Association of Study Strategy with Exam Performance Among Medical Students

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ABSTRACT

Background: Medicine is a challenging field in which students are expected to grasp large volumes of information and continuously evolving concepts, emphasizing the importance of effective study strategies to help students manage the demands of medical education and improve academic outcomes. Only a few local studies have explored the study strategies of medical students in relation to academic performance. This study aimed to identify the relationship between study strategies and exam performance of medical students at FEU-NRMF.

Methods: This cross-sectional study was carried out among second-year medical students at FEU-NRMF School of Medicine during the second semester of AY 2025-2026. The final examination scores in one of the subjects during the first semester were used as the outcome variable. The Study Strategy score was obtained using a 4-point Likert Scale for spaced repetition and reverse scoring for cramming. Mean examination score difference between the two groups was assessed using an independent sample t-test, and potential confounding variables were checked through multiple linear regression.

Results: Among the 128 respondents, 61.7% were classified as Spaced Repetition users, while 38.3% were Crammers. A slightly higher mean examination score (80.34%) was seen in Spaced Repetition users compared to Crammers (79.49%); However, the mean difference between the two groups is small (0.85 percentage points). After controlling for confounding variables, further analysis showed that Study Strategy was not significantly associated with exam performance and explained only 2.8% of the variance in exam scores.

Conclusions: The study found that spaced repetition may have limited effects on the short-term examination performance among medical students. The findings also indicate that, beyond study strategies, academic performance is influenced by many other factors that contribute to examination performance.

Key words: Study strategies, exam performance, medical students, spaced repetition, cramming

Medicine is known to be one of the most challenging fields that require students to master vast knowledge and keep up with constantly evolving ideas and concepts (Omar, 2024). Due to the overwhelming academic demands of medical school, detrimental effects on the students' mental health were identified such as disruption of students' psychological well-being and heightened levels of anxiety, depression, and emotional exhaustion (Adesola et al., 2025). 70 percent of students report being overwhelmed by their coursework (Mohd Radzuan et al., 2022). In addition, negative effects were also seen in students' ability to concentrate, retain information, and perform well academically, leaving them ill-equipped to handle academic pressure. Thus, students may find it difficult to meet academic expectations and experience cycles of poor performance. Additionally, medical students

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lack knowledge about how to study efficiently and retain the information effectively (Augustin, 2014). Effective study strategies are important not only in helping students manage the demands of medical education, but also in improving academic outcomes. Among commonly used study strategies is cramming which involves the quick absorption of large amounts of information for short-term memorization (Daroedono et al., 2024), and often stems from procrastination. On the other hand, spaced repetition strengthens long-term memory by reviewing information with intervals (Tamm, 2023). At FEU-NRMF, students often choose study methods based on convenience rather than evidence, highlighting the need to investigate how cramming and spaced repetition influence academic outcomes in this context.

Several studies have explored the influence of cramming and spaced repetition study strategies on academic performance. Spaced repetition has been shown to not only significantly enhance medical students' ability to retain and apply clinical knowledge over time, but also suggests that reliance on less effective strategies like cramming may harm exam performance and long-term competence (Durrani et al., 2024). Hjiej et al. (2017) implemented a cross-sectional design in Morocco and found that students who practiced spaced repetition and regularly attended classes were likelier to perform well academically, while students who crammed and skipped chapters had poor outcomes. Likewise, in France, Burel et al. (2025) found that those who used spaced repetition were twice as likely to pass their entrance examination. In Pakistan, Ali et al. (2025) investigated the study behaviors of medical students, and cramming was found to be significantly associated with lower academic performance, particularly among first-year students, highlighting the need to examine further cramming as a potential contributing factor to academic difficulties among medical students. Sunarti et al. (2022) and Siagan (2022) both note that students who resorted to cramming were more likely to underperform in tests. In Illinois, Mehta et al. (2023) reported that early and consistent use of spaced repetition was linked to higher summative exam performance. The Bulacan-based study of Capiral et al. (2025) also supports the conclusion that spaced repetition is more effective over last-minute preparation. On the other hand, a study by Chai and Guest (2017) determined that there is a direct relationship between time spent on cramming and academic performance, wherein the more that students concentrated their study into the immediate period before an exam, the higher their academic performance. Seo (2012) found that cramming can be effective, especially for active procrastinators who perform well under pressure. Those who crammed a day before the exam achieved comparable or even better results than those who studied earlier.

