

Faiza Abdul Hafeez¹, Dr. Muhammad Naeem Mohsin¹

1. Department of Education, GC University, Faisalabad.

How to Cite This Article: Hafeez, F. A. & Mohsin, M. N. (2026). Effect of Cognition on Academic Achievement of University Students. *Journal of Social Sciences Research & Policy*. 4 (01), 516-526.DOI: <https://doi.org/10.71327/jssrp.41.516.526>**ISSN:** 3006-6557 (Online)**ISSN:** 3006-6549 (Print)**Vol.** 4, **No.** 1 (2026)**Pages:** 516-526**Key Words:**Academic achievement; Cognition;
University students; Personality traits;
Factor analysis; Knowledge curiosity;
Communication skills; Reasoning ability**Corresponding Author:****Faiza Abdul Hafeez**Email: faizaabdulhafeez@yahoo.com**License:**

Abstract: Academic achievement has been the center of attention of many studies in terms of the factors affecting it at various levels and in diverse contexts. The main purpose of this study was to scrutinize how the academic achievement of university students is affected by their personality trait like cognition. The participants 532 students were selected from the population of 9125 students. The questionnaire of cognition consisted of 34 items was used to collect the data. The internal consistency of the cognition scale had also been examined. Factor analysis was conducted to explore the underlying dimensions (Knowledge curiosity, Communication skills, Perception, Reasoning, Information processing ability, need a lot of attention to memorize information, need less attention to memorize information. Socially responsible and appealing new ideas) of cognition. A cross-sectional study was conducted. SPSS version 27 was used to analyze the data. The simple linear regression cognition was observed having positive and significant effect on the academic achievement. It is advised that going for a vigorous walk or by adding any brain enriching activity into their routine work in a week can make their body and mind healthy and students can also benefits greatly from physical activities and balanced diet. So the university administrations were suggested to promote the activities for the development of the attribute of cognition among the students to consequently improve their academic achievement.

Introduction

Academic achievement had been the focus of many studies in terms of the factors affecting it at various levels and in different contexts. Academic achievement refers to the knowledge, skills and subject to learning and training. Personality traits coupled with self-control can lead towards comprehensive academic achievement (Duckworth, & Seligman, 2005).

Cognition is defined as a lens or mental frame that we utilize to put in order and encode information. Everybody had their own way of responding to their surroundings which influenced physiological, behavioral and psychological results significantly and more particularly affected the decisions and judgments as evaluations, behavior, health, and intelligence as well (Crum, Salovey, & Achor, 2013).

So cognition included information processing ability (IPA), logical reasoning ability (LRA), memory ability (MA), representing ability (RA), and thinking conversation ability (TCA). Zhao (2017) defined academic

achievement as the effects of a student's learning after a particular learning phase of knowledge and skill. It can also be defined as an examination of the education system in the current scenario.

According to Young, Ong, Kalimuddin, Low, Tan, Loh, & Singapore 2020, the learning and training of students represents students' command of learned knowledge and skills. It was defined as the main parameter and noteworthy indicator for the measurement and evaluation of student's knowledge, skills, and progress of learning respectively.

Cognition ability influenced individuals in numerous areas of their lives when interact with the world. Human beings make use of cognitive ability to be aware of memories, which may find out how a person perceives the latest experiences. Whenever someone experiences an unforgettable event then there is a lot of sensory information coded into the brain. People sometimes remember things in different ways as they occurred in reality because cognition aspects may not have been fully remembered as they were. Usually, people's brains consistently utilize old information to understand fresh data (Schacter, 2002).

Cognitive process take place differently within the brain every day which include attention, perception, thought, learning, and memory (Goldstein, 2018)

One can learn through cognitive process like memory, perception, and thought. By combining all these processes, a person can learn and retain more information quickly. Verbal communication, thinking, reading writing, and listening about a language can assist a person to learn faster than any other processes separately (Sternberg, & Sternberg, 2016).

The term "cognitive ability" describes the capacity of the human brain to receive, process, and retain information. This includes functions like thinking, memory, and attention. According to Sternberg and Sternberg (2009), it is the essential psychological component needed for people to effectively finish an activity, and it is currently one of the most well-researched and reliable indicators of academic achievement (Vilia, P. N., Candeias, A. A., Neto, A. S., Franco, M. D. G. S., & Melo, M. 2017)

According to Margaret W. Matlin (2013), cognition incorporates all procedures by which persons gain knowledge and understanding through thought, experience, and the use of senses.

