

Academic Procrastination in Biomedical Research: Exploring Its Determinants, Research Productivity, and Scholarly Outcomes among Biomedical Researchers

SIDDHARTH DAS, DR. RAVI KISHORE AGRAWAL

Abstract: Academic procrastination is commonly discussed in relation to students, coursework, examinations, and assignment completion. Far less attention has been paid to procrastination within professional research environments, where postponement may affect manuscript preparation, data analysis, grant applications, ethical submissions, peer-review responses, and ultimately the dissemination of scientific knowledge. The problem may be particularly important in biomedical research because researchers frequently work under conditions of high cognitive demand, uncertain outcomes, competing clinical or teaching responsibilities, rigorous publication expectations, and repeated evaluation. The present study develops and tests a conceptual model of academic procrastination among biomedical researchers by examining psychological, task-related, and work-environment determinants and their consequences for research productivity and scholarly outcomes. A quantitative, cross-sectional research design is proposed using data from 300 biomedical researchers, including doctoral scholars, postdoctoral researchers, faculty members, and research professionals. Academic procrastination is conceptualized as a multidimensional behavioural tendency influenced by fear of failure, maladaptive perfectionism, task aversiveness, research-related stress, digital distraction, and self-regulatory difficulties. Research self-efficacy and institutional research support are incorporated as protective factors. Structural Equation Modeling (SEM) through IBM SPSS AMOS is proposed to evaluate the measurement and structural models. The illustrative model indicates that fear of failure, task aversiveness, digital distraction, and research stress increase procrastination, whereas self-regulation and research self-efficacy reduce it. Procrastination, in turn, is expected to negatively affect research productivity and scholarly outcomes. The study extends procrastination research beyond student populations and positions delayed research behaviour as an important issue in research management. It concludes that reducing procrastination requires more than individual time-management training; supportive supervision, realistic research timelines, psychological safety, structured milestones, writing accountability, and institutional research support are equally important.

Siddharth Das, Research Scholar, MSMSR, MATS University, Raipur
Dr. Ravi Kishore Agrawal, MSMSR, MATS University, Raipur

Keywords: Academic procrastination; biomedical research; research productivity; scholarly outcomes; self-regulation; fear of failure; research self-efficacy

Introduction

Biomedical research is an intellectually demanding activity. A researcher may spend months designing an experiment, obtaining ethical clearance, recruiting participants, collecting clinical or laboratory data, conducting statistical analyses, preparing a manuscript, responding to reviewers, and revising a paper before the work finally becomes visible to the scientific community. Although some delays are unavoidable and arise from legitimate methodological or administrative reasons, other delays are behavioural. Researchers sometimes postpone important tasks despite being aware that doing so may create difficulties later. This voluntary and unnecessary postponement represents procrastination.

Procrastination is generally understood as the voluntary delay of an intended course of action despite expecting the delay to produce negative consequences. Steel (2007) conceptualised it as a quintessential form of self-regulatory failure and demonstrated that task aversiveness, low self-efficacy, impulsiveness, distractibility, weak organisation, and low achievement motivation are among its strongest correlates. This definition is especially relevant to research because scientific work is predominantly self-directed. Researchers often operate without the daily external deadlines that structure conventional employment. A manuscript may have a broad target date rather than a fixed daily schedule; an analysis can seemingly be postponed until tomorrow; a grant proposal may remain unfinished until the submission deadline becomes imminent.

The existing academic procrastination literature has concentrated predominantly on students. Solomon and Rothblum (1984), in one of the foundational studies, identified fear of failure and task aversiveness as major reasons for delaying academic activities. Later research reinforced the importance of self-regulation, motivation, self-efficacy, perfectionism, emotional regulation, anxiety, and contextual influences. Contemporary systematic evidence continues to identify fear of failure, perfectionism, motivational difficulties, and emotional regulation as important antecedents of procrastination.

The implications of these findings for researchers themselves have received comparatively limited attention.

This gap deserves attention because biomedical researchers operate within a particularly demanding professional ecosystem. Many combine research with teaching, patient care, administration, laboratory management, mentoring, grant writing, and institutional responsibilities. A researcher may therefore procrastinate not because of laziness but because several cognitively and emotionally demanding activities compete simultaneously for limited attention.