Cepeda et al. (2006) also noted that cramming can outperform spaced repetition when the exam is taken shortly after. Additionally, Bego et al. (2024) indicated that spaced repetition's effectiveness may be context-dependent, as its benefits were not consistently observed across all learning environments. However, existing studies vary in their methods; some studies utilized self-reports,[2,13] while others relied on software tracking or academic records,[3,15] making comparison of results challenging. Participants have also differed, ranging from medical students in different year levels[2] and non-medical students,[4,8,9,19] which may introduce variability in workload and learning environments. Furthermore, the effectiveness of spaced repetition may vary based on subject matter, question type, and feedback availability,[4] while cramming can be beneficial in specific conditions or for certain learner types.[8,19] Despite these findings, a lack of local research remains on how cramming and spaced repetition study strategies influence the exam performance of medical students in the Philippines.

This research intends to explore how the study strategy correlates with exam performance among medical students at FEU-NRMF. It is hypothesized that medical students who predominantly use spaced repetition will achieve better exam performance than those who primarily rely on cramming. Therefore, the study aims to determine the association of study strategy with exam performance of medical students.

MATERIALS AND METHODS

Study Design

Researchers used cross-sectional design in order to identify the relationship between study strategies and exam performance among medical students. The design chosen allows the evaluation of exposure in study strategy and outcome of the exam performance in a well- defined population at a single time point.

Setting

The setting was at FEU-NRMF School of Medicine involving second-year medical students enrolled during the second semester of 2025–2026 academic year. Data were collected in this same academic year so that all subjects were regularly attending class and had completed the required final exam in the chosen subject.

Participants

The study included second-year medical students at the FEU-NRMF School of Medicine during the Second Semester Academic Year 2025-2026. This population was selected because second-year students are in a relatively stable preclinical phase and have already adjusted to the academic demands of medical school, while maintaining a more uniform, exam-based learning environment. In contrast, first-year students are still in the adjustment phase, while third- and fourth-year students are engaged in clinical training. The study behaviors of those in their third or fourth year of medical school are influenced by patient exposure, rotating schedules, and varied assessment methods.

These factors make direct comparison less consistent.

Eligible participants were those who had completed the Final Examination in the chosen subject during the first semester of the same academic year and who provided informed consent to participate in the study. Second year students were selected as the target population as first year students are still in the phase of adjustment entering medical school while third and fourth year students are engaged in clinical rotations which may limit their availability and may pose difficulty in coordination. Irregular students were excluded, given the differences in academic schedules as they may have retaken the subject and are currently enrolled in the course during mid-year schedule which could affect both study patterns and comparability of examination performance. Students without recorded examination scores or with incomplete questionnaire responses were excluded from the analysis.

A total of 128 participants were included. Participants were selected using a non-probability sampling approach, specifically haphazard sampling, wherein available and consenting students were recruited during the data collection period. All participants were actively enrolled and attending classes at the time of data collection.

Variables

Study variables in this analysis included the outcome, exposure, and potential confounders. The primary outcome variable was exam performance, a continuous variable defined as the final exam score of second-year medical students in the chosen subject during the First Semester Academic Year 2025-2026 from official academic records of the Department expressed as percentage. The main exposure variable was study strategy, which was defined as the method used by medical students to prepare for exams and was operationalized using a composite Study Strategy Score. Spaced repetition was defined as reviewing a study material multiple times from 3 to 5 days or 2 weeks before a scheduled examination and measured through a 4 point Likert Scale. Cramming was defined as studying within 24-48 hours before a scheduled examination, measured through reverse scoring.

Scores were computed by aggregating spaced repetition items and reverse-scored cramming items. Based on the total score, participants were classified into two groups based on predefined cutoff to identify predominant study strategy categorizing a respondent as either a spaced repetition user with a Study Strategy Score of 50 to 80 or a crammer with a Study Strategy Score of 20 to 49.

Potential confounding variables included age, sex, travel time, and total academic unit load. These variables were selected for possible influence on examination performance, and were accounted for in the analysis. Age was the chronological age of the respondent measured in completed years while data were collected and treated as a continuous variable, while sex was the biological designation of the respondent as male or female and was analyzed as a categorical variable. Quantitative variables of travel time and total academic unit load were converted into categories to facilitate comparison between groups, and were grouped based on predefined cut-off values. Travel time was defined as the average duration in minutes or hours that the respondent travels from residence to the school campus per day in the First Semester Academic Year 2025-2026. It was categorized into ≤30 minutes as short commute duration and >30 minutes as long commute duration. Total academic unit load was defined as the cumulative credit units enrolled by the student in First Semester Academic

Year 2025-2026, and was grouped into ≤20 units or low unit load and >20 units or high unit load. The cut-off values were based on practical distinctions in daily travel time and academic workload. The measures of central tendency and dispersion that were used to summarize age and exam performance were mean and standard deviation. For inferential analysis, study strategy, travel time, and academic unit load were treated as categorical variables, while age and exam performance were analyzed as continuous variables.