In a study conducted on 4,743 junior high school students, it was discovered that reasoning ability, selective attention, and short-term memory are important indicators of language and mathematics success (Xu and Li, 2015).

Academic achievement was directly predicted by cognitive ability, with a correlation as high as 0.38 between the two established by Rohde and Thompson (2007). Lan (2006) reported that there was a 0.81 association between academic success at age 16 and general cognitive capacity at age 11, based on 5-year follow-up research involving over 70,000 British students. Paulo evaluated the relationship between the inference dimensions and students' physical and chemical achievements in each of the three semesters using multiple regression stepwise analysis and standardized regression coefficients (β). He found that students' physical and chemical performance was significantly positively correlated with their reasoning ability (Grass, J., Strobel, A., & Strobel, A. (2017).

Liu assessed 499 Chinese children's cognitive skills in reading, math, and visual space. She also gathered the results for Chinese and mathematics learning for two academic years, the year before the test and the year after it. According to correlation study, reading comprehension, math, and visual space had a substantial impact on academic achievement (Li, Luo, Mu, Ye, Zheng, & Chen, 2021).

It was important for educators and counselors to pay close attention to the psychological resources of pupils and make deliberate attempts to instill good values and beliefs in them. Positive values and beliefs often correlate with optimistic thinking, empowering individuals to embrace a more positive

outlook on events and outcomes (Alarcón, G. M., Edwards, J. M., & Menke, L. E. (2013). Research suggested that augmented reality (AR) enhances cognitive evaluation, including the perception of academic control, leading to positive outcomes (Parker, C. J., He, J., & Ro, Y. K. (2018). Recent studies had shown the significant benefits of using cognitive interventions, such as augmented reality (AR), in the education of undergraduate students. Therefore, it is crucial for higher education institutions to prioritize the implementation of AR in their teaching methods (Parker et al., 2018)

Augmented Reality enhances cognition by improving understanding, memory, and higher-order thinking, while it increases resilience by building confidence, persistence, and adaptability. When AR systematically implemented in universities through curriculum design, interactive pedagogy, and proper technological support then it converts education into a student-centered, experiential, and psychologically empowering system (Mirza, T., Dutta, R., Tuli, N., & Mantri, A. (2025).

Attributional Retaining(AR) was a motivational approach that could help undergraduate students. It aimed to change the way they attribute success and failure, reducing the likelihood of experiencing stress (Haynes-Stewart, T. L., Clifton, R. A., Daniels, L. M., Perry, R. P., Chipperfield, J. G., & Ruthig, J. C. (2011).

It was a form of cognition referred to other processes within the brain such as perception and memory. It referred to the way people think and negative cognition can influenced depression, stress, and anxiety. In many ways, a person could have improved his thinking ability by understanding themselves, adopting a healthier diet, and adjusting their proper sleeping habits (Sternberg, & Sternberg, 2016).

Methodology

Participants

The sample of 532 students from the population of 9125 students who were screened out from three selected universities. Sample size was determined based on the rule of thumb mentioned in Comrey and Lee (1994). The nature of this research was descriptive and was made to explore the effect, affiliation, and relationships of cognition on academic achievements among the students.

Instrument

Data were collected with the help of self-developed Questionnaire of Cognition for Students.

Data Collection

After getting permission for concerned authorities researcher personally visited seven departments of each university. With the help of a class teacher and class representative (CR), a performa was filled from the students before data collection. This performa consisted of questions to respond as any physical disability (1-hearing loss, 2- Eyesight issue, 3-Sleeping issue, 4- Walking issue, 5- Pain after injury/ illness, 6- Weakness because of any disease, and 7- Other), Any Issue in life (1- Travelling issue, 2- Lonliness, 3- Studied related stress 4-Money issue, 5- Drug issue, 6- Fail to maintain healthy relationship). Any Disease (Stress, Blood Pressure Issue, Diabetes, TB, Headache, Heart Problem, Liver Issue, Kidney problem, Skin related issue, Asthma, Hydro- nephrosis, Panic attacks, Vitiligo), After getting this personal information from students, a purposive sampling technique was applied and those students were selected to fill the questionnaire who were frustrated and suffering from some problems according to predefined criteria and remained were not included in the data collection. For testing and refining the purpose of the questionnaire, opinions from different experts were considered. By getting feedback from these experts questionnaire was refined and finalized.

