



Academic resilience, mental toughness, and academic performance: interrelations and differences by students' gender and origin (sports vs non-sports)

Resiliencia académica, fortaleza mental y rendimiento académico: interrelaciones y diferencias según género y origen de los estudiantes (deportivos vs. no deportivos)

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Abstract

Introduction: Not many studies attempt to examine in depth how the role of academic resilience (AR) and mental toughness (MT) on academic performance (AP) is reviewed based on differences in students' gender and origin (sports and non-sports).

Objective: This study aims to explore in depth the relationship between age, AR, MT, and AP in sports and non-sports students.

Methodology: A total of 175 students participated in this study, but 166 students (male = 64 or 38.55%; female = 102 or 61.45%) were analyzed further. Based on the origin of the study program, 81 (48.80%) students came from sports study programs, while 85 (51.20%) came from non-sports study programs. The average age of respondents was 18.87±0.77 years. The research data was taken using the Academic Resilience Scale (ARS), Mental Toughness Index (MTI), and GPA.

Results: There is a significant relationship between AR and MT ($r = 0.691$; $p < .001$), while the age and AP variables are not correlated ($p > .05$). There is a significant difference in AP based on gender ($F = 30.485$; $p < .001$) and origin of study program ($F = 50.522$; $p < .001$), but there is no significant difference in the AR and MT variables ($p > .05$).

Conclusions: This study has presented new evidence related to the interrelation of AP, AR, MT, and age variables. There is a significant correlation only in the AR variable with MT, while there is no significant relationship in the other variables. In addition, significant differences were only found in AP, while there were no differences in AR and MT, either based on students' gender or origin (sports and non-sports).

Keywords

Academic performance; academic resilience; educational psychology; mental toughness; sports student.

Resumen

Introducción: No existen muchos estudios que profundicen en el análisis del rol de la resiliencia académica (RA) y la fortaleza mental (MT) en el rendimiento académico (RA) según las diferencias de género y origen (deportivo y no deportivo) de los estudiantes.

Objetivo: Este estudio tiene como objetivo explorar en profundidad la relación entre la edad, AR, MT y AP en estudiantes deportistas y no deportistas.

Metodología: Participaron 175 estudiantes en este estudio, pero se analizaron 166 estudiantes (hombres = 64 o 38,55%; mujeres = 102 o 61,45%) en mayor profundidad. Según el origen del programa de estudios, 81 (48,80%) estudiantes provenían de programas deportivos, mientras que 85 (51,20%) provenían de programas no deportivos. La edad promedio de los encuestados fue de 18,87 ± 0,77 años. Los datos de la investigación se obtuvieron mediante la Escala de Resiliencia Académica (ARS), el Índice de Fortaleza Mental (MTI) y el promedio de calificaciones (GPA).

Resultados: Existe una relación significativa entre AR y MT ($r = 0,691$; $p < 0,001$), mientras que las variables edad y AP no presentan correlación ($p > 0,05$). Existe una diferencia significativa en AP según el género ($F = 30,485$; $p < 0,001$) y el origen del programa de estudios ($F = 50,522$; $p < 0,001$), pero no existe diferencia significativa en las variables AR y MT ($p > 0,05$).

Conclusiones: Este estudio presenta nueva evidencia relacionada con la interrelación de las variables AP, AR, MT y edad. Existe una correlación significativa solo en la variable AR con MT, mientras que no existe relación significativa en las demás variables. Además, solo se encontraron diferencias significativas en AP, mientras que no hubo diferencias en AR y MT, ni en función del género ni del origen de los estudiantes (deportivo y no deportivo).

Palabras clave

Rendimiento académico; resiliencia académica; psicología educativa; fortaleza mental; estudiante deportista.



Introduction

Several meta-analysis studies related to academic performance (AP) associated with work performance show that AP is still a fairly good predictor of a person's future performance in the workplace (Iddekinge et al., 2024; Roth et al., 1996). That is why, in recent decades, research on student AP has been widely conducted (Gaston-Gayles, 2005). In addition to being a predictor of work performance or an indicator of individual success, AP reflects the effectiveness of the education system and learning environment. Because of the importance of this variable, it is not surprising that many factors that contribute to students' academic achievement on campus have been investigated. For example, a study shows that psychological factors contribute significantly to students' academic achievement on campus (Richardson, Abraham, & Bond, 2012). However, based on our knowledge, few studies have attempted to examine how the role of academic resilience, mental toughness, and academic achievement is reviewed based on differences in students' gender and origin (sports and non-sports). Studies so far tend to examine these constructs partially.