Data Sources

The First Semester (AY 2025-2026) Final Examination scores in the chosen subject were obtained from the Department at FEU-NRMF School of Medicine upon obtaining written consents. A written, in-person consent was obtained to ensure voluntariness of the 128 participants. In line with the data privacy policies, the examination scores were anonymized and researchers had no access to it.

Upon signing the consent form, self-reported data were obtained through Google forms questionnaires. The data obtained included the following:

1. Demographics (Age, Sex, Travel Time, and Total Academic Unit Load) and Independent variable (Study Strategy) were obtained through the google forms, which were accessed via QR code.

2. Dependent variables (Final Examination scores in the chosen subject) were obtained from the official records of the Department of the chosen subject in FEU-NRMF. The data set released contains only the unique participant codes and corresponding scores ensuring all information remains confidential and are solely used for research purposes.

Bias

Data collection procedures were uniform for all participants and questionnaires used were adapted from the validated, researcher-developed survey questionnaire of Capiral et al. (2025). This included 20 questions focusing on spaced repetition and cramming. The examination and scoring system used in the final examination of the chosen subject for First Semester Academic Year 2025-2026 were departmentalized. In addition, scores were obtained from the official records of the Department handling the chosen subject ensuring comparability and minimizing biases during data collection.

Study Size

The sample size was determined using a one-tailed alternative hypothesis with alpha error of 5% and 80% power. The following values were also used in the estimation of sample size: SD = 0.86 for cramming and SD = 0.73 for spaced-repetition with a hypothesized difference of 0.35 in the mean exam scores of the two study strategy groups. The sample size calculated was 128.

Statistical Methods

In order to conduct data analysis, IBM SPSS was utilized. To summarize the characteristics of participants and study variables, descriptive statistics were utilized. The continuous variables (age and exam performance) were presented via mean ± standard deviation while the categorical variables of sex, travel time, total academic unit load, and study strategy categories were summarized through percentages and frequencies. To assess association of study strategy with exam performance, independent samples t-test was performed for comparison of mean examination scores between spaced repetition users and crammers. Additionally, in order to account for any potential confounding variables, multiple linear regression analysis was performed. Exam performance was treated as dependent variable, while study strategy was the primary independent variable. Age, sex, travel time, and total academic unit load were entered as covariates. Adjusted regression coefficients with corresponding 95% confidence intervals were reported to estimate the independent effect of study strategy on exam performance. A one-tailed p-value of less than 0.05 was considered statistically significant. Neither subgroup or interaction analysis nor sensitivity analyses were performed. Participants with incomplete data were excluded from the analysis, and no imputation methods were used. The study abided by a non-probability sampling method, hence findings were interpreted with consideration of potential selection bias.

Funding

This study did not receive any funds from external sources and was conducted solely for academic

purposes. No funding or sponsorship has influenced the study.

RESULTS

Participant Recruitment and Inclusion

Figure 1 presents the flow of participation recruitment and inclusion in the study. Second year medical students were identified as potential the respondents and are screened for eligibility based on the inclusion criteria. Those who did not meet the criteria, did not complete the final examination and had incomplete questionnaire responses were excluded. Eligible respondents were recruited, provided informed consent, and assigned unique participation codes for confidentiality and anonymization. Data collection was conducted using Google forms and official examination records.

Final analysis included a total of 128 participants.