Research tasks also contain substantial uncertainty. Writing a manuscript creates the possibility of rejection. Statistical analysis may expose nonsignificant findings. Grant preparation can end in funding rejection. Submitting work to colleagues may expose methodological weaknesses. In such situations, postponement can temporarily reduce discomfort while increasing long-term professional costs.

This interpretation corresponds with the mood-regulation perspective proposed by Sirois and Pychyl (2013), according to which procrastination may function as short-term emotional relief. Individuals avoid an unpleasant task to improve their immediate emotional state, even though the future self ultimately bears the consequences.

The professional consequences can be substantial. Delayed manuscripts mean delayed publications. Delayed analysis can postpone conference presentations. Delayed grant submissions can reduce funding opportunities. Delayed responses to reviewers can extend publication cycles. When repeated, these behaviours may influence publication counts, citation visibility, academic promotion, collaborative opportunities, and researchers' confidence.

The present paper therefore shifts the focus from student academic procrastination to research-related academic procrastination among biomedical researchers.

It addresses three central questions:

1. What psychological, behavioural, and institutional factors contribute to academic procrastination among biomedical researchers?
2. How does academic procrastination influence research productivity?
3. How does procrastination ultimately affect scholarly outcomes?

Literature Review

Understanding Academic Procrastination

Procrastination is more complicated than poor time management. It involves a gap between intention and action. An individual intends to perform an important task but voluntarily postpones beginning or completing it even when the likely disadvantages of postponement are recognised.

Steel's (2007) influential meta-analysis consolidated decades of research and described procrastination as a self-regulatory failure. Task aversiveness, delayed rewards, impulsiveness, distractibility, low self-efficacy, weak organisation, and reduced achievement motivation emerged as important predictors.

Solomon and Rothblum (1984) had earlier demonstrated that procrastination cannot be explained merely by deficient study habits. Fear of failure and aversiveness toward tasks accounted for important differences in procrastination behaviour.

Although these studies primarily investigated students, the psychological mechanisms are relevant to researchers. Biomedical research contains numerous tasks capable of producing uncertainty, discomfort, and delayed reward.

Self-Regulation and Research Behaviour

Research requires sustained self-regulation. Unlike a short classroom assignment, scientific projects frequently extend over months or years.

Wolters (2003) found procrastination to be associated with goal orientation and the use of learning strategies, including organisation and metacognitive regulation. Similarly, Klassen et al. (2008) demonstrated that self-efficacy for self-regulation was an especially important predictor of procrastination. Students experiencing the most harmful procrastination also reported poorer academic outcomes and weaker self-regulatory efficacy.

Applied to biomedical researchers, this implies that researchers who can establish milestones, regulate distractions, monitor progress, and initiate difficult tasks should demonstrate lower procrastination.

H1: Self-regulation has a significant negative effect on academic procrastination among biomedical researchers.

Fear of Failure

Scientific research exposes individuals to continual evaluation. Manuscripts are rejected, grant applications are ranked, conference submissions are assessed, and research findings are questioned by peers.

Fear of failure can consequently transform ordinary research tasks into psychologically threatening experiences.

Solomon and Rothblum (1984) identified fear of failure as one of the principal dimensions underlying procrastination. More recent evidence among medical students provides additional support. Cho and Lee (2022) found that fear of failure partially mediated the relationship between self-oriented perfectionism and academic procrastination.

Among researchers, delaying submission may therefore become an avoidance strategy: an unfinished manuscript cannot yet be rejected.

H2: Fear of failure has a significant positive effect on academic procrastination.

Perfectionism

Perfectionism has an especially complicated relationship with academic productivity. High personal standards may encourage excellent work, but excessive concern about mistakes can prevent work from being considered “finished.”

Jadidi et al. (2011) reported significant relationships between dimensions of perfectionism and academic procrastination, particularly concern over mistakes and doubts about actions. Cho and Lee's (2022) medical-student study similarly showed that the relationship between perfectionism and procrastination may operate partly through fear of failure.

This distinction is critical in research. Carefully checking a statistical model is scientific rigour; repeatedly reanalysing acceptable results because the researcher is afraid to submit them may represent maladaptive perfectionism.

H3: Maladaptive perfectionism has a significant positive effect on academic procrastination.