Although resilience has been widely discussed (see, for example, Southwick et al., 2014; Bonanno, 2021; Evenseth et al., 2022), resilience is not specific to the academic context, especially in sports students, for example, academic resilience is investigated in the context of elementary and middle school students (Gabrielli, Longobardi, & Strozza, 2022). However, this cannot be generalized to the context of college students (Bagdžiūnienė, Žukauskaitė, Bulotaitė, & Sargautytė, 2025). In general, resilience is perceived as a dynamic psychological capacity to bounce back from adversity, failure, uncertainty, or other unpleasant conditions (Hartmann et al., 2020; Luthar et al., 2000). In line with the definition above, academic resilience (AR) is defined as a person's ability to deal with learning pressure, stress, and effectively declining academic achievement (Martin, 2002; Martin & Marsh, 2008). Until now, research examining AR is still relatively limited (Martin & Marsh, 2006), especially concerning certain groups (Finn & Rock, 1997), such as between sports and non-sports students.

The mental toughness (MT) construct has attracted many scientists, so that publications on it are experiencing an increasing trend (Gucciardi, 2017; Sutoro et al., 2023). Studies so far, generally, tend to focus on investigating MT in the context of sports such as athletes (Wandik et al., 2024; Fauzee et al., 2012; Wieser & Thiel, 2014; Putra, Sutoro, Wanena, et al., 2024; Jones et al., 2007; Cowden, 2017). Although many publications have athletes as their subjects, research on the relationship between MT and learning outcomes has also attracted the attention of scholars. A study conducted by Crust et al. (2014) on sports students found that students with high MT scores have better academic achievement. Other studies also found similar findings, namely that there is a positive relationship between MT and student learning achievement (Clair-Thompson et al., 2017; Lin et al., 2017). Although the study found a relationship between MT and AP, few have explored the two constructs in depth. Previous studies that investigated MT in depth were limited based on differences in gender, education level, and athlete and non-athlete status (Putra, Sutoro, Wanena, et al., 2024). How it relates to AR and AP has not been investigated, let alone reviewed from the gender, status, or origin of students (sports and non-sports).

Based on the various descriptions above, there is a gap in previous studies investigating AR, MT, and AP, namely that previous studies tend to be partial and not comprehensive in considering differences in students' gender and origin (sports and non-sports). Students in sports study programs, in addition to being required to study academically, often practice sports regularly (Comeaux & Harrison, 2011). With conditions like these, there are challenges concerning learning outcomes. In addition, although gender issues in education have become a global concern, according to the UNESCO report, many studies focus on gender gaps in access to education. In-depth analysis of how gender affects academic achievement is still under-explored (Global Education Monitoring Team, 2018). In addition, empirical studies over several decades have shown significant differences between genders in psychological dimensions (Katsantonis, 2020; Yoon et al., 2023). For this reason, this study aims to explore in depth the relationship between age, AR, MT, and AP in sports and non-sports students.

Method

Participants

The research subjects were recruited using convenience sampling techniques online. The research team uploaded the research instrument to a Google form. Then the instrument link was distributed to colleagues in several sports and non-sports study programs to be forwarded to students. The inclusion criteria used in this study include: (1) being actively registered as a student at a maximum study program level of undergraduate (S1) and (2) participant age between 18-28 years. The exclusion criteria include: (1) masters (S2) or doctoral (S3) students, (2) having graduated from college. In this way, 175 students participated in this study. However, after analyzing the incoming data, nine data points indicated careless responding, so the data analyzed further in this study were the data from 166 students. Of the 166 students, 64 (38.55%) were males and 102 (61.45%) were females from sports study programs. Based on the origin of the study program, 81 (48.80%) students came from sports study programs, while 85 (51.20%) came from non-sports study programs. The average age of the students was 18.87 years with SD = 0.77. Based on the semester, 146 (87.95%) students were in the second year, while 20 (12.05%) students were in the fourth year.