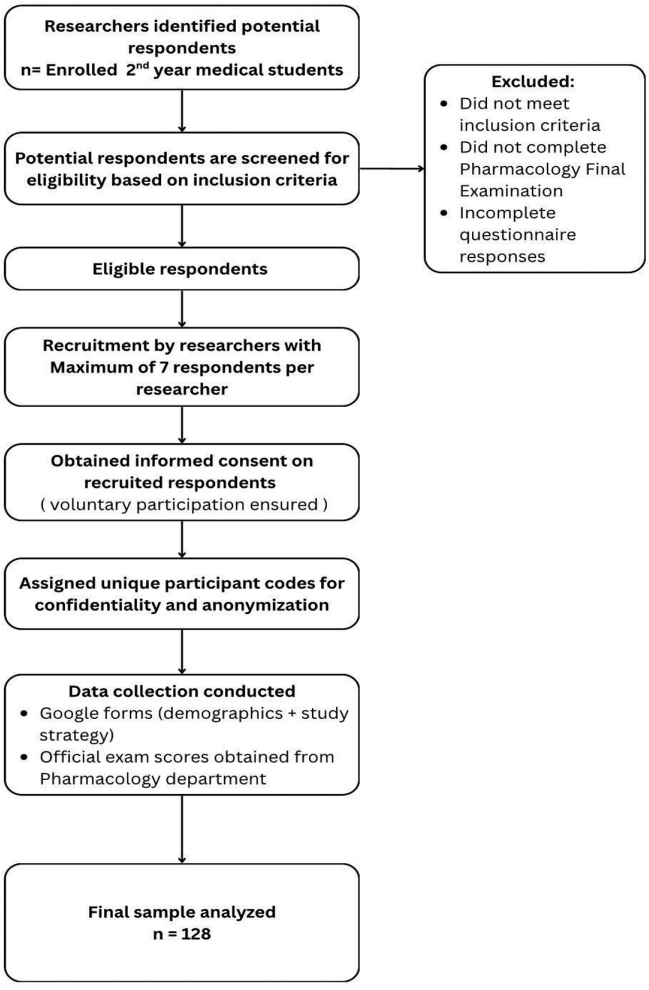

Figure 1. Participant recruitment and inclusion.

Descriptive Data

A total of 128 second-year medical students from FEU-NRMF in the first semester of Academic Year 2025-2026 were covered within the analysis. The mean age was 24.86 ± 1.00 years with ages ranging from 23 to 28 years old. Most were female which comprised 78.1% of the sample size. The majority of the participants reported a travel time of ≤30 minutes from their residences to campus (76.6%) while the remaining respondents had longer commute durations >30 minutes (23.4%). All respondents were enrolled in > 20 Total Academic Unit Load which showed a uniformed load across the sample. The mean Final Examination score was 80.02 + 6.15% with scores ranging from 64% to 96%. The standard deviation suggests moderate dispersion around the mean, indicating a reasonable spread of examination performance within the cohort without evidence of extreme clustering or outliers.

Respondents were categorized into two groups based on the operational cutoff of the Study Strategy Score. The majority of 79 respondents (61.7%) were categorized as Spaced Repetition users, while the remaining 49 respondents (38.3%) were categorized as Crammers, indicating a higher prevalence of distributed learning strategies within the sample. No variables in the analysis had missing data.

Main Results

Respondents were classified based on study strategy scores into Spaced Repetition users (61.7%) and Crammers (38.3%). Spaced Repetition users had a slightly higher mean exam score (80.34% ± 5.72%) compared to Crammers (79.49%), with a mean difference of 0.85 percentage points (Levene's test $F = 3.227$, $p = 0.075$). In the unadjusted analysis, no statistically significant difference emerged in exam performance between the two groups ($t(126) = -0.076$, $p = 0.449$), with a small effect size ($d = -0.14$, 95% Cl: -0.50 to 0.22).

Figure 2 presents the distribution of exam scores for each dominant study strategy group. Visual assessment of the boxplot supports the non-significant t-test results by confirming the difference between the two distributions.

Figure 3 presents the subgroup analysis that showed both males and females predominantly used space repetition, with a slightly higher proportion

Table 1. Demographic profile of the respondents (N = 128).

Variable	n (%) or Mean ± SD
Age (years), mean ± SD	24.86 ± 1.00
Sex	
Female	100 (78.1%)
Male	28 (21.9%)
Travel time	
≤ 30 minutes	98 (76.6%)
> 30 minutes	30 (23.4%)
Total academic unit load	
High unit load (> 20 units)	128 (100%)
Exam score (%), mean ± SD	80.02 ± 6.15
Range	64 – 96

Note. SD = standard deviation.

Table 2. Study strategy classification and exam performance results.

Study Strategy	n	Mean Exam Performance (%)	SD	t	p-value
Spaced Repetition	79	80.34	5.72	*–.760*	.449
Cramming	49	79.49	6.82		

Note. SD = standard deviation. t = independent samples t-test statistic (df = 126). p-value is two-tailed. Equal variances assumed based on Levene's test (F = 3.227, p = .075). α = 0.05.