Findings and Conclusions

The data were analyzed through the Statistical Package for Sciences (SPSS) version 27. Inferential Statistics i.e. factor analysis, chi-square, and regression were applied for the data interpretation. Factor

analysis was used to check out Cronbach's Alpha Value to know about the reliability of the questionnaire. A chi-square test was applied to determine the association between cognition and academic achievement and a regression analysis test was used to estimate the relationship among independent and dependent variables.

Table 1
Showing association between gender and disability

Disability	No Disability	Hearing Issue	Eye Sight	Sleeping Issue	Walking Issue	Pain Injury/Illness	After Weakness disease	Total
Gender Male	54	10	9	11	7	9	12	112
Female	229	11	80	51	13	19	17	420
Total	283	21	89	62	20	28	29	532

Table 1 indicated that there is a significant association observed between demographic attributes i.e. disability and gender at 5% level of significance.

Table 2
Measure of sampling adequacy for cognition

Kaiser-Meyer-Olkin and Bartlett's Test: Cognition	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.860
Approx. Chi-Square	4730.344
Bartlett's Test of Sphericity	df
	Sig.
	561
	.000

The above table exhibited that for the cognition instrument the value of KMO was 0.860 which was higher than the threshold value of 0.7 indicated that correlation structure among the items of the cognition instrument was stronger enough for the application of factor analysis.

Table 3
R-Square and Adjusted R-square for Multiple Linear Regression Mode.

R Square	Adjusted R Square	Std. Error of the Estimate
.519	.516	.68205

a. Predictors: (Constant)

Table 3 showed that cognition has positive, moderate and significant correlation with the academic achievement i.e. 0.519. It also showed that the coefficient of determination is found to be 0.516 which states that 51.6% variation in academic achievement is explained by the independent variables namely cognition. The rest of the 48.4% variation in academic achievement is explained by the variables which are not included in our model.

Table 3 also depicts that the independent variable namely cognition has positive and the significant effect (P=0.000) on academic achievement.

Table 4

Underlying Dimensions of Cognition (Knowledge Curiosity, Communication Skills, Cognition, Reasoning, Information Processing Ability, Need A lot of Attention to Memorize Information, need less Attention to Memorize Information, Socially Responsible and Appealing New Ideas.

Name of Factor	Items in the Factor	Statements
Knowledge Curiosity	C12	Learning new ways of thinking excites me a lot.
	C10	I like to think about those tasks which require little thought once I have experienced them.
	C11	I enjoy those tasks which involve new ideas.
	C9	I like to think about daily-based small projects.
	C14	I feel pleasure after completing a target which requires a lot of mental effort.
	C7	I find satisfaction in doing hard work.
	C5	I like to consider those targets that require attention from my side.
Communication Skills	C32	I am good in reading.
	C33	I am good in writing.
	C34	I am good in speaking.
	C31	I am a good listener.
Perception	C28	I have ability to connect the ideas.
	C27	I have ability to justify my thinking.
	C29	I have ability to organize the knowledge.
	C30	I have ability to implement knowledge into new situation.
Reasoning	C24	I can do my work independently.
	C2	I prefer thought provoking situations.
	C3	I enjoy the process of critical thinking.
Information Processing Ability	C1	I have ability to solve academic problems.
	C19	It is difficult for me to learn the material in short time.
	C20	The thought-provoking activities disturbs my physical health.
	C21	I have the desire to dominate.
Need a lot of Attention to	C22	I have good sense of responsibility.
	C6	I like to avoid those situations that require in-depth thinking.

