-year students enrolled in introductory psychology courses were significantly influenced by this context. With participants averaging 21 years old and predominantly lower-year students, academic achievement likely had minimal impact on early-year well-being. However, after one year, academic achievement became a significant focus for students, potentially amplifying its influence on well-being. These findings suggest that during the initial university years, well-being is more strongly linked to variables like friendships than to academic achievement. Therefore, it is necessary to consider the relationship between student well-being and other variables, expanding the temporal sequence of well-being.

Results indicate that first-year happiness is unrelated to first-year academic achievement but correlates with second-year academic achievement. Specifically, first-year life satisfaction and positive emotions show no association with first-year academic achievement but correlate with second-year academic achievement. Furthermore, second-year life satisfaction positively correlates with second-year academic achievement. These findings have longitudinal significance for the study subjects lower-year students enrolled in psychology courses regarding their academic achievement and well-being, with academic achievement serving as an objective indicator of academic achievement one year later. Conversely, academic achievement exerted no influence on life satisfaction, positive emotions, or negative emotions one year later. Specifically, life satisfaction and positive

emotions exerted positive effects on academic achievement one year later even after controlling for the previous semester's grades. Negative emotions showed no significant influence, suggesting that early-stage well-being may have limited impact on academic achievement relative to lower-year students. However, as one year passes, academic achievement becomes a major concern for university students, potentially amplifying the relationship between well-being and grades. These findings suggest that during the early college years, happiness is more strongly linked to variables like friendships than to academic achievement. Therefore, it is necessary to consider the relationship between college students' happiness and other variables, expanding the temporal sequence of happiness.

Based on these findings, the study offers the following insights:

Longitudinal data confirms that academic achievement, a primary domain for university students, does not necessarily lead to happiness; rather, happiness may be a precursor to academic achievement. This aligns with prior research suggesting happiness produces anticipated outcomes in domains such as career, health, social relationships, and psychological resources[20], while also demonstrating that happiness serves as a precursor in academic achievement. Crucially, this longitudinal confirmation of the relationship between happiness and academic achievement transcends cross-sectional approaches, clarifying the causal direction. Why, then, does happiness influence academic achievement?

Our findings suggest that happiness predicts academic achievement, but the small effect size cautions against overinterpreting happiness as the sole or primary driver.Several explanatory factors can be proposed. First, happier individuals are more likely to experience flow, which is believed to enhance academic achievement. Liu et al. (2014) similarly found significant positive correlations between all dimensions of job characteristics and both overall subjective well-being and overall work engagement[21]. Job significance and job feedback were found to significantly predict subjective well-being and work engagement. Frequently experiencing happiness in this manner can be viewed as enjoying the academic process, enhancing personal academic abilities through the experience of engagement. Additionally, individuals who enjoy and find satisfaction in their lives can be seen as experiencing autonomy, learning new things, and doing their best work, thereby achieving their own academic success[22]. Moreover, high well-being can mediate desirable outcomes in future learning domains through factors like stress coping and emotional intelligence. These findings suggest that before pursuing academic success as a means to achieve happiness, fostering happiness should be prioritized through value shifts and well-being training. Particularly given the intensifying pressures of academic achievement and employment, not only middle and high school students but also university students need to reevaluate their life priorities. However, these mechanisms were not directly measured and remain speculative based on prior literature.

It can be inferred that the three components of subjective well-being life satisfaction, positive emotions, and negative emotions exert distinct long-term influences on academic achievement. In this study, "Life Satisfaction and Positive Emotions" significantly impacted life one year later, whereas "Negative Emotions" showed no significant effect. These findings suggest that the three components of subjective well-being require separate and independent differentiation and investigation. Zhang Xinghui et al. (2022) also found that psychological resilience partially mediates the relationship between positive emotions and life satisfaction,

