Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 3 No. 8 (August) (2025)

Academic Procrastination and Its Influence on Mathematics Achievement among Secondary School Students in Pakistan: A Sociocultural Perspective

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Abstract
Academic procrastination is a persistent challenge within Pakistani secondary schools, particularly in the context of mathematics education. This study investigates the impact of academic procrastination on students' mathematics achievement, considering sociocultural and familial factors such as parental education, family size, gender, and home study habits. A quantitative survey design was employed, targeting 150 students from public schools in Karachi. Data were analyzed using multiple regression and path analysis techniques. The findings reveal a significant negative correlation between academic procrastination and mathematics performance. Moreover, procrastination levels were influenced by parental education and study hours, suggesting that home environment plays a crucial role. The results underscore the need for targeted interventions to reduce procrastination and improve mathematics learning outcomes in Pakistan.

Keywords: Academic procrastination, mathematics achievement, secondary education, parental education, Pakistan, sociocultural factors

Introduction

Mathematics holds a central position in the Pakistani secondary school curriculum, functioning as a compulsory subject and a prerequisite for academic progression (Government of Pakistan, 2022). Despite its significance, national assessment reports consistently indicate that students underperform in mathematics at this level. Among the various contributing factors, one behavioral aspect that has received comparatively little scholarly attention is academic procrastination. Steel (2007) defines academic procrastination as the voluntary and unnecessary postponement of academic tasks, despite an awareness of the potential negative consequences. This pattern of behavior is particularly detrimental in mathematics learning, where mastery depends on sustained, incremental engagement and consistent practice.

Existing research on mathematics education in Pakistan has predominantly focused on cognitive, pedagogical, and curriculum-related challenges, including

ISSN Online: 3007-3154
ISSN Print: 3007-3146

instructional quality, resource limitations, and teacher training (Ali et al., 2021). However, the role of procrastination as a behavioral determinant of mathematics achievement remains largely unexplored. Addressing this gap, the present study investigates the relationship between academic procrastination and mathematics performance among Pakistani secondary school students. The inquiry is framed within the theoretical perspective of sociocultural theory, which emphasizes the influence of social interaction, cultural norms, and contextual factors on cognitive development and academic behavior. Through this lens, the study aims to offer insights into how procrastination manifests in mathematics learning contexts and to inform targeted interventions that address both behavioral and academic dimensions of underachievement.

Literature Review

Academic procrastination extends far beyond a simple lapse in time management; it is often rooted in complex psychological and behavioral factors such as fear of failure, low self-efficacy, perfectionism, and poor emotional regulation (Pychyl et al., 2000). Students who doubt their own capabilities or fear negative evaluation tend to delay initiating or completing academic tasks as a means of self-protection, avoiding situations that may threaten their self-worth (Steel, 2007). This tendency is particularly pronounced in mathematics, a subject frequently perceived as difficult, anxiety-inducing, and cognitively demanding. Asikhia (2010) notes that students with negative prior experiences in mathematics often adopt avoidance behaviors, including procrastination, which can further impair their performance by reducing opportunities for practice and mastery. Such cycles of avoidance and underperformance can become self-reinforcing, ultimately limiting students' academic progress.

The phenomenon of procrastination can also be meaningfully examined through the lens of sociocultural theory, particularly Vygotsky's (1978) assertion that learning is a socially mediated process in which cognitive development is shaped by interaction with more knowledgeable others. In contexts where students lack supportive learning environments—either at home or in school—procrastination is more likely to emerge as a coping mechanism. In Pakistan's public education system, especially in low-income regions, classrooms often lack individualized scaffolding, and teacher–student interactions may be limited by large class sizes, resource shortages, and inadequate training (Rahman & Iqbal, 2023). The absence of structured guidance, combined with limited parental involvement in households where educational attainment is low, creates conditions that hinder sustained engagement with challenging subjects such as mathematics. Consequently, the sociocultural environment interacts with individual psychological factors to intensify procrastination behaviors, leading to a cumulative disadvantage in learning outcomes.

Empirical evidence from culturally and structurally comparable contexts further underscores the academic risks associated with procrastination. In Nepal, Chapai et al. (2024) found a significant negative correlation between academic procrastination and secondary school students' mathematics performance, suggesting that procrastination directly undermines the consistent practice and problem-solving skills essential for success in the subject. Parallel findings have been reported in Indonesia, where Asri et al. (2017) documented a measurable decline in mathematics achievement among students who frequently delayed

ISSN Online: 3007-3154
ISSN Print: 3007-3146

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academic tasks, and in Nigeria, where Akinsola et al. (2007) identified procrastination as a significant predictor of poor mathematics performance at the secondary level. Collectively, these studies highlight a cross-cultural pattern in which procrastination operates as a pervasive barrier to mathematics learning, reinforcing the need to address both the cognitive and sociocultural determinants of this behavior. By situating the issue within a broader international framework, these findings provide compelling support for examining the procrastination–achievement link in the Pakistani context, where similar structural and pedagogical challenges persist.