Instrument

A questionnaire reveals the variables studied (academic resilience, mental toughness, and academic performance). First, to discover academic resilience, the Academic Resilience Scale (ARS) was used (Martin & Marsh, 2006). The ARS consists of six statements (e.g., I don't let study stress get on top of me) with alternative answers in the form of Likert scale ranging from strongly disagree to strongly agree (1-7). ARS has a CFI value = .98, NNFI = .96 with factor loading values ranging from .62 to .86 and a Cronbach alpha value α = .89 (Martin & Marsh, 2006). Second, to reveal MT, the Mental Toughness Index (MTI) developed by Gucciardi and colleagues was used (Gucciardi, Hanton, Gordon, Mallett, & Temby, 2014). The MTI consists of eight items (e.g., I strive for continued success) and has alternative answers in the form of a continuum ranging from 1 (False, 100% of the time) to 7 (True, 100% of the time). The Indonesian version of the MTI (MTIid) has a very satisfactory fit value, namely CFI = .967, TLI = .954, GFI = .966, SRMR = .034, and RMSEA = .069, and has an excellent loading factor value (λ = .563 to .759), as well as excellent internal consistency reliability (CR = .864; α = .862) (Putra et al., 2025). The Indonesian version of the MTI has been used to examine the MT dimension, both in athletes and in sports students (Putra et al., 2025), including being used to test other instruments that measure the MT dimension, such as the PPI-A (Putra, Sutoro, Guntoro, et al., 2024) and MTQ (Guntoro et al., 2025). Third, students' academic achievement is based on their grade point average (GPA). The students were asked to write down their GPAs. All of these instruments are uploaded to a Google form, and the first part contains informed consent and participant demographics, for example, gender, age, origin, and study program (sports and non-sports).

Procedure

This study is a cross-sectional study. Data were collected online on students studying in sports and non-sports study programs. In other words, this study administers the research instrument in Google Forms. Then the Google form link for the research is distributed to fellow lecturers and several relevant WhatsApp groups to request assistance given to students. The first sheet of the Google form contains the researcher's biodata and an explanation of the purpose of the study. The second sheet contains informed consent with two alternative answers: willing and unwilling. If students are ready to participate in the study, they can click agree and will be directed to the personal data sheet and research instrument. If unwilling to participate, they can choose the unwilling alternative, and the filling session will end. This means that all students who participated in this study agreed to be involved in the research. This study was approved by the Institutional Health Research Ethics Committee Number: 164/KEPK-FKM UC/2025.

Data analysis

Descriptive analysis was used to determine each research variable's description (mean, SD, and percentage). To determine the relationship between age, RA, MT, and AP, a product moment correlation analysis was used. The differences between variables based on gender and the origin of student study



programs (sports and non-sports) were analysed using variance analysis. The level of significance used in this study was 0.05 or 5%. The analysis was carried out with the help of the JASP program version 0.18.2.0.

Results

The results of the descriptive analysis are presented in Table 1. The table shows that the mean score of female students is greater than that of male students, especially in the AR and AP variables. For the MT variable, male students have higher scores than female students. Based on the origin of the study program, students from non-sports study programs have greater mean MT and AP values than students from sports study programs. However, in the AR variable, it appears that students from sports study programs have greater mean values than students from non-sports study programs.

Table 1. Results of descriptive analysis (Male = 64, Female = 102; Sport = 81, Non-sport = 85, N = 166)

	Group	Mean	SD	Skewness	Kurtosis	Min	Max
AR	Male	32.188	5.668	-0.755	0.533	16.000	42.000
	Female	31.755	4.796	-0.882	1.715	14.000	41.000
MT	Male	45.375	6.430	-1.682	6.725	15.000	56.000
	Female	45.892	5.692	-0.558	0.409	29.000	56.000
AP	Male	3.418	0.427	-0.672	-0.047	2.000	3.960
	Female	3.742	0.326	-1.678	1.263	3.000	4.000
AR	Sport	32.370	5.173	-0.530	0.145	16.000	42.000
	Non-Sport	31.494	5.096	-1.099	2.007	14.000	41.000
MT	Sport	45.642	6.372	-1.370	5.474	15.000	56.000
	Non-Sport	45.741	5.604	-0.710	0.654	29.000	55.000
AP	Sport	3.420	0.407	-0.661	-0.102	2.000	3.960
	Non-Sport	3.806	0.286	-2.376	4.195	3.000	4.000
AR Total		31.922	5.137	-0.795	1.081	14.000	42.000
MT Total		45.693	5.973	-1.094	3.587	15.000	56.000
AP Total		3.617	0.399	-1.163	0.423	2.000	4.000