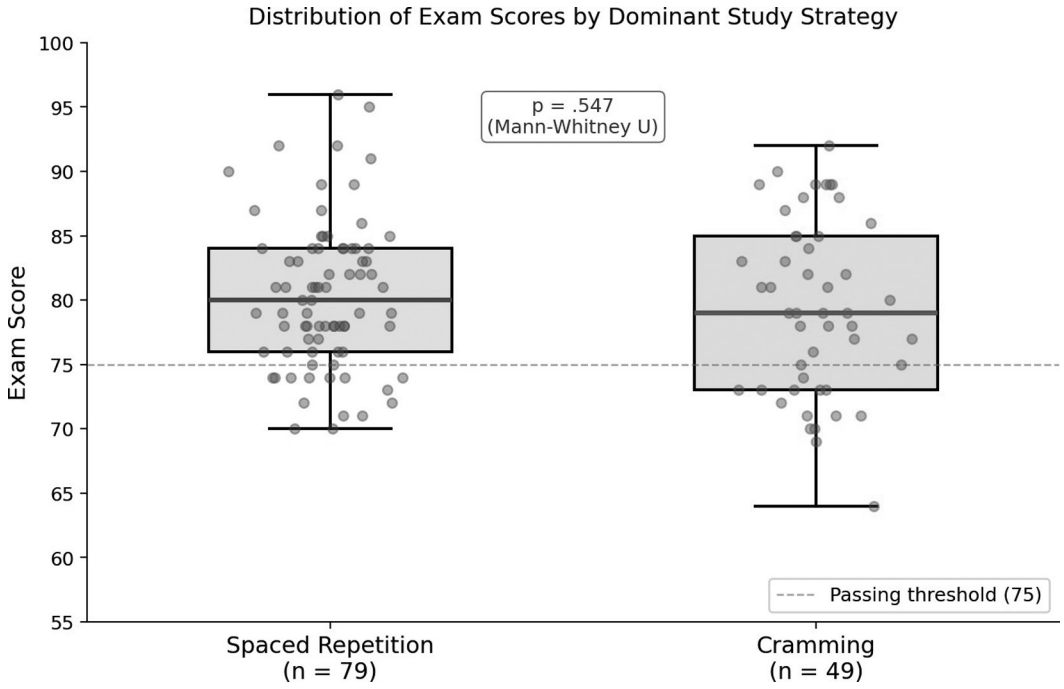

Figure 2. Distribution of final examination scores by dominant study strategy.

among females; however, no meaningful differences in outcomes were observed across subgroups. Among female respondents (n = 100), 63.0% were classified as Spaced Repetition users and 37.0% as Crammers. Among male respondents (n = 28), 57.1% were classified as Spaced Repetition users and 42.9% as Crammers.

The unadjusted multiple linear regression analysis revealed no significant association between study strategy and exam performance (β = 0.894, 95% Cl: -1.34 to 3.13, p = 0.430) following control for age, sex, and travel time. None of the covariates were significant predictors: age (β = -0.834, SE = 1.129, t = 0.791, 95% CL: -1.34 to 3.13, p = 0.430), sex (β = 0.769, SE = 1.336, t = 0,575, p = 0.566, 95% CI: -1.88 to 3.41), travel time (β = 0.475, SE = 1.308, t = 0.363, p = 0.717, 95% CI: -2.11 to 3.07). No statistical significance was observed for the overall model (F(4,123) = 0.875, p = 0.48) and accounted for merely 2% of the variance (RR^2 = 0.028) in exam scores. None of the individual predictors attained statistical significance at the α = .05 level.

No interaction analysis was conducted following that the primary analysis showed no statistically significant association between study strategy and examination performance. No sensitivity analysis was performed as there were no missing data and all analysis followed the predefined study protocol.