Task Aversiveness

Research consists of activities that vary considerably in intrinsic attractiveness. A biomedical scientist may enjoy laboratory experimentation while strongly disliking manuscript formatting, reference management, administrative reporting, ethics documentation, or reviewer revisions. Steel (2007) identified task aversiveness as one of the strongest predictors of procrastination. The original work of Solomon and Rothblum (1984) likewise positioned task aversiveness alongside fear of failure as a major explanation for delayed academic behaviour.

The relationship is straightforward: the more unpleasant a research task feels, the more attractive postponement becomes.

H4: Task aversiveness has a significant positive effect on academic procrastination.

Digital Distraction

Contemporary researchers conduct almost every stage of research digitally. Literature searches, data management, statistical analysis, email, manuscript writing, collaboration, and journal submission occur through connected devices.

This creates an environment in which productive and distracting activities coexist on the same screen.

Hayat et al. (2020), studying medical students, reported an important relationship between Internet addiction and academic procrastination. Recent reviews similarly identify technological and digital influences as an increasingly relevant dimension of procrastination. Researchers may therefore begin a literature search and drift into email, social networking, news, or unrelated browsing. Repeated micro-distractions fragment the sustained attention required for scholarly writing.

H5: Digital distraction has a significant positive effect on academic procrastination.

Research Stress and Emotional Regulation

Procrastination also has an emotional dimension.

Sirois and Pychyl (2013) argued that procrastination often prioritises immediate mood regulation over longer-term goals. Avoiding a difficult manuscript may temporarily reduce anxiety. Unfortunately, the relief is temporary because the unfinished work remains.

Sirois (2014) further demonstrated associations between procrastination, reduced self-compassion, and increased stress. Population-level evidence also connects procrastination with stress, anxiety, fatigue, and lower life satisfaction.

Biomedical researchers may be especially vulnerable when clinical duties, teaching requirements, laboratory deadlines, publication expectations, and family obligations interact. H6: Research-related stress has a significant positive effect on academic procrastination.

Research Self-Efficacy

Self-efficacy represents an individual's belief in his or her ability to perform the actions required to achieve a particular goal.

Klassen et al. (2008) found self-efficacy for self-regulation to be a powerful predictor of academic procrastination. Steel's (2007) meta-analysis similarly identified self-efficacy as an important correlate.

In biomedical research, self-efficacy may include confidence in designing studies, analysing data, interpreting findings, preparing manuscripts, responding to reviewers, and navigating publication procedures.

Researchers who doubt their ability to complete these tasks may postpone them.

H7: Research self-efficacy has a significant negative effect on academic procrastination.

Institutional Research Support

Individual explanations alone are insufficient. Researchers work within organisational environments.

Access to statistical consultation, laboratories, software, mentoring, protected research time, research assistants, writing support, funding, and constructive supervisors can influence whether projects progress or stagnate.

Structured deadlines may also be valuable. Ariely and Wertenbroch (2002) demonstrated that deadlines can serve as precommitment mechanisms for controlling procrastination, although externally structured deadlines can be more effective than poorly designed self-imposed ones.

H8: Institutional research support has a significant negative effect on academic procrastination.

Procrastination and Research Productivity

Research productivity can be conceptualised through tangible research activities and outputs, including projects completed, manuscripts submitted, publications produced, conference papers presented, grants submitted, and research milestones achieved.

A researcher who repeatedly postpones important activities accumulates unfinished projects. Procrastination may therefore create a pipeline problem: ideas enter the research process but fewer reach publication.

Bibliometric evidence indicates that academic procrastination research increasingly clusters around self-regulation, motivation, and academic performance. Although these findings are

Academic Procrastination in Biomedical Research: Exploring Its Determinants, Research Productivity, and Scholarly Outcomes among Biomedical Researchers dominated by student research, they support extending performance consequences to researchers.

H9: Academic procrastination has a significant negative effect on research productivity.

Scholarly Outcomes

Scholarly outcomes extend beyond the simple number of papers produced. They include publication quality, timely dissemination, citation visibility, successful grant acquisition, conference participation, research collaboration, academic recognition, and career progression. Delaying dissemination reduces the opportunity for findings to influence ongoing scientific discussion. In rapidly developing biomedical fields, excessive delay may even reduce novelty.