The above table indicated that 34 items of cognition instrument, the C12, C10, C11, C9, C14, C7, and C5 items were given a collective name of Knowledge curiosity, the C32, C33, C34 and C31 items were given a collective name of Communication Skills, the C28, C27, C29, C30 and C24 items were given a collective name of Perception, the C2, C3 and C1 items were given a collective name of Reasoning, the C19, C20, C21 and C22 items were given a collective name of Information Processing ability, the C6, C8, C4 and C16 items were given a collective name of Need a Lot of Time to Memorize the Information, the C17 and C18 items were given a collective name of Need Less Time to Memorize Information, the C26, C23 and

C25 items were given a collective name of Socially Responsible, the C13 and C15 items were given a collective name of Appealing New Ideas.

Table 5

Communalities of Items of Cognition using Principal Component Method

	Initial	Extraction
C1	1.000	.606
C2	1.000	.631
C3	1.000	.567
C4	1.000	.524
C5	1.000	.405
C6	1.000	.538
C7	1.000	.543
C8	1.000	.523
C9	1.000	.547
C10	1.000	.542
C11	1.000	.538
C12	1.000	.630
C13	1.000	.661
C14	1.000	.455
C15	1.000	.531
C16	1.000	.431
C17	1.000	.671
C18	1.000	.702
C19	1.000	.625
C20	1.000	.563
C21	1.000	.478
C22	1.000	.491
C23	1.000	.484
C24	1.000	.503
C25	1.000	.378
C26	1.000	.571
C27	1.000	.576
C28	1.000	.678
C29	1.000	.543
C30	1.000	.518
C31	1.000	.584
C32	1.000	.651
C33	1.000	.631
C34	1.000	.555

Extraction Method: Principal Component Analysis. C = Cognition

The above table showed that none of the communality was exceptionally low (below 0.2) and hence no item was required to be excluded from the factor analysis.

Table 6
Total Variance Explained of the Factors of Resilience using Principal Component

Component			Initial Eigenvalues		Extraction Sums of Squared Loadings		Rotation Sums of Squared Loadings		
Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	7.184	21.131	21.131	7.184	21.131	21.131	3.258	9.583	9.583
2	2.109	6.203	27.334	2.109	6.203	27.334	2.785	8.190	17.773
3	1.827	5.374	32.708	1.827	5.374	32.708	2.607	7.667	25.439
4	1.574	4.629	37.337	1.574	4.629	37.337	2.035	5.984	31.423
5	1.419	4.174	41.511	1.419	4.174	41.511	1.918	5.641	37.064
6	1.314	3.866	45.377	1.314	3.866	45.377	1.831	5.385	42.449
7	1.254	3.689	49.066	1.254	3.689	49.066	1.665	4.898	47.347
8	1.115	3.280	52.346	1.115	3.280	52.346	1.513	4.450	51.797
9	1.079	3.172	55.518	1.079	3.172	55.518	1.265	3.720	55.518

Extraction Method: Principal Component Analysis.

The above table depicted that there were nine dimensions underlying the set of 34 items of the cognition instrument. These nine dimensions or factors collectively explained 55.518 variations which was on the safer side being greater than the threshold value of 50%. In Table above, the KMO value of 0.864 was excellent as it exceeded the recommended value of 0.6. Additionally, the significance value of Bartlett's Test of Sphericity must be less than 0.05 for the factor analysis to be acceptable. There was statistically significant relationship between academic achievement and cognition.

Discussion

The process of cognition was a series of electronic and chemical signals that occurred in the brain and allowed someone to understand the environment and gain knowledge. Neurons released such chemicals, which created electrical signals within nearby neurons and built a mass of signals which were translated then into conscious and unconscious kind of thoughts. The state of consciousness gave an interpretation of the five senses, emotional reactions, and procedural knowledge (Kandel, Schwartz, & Jessell, 2021).

Researchers also discovered that the variations in students' grade point averages (GPAs) may be explained by both rigor and achievement incentives. Their drive for achievement controls the effects (Richardson, Abraham, & Bond, 2012). Adrian and Tomas (2005) also looked at the interior relationship between knowledge level and personality traits, and they discovered that openness and rigor had a strong positive correlation with knowledge level. Ruffing's research revealed comprehensible personality variations and a strong correlation between academic achievement and overall cognitive capacity. The incremental variance exceeding general cognitive ability can be explained by differences in personality traits (Ruffing, Wach, Spinath, Brünken, & Karbach, 2015).