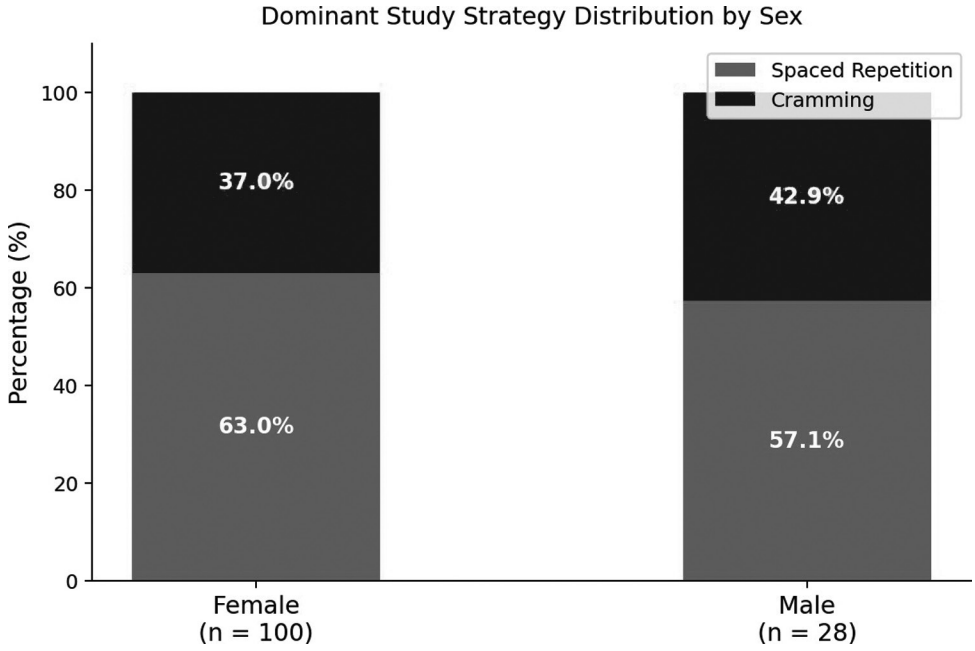

Figure 3. Dominant study strategy distribution by sex.

Table 3. Multiple linear regression analysis of factors associated with exam performance (N = 128).

Independent Variable	β	SE	t	p-value	95% CI
Age	-0.834	0.547	-1.523	.130	[-1.918, 0.250]
Sex (Female = 1)	0.769	1.336	0.575	.566	[-1.876, 3.414]
Travel time (> 30 min = 1)	0.475	1.308	0.363	.717	[-2.114, 3.065]
Study Strategy (SR = 1)	0.894	1.129	0.791	.430	[-1.342, 3.129]

R^2 = .028 Adj. R^2 = -.004 F(4, 123) = .875, p = .481

Note. β = unstandardized regression coefficient. SE = standard error. SR = Spaced Repetition. α = 0.05. Academic unit load was excluded due to zero variance (all participants enrolled in > 20 units).

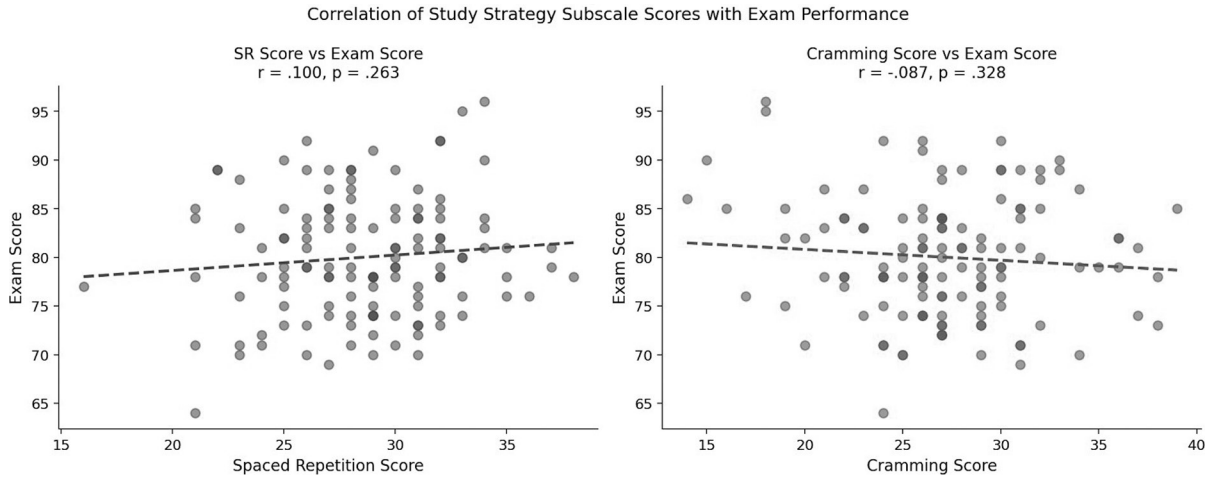

Figure 4. Scatterplots of spaced repetition score and cramming score versus final examination score in the chosen subject.

Outcome Data

This study examined the Final Examination performance in the chosen subject as the primary outcome, measured as a percentage score. Among the 128 respondents included in the analysis, the mean examination score was 80.02% (SD=6.15). Scores ranged from 64% to 96%, indicating a moderate spread of performance across the cohort.

The study also measured students' study approaches using the Study Strategy Score, which served as the basis for classifying respondents according to their dominant study strategy. The sample Study Strategy Scores vary between 32 to 69, having an overall mean of 51.46 (SD=6.57). These scores were then used to classify respondents according to their predominant study strategy.

Among the 79 students categorized as Spaced Repetition users, the mean Final Examination score reached 80.34% (SD=5.72). In comparison, the 49 students classified as Crammers obtained a slightly lower mean score of 79.49% (SD=6.82%). Although Spaced Repetition users showed a marginally higher score, the difference between the two groups was small, 0.85 percentage points overall.