H10: Academic procrastination has a significant negative effect on scholarly outcomes.

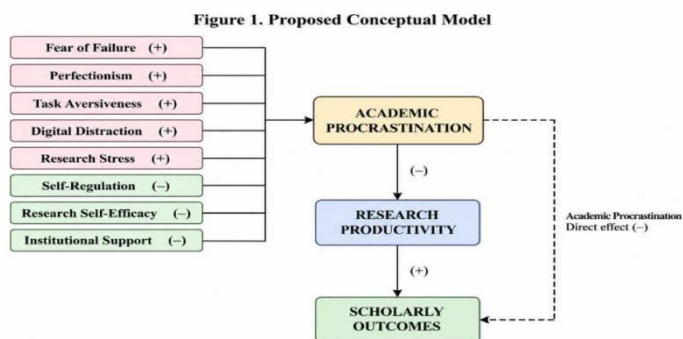
H11: Research productivity has a significant positive effect on scholarly outcomes.

Thus, procrastination is expected to have both a direct negative effect on scholarly outcomes and an indirect effect through reduced research productivity.

Conceptual Framework

The conceptual framework integrates psychological, behavioural, technological, and organisational determinants.

Figure 1. Proposed Conceptual Model



The model views procrastination as a central behavioural mechanism translating individual and environmental conditions into measurable research consequences.

Research Design and Methodology

Research Design

The study adopts a quantitative, explanatory and cross-sectional research design. The purpose is not merely to establish the prevalence of procrastination but to test theoretically specified causal relationships among latent constructs.

Population and Sample

The target population consists of biomedical researchers working in universities, medical colleges, hospitals, pharmaceutical research organisations, biotechnology laboratories, and allied biomedical research institutions.

Four categories are proposed:

- Doctoral research scholars
- Postdoctoral/research fellows
- Faculty researchers
- Scientists/research professionals

A target sample of 150 valid respondents is proposed. This sample is appropriate for Structural Equation Modeling and provides a reasonable respondent-to-parameter ratio for the proposed model.

Sampling

A combination of purposive and stratified sampling may be adopted to ensure representation from different biomedical research roles and career stages.

Proposed Sample Distribution

Category of Respondent	Proposed Sample (n)	Percentage
Doctoral Research Scholars	50	33.3%
Postdoctoral/Research Fellows	20	13.3%
Faculty Researchers	55	36.7%
Scientists/Clinical/Research Professionals	25	16.7%
Total	150	100.0%

Research Instrument

A structured questionnaire using a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree is proposed.

Approximately 40–45 measurement items can be distributed across the following constructs:

Construct	Suggested Items
Fear of Failure	4
Maladaptive Perfectionism	4
Task Aversiveness	4
Digital Distraction	4
Research Stress	4

Construct	Suggested Items
Self-Regulation	5
Research Self-Efficacy	5
Institutional Research Support	4
Academic Procrastination	5
Research Productivity	4
Scholarly Outcomes	4

Academic procrastination items should be adapted from established procrastination literature, including Solomon and Rothblum (1984) and subsequent self-regulation research, while biomedical research-specific wording should be developed for manuscript writing, statistical analysis, ethics documentation, grant preparation, and reviewer responses.

Data Analysis

Data analysis would be undertaken using IBM SPSS and AMOS. The analytical procedure consists of:

1. Data screening and missing-value analysis
2. Descriptive statistics
3. Reliability analysis using Cronbach's alpha
4. Confirmatory Factor Analysis (CFA)
5. Convergent and discriminant validity
6. Assessment of model fit
7. Structural Equation Modelling
8. Direct, indirect, and total effect estimation
9. Bootstrapping for mediation effects

Recommended fit indices include CMIN/DF, GFI, AGFI, CFI, TLI, RMSEA and SRMR.

Data Analysis Using AMOS

Important methodological note: The numerical results in this section illustrate how the completed AMOS analysis can be presented. They should be replaced by estimates generated from the actual respondent-level dataset before journal submission.