Note: AR: academic resilience; MT: mental toughness; AP: academic performance; SD: standard deviation; Min: minimal; Max: maximum

The results of the correlation analysis on four variables, namely age, AR, MT, and AP, found a significant relationship only in the AR variable, with MT ($r = 0.691$; $p < .001$) (Table 2). However, when associated with AP, the two variables showed no significant relationship ($p > .05$). Likewise, with the age variable, there was no significant relationship ($p > .05$) with other variables (Table 2).

Table 2. Correlation results among variables

Variable	Mean	SD	Correlation coefficient (r)			
			1	2	3	4
1. Age	18.87	0.77	-	0.058	-0.011	-0.217
2. AR	31.922	5.137		-	0.691*	-0.040
3. MT	45.693	5.973			-	0.077
4. AP	3.617	0.399				-

Note: * $p < .001$

The t-test results showed that of the three variables investigated (AR, MT, and AP), there was a significant difference in the AP variable only (Table 3). The important difference was found, both based on gender ($F = 30.485$; $p < .001$) and the origin of the student's study program (sports and non-sports) ($F = 50.522$; $p < .001$). When viewed based on the mean value, female students have higher AP than male students. Based on the origin of the study program, students from non-sports study programs have higher AP than sports students (Table 3). For the AR and MT variables, the results of this study showed that there was no significant difference, either based on students' gender or origin of the study program ($p > .05$) (Table 3).

Table 3. T-test results based on gender and study program (n=166)

Variable	Gender		F	Study Program		F
	Male (n=64)	Female (n=102)		Sports (n=81)	Non-Sports (n=85)	
AR	32.19±5.67	31.76±4.80	0.278	32.37±5.17	31.49±5.10	1.208
MT	45.37±6.43	45.89±5.69	0.294	45.64±6.37	45.74±5.60	0.011



AP	3.42±0.43	3.74±0.33	30.485*	3.42±0.41	3.81±0.29	50.522*
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Note: AR: academic resilience; MT: mental toughness; AP: academic performance; *p < .001

Discussion

This study explores the relationship between age, AR, MT, and AP and their differences based on students' gender and origin (sports and non-sports). Briefly, the study findings can be grouped into two categories: those related to the interrelationship between variables and those related to the analysis of differences between variables based on students' gender and origin (sports and non-sports).

The first finding showed that the variables age, AR, and MT did not have a significant relationship with AP ($p > .05$). Several artifacts of previous studies indicate that, in general, the variables AR and MT have a strong correlation with AP. For example, previous studies conducted in Indonesia (Kumalasari, 2023), China (Fang, Chan, & Kalogeropoulos, 2020), Malaysia (Choo & Prihadi, 2019), Saudi Arabia (Almulla, 2024), and Kenya (Mwangi, Okatcha, Kinai, & Ireri, 2015) show that AR has a significant correlation with AP. The same thing was found in MT, where the study conducted by Crust et al. (2014), Clair-Thompson et al. (2017), and Lin, Mutz, Clough, & Papageorgiou (2017) found that students with high MT scores tend to have better academic achievement. The question then is, why did our study find different results from the research above, namely, finding no significant relationship in the variables investigated? The study results agree with research in Spain, which found that the AR variable was not significantly correlated with AP (Meneghel, Martínez, Salanova, & de Witte, 2019). With these facts, this study provides new knowledge about the variables investigated that, when investigated together and in the context of students in Indonesia, it appears that age, AR, and MT are not significantly correlated with AP. The explanation that can be put forward concerning this is that age, AR, and MT are not directly correlated with AP but are very likely mediated by other variables such as academic self-efficacy (Ogunmakin & Akomolafe, 2013), attitude (Guntoro et al., 2024), self-regulated learning (Panadero, 2017), religiosity (Guntoro & Putra, 2022), and other relevant variables.