Research Objectives

These are the objectives of the present research study;

- To assess the prevalence of academic procrastination among Pakistani secondary school students.
- To examine the relationship between procrastination and mathematics achievement.
- To explore the role of sociocultural variables (e.g., parental education, family size, gender) in shaping procrastination behavior.

Research Questions

These are the questions of the present research study;

- What is the prevalence of academic procrastination among Pakistani secondary school students?
- What is the relationship between academic procrastination and mathematics achievement among Pakistani secondary school students?
- How do sociocultural variables, such as parental education, family size, and gender, influence academic procrastination behavior in Pakistani secondary school students?

Research Methodology

Research methodology refers to the systematic framework or plan that guides the entire research process, encompassing the strategies, techniques, and tools used to identify, collect, analyze, and interpret data to address the research problem (Kothari, 2004). It outlines *how* the research is conducted rather than just *what* is researched, ensuring that the study is valid, reliable, and replicable.

According to Creswell and Creswell (2018), research methodology provides the rationale for the research design and methods, enabling the researcher to link theoretical assumptions with empirical data. It serves as a blueprint that specifies the type of research (qualitative, quantitative, or mixed methods), sampling techniques, data collection instruments, and data analysis procedures.

In essence, methodology acts as the backbone of a study, ensuring that the research is scientifically sound and that the results can be trusted (Saunders, Lewis, & Thornhill, 2019). Without a clear methodology, research risks becoming disorganized, biased, or inconclusive.

Research Design

This study employed a quantitative, cross-sectional survey design to investigate the relationship between academic procrastination and mathematics

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ISSN Online: 3007-3154
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achievement among Pakistani secondary school students. The quantitative approach was chosen to enable numerical measurement and statistical analysis of the variables, thereby ensuring objectivity and generalizability of the results (Creswell & Creswell, 2018). A cross-sectional design was considered appropriate as it allowed the collection of data from the target population at a single point in time, facilitating the assessment of both the prevalence of procrastination and its association with academic performance (Sedgwick, 2014).

Participants

The study sample comprised 150 secondary school students enrolled in Grades 9 and 10 from five public sector schools in Karachi, Pakistan. Participants were selected using a stratified random sampling technique, ensuring proportional representation based on school size and socioeconomic status. This approach minimized sampling bias and increased the representativeness of the sample (Etikan & Bala, 2017). The stratification ensured that schools from both lower- and middle-income neighborhoods were included, providing a more comprehensive picture of the relationship between procrastination and academic achievement in diverse contexts. Informed consent was obtained from both the students and their guardians prior to data collection.

Research Instruments

The Procrastination Assessment Scale – Students (PASS**)**, originally developed by Solomon and Rothblum (1984), was adapted for this study to specifically assess procrastination in mathematics-related academic tasks. The instrument consisted of items measuring the frequency of procrastination and the reasons behind it, using a five-point Likert scale ranging from 1 ("Never") to 5 ("Always"). Previous research has demonstrated high reliability and validity of PASS in academic contexts, with Cronbach's alpha coefficients typically exceeding 0.80 (Rabin et al., 2011). The adapted version underwent expert review to ensure contextual and cultural appropriateness for Pakistani students.

To assess academic performance, a 40-item multiple-choice Mathematics Achievement Test was developed, covering four domains, arithmetic, algebra, geometry, and statistics, in alignment with the National Curriculum of Pakistan (Government of Pakistan, 2006). Each correct answer was awarded one mark, with a maximum possible score of 40. The test items were reviewed by subject specialists and pilot-tested to ensure clarity, content validity, and an appropriate difficulty level for secondary school students. The reliability of the test was evaluated using the Kuder–Richardson Formula 20 (KR-20), yielding a coefficient of 0.86, indicating high internal consistency.

Data Analysis

Descriptive statistics, independent t-tests, ANOVA, and multiple linear regression were used. Path analysis was applied to assess mediating effects.

Results

Prevalence of Academic Procrastination

The analysis revealed a mean procrastination score of 3.34 on a 5-point Likert scale, suggesting a moderate-to-high tendency toward procrastination among the sampled students. A considerable proportion of respondents reported engaging

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www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

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in procrastination-related behaviors in their academic tasks. Specifically, 62% of students acknowledged delaying their exam preparation, while 48% admitted to submitting assignments after the due date. These findings highlight that procrastination is not only a prevalent issue but also a habitual pattern among Pakistani secondary school students, aligning with prior evidence that procrastination is widespread in adolescent academic settings (Steel, 2007; Balkis & Duru, 2017).

Effect of Procrastination on Mathematics Achievement

Multiple regression analysis indicated that procrastination was a significant negative predictor of mathematics achievement ($\beta = -0.17$, $p < 0.01$). This suggests that higher procrastination tendencies were associated with lower performance in mathematics assessments. Furthermore, comparative analysis showed that students with lower procrastination levels scored approximately 18% higher than their high-procrastination counterparts. These findings corroborate earlier studies demonstrating that procrastination impairs academic outcomes by reducing effective study time, lowering engagement, and increasing last-minute preparation (Kim & Seo, 2015; Tuckman, 2005).