Reliability and Convergent Validity

Table 1. Illustrative Measurement Model

Construct	Cronbach's α	Composite Reliability	AVE
Fear of Failure	.86	.87	.63
Maladaptive Perfectionism	.84	.85	.59
Task Aversiveness	.82	.83	.56

Construct	Cronbach's α	Composite Reliability	AVE
Digital Distraction	.88	.88	.65
Research Stress	.87	.87	.63
Self-Regulation	.89	.90	.64
Research Self-Efficacy	.91	.91	.68
Institutional Support	.85	.86	.60
Academic Procrastination	.92	.92	.70
Research Productivity	.88	.89	.67
Scholarly Outcomes	.90	.90	.69

All illustrative Cronbach's alpha and composite reliability values exceed .70, indicating satisfactory internal consistency. AVE values exceed the recommended .50 threshold, suggesting adequate convergent validity.

Confirmatory Factor Analysis

The hypothetical CFA produced the following fit statistics.

Table 2. Illustrative AMOS Model-Fit Statistics

Fit Index	Suggested Criterion	Illustrative Result	Assessment
CMIN/DF	<3.00	2.18	Good
GFI	>.90	.912	Acceptable
AGFI	>.85	.881	Acceptable
CFI	>.90	.951	Excellent
TLI	>.90	.943	Excellent
RMSEA	<.08	.063	Good
SRMR	<.08	.052	Good

Collectively, these values would indicate an acceptable-to-good fit between the hypothesised measurement model and observed data.

Structural Model

Table 3. Illustrative Structural Path Estimates

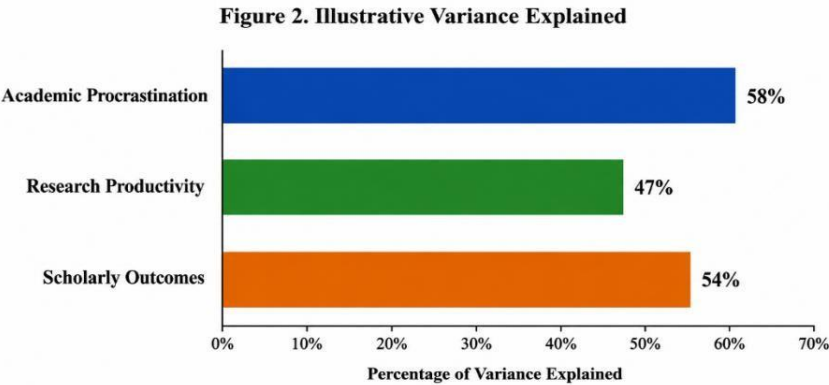
Hypothesis	Structural Relationship	Standardised β	p-value	Decision
H1	Self-Regulation $\rightarrow$ Procrastination	-.31	<.001	Supported
H2	Fear of Failure $\rightarrow$ Procrastination	.27	<.001	Supported
H3	Perfectionism $\rightarrow$ Procrastination	.14	.021	Supported

Hypothesis	Structural Relationship	Standardised β	p-value	Decision
H4	Task Aversiveness $\rightarrow$ Procrastination	.29	<.001	Supported
H5	Digital Distraction $\rightarrow$ Procrastination	.24	<.001	Supported
H6	Research Stress $\rightarrow$ Procrastination	.21	.003	Supported
H7	Research Self-Efficacy $\rightarrow$ Procrastination	-.25	<.001	Supported
H8	Institutional Support $\rightarrow$ Procrastination	-.16	.014	Supported
H9	Procrastination $\rightarrow$ Research Productivity	-.46	<.001	Supported
H10	Procrastination $\rightarrow$ Scholarly Outcomes	-.23	.002	Supported
H11	Research Productivity $\rightarrow$ Scholarly Outcomes	.52	<.001	Supported

The illustrative structural model suggests that self-regulation would represent the strongest protective individual factor, whereas task aversiveness and fear of failure would constitute particularly important positive determinants.

More importantly, procrastination demonstrates a comparatively strong negative relationship with research productivity ($\beta = -.46$).