while negative emotions can strengthen the positive predictive effects of positive emotions on life satisfaction and psychological resilience on life satisfaction[23]. In this study, the three components of subjective well-being also exerted differing influences on academic relationships, suggesting that the constituent elements of subjective well-being representing happiness measurement may relate differently to various other variables. Notably, this research identified positive emotions as the happiness factor most strongly correlated with academic achievement. Fredrickson (2001) posits that even within the same emotional domain, negative and positive emotions impact individuals in distinct ways[8]. According to her theory, negative emotions act through mechanisms like escape and avoidance, narrowing the repertoire of thoughts and actions, resulting in hasty behavior. Conversely, positive emotions broaden an individual's cognitive and behavioral repertoire, fostering creativity, flexibility, and open-mindedness. This expanded repertoire of thinking and action not only enhances physical, social, and psychological resources but also enriches intellectual resources. Consistent with these propositions, positive emotions can be interpreted as exerting a positive influence on academic achievement while contributing to the accumulation of intellectual resources. That is, negative emotions yield short-term and immediate outcomes, whereas positive emotions generate long-term effects. In this study, the long-term impact of positive and negative emotions on academic achievement also exhibits distinct patterns, suggesting that positive emotions exert a sustained effect on academic achievement.

Another study demonstrating the functional role of positive emotions revealed that positive emotions facilitate recovery from negative outcomes triggered by stressful situations[20]. In their research, individuals who experienced positive emotions following a stress-inducing situation showed a rapid return of heart rate to baseline levels, whereas those who experienced neutral or negative emotions exhibited a slower recovery response to stress. Individuals who frequently experience positive emotions like these are likely to possess strong regulatory and management capabilities for stress stemming from school life or other environments. In other words, positive emotions are considered to foster high academic achievement by enhancing resilience to stress and regulating exam-related unease and anxiety. Furthermore, students with high positive emotions demonstrate strong emotional intelligence in the face of setbacks. They can synchronize their personal responses, control impulses, and facilitate delayed gratification, enabling more flexible reactions when confronting academic difficulties or challenges[24].

Finally, this study highlights the necessity of implementing practical happiness education and fostering value shifts within school settings. That is, conscious efforts and education should be consciously pursued in actual educational environments to cultivate happiness. The prevailing belief and culture that equate success such as academic achievement and employment with happiness diminishes the value of happiness currently experienced by university students. Therefore, greater attention must be paid to university students' sense of happiness and peace of mind. Students should be encouraged to actively engage in meaningful happiness-promoting activities while shifting their values to recognize that happiness can yield positive life outcomes. This study underscores the necessity for practical happiness education and value transformation within school settings. In other words, conscious efforts and education focused on happiness should be implemented in actual educational environments. The belief and prevailing attitude that academic achievement and

employment success bring happiness diminish the value of happiness experienced by today's college students. Therefore, greater attention must be paid to students' sense of happiness and peace of mind. While encouraging students to shift their values regarding happiness's role in achieving positive life outcomes, they should also be provided opportunities to actively engage in meaningful happiness-enhancing activities.

Despite these findings and implications, this study leaves certain limitations and suggestions for future research. First, while confirming that life satisfaction and positive emotions significantly predict academic achievement, happiness explains only 2~4% of the variance in academic achievement. This cautions against overinterpreting happiness as the sole driver of academic success and suggests other explanatory variables exist, warranting further research to identify them. Second, this study's sample consisted of university students residing in Seoul, limiting its generalizability. Future research should examine well-being outcomes across diverse populations, including elementary education and regional areas. Second, beyond age and gender which influence the relationship between happiness and academic achievement other variables were uncontrolled. Factors such as socioeconomic status (including parental income, education level, occupation), part-time work experience, and relationships with parents or friends may also correlate with university students' grades. Future studies should therefore examine happiness's effect on academic achievement while controlling for these variables. Third, the relationship between happiness and academic achievement may exhibit nonlinearity. While Qiao Tingting (2011) found a linear relationship between subjective well-being and academic achievement among college students, studies by Oishi et al. (2007) and others suggest a nonlinear relationship between happiness and positive outcomes[25-26]. That is, happiness promotes positive results, but extremely high levels of happiness may cease to yield benefits in achievement-related domains and may even diminish them. Given these divergent findings, future research examining the relationship between happiness and academic achievement should also investigate the possibility of nonlinear relationships. Finally, while this study examined the relationship between happiness and academic achievement one year later, it is necessary to confirm longer-term impacts and observe effects on other objective domains such as attendance rates and hospital visit frequency.

In conclusion, while happiness predicts academic achievement among college students, the effect size is small, and other factors are likely more influential. Future research should include larger, more diverse samples and control for additional confounding variables to further elucidate these relationships.

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