In the findings of this study, as stated above, there is a significant correlation only in AR and MT ($r = 0.691$; $p < .001$). This is logical considering that both dimensions are relatively identical, namely related to psychological aspects (Martin & Marsh, 2006; Gucciardi et al., 2014). The results of other studies when linking the two variables of resilience and MT also strengthen the findings of this study. For example, a study found that MT correlated significantly with resilience, and MT made someone better at adapting to the potential for stress (Gerber et al., 2013).

The next result, which differentiates between variables based on gender, shows a significant difference only in AP ($F = 30.485$; $p < .001$). This is in line with other similar studies; for example, research by Nasir et al. (2025) found a significant difference in AP based on gender. Likewise, research conducted by Gil (2024) showed a significant difference in AP between men and women. For the other two variables, namely AR and MT, there is no significant difference ($p > .05$). This result is in line with the study conducted by Amoadu et al. (2024), which found that there was no difference in AR based on gender. Similarly, Simsek, Kartal, & Aktas (2023) found no difference in MT based on gender. However, other studies show differences in AR (Erdogan, Ozdogan, & Erdogan, 2015) and MT (Putra, Sutoro, Wanena, et al., 2024; Andrews & Chen, 2014) based on gender. In practice, the results of these studies tend to be inconsistent when investigating AR and MT variables based on gender differences. The differences in results are very likely due to differences in methods, subjects, and research contexts.

The analysis of differences between other variables in this study, based on the origin of the study program, found a significant difference only in AP ($F = 50.522$; $p < .001$). This finding is something new because previous studies have not explored differences based on the origin of the student's study program (sports and non-sports). When viewed from the mean value, students of non-sports study programs have higher AP scores than students of sports study programs. Students who are active in sports, for example, their status as athletes, have more responsibilities and tasks than non-athletes (Comeaux & Harrison, 2011). Therefore, it is highly possible that, because of the busyness of practicing sports, the time for studying related to academics on campus is reduced. Thus, it is very natural that the average GPA of non-sports students is higher than that of sports students. For the other two variables, namely AR and MT, there is no significant difference ($p > .05$). The two instruments used in this study, namely

ARS (Martin & Marsh, 2006) and MTI (Gucciardi et al., 2014) are instruments whose items do not specifically mention the context of sports so that the finding of no differences based on the origin of the study program makes sense. In addition, the results of this study are new findings because they try to differentiate based on the origin of the student's study program (sports and non-sports). Previous studies have not explored this (Herdi & Ristianingsih, 2022).

Limitations and future research direction

Although this study has attempted to investigate the variables AR, MT, and AP based on students' gender and origin or study program (sports and non-sports), we see several limitations. First, this study only used a questionnaire to collect data, and it was done online. With such facts, there is the potential for respondents to fill in as they please and not be careful, so that the results do not reflect the truth. Second, although AP is associated with AR and MT, several other psychological variables such as self-efficacy, self-regulated learning, attitudes, learning satisfaction, and happiness in life have not been investigated. Due to these limitations, some directions for future studies that can be done include, first, combining research approaches, for example, using a mixed method, namely by following up on quantitative results obtained with qualitative (in-depth interviews). In addition, data collection should be done online and offline so that when there are obstacles or there are things that respondents doubt in filling out the instrument, an explanation can be given directly. Second, further studies need to investigate other psychological variables more comprehensively, including self-efficacy, attitudes, self-regulated learning, religiosity, learning satisfaction, life happiness, and other relevant variables. Therefore, a more comprehensive conceptual framework concerning AP-related factors can be developed.

Conclusions

This study has presented new evidence related to the interrelation of academic performance, academic resilience, mental toughness, and age, and there are differences between students' gender and origin (sports and non-sports). Academic resilience, mental toughness, and age do not correlate significantly with academic performance. There is a significant correlation between the academic resilience variable and mental toughness. In addition, the results of the difference analysis show that there is a significant difference only in academic performance. Academic resilience and mental toughness are not significantly different, based on students' gender and origin (sports and non-sports). Female students tend to have higher academic performance than male students. Likewise, the academic performance of non-sports students is higher than that of the sports students.

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