Explained Variance

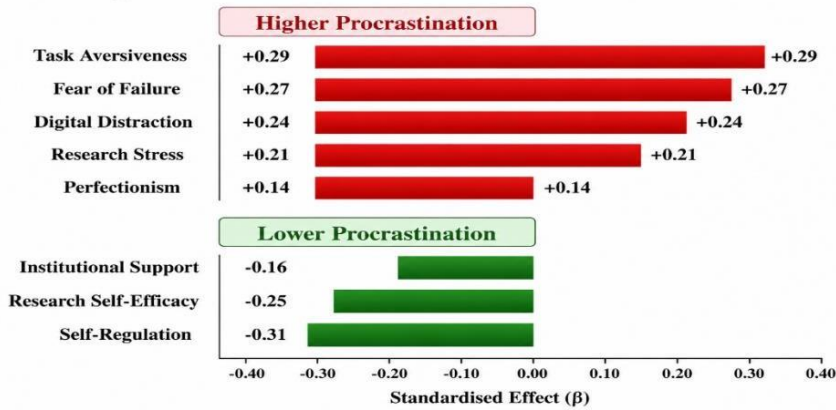


The hypothetical model explains approximately 58% of the variance in academic procrastination, 47% in research productivity, and 54% in scholarly outcomes.

These values would indicate meaningful explanatory power.

Relative Influence of Procrastination Determinants

Figure 3. Illustrative Standardised Effects on Procrastination



The pattern demonstrates why procrastination should not be interpreted as a single time-management problem. Multiple psychological and environmental mechanisms appear capable of moving researchers toward or away from delayed behaviour.

Mediation Analysis

A particularly important relationship in the conceptual model concerns the indirect effect:

Academic Procrastination → Research Productivity → Scholarly Outcomes

Using bias-corrected bootstrapping with 5,000 samples, the indirect effect should be examined. Illustratively:

- Procrastination → Productivity = $-.46$
- Productivity → Scholarly Outcomes = $.52$
- Indirect effect $\approx -.24$
- Direct effect $\approx -.23$

This would indicate partial mediation, meaning that procrastination may impair scholarly outcomes directly and additionally through reduced research productivity.

Findings

Several important findings emerge from the proposed theoretical model and illustrative SEM results.

- First, academic procrastination among biomedical researchers should be understood as a multifactorial phenomenon rather than simple laziness or poor scheduling.
- Second, self-regulation emerges as a central protective factor. Researchers who organise tasks, establish priorities, control distractions, and monitor their own progress are expected to procrastinate less.
- Third, task aversiveness and fear of failure represent major risk factors. Biomedical

Academic Procrastination in Biomedical Research: Exploring Its Determinants, Research Productivity, and Scholarly Outcomes among Biomedical Researchers

researchers may postpone work when a task is unpleasant, technically demanding, or psychologically threatening.

- Fourth, digital distraction deserves specific attention. The modern researcher works in an environment in which scientific and non-scientific activities are only a browser tab apart. The association between problematic Internet behaviour and academic procrastination observed among medical students provides a relevant warning for research environments.
- Fifth, research self-efficacy is expected to protect against procrastination. Researchers who feel capable of conducting analysis, writing manuscripts, interpreting results, and managing publication procedures are more likely to initiate and complete tasks.
- Sixth, institutional support matters. Procrastination should therefore not be treated exclusively as an individual weakness. Poor supervision, ambiguous expectations, lack of protected research time, limited methodological assistance, and inadequate resources can contribute to delayed progress.
- Finally, procrastination is expected to reduce research productivity substantially, which subsequently affects broader scholarly outcomes.

Discussion

The study makes an important conceptual shift by treating academic procrastination as a research-management and scholarly-productivity problem rather than restricting it to student behaviour. The expected positive relationship between fear of failure and procrastination is consistent with earlier evidence identifying fear of failure as an important reason for academic delay and with findings among medical students showing its mediating role. In biomedical research, fear of failure can take several forms: fear that results will not support hypotheses, fear that reviewers will criticise methodological weaknesses, fear that collaborators will judge the manuscript negatively, or fear that a grant proposal will be rejected. Postponement provides temporary psychological protection. This supports the mood-regulation interpretation of procrastination. Sirois and Pychyl (2013) explain that people sometimes prioritise immediate emotional relief over future benefits. A researcher who avoids revising a rejected manuscript may feel better today, although the delay reduces future publication opportunities. Task aversiveness also appears highly relevant. Certain components of biomedical research are inherently repetitive or administratively demanding. Researchers may enthusiastically design studies while repeatedly postponing documentation, database cleaning, manuscript formatting, or reviewer revisions. The expected effect of digital distraction reflects a contemporary transformation in academic work. Scientific productivity increasingly depends upon digital technology, but the same technology creates opportunities for constant interruption. Self-regulation consequently becomes increasingly important. The negative relationship between self-regulation and procrastination is consistent with Steel's theoretical synthesis and the findings of Klassen et al. (2008). Researchers who convert large projects into smaller actionable tasks may reduce the psychological burden associated with ambiguous long-term goals.