Prior research on the relationship between personality traits and cognitive capacity was mostly focused on correlation studies or qualitative research, which resulted in only a few successful identifications of a causal relationship between them. Although personality traits and cognitive ability are the two main facets of individual psychology and are related and independent of one another (Li and Zhang, 2015), opinions regarding their applicability differ because personality traits and cognitive ability are indicators of various ability dimensions (James, Wilson, Barnes, & Bennett, 2011).

Although some researchers thought that personality traits and cognitive ability influenced one another, most personality traits and cognitive ability factors were very weakly correlated, meaning that the two can be used independently as explanatory variables of individual behavior (Borghans, Meijers, & Ter Weel, 2008). Information processing ability (IPA) was significantly impacted by personality traits, according to Tania's research. She discovered that as education level rised, conscientiousness will had a smaller effect on performance, suggested that a person's personality was more important in fostering academic success (Cerni, Benedetto, & Rumiati, 2021).

According to Chu, Liu, Guo, & Liu, (2022), pupils who exhibited higher levels of extroversion were less likely to experience psychological symptoms. The key personality traits that have an impact on psychological health are excitement, trust, optimism, and ease of going along. Students who are isolated and extremely sensitive, for instance, often exhibit neuroticism and incompatibility, which is detrimental to their own growth. Numerous studies demonstrated a strong correlation between a student's psychological well-being and learning effectiveness (Wu, 2021).

Research on psychology and psychological traits had been the main focus of previous studies (Wu, Wang, Lee, Lin, & Guo, 2019), not psychology's effect on academic achievement. However, academic performance had a significant role in the psychological health process (Zhang, Ye, & Xu, 2023), and was one of the main measures of student growth and educational outcomes (Wang and Jessica, 2016).

Findings

In Pakistan, this type of research was not conducted at the university level. There was a need to know about other factors which produced eustress among students. Researcher found other personality and mental traits that will be helpful for students to enhance their academic achievements. So being resilient and with a healthy mindset, students can think more positively which in return will increase their academic achievements.

It was found out that the way of thinking about stress drastically affected the experienced amount of anxiety and response towards the stress. In addition, they also found a connection with the health factor (Crum, Salovey, & Achor, 2013). Cognition is defined as a lens or mental frame that we utilize to put in order and encode information. Everybody had their own way of responding to their surroundings (Dweck, 2008) which influenced physiological, behavioral and psychological results significantly and more particularly affected the decisions and judgments as evaluations, behavior, health, and intelligence as well (Crum et al., 2013). Based on the above explanation, Crum et al. (2013) presumed that the way of thinking as cognition would have effects on stress directly and stress could have effects on outcomes such as productivity, performance, well-being, and health. They said a stressed mindset is a distinct condition that predicts the stress response and it had a significant impact not only on motivation (short-term effects but also on whole-life satisfaction (long-term effects). If there is any need for improvement in a person's response to stress then there will be a need to change the mindset of that person because this is all related to the amount of stress perceived (Crum et al., 2013). Poor diet, lack of exercise, and substance abuse resulted in declination of physical health (Dyrbye et al., 2005). Such consequences were also supported by Fehrmann, Tuechler, Kienbacher, Mair, Spreitzer, Fischer, Kollmitzer, & Ebenbichler, (2017), who described people having more distress, reported poor health conditions with more health problems, and also affected student's mental health negatively. H. Li (2017) recommended that the student who got more directions from their parents and more energetic commitment in institution environment could modify their conditions of low-down institution commitment and their own divergence behavior, and improve their accomplishment academically. On the other hand, children who got low level of parental support and monitoring have a low level of resilience (Sanders, & Turner,

2018).

Recommendations

It is imperative that university employees should help first-year undergraduate students more.