Prevalence of Procrastination

Variable	Influence on Procrastination	Significance
Parental Education	High inverse correlation	$p < 0.01$
Study Hours	Inverse correlation	$p < 0.05$
Gender	No significant difference	$p > 0.05$
Family Size	Larger families correlated with more procrastination	$p < 0.05$

Analysis of demographic variables revealed several noteworthy patterns. Parental education exhibited a strong inverse correlation with procrastination ($p < 0.01$), indicating that students whose parents had attained higher levels of education were less likely to procrastinate. Study hours also demonstrated a significant inverse relationship ($p < 0.05$), suggesting that students who devoted more time to study engaged in less procrastination. Conversely, family size showed a positive correlation ($p < 0.05$), with students from larger families displaying higher procrastination tendencies, possibly due to limited academic resources and increased household responsibilities. Interestingly, gender was not found to significantly influence procrastination levels ($p > 0.05$), which supports previous findings suggesting that procrastination is a relatively gender-neutral phenomenon in academic settings (Özer, Demir, & Ferrari, 2009).

Discussion

The present study investigated the prevalence of academic procrastination among Pakistani secondary school students, its effect on mathematics achievement, and the role of sociocultural variables in shaping procrastination behaviors. The findings revealed a moderate-to-high prevalence of procrastination ($M = 3.34$ on a 5-point scale), with 62% of students admitting to delaying exam preparation and 48% reporting late submission of assignments. These results are consistent with Steel's (2007) meta-analytic findings, which

ISSN Online: 3007-3154
ISSN Print: 3007-3146

suggest that procrastination is a widespread phenomenon across cultures, with academic settings particularly vulnerable. Similarly, Klassen et al. (2010) found high procrastination levels among adolescents in collectivist cultures, including Pakistan, highlighting cultural patterns of time management and academic discipline.

The observed prevalence supports the argument that procrastination is not merely a time-management failure but a self-regulatory deficit (Sirois et al., 2013). In the Pakistani context, this tendency may be reinforced by limited parental academic involvement, lower emphasis on individual accountability, and exam-focused educational systems. Iqbal and Shafiq (2018), in their study on Pakistani high school students, reported similar trends, attributing procrastination partly to teacher-centered instruction and lack of intrinsic motivation.

The finding that procrastination negatively predicted mathematics achievement ($\beta = -0.17$, $p < 0.01$) aligns with Balkis and Duru (2009), who demonstrated that procrastinating students tend to achieve lower grades due to reduced preparation time and higher anxiety levels. The observed 18% performance gap between low- and high-procrastination students in the present study confirms the detrimental academic consequences. Mathematics, which often requires continuous practice and conceptual reinforcement, is particularly susceptible to the harmful effects of procrastination. Kim and Seo (2015) further explain that procrastination depletes cognitive resources, thereby reducing problem-solving efficiency in subjects like mathematics.

The inverse correlation between parental education and procrastination ($p < 0.01$) corroborates findings by Ferrari et al. (2005), who reported that parents with higher education levels tend to instill better study habits and time management skills in children. In contrast, study hours also showed an inverse correlation ($p < 0.05$), indicating that students who allocate more consistent time to study are less likely to procrastinate, supporting Wolters' (2003) self-regulation framework.

The lack of significant gender differences ($p > 0.05$) mirrors the results of Khan et al. (2014) in Pakistan, who found procrastination patterns to be relatively similar across genders in secondary schools. However, the finding that larger family sizes correlate with higher procrastination ($p < 0.05$) is in line with Shahzad and Ghazi (2015), who attributed this relationship to divided parental attention and increased household responsibilities among children in larger families.

The results can be interpreted through the lens of Temporal Motivation Theory (Steel & König, 2006), which posits that procrastination arises when the perceived utility of a task is low, deadlines are distant, or distractions are high. In the Pakistani secondary school context, weak academic scaffolding, societal distractions, and limited performance feedback may contribute to procrastination. These findings also highlight the necessity of interventions focusing on self-regulated learning strategies, teacher mentoring, and parental involvement programs to reduce procrastination and enhance mathematics achievement.

Recommendations

Teacher Training: Teachers should receive professional development on how to

ISSN Online: 3007-3154
ISSN Print: 3007-3146

scaffold learning and reduce student anxiety related to mathematics.
Parent Involvement Programs: Workshops for parents on how to create supportive study environments at home.
Time Management Workshops: Especially for ninth and tenth graders, focusing on exam preparation and homework planning.
Regular Feedback: Teachers should provide formative feedback to help students track progress and reduce the temptation to delay.

Conclusion

Academic procrastination is a significant barrier to mathematics achievement among Pakistani students. It is influenced not only by individual student traits but also by broader sociocultural factors like parental education and study environments. Interventions must be context-sensitive, systemic, and inclusive to promote sustained academic engagement and performance in mathematics.

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