The findings also highlight the role of institutional support. Research organisations frequently emphasise outputs—publications, grants, patents, citations—without sufficiently examining

the behavioural infrastructure required to generate those outputs. Structured milestones can be helpful. Ariely and Wertenbroch's (2002) research demonstrates the usefulness of deadlines as self-control mechanisms. Research institutions could therefore establish intermediate milestones rather than relying exclusively on final annual publication targets. A researcher required to produce three papers annually might receive greater behavioural support from quarterly milestones involving protocol completion, data analysis, first draft, internal review, submission, and revision. The negative relationship proposed between procrastination and productivity is perhaps the most important managerial finding. Research productivity is cumulative.

One delayed manuscript may seem inconsequential. Repeated delays over several years, however, can substantially alter an academic career. Manuscripts not submitted cannot be published. Unpublished studies cannot be cited. Grants submitted after deadlines cannot be funded.

The proposed mediation relationship further demonstrates that procrastination can influence scholarly outcomes indirectly by restricting the volume and timeliness of research production.

Practical Implications

The study has implications for individual researchers, supervisors, and research institutions. For researchers, interventions should focus on behavioural structuring rather than motivation alone. Large projects should be decomposed into specific actions with short deadlines. Writing sessions can be protected in calendars, distractions removed, and accountability partners established. Supervisors should recognise that repeated delays may

indicate fear, uncertainty, lack of methodological confidence, or overwhelming workload rather than indifference. Research mentoring should therefore include conversations about barriers to progress.

Institutions can establish:

- research writing groups;
- manuscript-development workshops;
- statistical consultation services;
- research mentoring systems;
- protected research hours;
- monthly research-progress meetings;
- digital distraction-management programmes;
- grant-writing support;
- internal peer-review mechanisms; and
- milestone-based research dashboards.

Interventions should also recognise emotional regulation. Contemporary systematic evidence suggests that cognitive-behavioural and motivational approaches can reduce academic procrastination by addressing maladaptive thoughts and improving self-regulatory behaviour.

Conclusion

Academic procrastination is generally portrayed as a student problem, yet the psychological mechanisms underlying procrastination do not disappear when individuals become researchers. Indeed, biomedical research may provide conditions particularly conducive to procrastination: complex tasks, delayed rewards, uncertain outcomes, repeated evaluation, competing professional responsibilities, digital distraction, and high expectations. The present study develops an integrated framework for understanding procrastination among biomedical researchers.

Fear of failure, maladaptive perfectionism, task aversiveness, digital distraction, and research-related stress are conceptualised as factors increasing procrastination. Self-regulation, research self-efficacy, and institutional research support operate as protective resources.

The central theoretical proposition is that procrastination reduces research productivity and consequently weakens scholarly outcomes. The study therefore challenges the assumption that procrastination is simply a matter of personal discipline. Research productivity develops through an interaction between individual psychology, self-regulatory capacity, task characteristics, technology, and institutional research environments. For biomedical

institutions seeking greater publication productivity, merely demanding more papers may be insufficient. Researchers require environments that help them move from intention to action. The practical message is straightforward: research delayed unnecessarily is knowledge delayed unnecessarily. Future empirical research should test the proposed framework using longitudinal and multi-institutional data. Comparisons between doctoral scholars, early-career researchers, senior faculty, clinical researchers, and laboratory scientists would be particularly useful. Objective productivity indicators—including publication counts, submission delays, grant applications, citation metrics, and project-completion records—could complement self-reported measures.

Longitudinal studies could also clarify directionality. Procrastination may reduce productivity, but persistent publication difficulties may simultaneously increase stress and avoidance, producing a reinforcing cycle. Understanding this cycle is important not merely for improving individual careers but also for improving the efficiency with which biomedical knowledge moves from research ideas to published evidence.