- Counselors at universities should be conscious of the psychosocial support that could maintain students' healthy performance and well-being during a transition.
- First-year university students are less able to cope with stress, national initiatives are required to create innovative teaching methods that improve students' ability to withstand stress and offer academic help throughout their adjustment to university life.
- To encourage positive thinking and the development of psychological resources in students, university administrators should also consider enacting new regulations, such as reordering existing courses and increasing the frequency of lecturer-student interaction sessions.
- Educators and counselors should focus on students' psychological resources and intentionally work to inculcate positive values and beliefs in them. Optimistic thinking frequently correlates with positive values and beliefs, enabling people to adopt a more optimistic perspective on situations and results.
- To help transitional students adjust to university life, it is crucial to plan ongoing seminars and events at the university level. Their intellect will be improved and given a boost if they incorporate even a handful of these activities into their weekly routine.
- It is also advised that going for a vigorous walk or by adding any brain-enriching activity into their routine work in a week can make their body and mind healthy and students can also get benefits greatly from physical activity and balanced diet.
- Brain Exercises helps to develop and improve the memory, creativity and cognition which includes meditation and visualizing, playing games, card and video games, crosswords, puzzles, socializing and learning new skills, increasing vocabulary and learning of languages, regular exercises, engaging hobbies, sleeping and sports. So need to organize the healthy co-curricular activities on regular basis.
- Different foods help to boost up brain functions. Oily fish, Berries, Dark chocolates, Seeds, Nuts, Eggs, Whole grains, Soy, Avocados, Kale, Peanuts, Broccoli, and supplements hold fundamental nutrients and maintain short and long-term functions of brain.

References

- Alarcón, G. M., Edwards, J. M., & Menke, L. E. (2013). Student burnout and engagement: A test of the conservation of resources theory. *Journal of Psychology*, 147(6), 609–630. <https://doi.org/10.1080/00223980.2012.727663>
- Borghans, L., Meijers, H., & Ter Weel, B. (2008). The role of non-cognitive skills in explaining cognitive test scores. *Economic inquiry*, 46(1), 2-12.
- Cerni, T., Di Benedetto, A., & Rumiati, R. I. (2021). The contribution of personality and intelligence toward cognitive competences in higher education. *Frontiers in Psychology*, 12, 621990.
- Chu, F., Liu, S., Guo, M., & Liu, R. (2022). Group strength in safety performance: the effects of group characteristics on individual personality expression in high-speed railway operators. *International journal of occupational safety and ergonomics*, 28(2), 909-922.
- Comrey, A. L., & Lee, H. B. (1994). *A first course in factor analysis* (2nd ed.). Lawrence Erlbaum Associates.
- Crum, A. J., Salovey, P., & Achor, S. (2013). Rethinking stress: The role of mindsets indetermining the

- stress response. *Journal of personality and social psychology*, 104(4), 716-733
- Duckworth, A. L., & Seligman, M. E. P. (2005). *Self-discipline outdoes IQ in predicting academic performance of adolescents*. *Psychological Science*, 16(12), 939-944. <https://doi.org/10.1111/j.1467-9280.2005.01641.x>
- Dyrbye, L. N., Thomas, M. R., & Shanafelt, T. D. (2005). Medical student distress: causes, consequences, and proposed solutions. *Mayo Clinic Proceedings* 80(12), 1613-1622.
- Fehrmann, E., Tuechler, K., Kienbacher, T., Mair, P., Spreitzer, J., Fischer, L., Kollmitzer, J., & Ebenbichler, G. (2017). Comparisons in Muscle Function and Training of occupational stress. *New Zealand Journal of Psychology*, 35(2), 92.
- Goldstein, E. B. (2018). *Cognitive Psychology: Connecting Mind, Research, and Everyday Experience* (5th ed.). Cengage Learning.
- Grass, J., Strobel, A., & Strobel, A. (2017). Cognitive investments in academic success: The role of need for cognition at university. *Frontiers in Psychology*, 8, 790. <https://doi.org/10.3389/fpsyg.2017.00790>
- Haynes-Stewart, T. L., Clifton, R. A., Daniels, L. M., Perry, R. P., Chipperfield, J. G., & Ruthig, J. C. (2011). *Attributional retraining: Reducing the likelihood of failure*. *Social Psychology of Education*, 14(1), 75-92. <https://doi.org/10.1007/s11218-010-9130-2>
- James, B. D., Wilson, R. S., Barnes, L. L., & Bennett, D. A. (2011). Late-life social activity and cognitive decline in old age. *Journal of the International Neuropsychological Society*, 17(6), 998-1005.
- Lan, W. Y. (2006). The effects of self-monitoring on students' academic performance. *The Journal of Experimental Education*, 74(2), 121-134. <https://doi.org/10.3200/JEXE.74.2.121-134>
- Li, F., Luo, S., Mu, W., Li, Y., Ye, L., Zheng, X., ... & Chen, X. (2021). Effects of sources of social support and resilience on the mental health of different age groups during the COVID-19 pandemic. *BMC psychiatry*, 21, 1-14.
- Li, H. (2017). The 'secrets' of Chinese students' academic success: Academic resilience among students from highly competitive academic environments. *Educational Psychology*, 37 (8), 1001-1014. doi:10.1080/01443410.2017.1322179.
- Liu, Y., Wang, Z., & Lü, W. (2017). Resilience and affect balance as mediators between trait emotional intelligence and life satisfaction. *Personality and Individual Differences*, 116, 115-120. <https://doi.org/10.1016/j.paid.2017.04.009>
- Martin, A. (2013). Academic buoyancy and academic resilience: Exploring 'everyday' and 'classic' resilience in the face of academic adversity. *School Psychology International*, 34 (5), 488-500. doi:10.1177/0143034312472759.
- Mirza, T., Dutta, R., Tuli, N., & Mantri, A. (2025). Leveraging augmented reality in education involving new pedagogies with emerging societal relevance. *Discover Sustainability*, 6, 77.
- Parker, C. J., He, J., & Ro, Y. K. (2018). *Antecedents to the adoption of augmented reality smart glasses: A closer look at privacy risks*. *Journal of Business Research*, 92, 322-331. <https://doi.org/10.1016/j.jbusres.2018.07.038>
- Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: a systematic review and meta-analysis. *Psychological bulletin*, 138(2), 353.
- Rohde, P., & Thompson, M. (2007). Predicting academic achievement with cognitive ability. *Journal of Educational Psychology*, 99(3), 623-635. <https://doi.org/10.1037/0022-0663.99.3.623>
- Ruffing, S., Wach, F. S., Spinath, F. M., Brünken, R., & Karbach, J. (2015). Learning strategies and general cognitive ability as predictors of gender-specific academic achievement. *Frontiers in psychology*, 6,