Item-level responses provided additional detail on reported study behaviors. Within the Spaced Repetition subscale, the highest mean score corresponded to spending more time reviewing difficult topics (M=3.38). The lowest mean score reflected use of flashcards or digital tools (M=2.58).

For the Cramming subscale, the highest mean score appeared in the reviewing materials perceived as easier or more likely to appear on the examination (M=3.22). The lowest mean score corresponded to relying solely on existing knowledge without further review (M=2.02).

Across both strategy groups, examination scores showed substantial overlap in range and variability. Overall performance remained comparable between respondents classified as Spaced Repetition users and those classified as Crammers within the study sample.

DISCUSSION

Key Results

The study found no significant statistical difference (0.85%) on exam performance of second year medical students based on their study strategies. Results revealed that students who predominantly use spaced repetition as a study strategy, had a slightly higher mean Finals Examination score ($\bar{x}$ = 80.34, SD = 5.72) compared to the students who cram their studies ($\bar{x}$ = 79.49, SD = 6.82). Furthermore, after adjusting using the aforementioned covariates, using either study strategies were not independently associated with the Final exam score in the chosen subject. With the overall regression yielding non statistically significant results and accounted for only 2.8% of the variance of the exam performance.

Limitations and Bias

The limitations present in this study should be taken into consideration when interpreting the

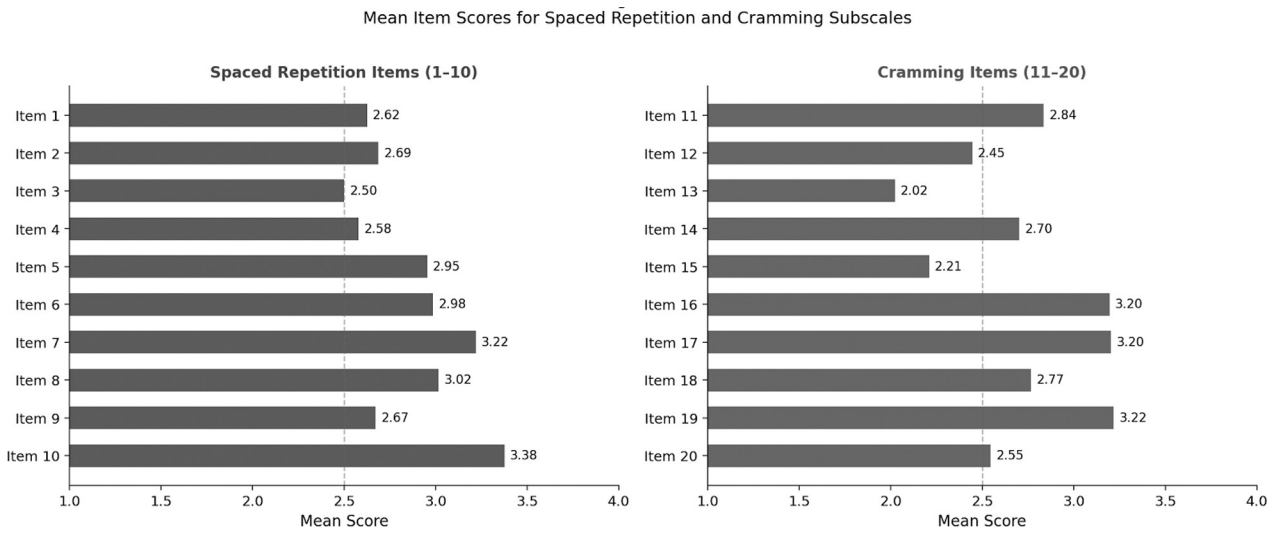

Figure 5. Mean item scores for spaced repetition (Items 1–10) and cramming subscales (Items 11–20)

results. First, it should be taken into account that the study used a self-reported questionnaire in order to determine what is the dominant study strategy for each respondent. This is why recall bias and social desirability bias may be present because the students may have not answered the questionnaire accurately. As it was also mentioned in other similar researches, Ali et al. (2025) and Sunarti et al. (2022), reported that these can have an impact on how accurately the respondents are classified.

Second, since this was a cross-sectional study, causality could not be established. The association between the study strategy and examination performance was examined but other confounding variables such as the students' prior academic performance, motivation, study time, and length of sleep of the respondents were not measured and taken into consideration in this study. The other confounding variables that were mentioned may have influenced the result of the students' exam performance as well (Siagian, 2022).

Third, the sample population used in this study was limited to second-year medical students only from a single institution with relatively similar characteristics. This limited variability also limited the analysis of some variables. Overall, the findings of the study's generalizability were affected.