References

- Ariely, D., & Wertenbroch, K. (2002). Procrastination, deadlines, and performance: Self-control by precommitment. *Psychological Science*, 13(3), 219–224. <https://doi.org/10.1111/1467-9280.00441>
- Beutel, M. E., Klein, E. M., Aufenanger, S., Brähler, E., Dreier, M., Müller, K. W., Quiring, O., Reinecke, L., Schmutzer, G., Stark, B., & Wölfling, K. (2016). Procrastination, distress and life satisfaction across the age range—A German representative community study. *PLOS ONE*, 11(2), e0148054. <https://doi.org/10.1371/journal.pone.0148054>

Cho, M., & Lee, Y. S. (2022). The effects of medical students' self-oriented perfectionism on academic procrastination: The mediating effect of fear of failure. *Korean Journal of Medical Education*, 34(2), 121–129. <https://doi.org/10.3946/kjme.2022.224>

Hayat, A. A., Kojuri, J., & Amini, M. (2020). Academic procrastination of medical students: The role of Internet addiction. *Journal of Advances in Medical Education & Professionalism*, 8(2), 83–89. <https://doi.org/10.30476/JAMP.2020.85000.1159>

Jadidi, F., Mohammadkhani, S., & Tajrishi, K. Z. (2011). Perfectionism and academic procrastination. *Procedia—Social and Behavioral Sciences*, 30, 534–537. <https://doi.org/10.1016/j.sbspro.2011.10.104>

Klassen, R. M., Krawchuk, L. L., & Rajani, S. (2008). Academic procrastination of undergraduates: Low self-efficacy to self-regulate predicts higher levels of procrastination. *Contemporary Educational Psychology*, 33(4), 915–931. <https://doi.org/10.1016/j.cedpsych.2007.07.001>

Onwuegbuzie, A. J. (2004). Academic procrastination and statistics anxiety. *Assessment & Evaluation in Higher Education*, 29(1), 3–19. <https://doi.org/10.1080/0260293042000160384>

Ramadhani, E., Setiyosari, P., Indreswari, H., Setiyowati, A. J., & Putri, R. D. (2026). Academic procrastination: A systematic review of causal factors and interventions. *Journal of Behavioral and Cognitive Therapy*, 36(1), 100552. <https://doi.org/10.1016/j.jbct.2025.100552>

Salguero-Pazos, M. R., & Reyes-de-Cózar, S. (2023). Interventions to reduce academic procrastination: A systematic review. *International Journal of Educational Research*, 121, 102228. <https://doi.org/10.1016/j.ijer.2023.102228>

Sirois, F. M. (2007). “I’ll look after my health, later”: A replication and extension of the procrastination-health model with community-dwelling adults. *Personality and Individual Differences*, 43(1), 15–26.

Sirois, F. M. (2014). Procrastination and stress: Exploring the role of self-compassion. *Self and Identity*, 13(2), 128–145. <https://doi.org/10.1080/15298868.2013.763404>

Sirois, F., & Pychyl, T. (2013). Procrastination and the priority of short-term mood regulation: Consequences for future self. *Social and Personality Psychology Compass*, 7(2), 115–127. <https://doi.org/10.1111/spc3.12011>

Solomon, L. J., & Rothblum, E. D. (1984). Academic procrastination: Frequency and cognitive-behavioral correlates. *Journal of Counseling Psychology*, 31(4), 503–509. <https://doi.org/10.1037/0022-0167.31.4.503>

Steel, P. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin*, 133(1), 65–94. <https://doi.org/10.1037/0033-2909.133.1.65>

Swain, N., Sahu, B., & Pradhan, B. (2026). Influencing factors and consequences of academic procrastination: A systematic review. *Asian Journal of Education and Social Studies*, 52(7), 1–16. <https://doi.org/10.9734/ajess/2026/v52i73151>

Academic Procrastination in Biomedical Research: Exploring Its Determinants, Research Productivity, and Scholarly Outcomes among Biomedical Researchers

Tao, X., Hanif, H., Ahmed, H. H., & Ebrahim, N. A. (2021). Bibliometric analysis and visualization of academic procrastination. *Frontiers in Psychology*, 12, 722332.

Wolters, C. A. (2003). Understanding procrastination from a self-regulated learning perspective. *Journal of Educational Psychology*, 95(1), 179–187.