1238.

- Sanders, M. R., & Turner, K. M. (2018). The importance of parenting in influencing the lives of children. *Handbook of parenting and child development across the lifespan*, 3-26.
- Schacter, D. L. (2002). *The seven sins of memory: How the mind forgets and remembers*. HMH.
- Singh, S. S., Kaur, A., & Gulzar, Y. (2024). The impact of augmented reality on education: A bibliometric exploration. *Frontiers in Education*, 9, 1458695. <https://doi.org/10.3389/feduc.2024.1458695>
- Sternberg, R. J., & Sternberg, K. (2016). *Cognitive Psychology (7th ed.)*. Cengage Learning
- Vilia, P. N., Candeias, A. A., Neto, A. S., Franco, M. D. G. S., & Melo, M. (2017). Academic achievement in physics-chemistry: The predictive effect of attitudes and reasoning abilities. *Frontiers in Psychology*, 8, Article 1064. <https://doi.org/10.3389/fpsyg.2017.01064>
- Wu, W., Wang, H., Lee, H. Y., Lin, Y. T., & Guo, F. (2019). How machiavellianism, psychopathy, and narcissism affect sustainable entrepreneurial orientation: the moderating effect of psychological resilience. *Frontiers in psychology*, 10, 779.
- Xu, X., & Li, J. (2015). The relationship between parental involvement and adolescents' academic achievement: A meta-analysis. *Educational Psychology Review*, 27(4), 599–620. <https://doi.org/10.1007/s10648-015-9313-3>
- Young, B. E., Ong, S. W. X., Kalimuddin, S., Low, J. G., Tan, S. Y., Loh, J., ... & Singapore 2019 Novel Coronavirus Outbreak Research Team. (2020). Epidemiologic features and clinical course of patients infected with SARS-CoV-2 in Singapore. *Jama*, 323(15), 1488-1494.
- Zhang, N., Ye, X., & Xu, J. (2023). The Mediating Role of Psychological Well-being Between Social Media Use and Academic Performance Among University Students: What is the Importance of Student Mental Health?. *American Journal of Health Behavior*, 47(3), 605-617.
- Zhao, X., Zhang, L., & Zhou, X. (2017). Emotion regulation and academic success in Chinese adolescents. *Educational Psychology*, 37(3), 269–282.