Fourth, the binary classification used to identify the participant's study strategy could have been too simple or has oversimplified the actual behaviors of the participants. Students may have been probably using a combination of strategies that possibly diluted the true difference between cramming and spaced repetition (Cepeda et al., 2026).

Lastly, although the sample size used in the study was acceptable (N = 128), the exam scores of the students showed a relatively low variability (range of 64-96%, mean of 80.02%, and an SD of around 6.15), which suggests that most students in the study performed at a similar level. This limited variability may have reduced the ability to detect the small differences present between the two groups, as it was reflected by a small effect size ($d \approx -0.14$) and a non-significant result ($p = 0.449$). The low R^2 value (2.8%) also suggests that other unmeasured factors could have a stronger impact on the students' examination performance (Bego et al., 2024).

Interpretation

The lack of a significant difference between the strategy used to study for the exam and the performance of the students on the exam indicates that both cramming and spaced repetition appear to be equally effective at producing similar short-term examination results within this group of medical students. These results are in line with studies by authors like Seo (2012) and Chai and Guest (2017), which have shown that cramming for exams can still lead to favorable results on those exams. Similarly, Cepeda et al. (2006) also noted that cramming for exams may be effective if the exams are to be taken immediately following the cramming sessions, which

may explain the lack of difference in effectiveness between the two types of studying within this study. However, these results should not be taken to mean that both study strategies are equally effective in all situations. Durrani et al. (2026), Mehta et al. (2023), and Capiral et al. (2025) reported that spaced repetition is generally associated with better academic performance. One possible reason for the difference in the findings is that spaced repetition mainly supports long-term retention, while the present study focused only on performance in a single examination. Thus, its advantage may not have been fully demonstrated. Another point to consider is that many participants may likely have used a combination of cramming and spaced repetition, which makes it more difficult to isolate their individual effects.

The regression analysis also showed non-significant results, which suggests that other factors not measured in this study, including motivation, prior knowledge, cognitive ability, stress levels, and quality of study materials, may play a more important role in influencing exam performance. Taken together, these factors may have a stronger impact on outcomes than study strategy alone.

Another possible explanation relates to the type of the assessment employed in this study. Pharmacology requires medical students to retain and apply extensive information, including thousands of drugs each with their own mechanism of action, indications, and case-specific uses. This subject attains a high level of complexity and need for long-term retention making it an appropriate subject for the study. If the pharmacology examination primarily focused on factual recall, both cramming and spaced repetition may have been similarly effective in supporting short-term performance. Prior evidence indicates that massed practice can yield comparable immediate test outcomes, particularly when assessments are administered shortly after learning and focus on recall-based tasks. In contrast, the benefits of spaced repetition are more consistently observed long-term retention and knowledge durability rather than immediate performance (Kang, 2021; Carpenter & Agarwal, 2020).

Generalizability

The results showed limited generalizability due to sample limitations, design constraints, and contextual factors. The sample population was obtained from a single institution and exhibited homogeneous characteristics, particularly year level, total academic unit load, age range, female gender, and short commutes, which reduces applicability to global or national medical student populations. The study design is prone to bias susceptibility, and dichotomous classification of strategies fails to account for mixed types, thereby diminishing the small differences between the two groups. Moreover, the narrow range of scores collected may also suggest variations in results across disciplines beyond the chosen subject and exam types, as reported by past studies. Although the non-significant findings align with related literature showing the context-dependent effects of study strategies, they contradict other research favoring spaced repetition as the superior strategy, highlighting other underlying factors that were not measured. Thus, to enhance generalizability, a multisite, longitudinal study utilizing digital platform logs can be used to validate the absence of differences and establish clear associations between the variables in diverse settings.

CONCLUSION

The study showed no statistically significant association between study strategy and exam performance among second-year medical students at FEU-NRMF. Spaced repetition users demonstrated a slightly higher mean Final Exam score (80.34% ± 5.72) compared to those who relied on cramming (79.49% ± 6.82), with a mean difference of 0.85 percentage points. The distinction was not statistically significant ($p = 0.449$). In the adjusted analysis using multiple linear regression, study strategy was not significantly associated with exam performance ($\beta = 0.894$, 95% CI: −1.34 to 3.13, $p = 0.430$), and the model described only 2.8% of the variance in exam performance.

The findings suggest that while spaced repetition is known for enhancing retention, its effect on short-term examination results may be limited. This result is consistent with research indicating that the effectiveness of study strategies may differ depending on timing, assessment type, and individual learning factors.

Overall, this study highlights that academic performance is influenced by multiple variables, and the choice of study strategy alone may not be sufficient to determine examination outcomes.

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